THE THESIS OF THE PHD DISSERTATION

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by

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CHAPTER 1. INTRODUCTION

1.1 Purpose and motivation of the research

Every research has got a purpose and motivation. The purpose of the topic and the originality of each work is the critical point to distinguish one piece of research from another. In this section I briefly present the purpose and motivation behind my dissertation work.

The purpose behind my research can be summarized as below:

First of all, the aim of this study is to analysis the innovative entrepreneurship ecosystems in Azerbaijan. Specifically, the primary actors and catalysts for innovative entrepreneurship ecosystems such as startups, their interrelations, funding methods, the influence of business incubators and accelerators are of great interest. The central driving force behind my research proposal stems from the emphasis placed Azerbaijani governments on fostering the growth of innovative entrepreneurship.

With an increasing number of startup companies and business incubators entrepreneurship ecosystem of Azerbaijan is experiencing significant growth. Furthermore, innovative entrepreneurship has not received enough attention by researchers and scholars in Azerbaijan until the introduction of long-term strategy of ”Azerbaijan 2030: National Priorities for Socio-Economic Development”. To this end the results of my research is of great importance for both researchers and ecosystem.

What makes my dissertation quite original is that development of favourable innovative entrepreneurship ecosystem is one of the priorities of the Azerbaijan government as stated in the abovementioned long-term strategy. Therefore, my research outcome is of great interest to both policy makers and decision makers.

To enhance the international relevance of my research, I conduct a comparative analysis of the startup ecosystems in Azerbaijan and Hungary. Azerbaijan and Hungary differ greatly in aspects like geography, demographics, business

environment, market, and culture. By comparing the start-up ecosystems of these countries we can evaluate the generalizability of research findings and better understand the dynamics of different startup ecosystems. My research addresses the research gap in comparative startup ecosystem analysis between former Soviet and European countries. Additionally, empirical analysis provides valuable policy insights for various stakeholders.

1.2 Research objective and research questions

The objective of this research is to comprehensively explore and analyze critical factors that influence the success and challenges faced by startups within a specific local ecosystem. The study is guided by five primary research questions:

1. Motivation and Previous Experience of the Startup Team: The first objective is to investigate the role that the motivation and prior experience of startup teams play in the success and growth of their ventures. Understanding how these factors contribute to the overall performance and sustainability of startups will provide insights into the importance of human capital in entrepreneurial success.

2. Advantages and Disadvantages of the Local Startup Ecosystem: The second objective is to identify and evaluate the advantages and disadvantages inherent in the local startup ecosystem. This includes assessing the support structures, resources, and opportunities available to startups, as well as the potential drawbacks and barriers that may exist within the ecosystem.

3.Challenges of the Local Startup Ecosystem: The third objective is to identify and analyze the main challenges that startups encounter within the local ecosystem. These challenges may include funding difficulties, regulatory obstacles, market access, and competition, all of which can impact the viability and growth of new

ventures.

4. Funding Methods and Revenue Models: The fourth objective is to explore the various funding methods available to local startups and to examine the revenue models that are most commonly adopted. This analysis will shed light on how startups finance their operations and generate income, providing a clearer understanding of the financial strategies that are most effective in the local context.

5. Local Market Landscape and Customer Base: The fifth and final objective is to assess the local market landscape and the characteristics of the local customer base. This involves examining market size, customer segmentation, and the level of customer engagement, which are crucial for determining the potential success of startups in the region.

Overall, this research aims to provide a detailed understanding of the factors that contribute to the success and challenges of startups in the local ecosystem, offering valuable insights for entrepreneurs, investors, and policymakers.
Therefore, the following research questions and hypothesis were the main drivers of the analysis throughout the research.
RQ1: How important are the motivation and previous experience of startup teams in startup success?
Hypothesis 1: There is no relationship between startup success and motivation and previous experience of startup teams

RQ2: How is the local market landscape and local customer base?
Hypothesis 2: The local market is well-defined and there is a loyal customer base.

RQ3: What funding methods are available, and what revenue models are mostly adopted by local startups?

Hypothesis 3a: Local startups do not face funding issues.

Hypothesis 3b: Local startups lack differentiated revenue models

RQ4: What are the advantages and disadvantages of the local startup ecosystem?

Hypothesis 4a: The local startup ecosystem does not offer any advantage.

Hypothesis 4b: The local startup ecosystem creates unfair competition.

RQ5: What are the main challenges of the local startup ecosystem?

Hypothesis 5: There are no big challenges in the local startup ecosystem.

The below table 1 illustrates which survey questions are associated with which research questions.

Table 1. Relations of survey questions with research questions

Researh Questions (RQ)	Related Hypothesis	Related Survey Questions
RQ1: How important are the motivation and previous experience of startup teams in startup success?	Hypothesis 1: There is no relationship between startup success and motivation and previous experience of startup teams	Q1. Have you participated in an entrepreneurship survey before? Q2. Your position/role at the startup Q3. How many members does your startup have? Q5. What is your motivation and aspiration for being in a startup? Q6. How old are you? Q7. What was the previous work experience before joining a startup?
RQ2: How is the local	Hypothesis 2: The local	Q4. How many years has your startup been on the

market landscape and local customer base?	market is well-defined and there is a loyal customer base.	market with a product/service offering? Q8. What kind of customers are you targeting? Q19. Connections with foreign startup ecosystems Q20. What sector do you operate in?
RQ3: What funding methods are available, and what revenue models are mostly adopted by local startups?	Hypothesis 3a: Local startups do not face funding issues. Hypothesis 3b: Local startups lack differentiated revenue models	Q9. What term best describes your revenue model? Q10. Which of the followings were your initial funding methods? Q13. What are the biggest expenses you are facing currently?
RQ4: What are the advantages and disadvantages of the local startup ecosystem?	Hypothesis 4a: The local startup ecosystem does not offer any advantage. Hypothesis 4b: The local startup ecosystem creates competition.	Q12. In what form would you like the state to support startups? Q15. What are the advantages of Baku Startup Ecosystem? Q16. What are the disadvantages of Baku Startup Ecosystem? Q17. What resources/opportunities lack in Baku Startup Ecosystem?
RQ5: What are the main challenges of the local startup ecosystem?	Hypothesis 5: There are no big challenges in the local startup ecosystem	Q11. What obstacles do you think are making it difficult for your startup to grow? Q14. How hard is to

		overcome the following challenges? Q18. Evaluation of the impact of Covid-19 on the business processes

Source: Author's own construction

The survey was designed to be conducted in both Azerbaijan and Hungary. However, despite all efforts to conduct a comparative survey between Azerbaijan and Hungary, the study was hampered by significant difficulties in reaching Hungarian startups. Although I co-authored a paper with Judit Szakos, *(JAFAROV, N., & SZAKOS, J. (2022). Review of entrepreneurial ecosystem models. ASERC Journal of Socio-Economic Studies, 5(1), 3-16.)* a PhD graduate from Ludovika University of Public Service, who successfully defended her dissertation on a related topic, we encountered considerable difficulties in securing interviews with Hungarian startups. In spite of the fact that she is hungarian and has good network in local startup ecosystem she had tremendous difficulties to interview start-ups. These challenges persisted, ultimately affecting my ability to gather the necessary data for the comparative analysis.

1.3 Structure of the Thesis

Chapter 1 outlines the aim of the study by providing the purpose and motivation of the research. The research objectives and methodology of the study were introduced in this section along with the originality of the study.

The chapters proceed as follows. Chapter 2 discusses materials and methods theoretical framework of entrepreneurship research, chapter 3 is about the results and discussion, chapter 4 presents conclusions and recommendations about the role of startups in the innovative entrepreneurship ecosystem of Azerbaijan and Hungary answer these questions, chapter 5 presents new scientific results and, chapter 6 presents the list of publications.

CHAPTER 2. MATERIALS AND METHODS

2.1 Research design

This section describes the research methodologies employed in this study and the research questions that were tested as a part of the empirical research. The sample selection and data collection as well as the rationale of using both quantitative and qualitative research is highlighted.

There are many definitions of research itself. I preferred, WALLIMAN AND WALLIMAN (2011) definition which says the research simply is a process or an activity giving you an understanding of things you did not know before. When it comes to the methodology there is not only one accepted definition among researchers.

BROWN (2006) describes the methodology as a framework for a research and O'LEARY (2004) as specific assumptions to carry out a research.

Simply put the methodology employed by a researcher is a best possible toolset to realize one's research objectives and it should be described in a way that can be utilized by other researchers as well (ALLAN AND RANDY, 2005).

2.2 Mixed research methods

In a research project that utilizes both qualitative and quantitative data, researchers employ diverse empirical materials to comprehensively investigate the studied issue. Qualitative research involves gathering and analyzing various forms of data such as case studies, personal experiences, interviews, observations, historical documents, interactions, and visual texts. These methods are used to describe and understand the nuances and complexities of the research topic. On the other hand, quantitative research involves the collection and analysis of numerical data to identify patterns, relationships, and trends through statistical analysis. By combining both qualitative

and quantitative approaches, researchers can achieve a more comprehensive understanding of the research question, incorporating both the depth of qualitative insights and the breadth of quantitative findings. This mixed-methods approach allows for a more holistic examination of the phenomenon under investigation, enriching the research findings and enhancing the overall rigor and validity of the study (DENZIN AND LINCOLN, 1994). WORTMAN AND ROBERTS (1982) argues that quantitative research primarily addresses "why" questions, while qualitative research concentrates more on "how" rather than "why." Quantitative methods are suited for examining averages, while qualitative research tends to focus on outliers or marginals. Quantitative research may seek to grasp the traits of the "average" entrepreneur using a substantial sample size and statistical distribution, while qualitative research does not mandate a large sample size (DANA AND DANA, 2005). The approach of employing case studies in research entails conducting a comprehensive examination, delving deeply into a restricted number of subjects, individuals, or settings. Ideally, data collection in such research should encompass both observations and interviews (DANA AND DANA, 2005).

For more holistic examination and for enriching the research findings and enhancing the overall validity in my research I have used both quantitative and qualitative methods which is discussed in detail in the following sections.

2.3 Qualitative method

Qualitative method is mainly used in the literature review part of the research in order to find out the different approaches in entrepreneurial ecosystem. To this end, highly reputable web of science, science direct publications and reports of top higher education institutions has been reviewed and analyzed.

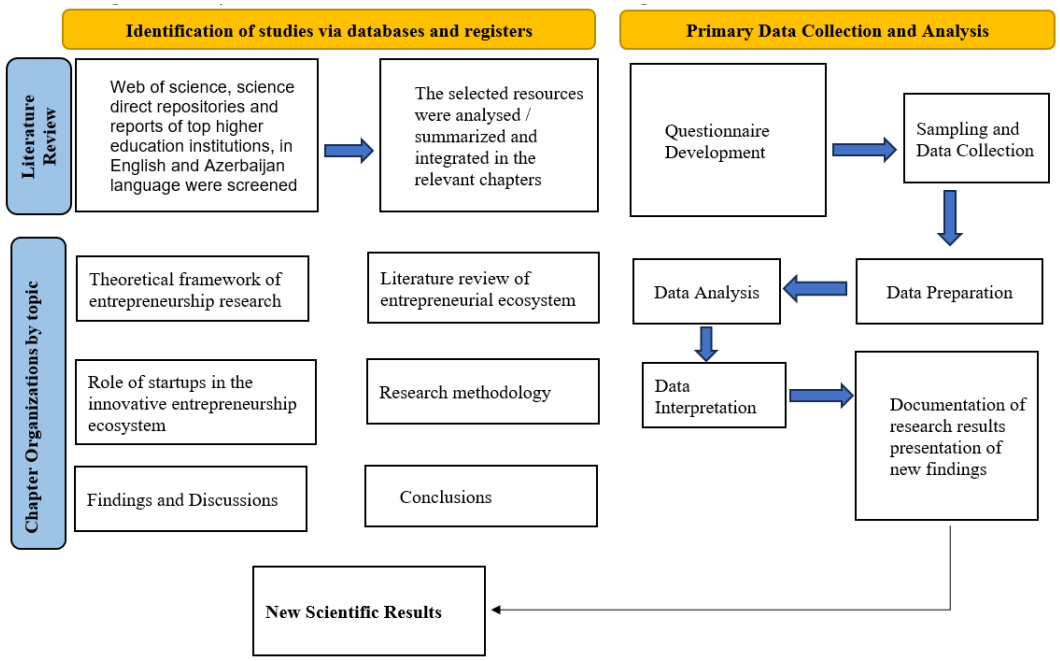

Figure 1. Research flow chart

Source: Author's own construction

Additionally, OECD and European Commission Oslo manual (2005) recommends using the qualitative data for innovation activities. Therefore, interviews with startup firms and incubation and acceleration center representatives and ecosystem players were planned but unfortunately, because of Covid-19 pandemic conditions the interview meetings had to be cancelled. I could manage to have carry our only one interview. The result is not discussed as it was only one interview with startup founder. However, this interview helped me to reach out to other startup representatives in Azerbaijan.

Moreover, I used survey questionnaire conducted annually by Startup Hungary among the Hungarian startups as a secondary data to compare with my survey results among Azerbaijan startup ecosystem players. One of advantages of comparative approach is to add originality and value to the research also add a reflexive or

intelligent benchmarking to the comparison. Last but not least, it is also important how startups are developed in their own context which will enable to avoid a mechanic copy during the comparison of results.

2.4 Quantitative Method-Survey

The second research method involved administering a survey questionnaire to collect quantitative data. Surveys offer the advantage of potentially yielding a wealth of both qualitative and quantitative data on the research topic. Originally, field research including meetings with startup firms and incubation/acceleration centers was planned to gather primary data through case studies and surveys. However, as mentioned above due to the COVID-19 pandemic, face-to-face interactions were canceled, and only online surveys were conducted instead.

2.5 Sampling

There are two main types of sampling strategies in population research: probability sampling and non-probability sampling. In probability sampling every member of the target population has an equal chance of being selected. Common methods include simple random sampling, systematic sampling, stratified sampling, cluster randomization (STRATTON, 2021)

In non-probability sampling not, every member has an equal chance of being selected. Common methods include:

- Purposeful Sampling: where researchers directly select participants.
- Snowball Recruiting: Participants refer others to the researcher.
- Convenience Sampling: Participants self-select after the researcher announces the study.
- Quota Sampling: Combines convenience sampling with systematic population segmentation, often used in street interviews (STRATTON,2021).

Within the cross-sectional data analysis framework, the research employs author's own survey data of 43 respondents (83% males, 17% females). Online survey was conducted between 01.06.2022-31.08.2022 via social media in the closed groups. (Facebook and LinkedIn). The survey was initially designed to be conducted in both Azerbaijan and Hungary. However, despite extensive efforts to carry out a comparative survey between the two countries, I encountered significant obstacles. A language barrier and the constraints imposed by the COVID-19 pandemic, which prevented face-to-face surveys or interviews, ultimately hindered the execution of the research.

The sample size seems small but as explained in the ANNEX 3, at the time of survey only 49 firms has been granted with startup certificate in Azerbaijan by the Small and Medium Business Development Agency of the Republic of Azerbaijan (SMBDA). This is state-owned agency who is the only authority that grants startup firms with startup certificates in Azerbaijan.

During the survey purposeful sampling, snowball recruiting, and convenience sampling method was employed. However, most of the respondents came from the convenience sampling. This method is useful for investigating new fields or areas with limited prior research, allowing researchers to discover patterns and areas of interest without requiring a representative sample. When research targets a specific group that is easily accessible, convenience sampling can provide direct access to relevant data. This is especially useful for studies focused on niche, specialized, or hard-to-reach populations that are difficult to sample randomly (GOLZAR et al.,2022).

2.6 Ethical Considerations for Research

It is a researcher's choice when it comes deciding methods to be deployed. Moreover, ethical considerations also depend on the researchers' own values. On the other hand,

in academic settings when a researcher carries out any research participants need to be assured about the privacy of the research. To this end before the online survey and before the online interview(even if there was only one) participants have been informed about their rights and the way the data will be processed after the research, data access options and privacy matters. If participants had not agreed to take part in the research, I would have been unable to proceed any further. Thus, all participants were notified that the data collected would be solely used for this research, and the anonymity and confidentiality of both participants and interviewers would be maintained.

This transparency assisted participants in understanding the researcher's objectives, thereby enhancing the researcher's credibility and facilitating more convenient information sharing.

By addressing ethical concerns, we reassured participants that only the researcher would have access to the information provided during the online interviews and surveys.

CHAPTER 3. RESULTS AND DISCUSSION

This chapter holds significant importance within the thesis since it delves into the discussion of the research findings. First, we will start with the findings of the startup ecosystem of Azerbaijan.

To run a qualitative analyses online survey was conducted among the startups. The startup profile is quite mixed, and majority of the participants are either based in or operating in Baku, the capital of Azerbaijan. The next section describes the results and analyses of the online survey.

3.1 Startup Ecosystem of Azerbaijan

As discussed in chapter 4 the startup ecosystem a quite young and developing in spite of the challenges. To uncover and analyse these challengess the survey was conducted. The representative sample is mainly comprised of the startups mainly based in Baku, the capital city.

Survey questionnaire is prepared based on the BLANK and DORF (2012), STARTUP HUNGARY (2022) report.

The survey questionnaire visualization and questions are provided in the Annex. Here the overall analysis is given.

Almost half of the respondents have participated in an entrepreneurship survey before and for the rest of the respondents it was their first entrepreneurship survey.

It is worth to note that about 80% of the participants reported themselves as a co-founder of the startup they are currently part of. This is quite important in a sense that they are people in charge of the startup and their responses are quite critical and valuable for the research and for the policymakers.

Half of the startups attending the survey are small teams comprised of 2-3 members. About 33% of the teams have 4-10 members and about 14 % are considered big teams made up of 11-20 members. Among respondents only one team was recorded with only 1 member who is the only founder among others.

It is important to see how many years the startup has been offering their product or services.
Half of the startups are still under a year and 1/3 of the teams has been around 1-3 years.
The question of 'What is your motivation and aspiration for being in a startup' is based on a startup typology proposed by BLANK & DORF (2012)
Among the above 6 categories 3 were most preferred by the respondents. 36 startups (around 83%) opted for realizing innovative ideas, 26 startups (60%) chosen to make a difference and meet people's needs and 20 startups (46%) have preferred to be in startups in order to live their passion.

Hungarian startups rank their motivation as follows: 49% solving an important problem, 22% want work with great people at a great company and 13 % prefer to influence/help millions of people

All the respondents answered this question. The age range of CEO or Co-Founder of the startups. It is promising to see that about half of the CEO/ Co-Founders are younger than 25 years and about 33 % are within the 26-40 age range.

It is worth to note that almost half of the respondents were in a managerial team of a startup company before joining the current startup.
Around 68% and 56% of respondents aim to sell to individuals and SME firms with only 39% of total respondents targeting large corporations.
When it comes to Hungarian startups, they tend to work with SME firms (about 65%) and with large corporations (about 60%)
Revenue model of startups vary with delivering product/service to customers being the most preferred and subscription-based and content & advertising sale being second and third respectively.
It is interesting that almost half of the startups have not fundraised, yet which means

they are either new in the business or have been running the startup by the help of the savings of the startup team.

As it was obvious from previous questions startups are facing big issues when it comes to fundraising. That is why most of the respondents ticked the financial barriers that holding back their startup and impede their growth.

Although less bureaucracy is also among the most wanted but again financial support expectation (seed capital support) and tax discounts were two most expected state support by startups.

28 respondents chose MVP development cost as a biggest cost which again indicates that financing startups are not good enough in Baku startup ecosystem.

When it comes to overcoming challenges attracting investment is number one issue followed by attracting experts and following legal changes. It is good to see that startup registration is getting easier and probably will not require too much effort in the near future.

One of most important question of the survey is of course to find out the advantages of Baku startup ecosystem. High number of teenagers and youngsters was the most preferred answer by respondents together with interest of teenagers and youngsters in new technology and number of incubation/ acceleration centers. It is quite promising to see youngsters are focusing more and more on technology, incubation and acceleration centers are increasing and therefore the startup ecosystem is getting bigger. As a result, Baku is strengthening it is place as a startup hub in Azerbaijan and in the Caucasus region.

Another most important question is the disadvantages of Baku startup ecosystem. Lack of investment funds and financing is the biggest disadvantage followed by other biggest disadvantages such as small size of local market, lack of trust to local market and justice system and lack of advanced legislation for ecosystem development.

Resources are very important in any startup ecosystem. In Baku startup ecosystem the most needed resources are investor support, financing and professional staff.

As Covid-19 pandemic was the most influential global pandemic of all times it is worth to know the impact on the startups in Baku ecosystem. The good thing is work-from-home was not difficult for majority of startups. Altogether for about 40% of startups Covid-19 had positive impact and for about 30% of startups it had negative impact.

Needless to say, international connections are always good to have for any business and startups are not exceptions. The respondents are mainly cooperating with Turkish, Estonian and US startups. It is not a coincidence that the main partnerships are with European and US startups which is due to their leading role in global startup market.

The variety of startups by sector is also an advantage and shows the talent pool has a diverse background among startups. Edutech startups are leaders in the ecosystem followed by HR tech together with AI and Software startups.

When it comes to the demographics about the survey respondents it is not a surprise to see that 83% percent of the respondents are male and 17% are female in the startup ecosystem. But the trend shows that the number of female founders or co-founders are going up in recent years.

When we look at the age and the age range statistics, it is a little bit surprising and at the same time promising to see that 46% of startups are below 26 and 38 % is under 38. This once again shows that the youngsters are a driving force of startup ecosystem. Also, we have the youngest female respondent who is only 14 and very early on the startup ecosystem.

It's not unexpected to observe that 72 percent of the participants are unmarried, given that 84 percent fall within the 18 to 35 age range. Concerning the respondents' educational attainment, half of them have completed a bachelor's degree and the rest is the mix of people holding master’s degree diploma, secondary school diploma and PhD degree with 21 percent, 19 percent and 10 percent respectively.

The surprising statistics were the high percentage of the respondents with secondary school education. Usually startup ecosystem attracts fresh graduates or experienced

people rather than people who have high school diploma.

I have grouped different qualifications under three broad categories. To my surprise, social sciences are leading the ecosystem followed by technical sciences and humanities.

Having entrepreneur among the relatives could be a motivation because 85 percent of the respondents have seen their relatives as an entrepreneur and only 15 percent declared one parent as an entrepreneur. This statistic is also crucial indicator, and it could be good evidence how entrepreneurship could be a contagious in a good way.

Work experience is also important factor when evaluating the strength and the potential of the startup teams. As we have seen in the previous question the startup teams are very young and that is why about 45 % of them either have never been employed or started their professional career in a startup firm. About 20 percent of the respondents reported 4-6 years of experience in startup companies. Only around 10 percent reported to have 7-10 years of experience in startup industry.

3.2 Startup Ecosystem of Hungary

Budapest, the capital city of Hungary, serves as the country's primary startup hub, characterized by its multicultural environment and boasting a vibrant ecosystem with over 900 startups, more than 50 angel investors, and numerous startup support organizations. In 2021, Budapest was recognized by Startups.co.uk as the top city for launching a business post-Brexit.

The Hungarian government plays an active role in supporting startups, with initiatives such as Hiventures, one of the largest government-funded venture capital firms in Central and Eastern Europe, offering substantial funding opportunities, amounting to EUR 258 million, for innovative and scalable micro, small, and medium-sized enterprises up to five years old.

Additionally, government entities like the Ministry of Innovation & Technology are tasked with developing national research, development, and innovation (RDI) strategies, as well as policies related to research, innovation, and higher education. The National Research, Development, and Innovation Office oversee the implementation of RDI policies and ensure adequate investment in research and innovation to enhance Hungary's innovation capacity and support leading research initiatives.

The NRDI Office also spearheads the implementation of the Smart Specialisation Strategy (S3) policy tool, aimed at advancing regional economies, accelerating industrial transformation, and promoting digitalization. Hungary's goal, as reflected in the European Innovation Scoreboard, is to become one of the top innovators in the EU by 2030. This involves enhancing the value creation capacity of the innovation ecosystem and increasing the productivity of the business sector.

To have a deep dive into the challenges holding back the startup ecosystem growth the survey data of Startup Hungary and Startup Genome were the main data sources. According to startup genome and field research, there are 3 main reasons worth to consider moving the startup to Budapest.

1. Lower living cost

Budapest is an affordable place to launch a startup and to run it compared to Western Europe and the United States ecosystems. Suffice it to say that the Cost of Living Index in Budapest is two times cheaper than that of New York. Simply put, it is because the cost of housing, utilities, and education transportation, energy, clothing, healthcare, and entertainment are all quite low compared to many other business hubs in the world.

2. Skilled Workforce

Hungary's education system prioritizes practical skills, with a focus on STEM subjects, and an emphasis on English proficiency, as evidenced by 90% of students being proficient in the language. Furthermore, approximately two-thirds of the startup workforce comprises graduates with STEM backgrounds. Therefore many

pharmaceuticals, engineering, R&D, and IT firms turn to Budapest labour market in search of talent.

3.Startup-Friendly Policies

Hungarian corporate income tax rate of 9% is among the lowest in Europe, and it takes only 3 days to register and receive a tax number.

Also, startup genome reports significant developments are taking place across various industries, particularly in the realms of AI, big data, analytics, fintech, and life sciences.

1.AI, Big Data, and Analytics

Bosch is investing in a new 3,500 square meter R&D center near Zalazone, Hungary's advanced mobility solutions test site. The facility will house 200 engineers dedicated to the fields of autonomous driving, electric mobility, and artificial intelligence. Notably, a groundbreaking artificial intelligence supercomputer module was inaugurated in January 2022 through a collaboration between Mininnovation and Technology and OTP Bank.

2.Fintech

As of January 2023, Budapest is a thriving hub for fintech innovation, hosting 106 startups. The landscape is diverse, with 26% of these companies focusing on financial software development and systems integration, 19% on payment services, and 17% on data analytics and business intelligence services. This indicates a dynamic fintech ecosystem in the city.

3. Life Sciences

Hungary's life sciences sector is robust, boasting around 300 startups and employing a substantial workforce of 80,000 people. Hungary has emerged as a significant

destination for pharmaceutical and biotech manufacturing, hosting production facilities for eight out of the top 10 global companies in the industry.

The education system also contributes significantly, with 14 Hungarian universities graduating over 5,000 students annually in life sciences-related fields. The sector's growth is further exemplified by the success of Turbine's cell behavior modeling platform, which secured €20 million in a Series A funding round in November 2022.

Another data source for this research is a STARTUP HUNGARY which is comprised of local startup experts. The consulting firm of Startup Hungary is one of important firms conducting surveys among startups in Hungary annually. The survey questionnaire visualization and questions are provided in the Annex. Here the overall analysis is given.

In the Hungarian startup landscape, the year 2022 saw significant success in terms of funding, with local startups raising over €180 million. This represented a remarkable 60% increase compared to the previous year, contributing to a 30% growth in the total investment volume in 2021. However, this growth was driven not by a higher number of startups raising funds but rather by a few standout funding rounds. Notably, SEON's record-breaking $94 million Series B round accounted for almost half of the total amount raised in 2022.

Despite the impressive funding figures, there are concerning trends within the ecosystem. Most local startups are not anticipated to raise funds in the next 1-2 years, and government-backed funding has significantly slowed down, evident in a 37% decrease in the number of deals over the last four years. The survey participation rate dropped by 25% compared to 2022, signaling a decrease in the number of active startups. Additionally, the identification of 100 dead or zombie startups among the respondents from the previous two years indicates a challenging environment, with startups either officially closing or showing signs of imminent closure.

The decline in the number of startups founded in the last three years, with only 12.2% founded in 2022, further underscores the challenges faced by new ventures.

While these challenges are evident, there is still hope and promise in the Hungarian startup scene. New rising stars show potential for growth and success in the coming years. Although there's an overall decrease in the number of startups and government funding, the existence of innovative and promising startups suggests opportunities for growth and investment.

Despite the challenges faced in 2022, founders express unprecedented optimism about the future. The survey reveals that 42% of surveyed founders believe they are building the next unicorn, and 86% see themselves as major international players. This optimism is, however, tempered by the fact that twice as many founders this year express concerns about their startup's likelihood of failure.

While increased optimism and ambition are crucial for the growth of the startup ecosystem, there are indications of a misalignment between founders' aspirations and the current reality. The number of startups achieving substantial international success or attracting international venture capital does not align with the ambitious goals set by founders. Despite claiming to have a global outlook, the majority of startups generate less than half of their revenue from international markets. Operational activities are also predominantly focused on local or regional markets, with nearly half of the founders prioritizing Hungary and the wider region in the coming year.

In the local tech ecosystem, similar to global tech giants, some firms experienced significant downsizing in response to the changing macro environment, often reducing their workforce by double-digit percentages. However, according to a survey, 54% of respondents reported an increase in company size, while only 16% noted a decrease. The study also tracked 20 selected startups with over 30 employees, revealing that, collectively, they employ over 2300 people, a 16% increase from the previous year. Despite a slowdown in growth during the latter part of the year, only 4 out of the 20 scale-ups experienced a net decrease in headcount in 2022.

In conclusion, while founders in the Hungarian startup ecosystem remain highly

optimistic, there is a notable disconnect between their aspirations of international success and the actual realization of these aspirations. The challenge lies in aligning these ambitions with the practicalities of international expansion and investment, emphasizing the need for strategic adjustments within the ecosystem.

CHAPTER 4. CONCLUSIONS AND RECOMMENDATIONS

In this concluding chapter, we examine the current state of the startup ecosystems in Azerbaijan and Hungary, offer suggestions for enhancing their development, address research limitations, and outline potential areas for future research.

4.1 Recommendations for Azerbaijan startup ecosystem

Based on the comprehensive summary of the startup survey, here are some recommendations for the development and enhancement of the startup ecosystem in the region:

Financial Barriers

Given that a significant number of startups have not fundraised yet and financial barriers are hindering their growth, there is a need for targeted support mechanisms. Policymakers should consider initiatives such as seed capital support and tax discounts to alleviate financial challenges.

Investment Attraction

Recognizing that attracting investment is a top challenge, efforts should be directed towards creating a more supportive investment environment. This could involve establishing investment funds, facilitating investor networking events, and providing educational programs for startups on effective fundraising strategies.

Support for Small Teams

As half of the startups are small teams with 2-3 members, tailor-made support programs for micro-entrepreneurs can be beneficial. These programs could include mentorship, access to resources, and training specifically designed for small teams.

Encouraging Diversity in Education

While social sciences are leading in educational qualifications, there should be efforts to encourage diversity in educational backgrounds. Promoting programs in technical sciences and humanities can contribute to a more diverse skill set within the startup ecosystem.

Fostering International Collaboration

Since international connections are valued, fostering relationships with startups from diverse regions is crucial. Facilitating networking events, exchange programs, and collaboration platforms can encourage more cross-border partnerships.

Addressing Disadvantages

The identified disadvantages, such as the lack of investment funds and financing, small local market size, and challenges with the justice system, should be systematically addressed. Policymakers should work towards creating a more favorable business environment, including legal reforms and support for market expansion.

Youth Engagement

Given that youngsters are a driving force in the startup ecosystem, efforts should be made to continue engaging and supporting young entrepreneurs. Initiatives like mentorship programs, startup competitions, and educational outreach can encourage more youth participation.

Promoting Female Entrepreneurship

While there's a positive trend in the increase of female founders, more efforts can be made to encourage and support female entrepreneurs. Initiatives such as networking events, mentorship programs, and awareness campaigns can contribute to this goal.

Ecosystem Infrastructure Development

Building on the identified advantages of the local startup ecosystem, such as the interest of teenagers and the number of incubation/acceleration centers, continued infrastructure development is crucial. Expanding these centers, creating innovation hubs, and facilitating knowledge-sharing platforms can further strengthen the ecosystem.

4.2 Recommendations for Hungarian startup ecosystem

The overall Budapest startup ecosystem has got higher potential. Following recommendations are developed for Hungarian Startup Ecosystem based on the

analysed data.

A noteworthy observation made by seasoned investors and successful founders in Hungary is that local entrepreneurs tend to be risk-averse and lack the ambition to internationalize their businesses. An Oxford University study from 2018 ranked Hungary as the fourth lowest country out of 77 in terms of risk-taking behavior. While Hungary may have a skilled group of technically proficient entrepreneurs, their motivation and ability to build successful businesses falls short compared to their counterparts in neighboring Central and Eastern European countries.

One effective way to support the domestic startup ecosystem and boost national innovation capacity is by providing initial research grants in strategically important sectors. This targeted approach to research grants yields two primary benefits. Firstly, it directly supports startups in key sectors, allowing them to kickstart their innovation efforts and establish strong foundations. Secondly, it contributes to the overall innovation capacity of the nation, enabling the development of cutting-edge technologies and solutions.

To truly foster innovation in Hungary, it is crucial to create a bridge between the startup community and academia. By facilitating collaboration and knowledge exchange, startups can tap into the invaluable expertise and resources available within academic institutions. Through this collaboration, startups can access relevant research and development, leverage the latest advancements, and ultimately enhance their innovation capabilities.

Hungary's innovation potential can be unleashed by connecting startups with academic institutions. By leveraging their complementary strengths, startups can benefit from academic research and expertise, while academia gains access to real-world applications and entrepreneurial spirit. Additionally, providing targeted research grants in strategic sectors can drive innovation by supporting startups and enhancing the nation's overall innovative capacity. To further stimulate innovation, it is essential for entrepreneurs to be more willing to take risks and embrace internationalization, as demonstrated by their Central and Eastern European

counterparts.

Hungary is positioning itself as a significant player in cutting-edge technologies and industries, with notable developments in AI, big data, analytics, fintech, and life sciences. These advancements underscore the country's commitment to innovation and its growing influence in key sectors of the global economy.

4.3 Common Recommendations

To begin with both in Azerbaijan and in Hungary the leading hubs of the countries' startup ecosystem are operating in the capital i.e in Baku and in Budapest respectively.

THE EUROPEAN INNOVATION SCORECARD (2022) reveals that countries that equally support academic and entrepreneurial innovation tend to perform better in terms of innovation. The key to improving both Azerbaijan's and Hungary's startup ecosystem lies in bridging the gap between the startup scene and academia. Therefore, in the coming years, the success of both Azerbaijan's and Hungary's startup ecosystem will depend on establishing fruitful connections between startups and researchers. The survey highlighted varied impacts of COVID-19 on startups. Continuous monitoring of the situation and implementing responsive support measures can assist startups in adapting to changing circumstances.

These recommendations aim to provide a strategic roadmap for policymakers, industry stakeholders, and support organizations to nurture and advance the startup ecosystem. Regular assessments and feedback mechanisms should be implemented to ensure the effectiveness of these recommendations over time.

4.4 Limitations and Future Research Agenda

As with all research this thesis has some limitations. It would also be useful to compare the Visegrad countries that was established by four Central European countries comprised of Hungary, Poland, Czech Republic and Slovakia on the May

1, 2004, the date these countries got accepted to the European Union.

Furthermore, adding case studies and interviews with startup ecosystem players would add a great value to the startup ecosystem research for both countries.

Azerbaijan is participating in eastern partnership programs organized and funded by EU. So, how these programs can be directed to develop Baku startup ecosystem could be of great value to policymakers and researchers.

CHAPTER 5. NEW SCIENTIFIC RESULTS

My research has uncovered some novel scientific results that can lay the groundwork for future research endeavors.

For Azerbaijan startup ecosystem:

1. My research findings revealed that the financial challenges need to be addressed to strengthen the local startup ecosystem under the following directions:

1.1 Financial Barriers: Offer seed capital support and tax incentives to ease financial burdens on startups.

1.2 Investment Attraction: Foster a supportive investment climate through funds and networking events.

1.3 Support for Small Teams: Provide tailored programs for micro-entrepreneurs.

2. Based on my scientific research, I found that, the following measures are pivotal to enable sustainable expansion of local startup ecosystem:

2.1 Diversity in Education: Promote diverse educational backgrounds to enhance innovation.

2.2 International Collaboration: Facilitate cross-border partnerships for market access and resources.

2.3 Addressing Disadvantages: Systematically tackle obstacles like funding shortages and legal challenges.

2.4 Youth Engagement: Support young entrepreneurs through mentorship and educational initiatives.

2.5 Promoting Female Entrepreneurship: Encourage and support female founders through networking and awareness.

2.6 Ecosystem Infrastructure: Expand incubation centers and innovation hubs for startup support.

The findings given under 1.1, 1.2, and 1.3 are related to the government bodies in

charge of the economic development and namely the agencies whose mission is to support and initiate the innovation and entrepreneurship in Azerbaijan.

The findings given under 2.1, 2.2, 2.4 and 2.6 are of great interest to the Higher Education Institutions and findings 2.3 and 2.5 are of great interest for Innovation Hubs, Investors and Entrepreneurs.

Achieving these goals necessitates cooperation among policymakers, industry players, educational institutions, and the startup community to foster a thriving and inclusive startup environment.

For Hungarian startup ecosystem:

According to my research, I confirmed that the following challenges need to be addressed to increase the productivity and to uncover the potential of Hungarian startup ecosystem:

1.Providing Initial Research Grants: Offering initial research grants in strategic sectors can serve as a catalyst for innovation by providing early-stage funding for promising projects. These grants can help startups and researchers explore new ideas, develop prototypes, and conduct feasibility studies, laying the groundwork for future innovation and commercialization.

2. Bridging the Gap between Startups and Academia: Strengthening collaboration between startups and academic institutions can enhance innovation capabilities by leveraging the expertise and resources available in universities and research centers. This collaboration can take various forms, including joint research projects, technology transfer agreements, and industry-academia partnerships, facilitating the exchange of knowledge, skills, and technology between academia and the startup ecosystem.

3.Fostering a Greater Risk-Taking Attitude: Encouraging a greater risk-taking attitude among entrepreneurs is essential for fostering innovation and

competitiveness in the startup ecosystem. This may involve promoting a culture of experimentation and learning from failure, providing support mechanisms such as insurance schemes or grants for high-risk ventures, and highlighting success stories of risk-taking entrepreneurs to inspire others.

4. Supporting Startups in Cutting-Edge Technologies: Providing targeted support for startups specializing in cutting-edge technologies such as artificial intelligence (AI), big data, fintech, and life sciences can help drive technological innovation and economic growth. This support may include funding programs, specialized incubation and acceleration programs, access to industry experts and mentors, and regulatory support to navigate the complexities of emerging technologies and markets. Additionally, fostering collaboration between startups in these sectors and established companies, research institutions, and government agencies can further accelerate innovation and commercialization efforts.

The comparative startup ecosystem analysis between Azerbaijan and Hungary revealed several important scientific results. To date, the startup ecosystem of Azerbaijan has not been studied in comparison with the startup ecosystem of a European country. This importat feature makes my comparison more attractive and valuable to researchers who are comparing the post-Soviet country with the European countries.

These scientific contributions can be summarized as follows:

1. Based on the survey result we can clearly see that Azerbaijan's startup ecosystem is mainly concentrated in Baku, the capital city. On the other hand, although Budapest is the capital and important startup center in the Hungarian startup ecosystem, new startup centers are emerging in Debrecen, Szeged and Pecs mainly due to the strong academic environment, growing young and educated population and increased local and foreign investment in these cities

2. Another important finding is that the Azerbaijan's startup ecosystem is quite young and therefore the network between ecosystem players is weak. In other words, the key role in Azerbaijan's Starup ecosystem is played by state institutions and a small number of local investors or banks that provide investment financing and some new innovation centers. When we compare it with the Hungarian startup ecosystem, we see that this ecosystem has a more complex structure. Ecosystem players are quite experienced with established network among them, not only state institutions but also many private firms, consulting companies and non-bank financing firms are taking active role in the development of startup ecosystem.
3. A region that historically developed a strong industrial or technological base may find its startup ecosystem naturally gravitating towards sectors related to that base, even if emerging opportunities in other sectors exist. Similarly, the entrepreneurial culture within a region is often a product of historical developments. These findings is in line with the phenomenon called path dependency. Path dependency refers to the idea that the decisions and outcomes in a particular system are heavily influenced by the historical choices, events, and circumstances that have shaped its development. (PRESTON, 2013) In the context of a startup ecosystem, path dependency helps us to understand why Baku and Budapest is an innovaiton hub. However, the lack of risk-taking culture is an obstacle for the development of startup ecosystem in both countries.

4. Azerbaijan is in the nascent stages of building its startup ecosystem, with substantial government efforts in place, but it faces significant limitations in terms of capital access and the overall maturity of the ecosystem. Conversely, Hungary's startup growth is largely driven by its advantageous location, highly skilled workforce, and robust government support. However, it

encounters difficulties in securing international capital and expanding beyond its relatively small domestic market.

CHAPTER 6. LIST OF PUBLICATIONS

Scientific journal articles

1. Abdurazzakov, O., **Jafarov, N.**, Balayev, R. (2019) Applying International Experience on Technology Transfer in Azerbaijan Journal of Baku Engineering University pp. 143-152.
2. Abdurazzakov, O., Illés, C., **Jafarov N.**, Aliyev Kh. (2020). THE IMPACT OF TECHNOLOGY TRANSFER ON INNOVATION. Polish Journal of Management Studies, 21(2), 9-23.

   DOI: 10.17512/pjms.2020.21.2.01 **SCOPUS INDEXED**
3. **Jafarov N.**, Nahmatova, N. (2022) Sənaye Siyasəti ilə Sahibkarliq Ekosistemi Arasindaki Əlaqənin Təhlili. *Journal of Baku Engineering University*, *6*(1), 56-63
4. **Jafarov, N.,** & Szakos, J. (2022). Review of entrepreneurial ecosystem models. *ASERC Journal of Socio-Economic Studies*, 5(1), 3-16. DOI:10.30546/2663-7251.2022.5.1.3
5. **Jafarov, N.**, Nahmatova, N., Nuralizade, E. (2024). Analyzing the Relationship between Industrial Policy and Entrepreneurial Ecosystem. *PEOPLE: International Journal of Social Sciences,10(1),121-133 DOI-https://doi.org/10.20319/pijss.2024.101.121133*

Conference publications

1. O. Abdurazzakov, N. **Jafarov**, 2016, Impact of Risk Capital on Stimulating Innovation-Case of Azerbaijan, 9th International Conference on Entrepreneurship, Innovation and Regional Development, Romania.
2. N. **Jafarov**, 2018, Catalysts of Innovative Entrepreneurship Ecosystem: Case of Hungary, 8th International Conference on Management "Leadership, Innovativeness and Entrepreneurship in a Sustainable Economy", Poland

3. N. **Jafarov**, 2018, Innovation performance of Hungary based on the global innovation index, 4-th Winter Conference of Economics Ph.D. students and Researchers, Gödöllö, Hungary
4. N. **Jafarov**, 2018, Economics and Entrepreneurship: Review of the Current Approaches, Business and Management Sciences: New Challenges in Theory and Practice. Conference on the 25th Anniversary of the Doctoral School of Management and Business Administration, Gödöllö, Hungary.
5. O. Abdurazzakov, N. **Jafarov**, 2018, Applying International Experience on Technology Transfer in Azerbaijan, International Scientific and Practical Conference on the Sustainable Development of Economy and Administration: Problems and Perspectives, Baku Engineering University, Baku, Azerbaijan.

REFERENCES

1. Allan, AJ, Randy, LJ, 2005, Writing the Winning Thesis or Dissertation. A Step-by-Step Guide, Corwin Press, California
2. Blank, S., & Dorf, B. (2020). *The startup owner's manual: The step-by-step guide for building a great company*. John Wiley & Sons.
3. Brown RB, 2006, Doing Your Dissertation in Business and Management: The Reality of Research and Writing, Sage Publications
4. Dana, L.P. and Dana, T.E. (2005) 'Expanding the scope of methodologies used in entrepreneurship research', *Int. J. Entrepreneurship and Small Business*, Vol. 2, No. 1, pp.79–88.
5. Denzin, N.K. and Lincoln, Y.S. (1994) *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage, Chapter 1: 1–17.
6. Hollanders, H., Es-Sadki, N., Khalilova, A., European Innovation Scoreboard 2022, Publications Office of the European Union, 2022,
7. https://startupgenome.com/ecosystems/budapest (access date: 25.01.2024)
8. O'Leary Z. 2004 ,The essential guide to doing research. Sage.
9. OECD Oslo Manual: Guidelines for Collecting and Interpreting Technological Innovation Data. 2005, Paris: OECD Publishing.
10. Startup Hungary, 'Hungarian Startup Report 2022' , Budapest 2023
11. Stratton SJ. Population Research: Convenience Sampling Strategies. *Prehospital and Disaster Medicine*. 2021;36(4):373-374. doi:10.1017/S1049023X21000649
12. Walliman, N. S. & Walliman N. (2011) Research methods: the basics, Oxford, Taylor and Francis
13. Wortman, M. and Roberts, G. (1982) 'Innovative qualitative methods, techniques and design in strategic management research', presented at *Strategic Management Society Conference*, October 8.