

KAUNAS UNIVERSITY OF TECHNOLOGY
SCHOOL OF ECONOMICS AND BUSINESS

Viktorija Baltrūnaitė

**Challenges of Technology – Based Start-Ups Development: The Role
of Organizational Learning**

Final Degree Project

Supervisor

Prof. Jurgita Sekliuckienė

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**Challenges of Technology – Based Start-Ups Development: The Role
of Organizational Learning**

International Business (code 6211LX029)

Final Master's Degree Project

Supervisor

(Signature) Prof. Jurgita Sekliuckienė
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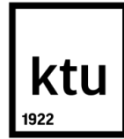
Reviewer

(Signature) Doc. dr. Rita Jucevičienė
(date)

Student

(Signature) Viktorija Baltrūnaitė, V MTVen-7
(date)

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KAUNAS UNIVERSITY OF TECHNOLOGY
School of Economics and Business

(Faculty)

Viktorija Baltrūnaitė

(Student name and surname)

International Business 6211LX029

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"Challenges of Technology – Based Start-Ups Development:
The Role of Organisational Learning" of final master's degree project

DECLARATION OF ACADEMIC INTEGRITY

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Santrauka

Temos aktualumas: Dabartinės pasaulinės rinkos tendencijos, jų globalizacija, atvirumas bei pastovi technologijų plėtra lėmė spartų įvairių tipų naujų kompanijų kūrimąsi, vienos iš jų – startuoliai. Sparti šių kompanijų plėtra, nulėmė ne tik naujų vadybinių praktikų atsiradimą, įvairių technologijų patobulinimą ar išradimą, bet ir aukštą startuolių žlugimo per pirmuosius jų veiklos metus procentą. Yra parengta daug mokslinės literatūros analizuojančios šių kompanijų fenomeną, vykdomas veiklas, jų vystymosi kylančius iššūkius bei organizacinio mokymosi aspektus, bet autorių veikaluose trūksta holistinio požiūrio tarp šių dedamųjų ir sprendimų kaip startuoliai savo veikloje galėtų išvengti ar minimizuoti kylančius iššūkius ar kaip įveiklina organizacinį mokymąsi. Dėl to baigiamojo tyrimo problema yra formuluojama klausimais: **Kokie yra technologijomis grįstų startuolių vystymosi patiriami iššūkiai ir kaip jie su jais susidoroja? Kaip startuoliai naudoja organizacinio mokymosi praktikas jų plėtroje?**

Baigiamojo darbo tyrimo objektas: organizacinio mokymosi vaidmuo startuolių vystymosi iššūkių kontekste.

Baigiamojo darbo tyrimo tikslas: išanalizuoti Lietuvos technologijomis grįstų startuolių vystymosi iššūkius ir taikomas organizacinio mokymosi praktikas

Baigiamojo darbo tyrimo uždaviniai:

1. Remiantis problemos analize atskleisti iššūkius keliančias sritis ir mokymosi svarbą startuolių veiklose;
2. Teoriškai išanalizuoti startuolių fenomeną, tipologijas, iššūkius kylančius startuolių vystymosi etapuose ir apibrėžti organizacinio mokymosi vaidmenį;
3. Pagrįsti metodologiją siekiant atlikti startuolių vystymosi kylančių iššūkių ir taikytų organizacinio mokymosi praktikų tyrimą;
4. Atlikti Lietuvos technologijomis grįstų startuolių vystymosi kylančių iššūkių, taikytų organizacinio mokymosi praktikų empirinį tyrimą ir pateikti rekomendacijas sėkmingai startuolių plėtrai.

Baigiamojo darbo tyrimo rezultatai: Atlikto atvejo analizės tyrimo su 7 Lietuvos technologijomis grįstų startuolių įkūrėjais rezultatai patvirtina teorinėje dalyje išsikeltų pagrindinių veiklos iššūkių ir organizacinio mokymosi praktikų taikymą Lietuvos technologijomis grįstų startuolių vystymosi. Tyrimas parodė, kad iššūkiai, susiję su startuolių vystymosi ir organizacinio mokymosi teikiami privalumai yra būdingi ir Lietuvos technologijomis grįstų startuolių veikloje.

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Study field and area (study field group): Business and Public Management, Business.

Keywords: *Start-up, technology – based start-up, challenges, development stages, organizational learning.*

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Summary

Relevance of the topic. The current global market trends, their globalization, openness and constant technological development have led to the rapid creation of various types of new companies, one of which is start-ups. This rapid development has resulted not only the emergence of new management structures, the improvement or invention of various technologies, but also the high percentage of start-ups failure during their first years of activity. There is a lot of scientific literature analyzing the start-ups phenomenon, their activities, the challenges in their development and the aspects of organizational learning, but there is a lack of holistic approach between these components and the solutions how start-ups in their activities could avoid or minimize emerging challenges or how they overcome organizational learning. That's why research problems are formulated in the following questions: **What are challenges, which technology – based start-ups face in different stages of development and how they dealt with them? How start-ups use organizational learning practices in entrepreneurial businesses development?**

The final work object – The role of organisational learning within the challenges of start-ups development.

The final work aim – To analyse faced challenges and used organizational learning practices within different development stages of Lithuanian technology – based start-ups.

The final work objectives:

1. On the basis of problem analysis, discover the challenging areas and learning importance in start-ups activities;
2. To carry out a theoretical analysis of start-ups phenomenon, typologies, challenges in development stages and emphasize the role of organizational learning;
3. Justify methodology for start-ups challenges and used organizational learning practices in their development;
4. To conduct an empirical research of Lithuanian technology – based start-ups challenges, used organizational learning practices and provide recommendations for successful start-up development.

Results of the final work. After carrying out case analysis research with 7 founders of Lithuania technology – based start-ups, the main challenges and organisational learning methods were validated in a start-up activity in their development stages that were distinguished in theoretical analysis part. The research showed, that challenges related with start-ups development and benefits of organisational learning are also inherent in Lithuania technology – based start-ups activities.

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INTRODUCTION

Relevance of the topic: Globalization of countries, openness of markets and development of technologies have made a positive stimulus for new business creation – start-ups. The advent of this type of companies on the world market has brought certain benefits for each country, and the start-ups market, according to Dane Stangler, a research manager at the Kauffman Foundation, annually expand around 500,000 businesses of this type.

Due to such large number of start-ups creation and various new management mechanisms, structures and actions emerging from these businesses activities in the markets, there are many scientific literature on start-up topics and understanding of their operations (Swanson, Baird, 2003, Blank, Dorf, 2012, Bosch, Olsson, Björk, Ljungblad, 2013, Chung, Bowie, 2017, Pomerol, 2018 and others). However, it is recorded in different sources that more than 50 % of start-ups fail most often without reaching their first five year of activity (Sweetwood, 2018; Henry, 2017; Swanson, Baird, 2003 and others). Many authors analyze challenges arising from start-up activities, which sometimes lead to the collapse of them (Terpstra, Olson, 1993, Cantamese, Gatteschi, Perboli, Rosano, 2018, Wang, Edison, Bajwa, Giardino, Abrahamsson, 2016, Mueller, Volery, Siemens, 2012 and others), and the frequent author emphasizes the importance of organizational learning for start-up competitiveness, inter-knowledge sharing and operational efficiency (Chen, Lin, Yen, 2014, Lumpkin, Lichtenstein, 2005, Brockman, 2013, Chandler, Lyon, 2009, Tam, Gray, 2016 and others), but rare who is looking for success practices to overcome the challenges of start-ups in general or even more – through organizational learning.

Thus, conducting the analysis of scientific literature in the foreign and Lithuanian authors works, there is a lack of solutions to overcoming challenges in the start-up activities and examples of applicable organisational learning practices for start-up success.

Since technology – based start-ups present new or improved products / services to the market, where the solution is not obvious and success may not be guaranteed (TechStartups, 2017), that's why it is important to analyse their activities, challenges and learning methods, in order to reduce the uncertainty of their success factor.

As a result, analyzing the challenges of technology – based start-ups development will be seeking to identify most common challenges and used practices for their overcoming and understand the role of organizational learning for the success of a start-up from a theoretical point of view, and to develop a theoretical model oriented to challenges overcoming mechanisms through organizational learning. The theoretical model will be developed on the basis of material collected by different authors, taking into account the different stages of start-up and the challenges that arise during those stages and for every stage the specific method adaptable of organizational learning and its possible benefits. That's why research problems are formulated in the following questions: **What are challenges, which technology – based start-ups face in different stages of development and how they dealt with them? How start-ups use organizational learning practices in entrepreneurial businesses development?**

Finally, a methodological study will be carried out during which in-depth interviews will be conducted to find out the current situation of Lithuanian technology – based start-ups and to present conclusions and recommendations related to the research.

Object of the research. The role of organisational learning within the challenges of start-ups development.

Aim of the research. To analyse faced challenges and used organizational learning practices within different development stages of Lithuanian technology – based start-ups.

Research objectives:

1. On the basis of problem analysis, discover the challenging areas and learning importance in start-ups activities;
2. To carry out a theoretical analysis of start-ups phenomenon, typologies, challenges in development stages and emphasize the role of organizational learning;
3. Justify methodology for start-ups challenges and used organizational learning practices in their development;
4. To conduct an empirical research of Lithuanian technology – based start-ups challenges, used organizational learning practices and provide recommendations for successful start-up development.

Methods of the research. Analysis of statistical data, comparative analysis, analysis of scientific literature, graphical representation of data, qualitative data survey by semi-structured interview method and analysis of this data in the MAXQDA program.

Results of the research. After carrying out case analysis research with 7 founders of Lithuania technology – based start-ups, the main challenges and organisational learning methods were validated in a start-up activity in their different development stages that were distinguished in theoretical analysis part. The research showed, that challenges related with start-ups development and benefits of organisational learning are also inherent in Lithuania technology – based start-ups activities.

Structure of the research. The research consist of 4 parts, 65 pages, 20 tables, 14 figures, 2 annexes. Interview transcripts attached separately.

Publication of the research results. Based on the Final Master's Degree Project an article "Challenges for technology – based start-ups through organizational learning perspective: the evidence from Lithuania" was prepared and presented in the 6th AIB-CEE 2019 conference "International Business in the Dynamic Environment: Changes in Digitalization, Innovation and Entrepreneurship".

1. PROBLEM ANALYSIS

1.1. Characteristic features of the Start-up

Economic globalization is changing relations between companies, markets and countries. As a result of this process, the global economy is superior to the local market economy (Cruikshank, 1995). Globalization offers the opportunity to recognize the need for business to be developed across a country's structure, which means that it covers the areas of economics, science, technology, culture and management. It is not a new phenomenon, but it involves more and more markets, technologies and participants every day (Krikštaponytė and Pukelienė, 2002). In the glossary, this term is interpreted in the same way as the authors mentioned earlier – globalization is a global integration of international trade, investment, information technology and culture. Globalization process opens opportunities that are necessary for start-up business.

As Steigertahl and Mauer (2018) state, there is no official term for start-ups, but it can be described in three main criteria. An age that is less than ten years and in some sectors less than five. Creating innovation in their product, service, or business model, and having a tendency to scale – either in a large number of employees or in different markets. The analysis of these authors, which they presented in the European Start-up Monitor (ESM) 2018 report, also includes the created European Start-up Profile (see Figure 1) which distinguishes the most common characteristic of European start-ups.

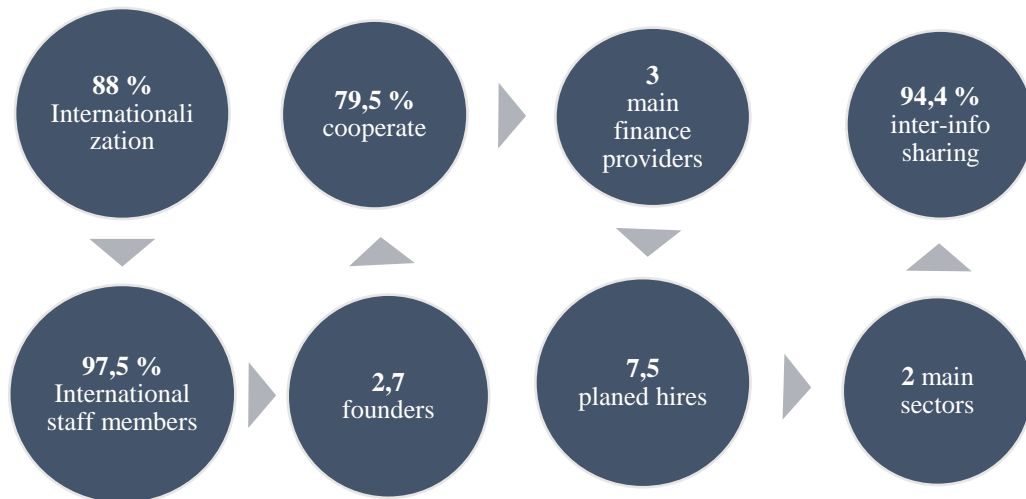


Figure 1. European Start-up profile (designed according to Steigertahl, Mauer, 2018)

Based on the created European start-up profile, 88% of European start-ups are planning international development / internationalization over a 12-month period, while 97.5% of start-up team members are not from start-up's home country. The average start-up number of founders is 2.7, so it can be assumed that most European start-ups are founded by at least two people. Almost 80% of start-ups are constantly

cooperating with SME and / or fortune 500 companies, and the main sources of funding for these start-ups are personal savings (77.8%), business angels (29%) or venture capital (26.3%). Also, in the European start-up, staff increase is planned for 12 months period - more than 7 new people. The main sectors of activity are distinguished: IT / software development (19.1%), software as a service (18.5%) and bio-, nano- and medical technology (6.5%). The new trending sectors are also arising for start-ups activities – green technologies (4.0%) and Fin-Tech sector (5.1%). In addition, according to the founders, 94.4% of start-ups share important information within the company.

According to the conducted European start-up profile, it can be seen that start-ups are expanding the home-country market into international and are creating new jobs. Areas of importance to the economy of the country, to which the start-ups are contributing, are distinguished by Centre for American entrepreneurship too. Based on the Why Is Entrepreneurship Important (n.d.), the impact of start-ups on the economy can be conveyed through the following spheres of influence:

- **promoting economic productivity**, with the arrival of new, fast-growing and productive companies that creates a more competitive environment for existing businesses and remove lower productivity companies from the market;
- **encouraging innovation**, driven by the constant development of disruptive innovation and commercialization in start-ups, which either leads to the creation of new markets or has a significant impact and transforms the existing ones. Kollmann, Stöckmann, Hensellek and Kensbock (2015), in the European Start-up Monitor (ESM) 2015 report argue that 2/3 of more than 2,300 (ESM) start-ups founders emphasize that their product or service is a novel in the European or international global market.
- **job creation** is determined by the steady growth of new and young companies that are constantly developing. They are creating net jobs in the economy (Why Is Entrepreneurship Important, n.d.) and according to Steigertahl and Mauer (2018) start-ups has the ability to generate new jobs. According to the statistics they provided, 18,015 new jobs were created in European start-ups during 2018, working not only from the domestic market but also from other countries.

So start-ups accelerate the economic development of the country through innovation and a creative work model, thus support for this type of company is one of the top priorities on the international stage, and their creation is no longer considered as a threat to a well-established marketplace. And while the benefits of start-ups for national economies are enormous, companies of this type are characterized by a very frequent failure rate, a low funding percentage, and other.

Statistics and common issues of Start-ups activities

According to different authors, the percentage of start-ups failure in the few first years of life varies from more than 50%, 60% or up to 75% rate (Sweetwood, 2018; Henry, 2017; Swanson, Baird, 2003). Updated statistics forming a broader approach to start-up problems were presented by Swanson and Baird (2003) after analysing various authors' studies, companies reports and other format statistics, they came up with a summary of statistics on success and failure rates (see Table 1).

Table 1. Start-up failure and success statistics (designed according to Swanson, Baird, 2003)

Statistics	Explanation
<50% → 5 years or more	Less than 50 percent of start-up founders are still part of those start-ups after five or more years of activity.
10-30 %	Start-ups who are actively looking for investors from outside receive funding.
1/10 of 1 %	With over 12,000 business plans reaching top-tier venture capital companies, approximately 12 companies are receiving venture capital investment in one year period.
10 %	Amount of start-ups who have received investment from venture capital reach the “go public” stage.
4 %	The amount of shares usually remain with the founders, after the start-up goes to IPO.

The frequent failure of start-ups, the lack of funding, are determined by various reasons that different authors describe as "reasons for start-ups fail". A combined analysis of the start-ups failure causes is presented in Figure 2.

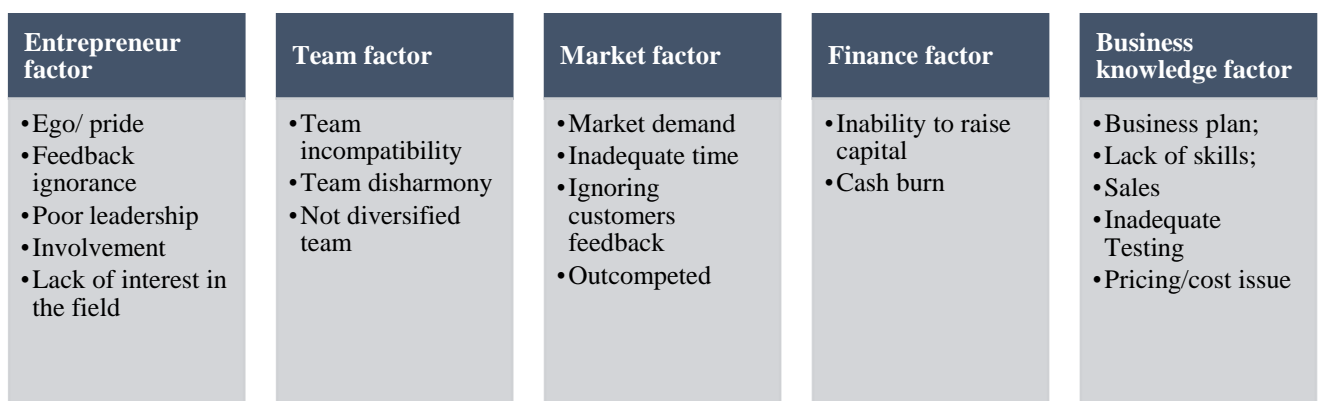


Figure 2. Reasons for start-up failure (designed according to Henry, 2017; Sweetwood, 2018; Arnaud, 2018; Houlihan, Harvey, 2018; CBINSIGHTS, 2018)

When analysing the cause of the start-up failure, part of them are directly related to the founder's personality. First of all, analysing the influence of the entrepreneur on the start-up failure, Sweetwood (2018) identifies the ego – founder's belief that the idea he proposes is the best, the inability to make contacts and receive feedback, see the environment and analyse it properly due to overestimating his potential. According to Arnaud (2018), the fact that the founder is not able to translate the vision of the company, involve the employees with his charisma and seek their permanent commitment to the start-up also leads to the collapse of the start-up. Frequently, start-up founders, after some time and certain setbacks, are starting to lack motivation, devotion – reducing their involvement in company activities, which also leads to failure (Henry, 2017). The founder spends 60 – 90 hours a week in this activity, getting almost no pay at the first stages. If an entrepreneur is not sufficiently interested in this activity, the area and does not really want to solve a particular customer problem that he / she is also experiencing, in this case the tight work rhythm will affect his / her interest in this activity and will potentially affect the unsuccessful development or failure of the start-up (Arnaud, 2018).

The start-up team has a great influence on its success. Team incompatibility is mentioned by many start-up founders as a very delicate issue that has a negative impact on start-up activities. Most often, it is related to the team's skills to overcome the challenges of the start-up activity and its ability to work together. Equally, team compatibility is determined by a common understanding of the company's vision, the team's ability to learn, adapt, and the ability to create a team culture acceptable to all its members. In addition to these aspects, the team factor has a major impact on inefficient start-up activities (Houlihan and Harvey, 2018). According to Sweetwood (2018) and CBINSIGHTS (2018) diversity of the team is one of the most important aspects of the start-up team. The most successful start-up teams are made up of experienced marketers and young market professionals, and a team with different skills is a critical success factor. In a different situation, start-up functionality is significantly reduced.

When analyzing the influence of the market factor, the start-up failure is determined by the lack of market demand for the product. This happens for a number of reasons, according to Arnaud (2018), a frequent start-up activity focused on the issues that are interesting to deal with, rather than the ones that actually meet the needs of the market. In essence, start-up activities fail when a problem is not big enough – in which case market scalable is impossible and start-up growth potential is extremely low. Attempting to enter a particular market too early or too late also has a major impact on the success of start-up activities. Often, the technology concerned is not yet fully developed and the entry into the market is currently inadequate or the incomplete analysis of competitors does not indicate that competitors are already on the market with such a product or service and it is too late to enter the market. The inability to find the right time to enter the market is directly related to the start-up failure (Arnaud, 2018). According to Cbinsights (2018), the failure to collect customer feedback data and the inability to use feedback has a major impact on start-up failure. When designing a product, it is critical not to work alone within the team and to complete it only by the decision of the start-up team, but to be able to work with clients and their feedback. Direct competition in the market is another reason why start-ups are leaving the market. When a start-up launches a product and is accepted on the market, it quickly becomes popular, then the competitors of the same service or product are coming on the market and if start-up fails to follow their behavior and actions that can lead to a start-up overcompetition.

The ability of a start-up to attract financial resources is directly related to his success. Due to the rapidly growing start-up ecosystem, the financing bubble of this type of companies exploded, leading to the fact that only a very small percentage of start-ups receive funding from venture capital, especially in the first stages of start-up (Sweetwood, 2018). Arnaud (2018) also calls this factor as the reason for the failure of the start-up, claiming that the start-up funding applications have been rejected many times, and the success in this process is rare and takes a lot of time. This hinders start-up activity and development opportunities. Another reason for the start-up financial factor is the frequent run out of cash process. According to Cbinsights (2018), start-up activities often do not consider running of money and time, and their distribution is not targeted. In this case, it has a direct impact on the start-up failure.

According to Sweetwood (2018), good ideas are not enough for a successful start-up business. According to the author, a start-up without a precise plan with clearly identified steps in how his / her company will carry out marketing, costs, staffing, manufacturing and other operations, and how he will turn them into

a successful one, has little chance of continuing with the ongoing activities. Start-up management also needs the skills of the founder and his team. In order to ensure the continuity of start-up activity, it is important that the entrepreneur is active in the market where his / her skills, education and available work experience are valued. In the event when start-up activities have already begun, and there is a lack of certain knowledge for both the founder and the team, the founder should invest in his / her own and team training in order to succeed successfully (Arnaud, 2018). According to Cbinsights (2018), the ability to attract the attention of its customers and turn them into a loyal start-up product users is one of the successful examples of business management, but in many cases, the founders focus on product development rather than placing it on the market/promoting, which is often a business failure. According to Houlihan and Harvey (2018), inadequate testing is the most commonly cited reason for failing a start-up. In this case, the start-up team is not able to create appropriate hypotheses and evaluate them or, in many cases, work on the product for too long without consulting customers or analyzing the feedback from a small sample of customers. In order to achieve start-up success, the proposed value proposition and customer segment need to be re-evaluated many times before other start-up development steps begin. Another reason for the failure of start-ups is inappropriate pricing. It is extremely difficult to set a price of services that cover the costs incurred and makes a profit, as well as at the same time is (not too high) acceptable for the customer segment (Cbinsights, 2018).

1.3. The importance of Start-up learning

As can be seen from figure 2 and the following descriptions, there are many reasons for the failure of a start-up. Most of them (entrepreneur factor, team factor, market factor, and business knowledge factor) can be managed if the start-up is able to respond quickly to the situation and learn to understand and solve the problem. The importance of learning from others is emphasized by Frankel (2015), arguing that despite the existing entrepreneurial knowledge and successful examples of practices, it is still important to collect and acquire new knowledge, which is best done by finding the cheapest and most effective learning tool - learning from others.

According to Reader (2017), a method to achieve better results by examining the field of interest, evaluating it, making assumptions, approving it, and repeating the process sequence should be used in a start-up development. Such learning through practice can improve the quality of start-up activities. Also, the author emphasizes that start-ups have to learn here and now about the surrounding environment – "just in time learning" to be able to quickly adapt to the changing market and not lose their position. Likewise, recurring processes should be mechanized and further work based on creativity and team engagement, sharing tasks according to the strengths of each employee.

Team learning as a priority in a start-up is emphasized by Kimbrell (2017) too, stating that workplace education has a major impact on start-up activity and should be promoted within the start-up, allowing the team to make its own decisions in accordance with certain recommendations and continually promoting workplace learning. According to the author, in order for the employee to be loyal to the start-up and at the same time to achieve the highest results, providing free time for learning and promoting learning among team members is necessary. However, in this free learning process, the role of the entrepreneur is important, where he should try to direct the team to the development of competencies

that will be critical for start-up both now and in the five-year period. Team learning promotes effective working relationships, where professionals from different fields work towards one goal and achieve important start-up results.

Finally, Stahl (2016) also highlights the importance of leadership in team learning – it must promote personal growth and knowledge sharing within team. In this case, the start-up founder can share his / her development through the learning experience, creating a fully supportive learning atmosphere within the company. Constantly overcome the learning process in the start-up becomes its basis and the guarantee of quality.

1.4. Lithuanian Start-ups

In recent years, the Lithuanian start-up community has grown and expanded most during its existence, and Start-up Lithuania (2018) formed a short description of the Lithuanian start-up community (see Figure 3).

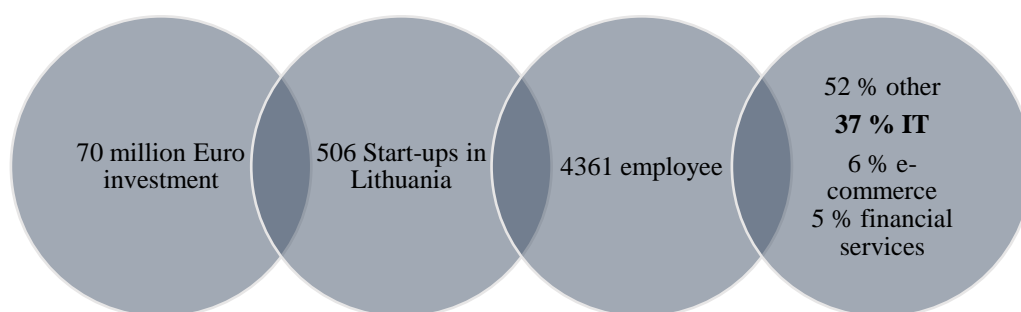


Figure 3. Lithuanian start-up community in 2018 (designed according to enterprise Lithuania)

In 2018, the Lithuanian start-up community attracted 70 million euros of investment from both Lithuanian investment funds and foreign countries, which is one and a half times more than last year. Currently, there are 506 start-ups in the Lithuanian start-up ecosystem, and this figure has risen by 58 percent since last year. More than 4000 employees / team members work in Lithuanian start-ups. As many as 75 percent of start-ups in Lithuania are profitable, and the largest sector in which Lithuanian start-up activities are carried out is information technology (37%).

However, in a deeper analysis, it can be seen that Lithuanian start-ups face the same problems as start-ups from other EU countries or the global context. According to M. Liao, in an interview in the bnz start portal, conducted by Lelevičiūtė (2018), Lithuanian start-ups should devote more time and improve their business models, deepen their understanding of marketing, sales and other commercial business solutions. Also the presentation / pitch of the product or service being created. In Bieliénès (2017) interview with the founder of “Welltrado”, T. Medeckis, is highlighted another issue of Lithuanian start-up activity – attraction of investments. More than 90 percent of investments in Lithuanian start-ups came

from abroad, due to the lack of capital in Lithuania, which obliges start-up founders to work with foreign markets in finding investors.

But the noticeable development of the start-up community in Lithuania has influenced the creation of new tools for the development of this community. According to Enterprise Lithuania (2018), in 2018, a "Start-ups for Start-ups" platform was created to encourage Lithuanian start-ups to share their experiences and good practices in order to reduce the repetition of the same mistakes. The need for knowledge sharing in the Lithuanian ecosystem is very real, and the platform created is a direct way to promote communication and knowledge sharing.

So, after analysing the problem of the topic, it can be noticed that most of the start-ups implements their activity in technology field, their activities has a positive influence on the country's ecosystem through different areas, and the start-up community has a tendency to grow, but the success rate of start-ups is low and more than 50 percent of start-ups fail in their first years of activity. Start-up's failure factors are strongly associated with the founder and team performance, knowledge and skills that encompass a wide range of emerging issues. However, it can be assumed that the ability to learn in the start-up could lead to better entrepreneur and team performance, which would also have a direct impact on start-up efficiency and potentially reduce start-up failure rates.

As a result, the theoretical analysis will seek to find out the principles of the start-up activity itself and the challenges arising in its activities, at different stages of the start-up. The aim is to find out whether the reasons for the failure of the start-ups found in the analysis of the problem are directly correlated with the challenges arising from the start-up activity and the exact challenges encountered during the start-up phase. Further efforts will be made to understand how Lithuania technology – based start-ups use organisational learning and the common benefits of organizational learning in start-up activities and whether there is a scope to overcome the challenges of the organizational learning/failure of the start-ups. Finally, the empirical part of the research will analyse Lithuanian start-ups operating in the technology – based sector, their challenges, opportunities exploration and exploitation and how that helps to overcome arising challenges. Also organisational learning practices that are being used now. Technology based sector was chosen because more than a half of EU start-ups are operating in this sector and most of the accessible material are based on data collected from start-ups which ones are participating in this field.

2. THEORETICAL PRECONDITIONS FOR STARTUP DEVELOPMENT CHALLENGES AND THE ROLE OF ORGANIZATIONAL LEARNING

2.1. Conceptualization of the start-up, stages typologies and challenges

2.1.1. Conceptualization of the start-up

Different authors describe the start-up by differentiating the different basic aspects and thus creating a different term for the start-up (see Table 2).

Table 2. Definition of the Start-up (Created by author)

Author	Definition	Main features
Swanson and Baird (2003)	“Start-up is a small company, most often with a high-tech focus, that is in the early stages of development, creating a product or service, or having a product or service needing manufacturing and/or marketing. They are looking to grow through possible venture capital funding, initial public offerings (IPOs) or acquisition by larger companies”	<ul style="list-style-type: none"> • Small company; • New product/service; • High-tech focus; • Fast growth opportunities; • Various funding sources.
Bosch, Olsson, Björk and Ljungblad (2013)	“Start-up is a human institution designed to deliver a new product or service under conditions of extreme uncertainty. Most often, start-ups have limited resources in terms of people and funding, and are run on very tight schedules. <...> they are commonly exploratory in nature, lacking clear requirements, customers and even business models.”	<ul style="list-style-type: none"> • New product/service on the market; • Insufficient resources; • Exploring the market; • Lack of knowledge.
Salamzadeh and Kesim (2015)	“Start-up companies are newly born companies which struggle for existence. These entities are mostly formed based on brilliant ideas and grow to succeed.”	<ul style="list-style-type: none"> • Competitive in the market; • Fast growing.
Blank and Dorf (2012)	“A start-up is a temporary organization in search of a scalable, repeatable, profitable business model.”	<ul style="list-style-type: none"> • Time-consuming company; • In scalable business model searches.
Wang, Edison, Bajwa, Giardino, and Abrahamsson, (2016)	“Start-ups are newly created companies that aspire to grow fast in extreme uncertainty”	<ul style="list-style-type: none"> • Fast growing; • Market uncertainty.
Pomerol (2018)	“<...> start-ups exploring the possibility of new technologies ignites an increasing instability in economy, making each business under the pressure of innovation and disruption.”	<ul style="list-style-type: none"> • Constantly looking for new technological opportunities; • Competitiveness.

To perform further scientific literature analysis regarding the subject of start-ups, it is important to understand the process of creating a new venture. Gartner (1985) presented a new venture creation model (Figure 4) in which this process is interpreted as interaction between four dimensions: individual(s), organization, process and environment (further – ecosystem). Individual is a person who starts a new venture - an entrepreneur - whose role depends on the venture he or she are setting up and personality of the entrepreneur. The term "s" is used to include other people who are co-creators or additional persons involved in creating a new venture. Organization in figure 4 represents the beginning of a new company, which is often inseparable from the founder, but the author points out that the process of entering the market and the ability to compete varies from the type of the chosen organization.

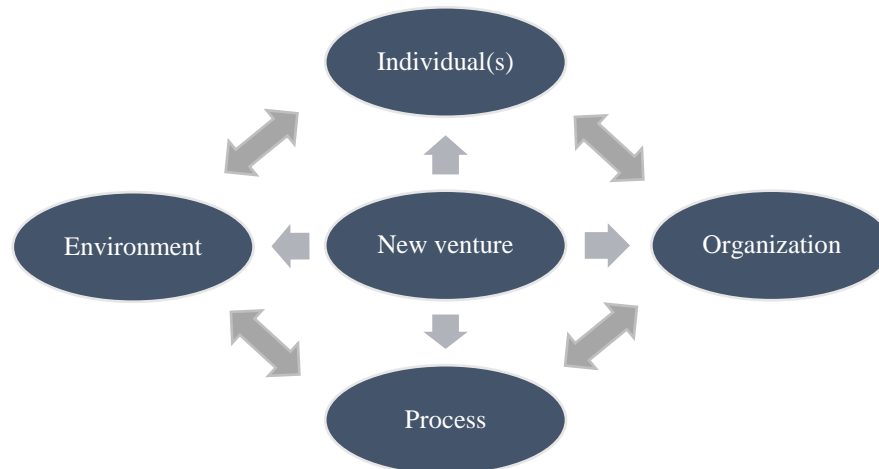


Figure 4. A framework for describing new venture creation (designed according to Gartner, 1985)

The external factors that influence the organization and the time-consuming environment that was at the start of the venture are part of the environment in the scheme created by author. No organization is established in a "vacuum" environment, and the environment around the start-up can create both positive and negative ("pushes" and "pulls") effects on its activities (Gartner, 1985). There are two theories that new venture has to adapt to the conditions existing in the external environment, or that the new venture perceives the external environment as being developed because of the strategic decisions they make. New venture process – is a necessary sequence of actions by the founder or founders in order to start a new business and maintain it (Gartner, 1985).

Based on the Gartner new venture creation model, further concept of the start-up analysis will be performed through four author-separated components.

Entrepreneur(s) of the start-up

The main role in recognizing, evaluating and exploiting the opportunities during the creation of a start-up or its development lies with the entrepreneur (Mueller, Volery and von Siemens, 2012). Alvarez and Busenitz (2001) argue that the first steps in creating a start-up depends on entrepreneur's ability to decide how and where to use the available resources. However, in order to understand the principles of entrepreneur decision-making, it is important to know the provisions of its activities.

According to Aldrich and Yang (2012), the founder of the start-up performs actions oriented towards goal, according to the logic of the 3-part action: *routines*, *habits* and *heuristics*. Executing activities based on routines means that the entrepreneur analyses the pre-existing routines and tries to apply and utilize the knowledge in its start-up activity. Meanwhile, the activities of the founder based on habits are more often determined by the context in which certain activities must be carried out by the individual entrepreneur's habits. In the authors' opinion, entrepreneur's habits will identify certain organizational routines in the start-up and will determine the decision-making based on emotions. In certain cases, when the entrepreneur has only the information available in the near environment and the limited time and

resources, the decisions are made on the “take the best” principle, which is determined by heuristic (Aldrich and Yang, 2012).

A person already has some experience and has certain contacts before starting a new venture. As Karataş-Özkan (2011) argues, each entrepreneur has 4 types of capital that he/she uses to create a start-up and to achieve his/her goals.

- **Economic capital** – this is the type of entrepreneur capital that represents the amount of financial resources that it has or may have access to;
- **Cultural capital** – is an entrepreneurs training, educational programs and a knowledge of the sector where start-up is created. In a general sense, this is a business know-how;
- **Social capital** – the capital that the entrepreneur has created by knowing and maintaining acquaintance / partnership with the university, working environments or other networks (strategic alliances);
- **Symbolic capital** – it is a capital that combines the three types of capital categories discussed above with the help of personal qualities (power, independence). Essentially, it is the ability to present your venture idea to potential stakeholders through your own person.

Lichtenstein and Brush (2001) also analyse the importance of the capital of entrepreneur. The authors argue that the new business founder must have the appropriate resources, such as education, experience, strong relationships, personal savings and financial contributions from a close environment to start a new venture and turn his/her capital into start-up capital.

Start-up organization

According to Osnabrugge and Robinson (2000), there are three different types of start-ups which convey their potential to grow:

- Lifestyle start-up;
- Middle-market start-up;
- High-potential start-up.

Lifestyle ventures are based on an activity that provides sufficient capital to the founders of the company, but they are not inclined to high growth as this increases the potential risk. Companies of this type mostly use internal funding, because their lack of propensity to expand has little chance of attracting funding from external sources (Osnabrugge and Robinson, 2000). Meanwhile, middle-market and high-potential start-ups are already considered as business enterprises and are prone to rapid growth. Middle-market companies have an annual growth probability of more than 20 percent and more than \$ 10 million revenue over a five-year period. This type of start-ups has the ability to attract external investors, mostly business angels, but also finances its growth processes by using bootstrapping. High-potential firms have a growth rate of over 50 percent each year, with a five-year projected return of more than \$ 50 million, and a 50 or more employees in a 5-10 year period. These are companies that are able to quickly adapt and change as needed, and take risky decisions, and their growth rates are attractive to both business angels and venture capitalists.

Jones, Macpherson and Jayawarna (2014) also support the claims that the start-up financing method depends on its type. The authors claim that the availability of start-ups to certain funding sources directly depends on their stage of development and the type of their business. This is a correlation (see Figure 5) of funding strategies and start-up lifecycle.

Funding at the start-up seed stage is considered to be the most risky because investors do not receive any income (the start-up does not yet generate it), no business or financial plan has been created (Paschen, 2017). As a result, most costs associated with start-ups early-development phase are usually financed from the personal resources of the entrepreneur, from his family and friends (MaRS, 2009a) from donation crowdfunding (Paschen, 2017) or using bootstrapping resources (overdrafts, credit cards) (Jones and others, 2014). According to Paschen (2017), these investors are the most attractive in the first start-up phase because the start-ups do not have to offer a tangible potential reward, and their investment is minimal. In case the start-up fails, investors will suffer less losses.

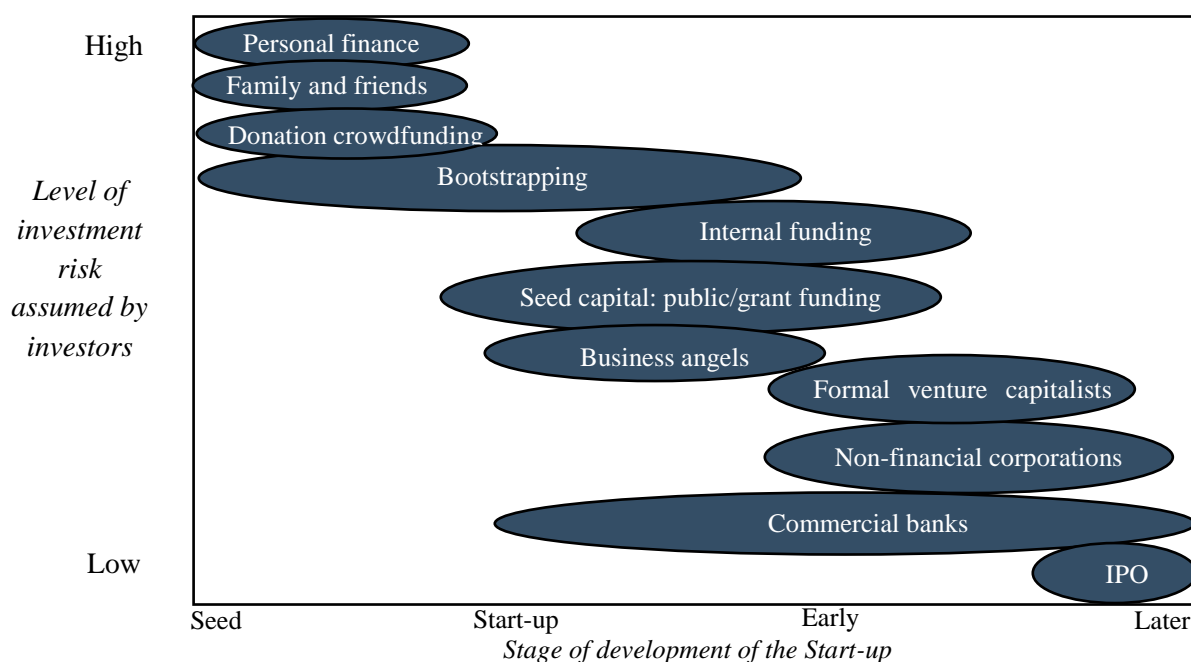


Figure 5. Financing strategies through Start-up stages (adapted to Jones, Macpherson and Jayawarna, 2014)

In the start-up stage of the start-up, the investment risk is reduced because the start-up product concept-stage has already been achieved. Also, since a business plan is already prepared, there are clear financial needs. The start-up at this stage usually attracts investment from business angels, as this stage is the most attractive to them and they fund the start-up individually or by assembling the group of investors (MaRS, 2009b). Moreover, at this stage, there are still significant importance of funds from a close circle of entrepreneur, because they can be as a guarantee of borrowing from the bank (Jones and others, 2014).

The investment risk in the early stage of the start-up decreases significantly compared to the first two stages because the new venture demonstrates business traction. At this stage, business angels and venture capital investments are the main financial sources (MaRS, 2009c). Furthermore, even if the start-up was funded by the banks in the previous stages, early stage intensifies the lending (Jones and others, 2014).

According to the authors, borrowed finances from banks are more used for everyday start-up operations, while investing in high-risk projects in the start-up is from VC or business angels.

In the last stage of the start-up, investments for even greater development come from VC funds, institutional investors and venture leasing companies. Surely it still cooperates with commercial banks (Jones and others, 2014). At this stage, the risk is reduced due to the already established relationship with customers and suppliers and revenue scaling. However, market competition remains, so the minimum start-up risk still exists (MaRS, 2009d).

Processes of the Start-up

Gartner (1985) carried out an analysis of the scientific research and created a plan of 6 general actions for starting a new venture: 1) finding a venture opportunity, 2) gathering of the resources, 3) adapting the product or service to the market; 4) production of goods or services; 5) creation of an organization; 6) responsiveness to the government and society.

Meanwhile, Mueller and others (2012) have identified the actions that entrepreneurs take in their start-up development. These actions were divided into three categories:

- **Activities** are mainly management tasks for exchanging information, analytical and conceptual work, contact support and networking, as well as constant start-up monitoring.
- **Functions** are actions that are organized according to their organizational context. Features include start-up management, marketing, sales, PR, product/service and organizational development, product/service production, HR, financial control and ongoing environmental monitoring.
- **Exploration/exploitation** – this is the ability of a start-up to constantly and simultaneously explore and exploit the opportunities. Actions related to possibilities exploration, identification, researching and obliteration are exploration start-up activities. Meanwhile, exploitation encompasses the implementation and execution of those discovered opportunities in start-up activities.

A broader theoretical activity analysis of the start-up is carried out in 2.1.2. subsection, where they are discussed in different stages of the start-up phase.

Ecosystem of the Start-up

Jones and others (2014) conducted an analysis of the development and improvement of start-ups stimulated for 40 years by UK policy initiatives. The authors argue that although the study was conducted in the UK market, the development and adaptation of different types of initiatives is applied to the development of start-ups in many countries and in various types (see Table 3).

Table 3. Ecosystem of the Start-up (Created by author)

	Jones and others (2014)	Salamzadeh and Kesim (2017)	Motoyama and Knowlton (2017)
Mentoring programs	✓	✓	✓
Various funding systems	✓		✓

Support programs	✓		✓
Trainings	✓	✓	✓
Acceleration entities / mechanisms	✓	✓	✓

According to Jones and others (2014), countries encourage the emergence of start-ups by creating various funding (loans and grants) and mentoring programs. Establishing support mechanisms such as incubators and hatcheries. Providing business and management development trainings and various support programs (marketing, R&D, specific sectors, ect.). In the authors' opinion, the authorities are trying to raise awareness of the importance of start-ups in society.

Salamzadeh and Kesim (2017) distinguish 6 different support mechanisms (entities) that contribute to the development of start-ups at various stages: incubators, accelerators, hatcheries, small business development centres (SBDC), angel investors and science parks. According to the authors, accelerators and hatcheries engage in start-up activities through intensive mentoring programs. Also, accelerators offer a variety of workshops for start-up learning, incubators train start-up to work with human resources and advise on legal issues, while hatcheries mainly work with the start-up introduction to a market.

Motoyama and Knowlton (2017) also identify a variety of entrepreneurship support organizations and programs that help the start-up in various ways. The authors name incubator and accelerator support mechanisms as the most common contributors to start-up activities. Discussing funding systems for start-ups, the authors distinguish not only the provision of different types of funding but also the creation of office and co-working places. Various competitions for financially supporting start-ups activities are another example of support programs.

2.1.2. The typologies of start-up development stages

The development of the start-up is divided into different stages, which have the respective distinctive features. Authors Osnabrugge and Robinson (2000) distinguish four stages of start-up:

- 1) **Seed stage** is a stage where only the idea of a potential new venture is being worked on. A new venture creator expects to have a potentially profitable business idea, but it needs to be analysed, developed and validated.
- 2) **Start-up stage** this is the stage when a new venture has already been started, progressing from an already approved idea to a work with product development/marketing campaign. Most often at this stage, new venture is still small.
- 3) **Early stage** is a development phase. At this stage, the new venture is expanding, The product or service is produced and marketed. In most cases, this phase takes less than five years and may still be unprofitable.
- 4) **Later (expansion) stage** is the maturity stage of the company. Venture is established, most likely profitable with predictable cash flows. A clear portrait of the client, known competitors.

Tech (2014) also distinguishes three different stages of the start-up: early, growth and later. Based on different researches by other authors, the author describes each stage through the organization, product, market and funding prisms (see Table 4) by presenting the young venture activities specific to that stage.

Table 4. Start-up stages for growth-oriented ventures (Tech, R. P., 2014, page 4)

	Early stage	Growth stage	Later stage
Organization	Existence survival success, business model	Strategic planning, company building processes	Merger, acquisition, IPO
Product	Concept Prototyping, pivoting, testing core features development, establishing production	Scaling production, refinement	Diversification
Market	Discovery Market calibration First customers, demand creation	Penetration, heavy marketing	Diversification, internationalization
Funding	Seed Start-up Start-up	Series	IPO, Exit, (internal)

The start-up is also divided into three stages by Paschen (2017). The author distinguishes **pre-start-up stage**, where the creator of a new venture verifies the possibilities of his idea to become a real business dealing with significant client problems. At this stage, the main competitors, partners and suppliers are identified. Working with the target market. The second stage pointed out by the author is **start-up stage** – at this stage the business idea and the reliability of the business model are already proven. Looking for possible improvements to the product prototype, creating a viable business plan. The last, third stage of start-up is called **growth stage**. The start-up reaches this stage when it becomes productive and profitable. Here it carries out market penetration and scaling operations as the product is already approved on the market. The company has the potential to grow steadily.

According to Salamzadeh and Kesim (2015), the start-up must also be divided into three stages (see Figure 6). In the first stage, the entrepreneur seeks to create a profitable venture by initiating various activities to implement his idea. At this stage, the first close environmental investment is obtained, but the risk of uncertainty is high. According to the authors, the bootstrapping stage needs to reveal the biggest advantages of product, team, financial management and customer interest in the product.

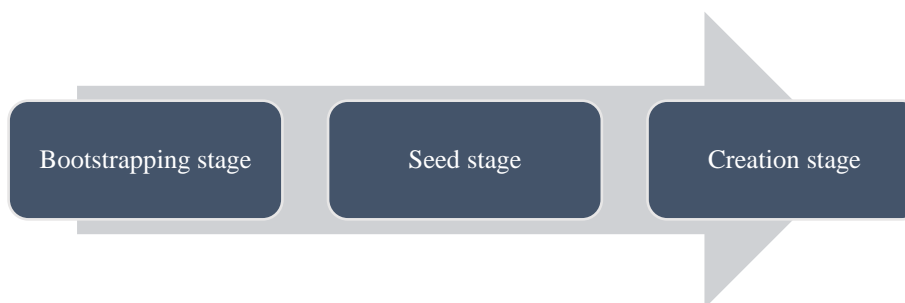


Figure 6. Lifecycle of start-ups (designed according to Salamzadeh, Kesim, 2015)

The next stage is also characterized by a high uncertainty level, but the main aspects of this stage are the creation of a product prototype, entry into the market and the search for additional assistance from

support mechanisms (incubators, accelerators, investments). This stage also includes a start-up evaluation. As a result, this stage, according to the authors, is also important because a large number of start-ups fail during this stage without finding support mechanisms. However, start-ups that outlast it, have great opportunities to become profitable companies. The latest, creation stage, pointed out by the authors is the stage of product sales, entry to the market and first employee recruitment. The company is formed at the end of this stage, but is still looking for additional sources of funding.

The different stages of the start-up are presented by Maurya (2012), the author suggests that the start-up development is divided into three stages connected to the problem and the product - **1) Problem / solution fit, 2) Product / launch fit, 3) Product / market fit**. According to the author, in the first stage of the start-up, the founder finds his start-up client whose problems are solved and when working with the available information, he also finds a solution to the problem. The second stage is a prototype preparation, creating an environment for sale, and re-evaluations / product corrections. The third stage is constant product evaluation and implementation of innovation to the product. After the final stage, start-up is considered as successful and continues to develop.

The different research carried out in eighth decade points out different stages of new ventures and small business as well. According to Kazanjian (1988), there are four stages of new venture growth:

- 1) **Stage 1: Conception and development.** The stage at which new ventures focus their activities on resource acquisition and development of technology. According to the author, technological development at this stage is a more initial expansion of the company, construction of product prototype, testing and adjustment of product prototypes.
- 2) **Stage 2: Commercialization.** This is the stage that focuses on the commercialization of a product or technology. Working with a product-development team and looking for solutions to enable the product to function properly.
- 3) **Stage 3: Growth** phase comes to play only if the product is technically sound and acceptable to the market. If the company reaches this stage, then it focuses on the sales of the product and the goal to gain the largest possible market share / not to be pushed out of the market. Also, at this stage, due to the development of the company, the organizational structure of the company is changing, and the company has a growing hierarchy. There is a need for specific positions in the company and professional and trained staff recruitment.
- 4) **Stage 4: Stability.** The company reaches the stage of stability when its growth rates become constant, reflecting the market growth. At this stage, the company has achieved stability and profitability with standardized activities, bureaucratic principles and development opportunities.

The other two authors of this period distinguish five stages of small business development: **existence stage, survival stage, a stage of success, take off stage** and **resource maturity stage** (Lewis and Churchill, 1983). The first stage emphasizes the importance of customer accumulation and the delivery of a product or service to them, and the second is about the sufficiency of financial resources to ensure the existence of a venture. The third stage is defined as the decision-making period when dealing with issues or further development of the company, enabling or attempting to keep the company in a stable position for the implementation of alternative activities. In the fourth stage, efforts are made to achieve

a rapid growth of the company by attracting sufficient financial resources to ensure this growth. The fifth stage is about the size of the company, the financial resources and the management peak.

Usually, start-ups distinguish 3 to 5 different stages of development, but Mueller and others (2012) distinguish only two stages: **Start-up stage** and **Growth stage**. Customer acquisition, product prototyping and market introduction, technology development, customer support, first marketing strategies and technology acquisition, start-up activity plan, personal investment, and a search of financial resources according to the authors are common for start-up in the start-up stage. Meanwhile, in growth stage, active recruitment of professional staff is carried out and targeted work functions, strategic contacts - alliances and supplier's, production, sales and distribution of large quantities of products, constant activity control, financial allocation, planning of future activities and implementation of specialized activities in production, in marketing and administration sectors.

Although the authors distinguish different number of the start-up development stages, the features are relatively similar or very similar in characterization. Further work analysis will use Osnabrugge and Robinson (2000) breakdown of start-up development stage, as it is used by some authors as a cornerstone for their distinctive start-up stage breakdown, the same or very similar is used in other authors' works to discuss start-up challenges or combining start-up stages with organizational learning. Using this breakdown of the start-up stages in a further analysis will combine the work more consistently.

2.1.3. Challenges in start-up development stages

Since start-ups perform different activities in different stages of growth (Sub-section 2.2), in the next study it is important to find out what authors distinguish as the main challenges that start-ups face in each of their growth stages (see table 5).

Table 5. Most frequent challenges in start-up development stages argued by different authors (Created by author)

Challenges	Author/s			
	Seed stage	Start-up stage	Early stage	Later (expansion) stage
Customer identification		Mueller and others (2012)		
Product/service creation	Wang and others (2016)	Wang and others (2016)	Wang and others (2016)	
Product/service market penetration		Mueller and others (2012) Cantamessa, Gatteschi, Perboli, and Rosano (2018) Wang and others (2016)	Wang and others (2016)	
Lack of business knowledge/development	Cantamessa and others (2018) Wang and others (2016)	Cantamessa and others (2018)	Cantamessa and others (2018)	Cantamessa and others (2018)

Financial acquisition and management	Salamzadeh and Kesim (2015) Cantamessa and others (2018) Wang and others (2016)	Salamzadeh and Kesim (2015) Terpstra and Olson (1993) Cantamessa and others (2018) Wang and others (2016)	Salamzadeh and Kesim (2015) Mueller and others (2012) Wang and others (2016)	
Human resource management		Wang and others (2016)	Mueller and others (2012) Terpstra and Olson (1993)	
Organizational management	Cantamessa and others (2018)	Terpstra and Olson (1993)	Terpstra and Olson (1993) Mueller and others (2012)	Wang and others (2016)
Sales		Terpstra and Olson (1993)	Terpstra and Olson (1993)	Wang and others (2016)

Challenges in Seed stage

To find out the main challenges arising in start-up activities from seed stage to later stage, Wang and others (2016) conducted research using a survey tool. According to them, the biggest challenge in the first stage, which exists in other stages of start-up, is the product development process itself.

Cantamessa and others (2018) emphasize that the main reason for the failure of the first year of start-ups is the inability to create a suitable business model for their start-up and lack of business development knowledge. According to the authors, this is the biggest challenge for start-ups in the seed stage. This is also supported by Wang and others (2016), arguing that the creation of a business model is another challenge in the seed stage.

According to Salamzadeh and Kesim (2015), financial resources are a major challenge in the first stage of a start-up. At this stage, the start-up founder has to try to persuade family members and close friends to provide financial resources for the initial idea of the start-up and, according to the authors, when the founder invests these finances in the start of the business, they need more and more to develop the start-up. Cantamessa and others (2018) agree, saying that in this start-up phase, the founder often lacks money, which is a major challenge for new business creation. Wang and others (2016) also named funding collection as one of the most important and challenging factors in the first start-up phase.

Lack of knowledge of organizational management (inexperienced management), based on Cantamessa and others (2018), is another challenge in the first start-up phase. The authors argue that the inexperience of managing an organization is a great challenge only in the first stage of start-up, as the start-up is still young.

Challenges in Start-up stage

The biggest challenge in the first start-up phase, according to Mueller and others (2012) is the acquisition of customers and the presentation of the product to them. According to Wang and others (2016), the importance of product development and its adaptation remains as a challenge also in this start-up phase.

According to Cantamessa and others (2018), the problems related to product / market fit increases in this start-up phase. Wang and others (2016) emphasize these problems, claiming that customer acquisition at this stage is a major challenge.

The financial acquisition challenge at the start-up stage is highlighted by Salamzadeh and Kesim (2015), arguing that at this stage, the founder must provide reasonable start-up strategy plans that should convince a potential investor, usually the business angel. Terpstra and Olson (1993), Wang and others (2016) also argue that at this stage a major challenge for start-up activity is the attraction of external finance, in other words, accessibility to them (Cantamessa and others, 2018). However, Terpstra and Olson (1993) as a challenge distinguish not only financial attraction but also financial management within the organization (problems with cash flow, inadequate working capital).

A new challenge in the start-up activity at this stage is the search and creation of team (Wang and others, 2016). As the start-up increases, challenges also arise with the overall management of the organization, because the founder lacks managerial experience, the management team is small, in many cases only one founder, which causes a lack of time for all tasks implementation (Terpstra and Olson 1993).

Another dominant problem in this start-up phase, according to Terpstra and Olson (1993), is ensuring sales volume, being dependent on a small customer audience and lack of distribution channels. The authors argue that at this stage there are also common problems with enabling marketing tools.

Challenges in Early stage

Wang and others (2016) distinguish product building as one of the challenges in this stage too. Although the main start-up product is already in place, the authors emphasize that at this stage the product needs to be constantly updated, as the start-up market is innovative and is constantly looking for technological improvements and changes. Adapting and keeping up with this innovative market is one of the challenges in the third start-up phase. The latter challenge creates another which is product / service market penetration. The authors argue that customer acquisition and retention at this stage is still a challenge, as the market is rapidly changing, as mentioned earlier.

At this stage, a frequent start-up fails due to improperly prepared or unprepared business model. Cantamessa and others (2018) specifically mention this as one of the challenges at this stage associated with a lack of business support knowledge. The authors also say that at this stage, there are often disagreements between the start-up founders, which are caused by the absence of common business goals in the company.

According to Salamzadeh and Kesim (2015), at this stage start-up founders have to prepare a detailed plan with mandatory support documents to attract investment from venture capital. It is this that poses great challenges for the start-up at this stage. The complexity of attracting financial resources at this stage is emphasized by Mueller and others (2012), Wang and others (2016) claiming that the organization of funding is a great challenge for the start-up.

Based on Mueller and others (2012) the planning of future activities and the work with the start-up team arise as the challenges of the early stage of the start-up. HR management problems are also highlighted by Terpstra and Olson (1993), arguing that employee recruitment, employment, employee change and search for certain ways to maintain them poses major challenges in this start-up phase. According to the authors, at this stage, the start-up must be able to maintain employee satisfaction, create moral obligations and provide opportunities for improvement, which is a great challenge for a new venture.

As mentioned earlier, planning future activities, according to Mueller and others (2012), can be identified as a challenge for founders in managing a start-up at this stage. Likewise, as Terpstra and Olson (1993) argue, the challenges of start-up management at this stage are related to the ability to manage and control start-up development and various administrative problems.

According to Terpstra and Olson (1993), sales volume assurance at this stage still remains a challenge for start-up activity, but compared to the first stages of start-up, the challenge is much less.

Challenges in Later (expansion) stage

According to Cantamessa and others (2018), the lack of business development knowledge is a challenge for start-ups at all stages. The last stage of the start-up is not an exception.

Two more challenges for the start-up in his fourth stage are organization management and sales. Based on Wang and others (2016) as a key challenge at this stage faced by a start-up founder in organizational management, is the ability to establish and maintain partnerships. It is also important at this stage to increase the volume of sales (scaling), which could be called as another challenge that is particularly evident at this stage.

The most common challenges in all stages of the start-up are related to product creation process, lack of business knowledge, business development / expansion or start-up management, lack of finance and the process of attracting and managing them, and ensuring sufficient sales for start-up development. Further research will try to take into account these emerging challenges and find used good practices for their solution in start-ups performances, opportunities exploration, exploitation and by start-up learning.

2.2. The role of organizational learning

According to Brockman (2013), a lot of research has been carried out that analyses the importance of group knowledge in start-up teams and how it contributes to the success of that start-up. Start-up has a variety of organizational resources, but the learning process amongst all the team members (organizational learning) in different start-up phases are one of the most important (Sekliuckienė,

Vaitkienė and Vainauskienė, 2018). This is also supported by Chandler and Lyon (2009) claiming that team engagement in knowledge-acquisition activities has a major impact on high start-up results.

According to various authors, the learning process of an organization involves the processes of communication and integration between different groups of people in a single organization. Purposefully implemented, this process can give the company a competitive advantage, timely creation of new knowledge and ability to share them, implementation of innovative processes and inconsistency adjustments within the company (see Table 6).

Table 6. Definition of the Organizational learning (Created by author)

Author	Definition	Main features
Chen, Lin and Yen (2014)	“Inter-organizational knowledge sharing is a critical factor for collaborative resource coordination, allocation and integration across different members of a supply chain”	<ul style="list-style-type: none"> • Promotion of cooperation; • Ensuring team integration processes.
Lumpkin and Lichtenstein (2005)	“Organizational learning, for example, emphasizes improving practices and expanding into new arenas by creating new knowledge, building new understandings and detecting and correcting misalignments”	<ul style="list-style-type: none"> • The process of creating new knowledge; • Exploration / exploitation of unmatched processes.
Brockman (2013)	“<...> firm must evolve from individual/small group learning, based in action learning, to advanced cognitive learning, built on critical dynamic capabilities.”	<ul style="list-style-type: none"> • Learning of different groups in the organization; • Different types of learning.
Chandler and Lyon (2009)	“Organizational learning is an organizational-level phenomenon, yet theorists point out that all learning takes place at an individual level”	<ul style="list-style-type: none"> • Involvement of the whole organization; • Supported by individual learning levels.
Tam and Gray (2016)	“Organizational learning, if effective, is a source of innovation and creating competitive advantage for a business. The effectiveness of organizational learning critically depends on how individual employees practice and share learning for knowledge at work and how the firm supports a learning-conducive workplace in the long run”	<ul style="list-style-type: none"> • Increasing competitive advantage / creation of innovative environment; • Knowledge sharing platform

Lumpkin and Lichtenstein (2005) also support the definition of organizational learning by different authors, stating that companies that promote and use organizational learning in their activities have an increased likelihood of recognizing various market opportunities and adapting them to their business or to the process of establishing other companies. According to the authors, companies wanting to become more entrepreneurial must try to use organizational learning in their activities and understand three different methods:

- **Behavioural learning** is based on the reactions of the organization itself or other organizations to the various company routines, systems, structures and technologies that occur when inefficient processes in the market or some gaps exist. In essence, it is learning from mistakes that has a tendency to constantly expand.

- **Cognitive learning** is a science that explores how individuals' cognitive maps changes affect the entire organization's cognitive schema. Cognitive learning specifically focuses on learning processes rather than on behavioural outcomes. If members of an organization effectively utilize this type of learning, basic data can become a knowledge base generated by the organization as a whole or by certain organizational competencies that can provide a significant competitive advantage in the market.
- **Action learning.** This type of learning focuses on momentary responses, trying to achieve the best possible action at a given moment. This science analyses the gap between a person's claim that he will perform a certain action and real action. If a group of people working in an organization uses the action learning methodology, a community of learning practice is often created that can significantly increase the company's performance in areas such as intercommunication, innovation and team efficiency.

Meanwhile, Dutta and Crossan (2005) analyze organizational learning through 4I framework (see figure 7), arguing that organizational learning takes place at different levels of the organization as opposed to new learnings (exploration) and acquired experience (exploitation).

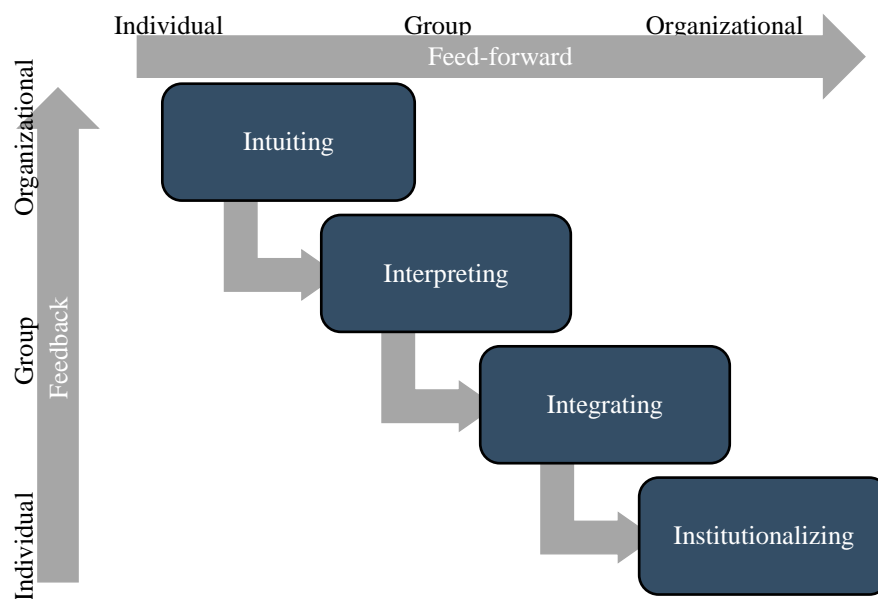


Figure 7. Organizational learning as a dynamic process (designed according to Dutta, Crossan, 2005)

4I learning is considered to be a dynamic process where learning moves from an individual to a group and to the entire organization, respectively through intuiting, interpreting, integrating and institutionalizing with feedback or through the feed-forward linkages (see Figure 7).

Dutta and Crossan (2005) using the 4I framework explanations developed by Crossan, Lane, and White (1999) describe each individual component of this model as follows:

- **Intuiting** is one person's intuitive behavior based on his or her own experience, a person's behavioural model. In this process, people who are in close contact with that person and / or interacting with him are affected.

- **Interpreting** is an understanding / peculiar explanation of the actions taken by both you and others. In this process, it is important to understand the verbal and non-verbal communication of an obsessive person.
- **Integrating** is the process of generating a common and equally acceptable understanding of the people in the group and, at the same time, adjusting coordinated actions. This process is primarily informal, but through dialogue and the integration of joint action, it can be institutionalized when it becomes meaningful.
- **Institutionalizing** is a process that seeks to ensure the emergence of routine actions in an organization. This is done through clearly defined actions, tasks and organizational mechanisms that were developed from individual and group learning through different systems, structures and procedures.

Thus, model 4I, according to the author, works when an individual, through his previous experience and intuition, finds a business opportunity that he explores through his individual action models. He then shares his insights with a larger group of people who join the process and interprets and explores the emerging business opportunity to create a common business proposition. Later, this common understanding is being enabled commonly across the organization through created systems, procedures, and overall strategies.

Brockman (2013) combined the process of organizational learning with three start-up phases, evaluating the evolution of this process during the growth of a start-up (see Figure 8). Start-up development also starts with the intuitive process – first and foremost the opportunity at the individual level is recognized. Since in this start-up stage its activity is only being prepared, there is an incubation period, so everything depends on the entrepreneur's ability to learn at this stage, recognizing the potential of the external environment and exploiting it by adapting his internal abilities. This is tantamount to entrepreneurial alertness, the ability to detect opportunities and the added value of the product being developed, and the ability to adapt and implement it all. Also in this start-up phase, action learning is important, which comes from the founder's responses to emerging market relationships and his knowledge and experience.

In the start-up phase, one person's intuition during the discussions with other people involved in it (stakeholders, other entrepreneurs) becomes an interpretation and the start-up starts to get a certain shape. Connections of this group of people become a common understanding arising from the interpretation of a single individual to the overall integrating process of the entire organization. At this stage, behavioural learning, which is particularly relevant at this stage of the start-up phase, is relevant to the action learning, group's beliefs and interpersonal relationships. However, the identification and exploitation of opportunities at this stage are still more informal and have not yet reached the institutionalizing process.

In the start-up growth phase, learning is transferred from an individual to a small group until the entire organization thinks through its processes and structures. If organizational learning has reached an integrating process until this phase of a start-up – learning in growth stage becomes an institutionalizing process. The process of learning because of common and combined mental models is becoming a dynamic activity for the whole company. All three learning modes are used here – cognitive, behavioural, and then action. And, depending on the company's activities and processes, their importance is constantly

changing, creating an ideal learning environment. According to the author, when companies get connected, learning makes it easier to innovate and divide their available capabilities because the information is used in a large and common knowledge system.

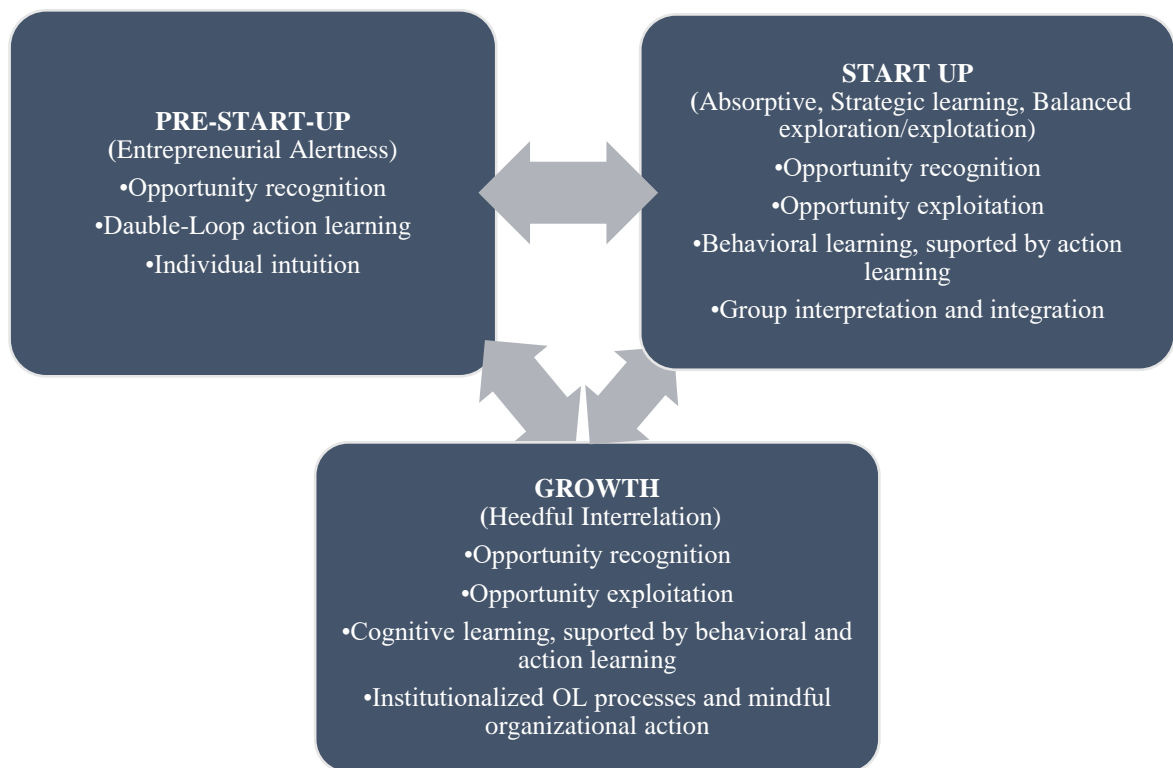


Figure 8. Organizational learning in new venture development (designed according to Brockman, 2013)

In summary, it can be stated that the organizational learning process that is being implemented purposefully can increase the competitive advantage in the market due to the promotion of cooperation and discussion inside the start-up. This helps to ensure different learning and the creation of a common knowledge base system. Similarly, application of organizational learning in the start-up ensures continuous market monitoring and learning from other start-up experiences, integrated / unified response to specific situations and implementation of a common strategy for the understanding of the information and knowledge of the company for each employee. The next study will assess how the organizational learning process is being implemented in the studied start-ups during their different stages (see Figure 8), with the growth stage covering the early and later stages.

2.3. Framework for dealing with challenges in different start-up stages through organizational learning perspective

After analyzing the concept of the start-up, its different stages and key challenges in the four stages of start-up, and discovering the organizational learning benefits and the application of this learning in the distinguished stages of the start-up phase, a framework for dealing with the challenges through organizational learning perspectives was created (see Figure 9).

The presented framework combines the activities of different stages of start-up in order to understand the specific activities of each stage better. The purpose of this combination is to understand which activities in the different stages of the start-up raise the main challenges. The next step is to convey possible organizational learning theoretical solutions that could potentially reduce the emerging challenges in the start-up activities. At the last level of the model, there are provided possible ways to solve the challenges by combining well-known organizational learning practices.

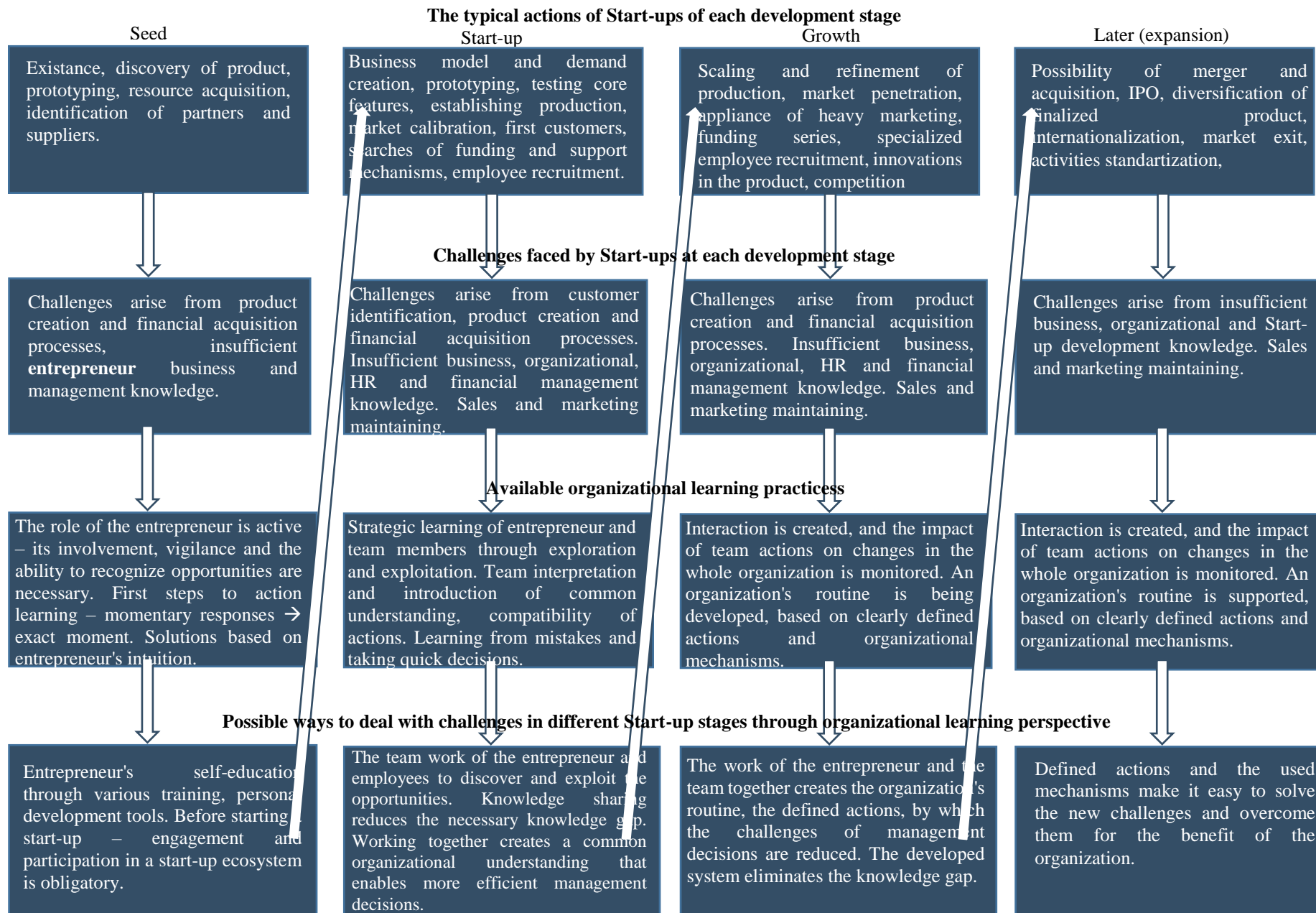


Figure 9. Framework for dealing with challenges in different start-up stages through organizational learning perspective (Created by author)

3. METHODOLOGY OF THE RESEARCH

Research problem: By analysing the challenges that start-ups face in each of their stages, the causes of their failure and the potential use of organizational learning in each start-up activity, various theoretical solutions can be found. However, there is a lack of practical examples related to dealing with different start-up challenges and the use of organizational learning in the context of start-ups. **This is why the problem of empirical research is formulated as:** How do Lithuanian start-ups in the technology field obliterate the emerging opportunities / solve challenges and how is the organizational learning context used in each of the start-ups?

Empirical research object – challenges and organisational learning role in different start-up growth stages.

Aim of the empirical research – to find out what challenges do Lithuanian technology based start-ups face and find practical examples of appliance of organizational learning.

Empirical research objectives:

1. To define the challenges faced by start-ups in their growth;
2. To analyse the start-up's ability of overcoming the challenges in start-up growth, by exploring and exploiting opportunities;
3. To identify the practices of organisational learning used in start-up's processes.

Research methods and tools: Chosen research method is **case analysis**, because this method helps answer the research questions the most, by retaining theoretical flexibility, focusing on theoretically useful cases, the one's that replicates or extends theory by filling conceptual categories. Case analysis for investigator let's see evidence through multiple lenses and that's how confirms, extends and sharpens the theory (Eisenhardt, 1989). The research is based on a **qualitative approach** to describe and define social construction of reality – to understand how a particular theory works in real, investigated examples (Eisenhardt and Graebner, 2007). In this work qualitative research was chosen because the data collected in this way is broader and can be more widely interpreted – available in a more in-depth study. Also, because there is a need to analyse how the social phenomena arise in the interactions of that phenomena participants and to understand processes (managing business, decision making). Because of that, according to Silverman (2017) researcher should choose qualitative data collection.

Qualitative research is conducted by using a method of semi-structured individual interviews. During these interviews, pre-defined topics and issues are analysed, but they can be refreshed and varied depending on the different respondents. When needed, these interviews are adapted to the specific context of the organization being investigated, supplementing the questionnaire with unforeseen issues, or changing / repositioning the questions depending on the situation. This is needed to find out more about the relevant events in the context of the organization or to change the flow of the conversation. Audio-recording technology is used during interviews, to collect data and process it to the transcripts. Also, it is important to mention, that interviews are conducted on one to one principle – either face-to-

face or through telephone, when there is no possibility to meet live with the respondent because of his physical location (Saunders, Lewis and Thornhill, 2009).

Datad collection methods ant tools: Based on previous mentioned type of interview, a question block questionnaire (see Appendix 1) which is appropriate for this interview method is being used. The questionnaire consists of 7 main blocks of questions, which include additional questions extensions that are used during the interview according to the investigated start-up stage and the sequences of activities performed by the start-up. At the beginning of the questionnaire, there are terms that unify the different stages of the start-up, by means of which the respondents are equally aware of the stages of development.

Data gathered during semi-structured individual interviews has been processed and systemized to the interview transcripts (attached separately), later analysed with qualitative data analysis software MAXQDA, while applying method of descriptive analysis. In MAXQDA, data was encoded to the main categories of codes, codes categories was divided into subcategories (see Appendix 2). When this process was implemented, the connection between different categories and subcategories was checked. The results was visualized. Also method of descriptive analysis was used to analyse secondary data sources.

Sample of the research: the research aims to reveal challenges faced by technology based start-ups and applicable organizational learning practices in their growth. Sample of the research was created based on *selection of critical cases* to get the critical information about the investigated phenomenon (Žydžiūnaitė and Sabaliauskas, 2017), that's why the following criteria are applied to the research sample:

1. The company should be small or medium (SME): according classification of European Commission (2018) SME's staff headcount could not be more than 250 and turnover could not exceed 50 million. Also, have the characteristics of start-ups described in 1.1. subsection of this work;
2. The company activities should be technology – based;
3. The interviews should be conducted with the founders or the co-founders of the company;
4. Company should be founded in Lithuania.

According research sample criteria, 7 semi-structured individual interviews was conducted with 7 different respondents.

Ethic of the research: During semi-structured individual interviews confidential principles was being adhered. Before interviews, respondent was informed, that research data will not be published, and will be used just for a scientific purposes.

Process of research activity: The research activity was implemented in 5 steps sequence.

1 step – Questionnaire was created within the framework of GLOBAL STARTUP Project No. PP32/1810, led by prof. Jurgita Sekliuckiene.

2 step – I, as a student, which one's master thesis supervisor is Jurgita Sekliuckiene, was invited to participate in this project by finding and conducting the interviews of Lithuania technology based Start-ups companies.

3 step – When the questionnaire was provided the interviews with Lithuanian technology based Start-ups took place from the end of October of 2018 till the beginning of December of 2018.

4 step – 7 interviews was conducted and transcribed within the project;

5 step – When all the data was gathered, transcripts was translated to the English language and processed with MAXQDA data analysis software.

Restrictions of the research: SME which ones are working in technology based field have been empirically investigated in this research, so results cannot be applied for the companies in bigger size, because challenges, growth stages and applicable organizational learning practices in bigger companies could differ from SME's. Also, previous mentioned attributes could differ from the field in which activities are implemented too, so these result could be applicable just for technology based SME's. In addition, because it is a qualitative research, the result cannot be applied for the whole general sample. In order to apply the results of the research to the whole general sample, more wider and broader research must be conducted, e.g. Quantitative. Geographically, the survey is limited to Lithuania, since start-ups that have been investigated started their activities in Lithuania, so the results cannot be applied to start-ups in other countries, as the countries' economic, political, legal and other environments differ.

4. RESULTS OF THE TECHNOLOGY – BASED START-UPS' EMPIRICAL RESEARCH

In a semi-structured individual interview, respondents were provided with a broader questionnaire (i.e. not all the questions in the questionnaire are focused on the results of this research), therefore further analysis will only be carried out with those question and answer groups that directly correlate with the object of this research, aim and tasks.

4.1. Characteristics of analysed start-ups

The main research and the main research result will be based on the code categories and sub-categories used in the study (see Annex 2), but when case analysis research method are being used, it is important to enrich semi-structured individual interviews with additional information from secondary data sources. This information will be collected from start-ups websites, informational articles and other publicly available sources. If necessary, this additional information will fill the missing information gaps about the start-ups that were not discussed by the founders or co-founders during the interviews. Additional information will be collected according to outlined criteria (see table 7), based on the possible need for additional information.

Table 7. Criteria to gather additional information of analysed start-ups from secondary sources

Information	Explanation
Industry	-
Year of foundation / age of the start-up	-
Number of founders	Number of people established the company
Number of employees	Publically available number of insured employees
Technology	What type of technology start-up provide/maintain
Main activity	Publically available brief description of the start-up activity

The study will analyze 7 interviews with founders or co-founders of different start-ups. When formulating the conclusions of the study and possible success factors, an additional characteristic of the investigated start-ups will be used, if necessary, based on 6 different sections (see table 8).

Table 8. Characteristics of analysed start-ups

	Industry	Year of foundation/age of the start-up	Number of founders	Number of employees	Technology
Start-up A	Computer Software	2018 / 1 year	2	5 people	Mobile app / platform
Main activity	The mobile app is designed for hair care professionals that can easily communicate with their customers: create and save customer data during their visit, and showcase your work examples to others.				
Start-up B	Telecommunication	2011/ 8 years	3	16 people	Cloud-enabled platform

Main activity	Company envision smart and connected communication experiences on demand in nearly any environment. Our goal is to deliver the most natural and pervasive face to face communication experience possible.				
Start-up C	Information Technology and Services	2017 / 2 years	2	18 people	ID scanning software
Main activity	Identity verification company, which helps reducing frauds, makes business smoother and more profitable. This company provide the possibility to turn smartphones (iOS and Android) or computers into an 24/7 ID scanning terminal and facial recognition system that makes it fast and easy to capture and verify their identity to meet KYC (Know Your Customer) and other regulations requirements.				
Start-up D	Marketing and Advertising	2018 / 1 year	1	5 people	Mobile app / platform
Main activity	The cloud-based platform for building and managing a customer loyalty program powered with analysis and communication tools that do not require any additional integrations for serving a customer. The platform connects all loyalty programs to one network and gives access to it through one customer's mobile application.				
Start-up E	Electrical/Electronic manufacturing	2016 / 3 years	1	3 people	Technological invention
Main activity	Focusing on delivering the revolutionary electric drive to the global market. Our patented X drive is a Plug & Play solution for making bikes electric.				
Start-up F	E-learning	2013 / 6 years	2	15 people	Platform
Main activity	Company teaches and connects 10 – 18 year old students and senior professionals with talents from business solutions programming, game development, 3D modelling areas.				
Start-up G	Computer Software	2009/ 10 years	4	18 people	Mobile robotics solutions
Main activity	<p>Company provides mobile robotics solutions, develops 3D visual perception and navigation technology for free ranging vision guided robotics applications in various industries, including manufacturing, material handling, and healthcare. The company is well regarded for its FDA-compliant robotic precise tumour targeting solution designed exclusively for an image guided radiation therapy product of Elekta, a medical device manufacturer listed on NASDAQ OMX NORDIC.</p> <p>Company provides hardware, software and services to enable self-driving vehicle development, deployment and fleet operation. Company can convert customer selected vehicle platforms into robotic systems.</p>				

4.2.Results of empirical research

Based on the theoretical part, a category of challenges was identified in which 8 subcategories were created covering the main challenges arising from the start-ups activities. In the course of the empirical research, another challenge was identified (marked with the * symbol, see appendix 2), which was named by the founder of START-UP C.

In order to present possible ways to overcome the challenges arising from start-up activities, their ability to explore and exploit opportunities will be analysed. An opportunity category was created in which the reasons for the emergence of 7 sub-categories were created (see appendix 2).

An organizational learning category was also created, in which 7 subcategories covering different organizational learning methods and dynamic processes was applied to the studied start-ups.

There was also a category stage created twice, where one of the 4 subcategories of the 4 development stages used in the research was created, while the other 3 subcategories included 3 development stages used in the research. These categories were created twice separately to make it easier analyse data and the relationship between subcategories in different categories in the MAXQDA program.

Subsequently, the data from semi-structured individual interviews will be analysed according to separated code categories and sub-categories, and the research result will be presented in 4.2.1., 4.2.2. and 4.2.3. subsections.

4.2.1. Challenges faced by analysed start-ups

After analysing the challenges arising in the 7 exploratory start-ups and their distribution frequencies (see figure 10), it can be said that the most common challenges arising in the theory of start-up activities are also found in the examined start-ups and most often Lithuanian technology – based start-ups face difficulties in creating the product or service provided, problems in human resource management processes, attracting investments and delivering a product or service to the market, challenges. This is justified by the maximum number of encoded segments in the "SUM" column and the maximum size of the symbols – circles whose size refers to all coded segments. Further analysis of the results will be presented from the most common to rarely emerging challenges in start-up activities.

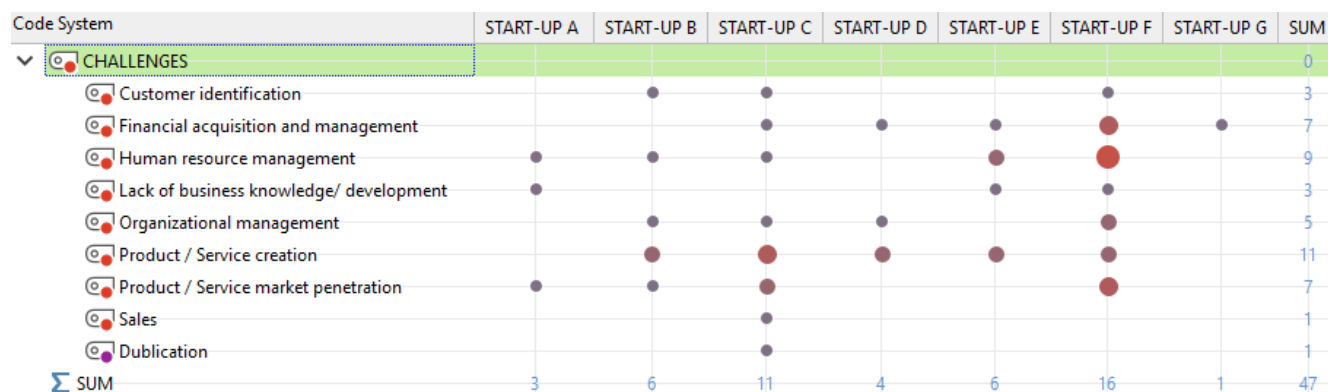


Figure 10. Distribution of challenges frequencies across analysed start-ups

Start-up founders were asked how they cope with the challenges related to different start-up processes such as product, team building, markets, technology and others. After analysing the respondents' responses, it was observed that mostly their activity face a product / service creation challenge (see table 9).

Table 9. Product / Service creation challenge faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up B	Challenges	Product / Service creation	“Have managed to cope with the attempts to adapt some innovations, always asking questions, and adapting to various challenges.”
			“The biggest problem would be to purify the product, only when everything was started, it was necessary to fully purify why it was

			needed, who needed it and whether it was needed. To make it clear what to do, because otherwise you will be floating for a few years. You think it has to be done one way, then someone else has an idea that it has to be done other way.”
Start-up C	Challenges	Product / Service creation	“Technical side was based on intense wandering.”
			“It was just difficult from technical side with some features that burned a lot of time and were useless.”
			“Perhaps from the technical side. It's really hard to see that true path... when you work for half a month on one part, and then you see that it was not worth it and the time was invested but wasted.”
Start-up D	Challenges	Product / Service creation	“It was so hard at first that we didn't know exactly how to do it, in the beginning we was doing one thing – later encountering business or someone that advises you to do otherwise because we will not be as functional or effective if we do, like we are doing right now.”
			“Our biggest difficulty is our app development, all the functionality.”
Start-up E	Challenges	Product / Service creation	“Product and technological difficulty are closely related, i.e. basically the same. Anyway, the creation of such a product that has not yet existed in the world has many different technological borders. <...> When you create the product from scratch when you face issues like new materials, new production processes, new technologies, and new management technologies. You need to create all the new components. For example, we had to create a new material that no one has ever tried or created in the whole world, and this is a thing we use. We had to build all our electronics, control systems, software we needed to create our own special engines.”
			“So these technological barriers, are the huge challenges that require a lot of working hours, require a very high-skilled team and, of course, it cost very large financial resources.”
Start-up F	Challenges	Product / Service creation	“I remember that we had to define the products, to define them quite strictly, because we knew that the development of each of them would take several years and in our case, it was the direction of the training.”
			“If at first, the first problem we had was, that we needed to choose what we do, dictate what we chose”

When start-ups create their product, they are primarily confronted with the problem of purifying the product itself (*the biggest problem would be to purify the product*), the final decision on the final product choice (*we had to define the products, to define them quite strictly*) and the real demand for it (*fully purify why it was needed, who needed it and whether it was needed*). When the product is already being developed and start-up is working on its functionality, it is often the case that time-consuming problems are encountered in the start-up activity: trying to make it as functional as possible (*difficult from technical side with some features that burned a lot of time and were useless*), in the case of choosing inappropriate functions (*when you work for half a month on one part, and then you see that it was not worth it*) or having a lack of technical knowledge (*we didn't know exactly how to do it, at the beginning <...> later encountering business <...> advises*). Also, since start-up activities are based on a completely new product or service development for the new market and are focused on high-tech (see table 2), Lithuanian start-ups are facing the lack of infrastructure and technological barriers creating such products (*many different technological borders <...> face issues like new materials, new production processes, new technologies*), especially for start-ups which activities are based on launching a new inventions to a

market (Start-up E). It is important to mention that Lithuanian technology – based start-ups consult with experts / partners when creating their products (*encountering business or someone that advises you; someone else has an idea that it has to be done other way*). In this way, the challenge of product / service creation as described by start-up founders justifies the problems raised by this challenge in the theoretical part – it is important to create a product that works purposefully i.e., ensure sufficient functionality and be able to adapt it when needed.

The second most common challenge in Lithuanian technology based start-up activities is human resource management (see table 10). In theoretical part identified challenges of this field, such as team building, staff change and lack of long–term motivation also are recognized in analysing practical examples of Lithuanian technology – based start-ups. Challenges in team building are primarily due to the lack of the necessary competencies in the marketplace (*we don't have the professionals already with experience on the market*), while the inability to maintain the employees with necessary skills in start-up activities is due to a lack of available financial resources and a lack of provided guarantees (*it would be financially very difficult for start-ups to keep such qualified people <...> they need much more guarantees than start-ups can provide*). In the analysed start-ups, as well as in the theoretical context, there is a challenge of employee motivation – the reason for the emergence of this challenge is the fact that the founders of start-ups rely on the fact that creating a completely new product / service raises many unresolved problems whose constant existence has a negative impact on employee motivation (*Maintaining a motivation level, when dealing with a problem after a problem, is in practice the biggest challenge; how to inspire motivation for a team*).

Table 10. Human resource management challenge faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up A	Challenges	Human resource management	“New things for me was work with people, in team, be responsible towards them, not just for myself. <...>. There was a need to coordinate and split the workloads. I had to manage everyone's job, tell them what to do, what also was new and challenging. I needed to gain new knowledge - IT terms, how to inspire motivation for a team and so on.”
Start-up B	Challenges	Human resource management	“The problem is between programmers and salesman's. The difficulty is that from the technological side some feature may look necessary, but from business side - salesman's side it may look otherwise. Then it is difficult sometimes to come up with common solution that it has to be done one way or another. There were certainly such difficulties here too.”
Start-up C	Challenges	Human resource management	“Yes, we have such thinking that everyone should be in-house because of the flexibility need, from the technical side. What's why we try to have our own employees. And there is a lot of 'issues but we try to do it everything by ourselves.”
Start-up E	Challenges	Human resource management	“The problem is not to find a person, but when he begins to work – to keep him from get bored by what he is doing, that he does not think, that we are doing something impossible, that he do not want to cut and find easier work. Maintaining a motivation level, when dealing with a problem after a problem, is in practice the biggest challenge. There were colleagues who said "how long we can live in the problems" and

			they leave the team. But we are working, despite the fact of changing team...”
			“This helps to maintain them. If they were working just for me, it would be impossible to maintain them, and it would be financially very difficult for start-ups to keep such qualified people and to work for such a long time, they need much more guarantees than start-ups can provide.”
Start-up F	Challenges	Human resource management	“This is the biggest problem, the first one that has arisen for us, the people who work for us. The first one, after just a few months, just realized where we hit, that the market demands people, that we need to grow those people that they are simply not in the market because the area is new.”
			“The second was the team's formation, which could really work on what we needed for a long time. And here was one of our biggest problems, because without that team we were unable to reach an appropriate number of customers.”
			“In our case, we don't have the professionals already with experience on the market, what is often a case for a start-up. You see that your area of interest is very new and that your team already has several competencies, but they will need much more. The idea I thought was that we would grow specialists and look further, we did it from our students. <...>. We can say that we were able to prepare ourselves as a training company and grow people who could work for us. But there was an extra problem when they needed to be prepared very quickly because the need was greater than just providing the service to those people.”
			“As I mentioned, the first difficulty was the development of the team. And this difficulty remains throughout the start-up life up to now. The decision to build a team ourselves and solve the problems ourselves was very brave. Whatever the market will have, this solution was right, because it is a way we can solve this problem, and this is a problem solution that you can control.”

Respondents described the challenge of human resource management as well as highlighting the new problems not discussed in the theoretical part. According to them, the founder often lacks experience of leadership to different teams, that is why the ability to work with people, guiding them to their and start-up goals and dividing the workloads is a challenge simply because start-ups founders often have a lack of this knowledge (*I had to manage everyone's job, tell them what to do, what also was new and challenging. I needed to gain new knowledge <...>*). The earlier mentioned problem also leads to another problem in the human resource management subcategory identified by start-up founders – this is an existing miscommunication amongst the start-up team members, which leads to a longer period of time reaching a common agreement and solving the problem in the start-up teams. (*Then it is difficult sometimes to come up with a common solution that it has to be done one way or another*).

It is important to point out, that the above mentioned problems are solved by the start-up founders in different ways depending on their activity specifics. Start-up C working with identity verification processes, a product that is extremely responsive to the time of legal market changes, decided to have the whole start-up team in-house, i.e., no freelance staff (*because of the flexibility need, from the technical side*). Meanwhile, start-up E concentrating its' activity on developing new inventions, such activities

require a large number of specialists in different fields, solves the problem of employee retention by creating a partnership with a large company where these employees work continuously, and the necessary specialists are recruited in start-up only in the short term if needed (*If they were working just for me, it would be impossible to maintain them*). Start-up F, operating in the e-learning industry, with a shortage of skilled workers in the market, decided to create a start-up team by themselves, teaching potential team members the skills needed for working in the start-up (*we were able to prepare ourselves as a training company and grow people who could work for us*).

Analysed subcategory of fundraising and financial management has been identified as a challenge by 5 out of the 7 analysed start-ups' founders (see table 11). The problems of attracting and managing finances in Lithuania technology based start-ups justify the statements in the theoretical part. Originally there are only the personal funds of the founders in the start-up activity (*In the beginning we started with our own savings*), and while improving the start-up's product and developing of new functional add-ons the need for external investors' investments appears in start-up activity (*now we are looking for investors intensively, because the integration into the cash registers costs quite a lot*). According to the respondents' answers, it can be assumed that the attraction of finances and the problems arising with their management inside the start-up is a continuous process (*Always fundraising; the challenge is constantly coordinate finances*).

Financial management challenges in Lithuanian technology – based start-ups arise due to financial errors occurring when the start-up is in a position to dispose of larger cash-flows or when the activity is directed to larger-scale performance that at the time the start-up cannot finance from their own resources – in this case the start-up is experiencing financial shortages and loss of working capital. (*Financial errors <...> when certain higher cash flows begin; decisions as a bigger company would, it inevitably leads to a loss of finance*).

Table 11. Financial acquisition / management challenge faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up C	Challenges	Financial acquisition and management	“In the beginning we started with our own savings, we worked completely without reward/ salary. We even gather money for first salary of Laimonas. We suffered this way <...>.”
Start-up D	Challenges	Financial acquisition and management	“The biggest challenge is investment, now we are looking for investors intensively, because the integration into the cash registers costs quite a lot. So after we will attract investor, we will start with the cash registers.”
Start-up E	Challenges	Financial acquisition and management	“Our current problem is production and investment. Always fund raising.”
Start-up F	Challenges	Financial acquisition and management	“Challenge is constantly coordinate finances, look for investments.”
			“Challenge – finance. One of the biggest mistakes is financial errors. Indivisibility for certain things when certain higher cash flows begin.”
			“Because as we have a start-up that makes some of the decisions as a bigger company would, it inevitable leads to a loss of finance, a lack of resources and the like.”

Start-up G	Challenges	Financial acquisition and management	“We created a shortlist of 50 capital ventures, we went there when we "raised" money and this was often the answer: you know, quite simply, your region is not very clear and now we have to come there to do that scrupulous research, it costs a lot, so maybe ... tell your friends to do something with local investors and then we will be able to "consider" you. Or they also suggested to move our core team somewhere, to London to try it there and we will discuss from that point... there was something like Lithuania invisibility, invisibility as an innovative country. That didn't help us with fund raising.”
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It is also important to mention, that the start-up G working with large-scale robotics solutions in the process of attracting finances has also identified Lithuania's problems as a country. According to the start-up founder, the investors do not yet recognize Lithuania as a well known and innovative partner country (*Lithuania invisibility, invisibility as an innovative country*), which determines their decision not to invest in a start-up from this country (*That didn't help us with fundraising*).

While analysing the market penetration challenges of a start-up product (see table 12), it can be noted that the key issue raised by start-up founders in this area is whether their product will be in demand on their market (*Most importantly, is there is demand; Well the market, will you hit it?*). This issue directly correlates with product preparation for a market, marketability, and user-friendliness (*Configuring, adding, we spend a lot of time for making this tool convenient to use; people think that they have the best product <...> do not listen what the market says*). Thus, it can be assumed that the main challenge in this category is the customization of the product to create the highest possible market demand.

Table 12. Product / Service market penetration challenge faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up A	Challenges	Product / Service market penetration	“Your product is everything for You, but for a half of the people is incomprehensible. Why? Then you start looking. Configuring, adding, we spend a lot of time for making this tool convenient to use.”
Start-up B	Challenges	Product / Service market penetration	“With finding customers, where we could install the product. There were customers discovered over time, but we wanted bigger clients.”
Start-up C	Challenges	Product / Service market penetration	“Most importantly, is there is demand, because often many people think that they have the best product, they fall in love with their product and do not listen what the market says. And you can invest a lot of money and do not have any demand for the product.”
			“Maybe the second stage. All those contracts, scaling. Well, if go to prehistory, the fear existed of the product readiness – if it will be good or successful enough. <...> And after two or three contracts you are hoping to sign one or two every single month and, for example, when three months passed and you did not sign any and can't sell ... oh then you start “thinking”, this is the first “cold shower”.”
Start-up F	Challenges	Product / Service market penetration	“In principle we were looking for a bigger market. Obviously, we have found a range of limits, we have seen what kind of market is our primary market, that it is not big enough for us. We then saw that there are higher standards in the larger market, then we have clearly solved a lot of problems because there is a problem with having a capacity of

			people, they need to be discovered somewhere, recruitment problems, a variety of things and even after that we have considered whether to have a big company or a very small one.”
			“Clients were the second problem, because if you have a good team, there will be some customers at the beginning, but. Well the market, will you hit it?”

Also, the founders of start-ups B, C, and F stressed that there is a constant desire and a search for larger customers at the time of product penetration to the market, and this process influences the inner activity of the start-up – first of all, it disrupts the founder's state of confidence in his start-up (*three months passed and you did not sign any and can't sell ... oh then you start “thinking”*), and when start-up starts working with a larger customers or expanding into a larger markets, there is a need for additional employees, higher standards, new processes, and so on (*higher standards in the larger market, capacity of people, they need to be discovered somewhere*).

Start-ups founders, in response to the question “how do they cope with the challenges related to different start-up processes”, as a further challenge in start-up development, distinguishes the overall management of the organization (see table 13), which involves the necessity to develop a strategy (*You have to know your strategy well in the beginning*), the importance of having a structure / plan of activity (*The biggest problem was at the beginning. We had no working plan, we had to create it*) and a start-up team configuration – the need to have the widest possible team of experts in reducing overall organizational costs (*start-up configuration must be good to cover the core areas that are at the forefront <...> initial competencies must be in the team because they are very difficult to buy*).

Also, challenges in the organization's management sub-category are posed by contact-building activities that shift the founder's focus from start-up internal management to external, which also poses some organizational management challenges (*it's really a lot of traveling, it has moved away from other goals. This is another challenge*).

Table 13. Organizational management challenge faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up B	Challenges	Organizational management	“You have to know your strategy well in the beginning as well as which market are you aiming for. That is what causes the main problems in the beginning. We were all happy to start the start-up when we suddenly realised that no one really needs it. This way you can waste your time.”
Start-up C	Challenges	Organizational management	“It was our first Start-up, everything was new to us. From searching office, the team. My previous working experience in the company of 400 people really helped to get a general picture. A general picture of how all the processes should work, team managing, formation and so on. And the agenda. We offer flexible working conditions in our company – not permanently fixed working hours, etc.”

Start-up D	Challenges	Organizational management	“The biggest problem was at the beginning. We had no working plan, we had to create it, but we were not very efficient, we just didn't know how to work consistently, one day we was working in one way, other day in other way, and we was trying to strive our goal somehow, but we realized that with this type of work we was just standing in one place. But after a few months, we started discussing more, we realized that everything needed to be done more seriously, and then we started contacting others start-ups asking how they had solved all these problems. After that we created a big model of work, a working plan, and we started to do the sprints, with specific tasks which ones we should achieve at certain time period, do them purely – hundred percent functional and so gradually come to the goal.”
Start-up F	Challenges	Organizational management	“How we can get to the markets. Meanwhile, it's really a lot of traveling, it has moved away from other goals. This is another challenge for the start-up (but here is a separate topic) <...>.”
			“And, as all start-ups say, the start-up configuration must be good to cover the core areas that are at the forefront. I have in mind that the initial competencies must be in the team because they are very difficult to buy, at least at first stages. And here's even more questions about how to have those competencies higher, because they are never enough. Here, when you think about it, the problem is always, you have to always have better competencies every day, but also a better psychological and motivational attitude to deal with it. This is very important.”

According to the start-ups' founders, the organizational management challenges can be more easily solved by consulting with external partners (*we realized that everything needed to be done more seriously, and then we started contacting others start-ups asking how they had solved all these problems*) or having a working experience in a large company (*My previous working experience in the company of 400 people really helped to get a general picture*). It can be assumed that learning from others mistakes that have already been made or solved, or having the opportunity to utilize previous work experience, can quickly and smoothly cope with the work culture of the start-up, create the core business processes and work model.

The lack of business knowledge / development challenge is strongly linked to the lack of organizational management knowledge in start-up activities, but this category is more focused on business development decisions than on the challenges of management (see table 14). The founders of Lithuanian technology – based start-ups emphasized that the challenge of developing start-ups was precisely because of the start-up development processes were completely new to them (*Everything was new. I had no experience at all; is the lack of knowledge*). It is also stressed that the lack of business knowledge leads to the creation of inaccurate and unclear business model canvas (*one of the biggest problems is clear, precise, concrete, you can say a business plan or at least BMC*) and that it continues until the start-up itself is not completely pure and does not truly understand the performance of its' product.

Table 14. Lack of business knowledge / development challenge faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up A	Challenges	Lack of business knowledge/ development	“Everything was new. I had no experience at all. We just tried. The main engine was motivation, me and my friend. We wanted to do something, so we sacrifice our free time and because of that we move on.”
Start-up E	Challenges	Lack of business knowledge/ development	“The biggest difficulty and problem, at least in our case, is the lack of knowledge. When you do something from scratch, there will always be some aspect where you just don't know what to do. Then you invest your time and resources to know something about it.”
Start-up F	Challenges	Lack of business knowledge/ development	“Next, there are a number of smaller problems, but one of the biggest problems is clear, precise, concrete, you can say a business plan or at least BMC, canvas, where you really see what you are doing, with who you do it, how much you do, who you do it for, what value what are the advantages that differ from others. These things they are so specific that until you know exactly what the product is and how it works, it is very difficult.”

Thus, it can be assumed that this challenge is solved over a longer period of time, when the start-up founder and team gain sufficient knowledge in practical situations or through high motivation, free time and resource sacrifice.

Start-ups B, C and F also encountered customer identification problems in their start-up activities (see table 15).

Table 15. Customer identification challenge faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up B	Challenges	Customer identification	“Attempts were made to adapt to different customers”
Start-up C	Challenges	Customer identification	“The same was with the first customers – we purify them just by trying work with them. We had 2 clients to see how the System works, what are the difficulties”
Start-up F	Challenges	Customer identification	“In fact, this was a very interesting process, because at the very early stage, we had the greatest choice and the least specificity of what to do. We knew what we wanted to do, but it was precisely the market that needed approval on what we wanted to do and what the market needed.”

As highlighted in the theoretical part, customer identification and product modification processes also exist in practice of Lithuanian start-ups. Start-up B working with the cloud-enabled platform tried to adapt the product they created to different users through various product modification processes (*Attempts were made to adapt to different customers*). Meanwhile, start-up C working with ID scanning software identified his client picture only after working with two different customers. According to this start-up founder, the experience with two different clients enabled to check the functionality of their software and to clear all the inaccuracies of the system (*We had 2 clients to see how the System works, what are the difficulties*). The founder of the start-up F stressed, that they were constantly working with the market to identify their product customers and to decide how to modify the product because they

didn't have the knowledge at the beginning and did not know how to do it (*very early stage, we had <...> the least specificity of what to do <...> what the market needed*).

After analysing the challenge of start-up customer's identification, we can assume that start-ups will modify their product by trying to respond to market needs and tailor it to different customer needs, thus attracting a constant customer.

While analysing challenges in the sales category (see table 16), it can be seen that start-ups overestimate their initial sales opportunities (*we looked to everything through pink glasses because we were expecting better sales*) while ensuring a high level of sales is a major challenge for start-ups. These faced challenges repeats to the problems of this challenge described in the theoretical part. As the start-up develops its' activities, the sales process becomes longer, as sales volumes begin to grow, but larger sales require longer procedures to ensure them (*larger customers, larger operations, more people should approve it so we need to talk and debate more, prepare more plans*). As a result, it can be assumed that sales start to grow as the start-up expands, but their implementation starts to take longer due to their extended implementation procedures.

Table 16. Sales and Duplication challenges faced by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up C	Challenges	Sales	“On the other hand, we looked to everything through pink glasses because we was expecting better sales. The first contracts took 2 weeks to close them, and now last for two and three months, because customers now are different, larger and the market is wide, many competitors. So now we are switching to larger customers, larger operations, more people should approve it so we need to talk and debate more, prepare more plans.”
		Duplication	“In short, maybe we did a small mistake, because where was one case, one investors who went out with their product... did the same like ours. The people worked in that sector and had ideas by themselves, and we was trying to get very good conditions, so the rejection reaction came.”

Also, the founder of start-up C has identified another challenge in their work, which is not mentioned in the theoretical analysis – it is a replica of their product launched on the market (*where was one case, one investor who went out with their product... did the same like ours*). This challenge arose from communication with one of the potential investors who had unacceptable conditions for them from the start-up and consequently created an identical product that was and still is on the market. As a result, it can be assumed that communication with external partners in initial start-up activities can pose major challenges to the availability of a start-up product duplication.

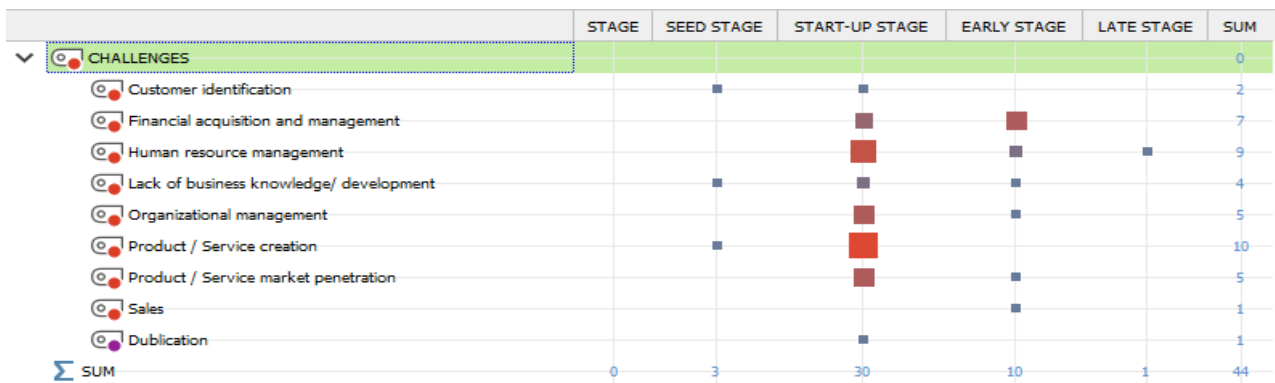


Figure 11. Code category challenges and category stage relations in analysed start-ups

After analyzing the challenges of Lithuanian technology – based start-up activities, it is important to link them with the stages of start-up development and to identify the relation between the challenges and the different stages of start-up growth (see figure 11). By comparing arrangement of challenges in the different stages of the start-up exposed in theoretical analysis (see table 5) and the challenges in the different stages founded in this research, it can be observed that the research examples basically justify the theory with a few exceptions.

Lithuanian technology based start-ups do not name financial acquisition / management and organizational management of one of the emerging challenges in seed stage, although in theoretical part they are distinguished as characteristic for this stage. However, unlike in theory, respondents at this stage distinguish the challenge of customer identification. Start-up stage as in the theoretical analysis is the stage in which the most challenges arise, but unlike in theory, at this stage, Lithuanian technology – based start-ups do not face a sales challenge. Analysing the early stage interface with the challenges faced by start-ups, it can be seen that at this stage, with the theoretical analysis, Lithuanian start-ups do not face the challenge of product / service creation. Analysing the late stage interface with the challenges faced by start-ups, the start-ups investigated in this research face fewer different challenges at this stage compared to the theoretical justification, but it is important to mention that only 3 of the investigated start-ups state that they are in the late stage or have just reached it.

Based on the code category challenge and category stage relations (see figure 11), it can be assumed that Lithuania's technology based start-ups face the most challenges in start-up and early stage, and most often the challenges at this stage are related to the development of the product / service, human resource management or financial attraction and management.

4.2.2. The overcome of challenges by exploring and exploiting opportunities in analysed start-ups

Lithuania technology based start-ups explore and exploit emerging opportunities from different sources, but as can be seen from distribution of opportunities frequencies (see figure 12), the most frequently occurring opportunities are explored and exploited from market, technology or potential users of the

product / service (this is justified by the maximum number of encoded segments in the "SUM" column and the maximum size of the symbol – circle which size refers to all coded segments).

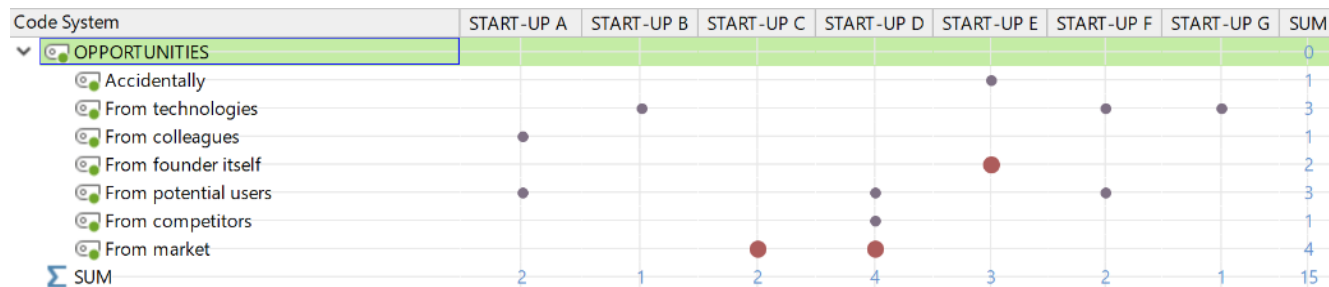


Figure 12. Distribution of opportunities frequencies across analysed start-ups

Start-ups ability to explore and exploit opportunities in practice could be named as success factor of start-ups activity and could minimize or help to avoid faced challenges. While analysing different areas where Lithuania technology based start-ups explore opportunities (see table 17), it could be seen 7 different areas identified by interviewed respondents.

As mentioned above, most frequently analysed start-ups explore and exploit opportunities while analysing current situation of the market and while trying predict the future trend (*predicting what will be in the half-year <...> future law on data protection; started to look what perspectives are in this field, and we saw that in Lithuania there is no such apps*), so if start-ups wants to ensure demand on the market and avoid customer identification, product creation and sales challenges they should constantly monitor the market and look for untapped and emerging market opportunities.

Also those start-ups who are working in the field of technology, often explore and exploit opportunities by new emerged technologies in the market. As the founder of the start-up B stated, they were able to create their product only because they had a new technological innovation on the market (*at that time the new technology that had emerged seduced us*). Similar situation with opportunities recognition through technology was for the founder of start-up F. When they were creating their start-up product they used all of the newest technologies on the market (*how to use all the latest things that just evolved at the same time when we did it*). The product provided by the start-up G was determined by the expected mobile robotics technology trend (*that mobile robotics are coming, we saw mega trend*). It can be assumed, that while exploring and exploiting opportunities imposed by technologies the challenge of product / service creation could be reduced or avoided.

Third area in which start-ups most frequent explore and exploit opportunities are “from potential users”. The start-up A founders communication with potential customers discovered the opportunity to create the current offered product – so listening to the needs of the people in the area where the founder of the start-up worked before created the opportunity to discover the idea of a potential demanded product (*Opportunities arise from the daily basis while communicating with customers*). The founder of start-up D also explored the additional product capabilities while communicating with clients (*meet up with companies <...> they have said, that when there will be added a cash registers, we can then negotiate*), and for start-up F founder – to confirm the expected demand for the developed product (*this showed us*

very clearly that we hit that area successfully). That is why it can be assumed, that exploration of opportunities through communication with potential customers, could help to avoid customer identification, product / service creation and product / service market penetration challenges.

Table 17. Opportunities recognized by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up A	Opportunities	From colleagues	“It all started from practice, while working and communicating with colleagues.”
		From potential users	“Opportunities arise from the daily basis while communicating with customers. For me it is important to work as efficiently as possible, to reduce the amount of notes and paper. I am using the program myself, I am constantly talking and presenting it to my colleagues, improving together, and the possibilities came from that dialogue. For us, the whole process is constantly dictated by the market. A wish is to use all the opportunities of the market (researcher's note: exploitation).”
Start-up B	Opportunities	From technologies	“At the time when the start-up was being created, a new technology was created that was used to create that product, because it was a product from the IT field and it was video platform with its various capabilities, at that time the new technology that had emerged seduced us and the market was booming in communication via telephones, browsers, smart TVs, and that's why it was trying to exploit that technology and develop such a product. This is a key and technological aspect, because in our field, IT, the emergence of technology is a big part.”
Start-up C	Opportunities	From market	“Yeah, it was like lobbying ... predicting what will be in the half-year (it's about the future law on data protection) and be on that exact time and in the right place.”
			“These market opportunities depend on the legal framework, both in Europe and in other countries. That's why we are currently analysing those laws in other countries, what are the differences between them, how many competitors are there and so on.”
Start-up D	Opportunities	From market	“<...> we started to think about the future and we saw that we would like create something with discounts, with all discount cards and so on. That's where we started to look what perspectives are in this field, and we saw that in Lithuania there is no such apps, there are some but few, but they are very simple, with few functionalities and everything in them is based on coupons, but they do not have high percentage of market.”
			“We have noticed that this market is not so big, that prospects are really great, because apps are very popular and especially from discount cards. We can see that many people going to the stores, accumulates those discount cards and it is uncomfortable for them. And in those cases when they forgot to bring a discount card, they will not get those discounts. And in our app, everything will be inside, so there are many prospects.”
	Opportunities	From competitors	“In fact, we have discovered the possibilities by simply analysing the products that was already created, what their functionalities are now, and we saw that those other apps have very little functionality and that those apps do not give much of opportunities for user and the company.”

	Opportunities	From potential users	“Co-founder started to meet up with companies and started to present our product and checked how companies respond, whether they were fascinated or not. Most of them was fascinated, but big networks like Charlie, Grill London, Republic, all petrol stations, they have said, that when there will be added a cash registers, we can then negotiate because they like it very much, but unfortunately it is now a bit problematic because it really needs enter the same system into cash registers and then serve through a computer, platform.”
Start-up E	Opportunities	From founder itself	“From personal experience, it was not inspired by any project, or by haketon, it just arose from the ambition to construct something.”
	Opportunities	Accidentally	“At first it was a combination of predilection and hobbies because I always was building and riding a bicycles.” “This was the first stage of business, when businesses showed interest in my product, when my business trips started and then I started to thought who could join the project and then, the business showed that they are interested, essentially. Then the first light came on, so I thought, it is really possible to do something with this product. After I had chosen a company to work with, we launched the first Kickstarter. Until Kickstarter, it was a complete game for myself, a hobby, a build-up game, a look at the abundance, no illusion of potential markets, consumer needs, market access, or other general business-related things.”
Start-up F	Opportunities	From technologies	“These are private training mainly with a new audience and technology training because I saw the need in that field. But I obviously had a lot of ideas on how to do it better or how to use all the latest things that just evolved at the same time when we did it, and very naturally, various events that took place in the ecosystem at the very start.”
	Opportunities	From potential users	“We just learned that the one out of 4 areas is doing the best. Our figures were that one area was 90-95 percent interest compared to others. And this showed us very clearly that we hit that area successfully, and then it turned out that we were all-in in that area basically.”
Start-up G	Opportunities	From technologies	“Just few understands, and we already had a people, the one's which already knows how to act with it and we saw, that mobile robotics are coming, we saw mega trend, that it will be similar at it was with mobile phones, when in 20 years from very luxury, when just businessman's could afford it, it went down to students, when they have 2 phones. It's mega trends and everyone says, that it will be the same with mobile robotics.”

Also, founder of analysed start-up E, explored and exploited opportunity because of his hobby and everyday activities (*it just arose from the ambition to construct something; it was a complete game for myself, a hobby, a build-up game*), so the targeted pursuit of persons interests and accidental observation of potential can be exploited as an opportunity which one can help to avoid the challenges posed by the product creation category.

As the communication with clients helps to explore and exploit opportunities, likewise communication with colleagues helps to do the same (*It all started from practice, while working and communicating with colleagues*), and it also could help to reduce the challenges of product / service creation and lack of business knowledge / development. Finally, constant observation of potential competitors and analysis of their products creates additional opportunities and helps start-ups to improve continuously (*we have*

discovered the possibilities by simply analysing the products that was already created) as well as avoid challenges mentioned above.

By combining the above-mentioned emerging opportunities with start-up growth stages, it can be seen that in start-ups development there are two main stages in which emerging opportunities are explored and exploited – seed and start-up (see figure 13).

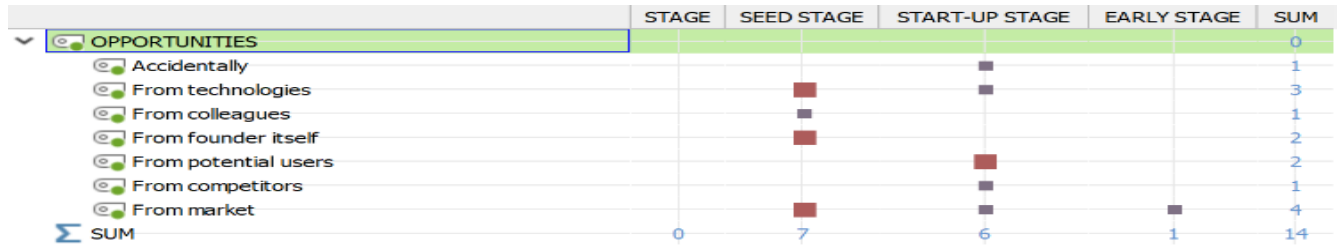


Figure 13. Code category opportunities and category stage relations in analysed start-ups

It is important to mention, that the reasons for the emergence of opportunities are linked to the characteristics of the start-up stages, i.e. in seed stage, the founder is mainly working on the idea itself, checking it and purifying it, which is why the emergence of opportunities is most closely related to the founder of the start-up, the technologies that appeared on the market at the time or the market trends. Meanwhile, the emergence of start-up ideas in the form of a real product, formation of the team and potential customers, is more likely to be associated with the start-up environment of this period.

4.2.3. Organisational learning practices used by analysed start-ups

Continuing the study and analysing which and how the organizational learning practices are used by the analysed start-ups (see figure 14), it can be observed that integrative behavioural learning is the most commonly used method of organizational learning (this is justified by the maximum number of encoded segments in the "SUM" column and the maximum size of the symbol – circle which size refers to all coded segments) and the group of behavioural learning is the biggest (7 recurrences in the analysed start-ups, based on "SUM" column indicators). Therefore, it can be assumed that Lithuania technology – based start-ups are more likely to learn from mistakes than by applying cognitive or action learning practices.

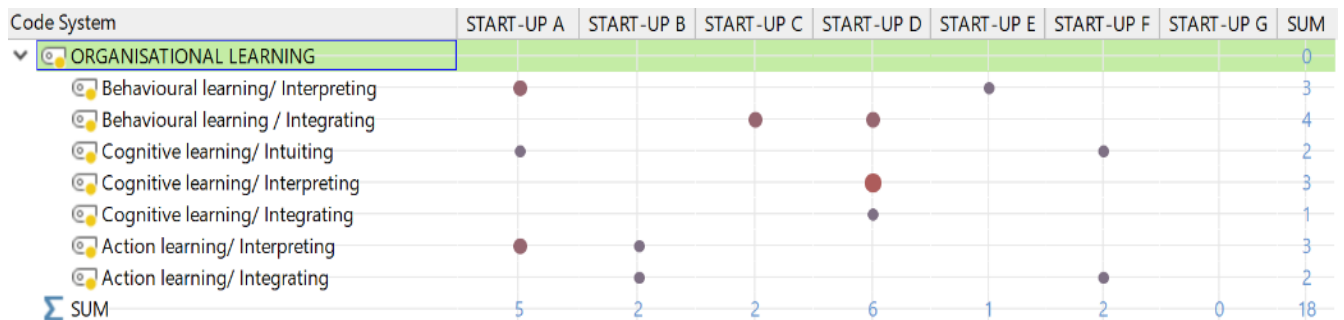


Figure 14. Distribution of used organizational learning practices frequencies across analysed start-ups

While analysing the dynamic process used in start-ups organizational learning, it can be observed that most often learning methods are interpreted (level 2), i.e. start-ups' teams are trying to understand the verbal and non-verbal communication of whole organisation when certain actions are performed. It can also be noted that in start-up activities, when the actions of colleagues are already interpreted, it's followed by a fairly frequent integration process, according to that, it could be assumed that Lithuania technology – based start-ups are trying to generate a common understanding of all members of the organization, implement coordinated actions in start-up activities and approach institutionalized processes in their activities.

As mentioned above, in Lithuania technology – based start-ups the method of behavioural learning is used the most. This method is interpreted and integrated in organization activities (see table 18). As is typical for this learning method, start-ups investigate the responses of their team members and their product / service users to a particular company's routine (*constantly talking and presenting it to my colleagues; talk to our customers, get feedback*). While analysing answers of respondents, it could be seen, that, as it is the case in this learning method, the start-up teams are learning from their mistakes (*We didn't really know that. We learned this from this very difficult situation. We fell, we get up, we learned and we did it again*), but this type of learning extends the final product / service result due to the required fixes only after the malfunction has been implemented (*we often think one way, but after a week we say no, this is really wrong and we should do it differently*).

Also, it is important to state, that routines which arise from behavioural learning at first are used in the group, and later are transmitted to other group and because of that becomes common for the whole organization (*sales team will communicate with the IT department*).

After analysing behavioural learning method in start-ups' activities, it can be assumed, that Lithuania technology – based start-ups are learning from their own mistakes, and they are analysing the reactions of both their own people and their external partners, and adapting that information to the results for improvements of start-up product / service, first by interpreting and checking it in smaller work teams and then integrating across the whole organization.

Table 18. Behavioural learning practices and dynamic processes used by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up A	Organisational learning	Behavioural learning/ Interpreting	“We talk to our customers, get feedback from them and according to that feedback we are fixing the app.”
			“I am using the program myself, I am constantly talking and presenting it to my colleagues, improving together, and the possibilities came from that dialogue.”
Start-up E	Organisational learning	Behavioural learning/ Interpreting	“Before the first kickstarter in 2013, we didn't even suspect that it would be so complicated to have so many new components created, tested, launched on the market. We didn't really know that. We learned this from this very difficult situation. We fell, we get up, we learned and we did it again. And after a little, we've solved those problems.”
Start-up C			“And inside - it's probably through practice mostly. At this time, in our budget training is not include, maybe just marketing trainings. Yes, the

	Organisational learning	Behavioural learning / Integrating	team goes to sales and marketing trainings. Mentors come, and so on. If our plan is to expand and move forward as soon as possible, then is no time to make a mistakes, to move aside, we need to be focused.”
			“Now, we are trying very hard that sales team will communicate with the IT department. Because from sales feedback comes from the customers, so the sales people should emphasize what the client wants for IT department and only then the priorities come up, continuous refresh..”
Start-up D	Organisational learning	Behavioural learning / Integrating	“All the decisions are made by our main manager. When we started to have meeting, he saw a lot of challenges in our app, so he decided to add extra members to the team so that it would be possible to solve all of our challenges as soon as possible, to optimize our system and as quick as possible adapt to our users, businesses and employees.”
			“Every Wednesday we are doing a team meeting, where every manager presents in what position they are in the process of app development. If any idea comes to our minds we all are discussing about it, how to apply it in the best possible way. But we often think one way, but after a week we say no, this is really wrong and we should do it differently. We always conduct our own internal discussions to deal everything at the best.”

Lithuanian technology – based start-ups also are using cognitive learning method in their activities (see table 19), in order to ensure learning processes, rather than respond to the consequences of the behavior of the start-up team members. The use of the cognitive learning method in start-up activities is very closely related to the founders of start-ups, because first of all they promote the application of this learning process by intuiting it.

According to respondents answers, it could be seen, that start-ups use this method by trying to get the particular knowledge in a field from more experienced and capable of providing this necessary knowledge person (*main manager had travelled through all the companies which ones are connected with the start-ups community <...> asked for advises; we started contacting others start-ups asking how they had solved all these problems; We communicated with Invest Lithuania, with all the other start-ups and with others, to get the best of possible knowledge*) also by learning from those team members, the ones that have the extraordinary skills in the particular field (*experience gained from previous practices; knowledge we already had*).

Most commonly, purposefully gained knowledge is interpreted by start-up teams in an attempt to absorb the best and most appropriate solutions proposed for their activity, and later integrate the most appropriate information in their processes (*to adapt our entire model as best as we can*). Because of that, it can be assumed that cognitive learning method is exploited to transform purposefully acquired knowledge into a shared start-up knowledge that improves operational processes and creates competitive advantage.

Table 19. Cognitive learning practices and dynamic processes used by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up A	Organisational learning	Cognitive learning/ Intuiting	“Education helped a lot (engineering), off course experience gained from previous practices and ongoing work with a customers.”
Start-up D	Organisational learning	Cognitive learning/ Interpreting	“So our main manager had travelled through all the companies which ones are connected with the start-ups community. He presented our business model, asked for advises, where are our mistakes and where our pluses. He has few colleagues whose are working with start-ups, so they also asked advises from surrounding people how to make our product better. So he has tried to get the most knowledge, experience and see problems which ones we can face in the future or now.”
			“Are the Invest in Lithuania helping <...> Yes, they helped – to get in touch with the investors, advised whit whom is the best to cooperate to get the biggest funds.”
			“But after a few months, we started discussing more, we realized that everything needed to be done more seriously, and then we started contacting others start-ups asking how they had solved all these problems. After that we created a big model of work, a working plan, and we started to do the sprints, with specific tasks which ones we should achieve at certain time period, do them purely – hundred percent functional and so gradually come to the goal.”
		Cognitive learning/ Integrating	“We communicated with Invest Lithuania, with all the other start-ups and with others, to get the best of possible knowledge and to adapt our entire model as best as we can.”
Start-up F	Organisational learning	Cognitive learning/ Intuiting	“It all started with the knowledge we already had. Just in the same field, in the same sector - in the training sector and in the technology sector, but also because at least a few dozen people have always been around in my circle of friends who did it all the time and where I was able to watch and actively do it myself the same. It was a talking to those people and listening / seeing what they did, which allowed me to analyse for some time, that it was "what" we wanted to do and it was clear that we could move quickly afterwards. I was like the main founder who knocked the whole idea up to business. As my colleague said, we already knew how to do it because in the end we knew all the steps before we started to develop in general.”

The last method of learning in organisational learning also is being used in Lithuania technology – based start-ups’ activities (see table 20). According to responses gathered from respondents, it could be seen, that this method is used to follow up on a common team solutions with quick actions, to find the best way to improve the product (*someone has an idea, then we would discuss it together, see it to fit or not, and then deciding whether to implement it; in the form of communication and discussion, ideas were born and implemented*), after the founder and the team discussion (*development opportunities are inevitable <...> conversation between the founder and the staff*) or after receiving valuable knowledge from outside consultants (*People from the side looks into our idea, analyse it and that helps me and team a lot*).

Table 20. Action learning practices and dynamic processes used by analysed start-ups

Start-up	Category	Subcategory	Justifying statements
Start-up A	Organisational learning	Action learning/ Interpreting	“But most of the learning came from team meetings.”
			“Accelerator helps with everything - for me it is the first time, everything is new, but very interesting. We receive training in different fields - finance, marketing, sales. I haven't heard so much information about my idea yet. People from the side looks into our idea, analyse it and that helps me and team a lot.”
Start-up B	Organisational learning	Action learning/ Integrating	“Regarding the functionality of the program itself, we made some common solutions here, whether someone has an idea, then we would discuss it together, see it to fit or not, and then deciding whether to implement it in the system. It is this team.”
		Action learning/ Interpreting	“We talked and made decisions together, we were one team. In the form of communication and discussion, ideas were born and implemented. I also think that we were in contact with people in Lithuania, there were various conferences, various events where we communicated with angels' investors, we didn't get investments, but we got various tips on how to move, what to do, how to purify the idea and so on.”
Start-up F	Organisational learning	Action learning/ Integrating	“Yes, product development opportunities are inevitable. A simple form is the conversation between the founder and the staff going on every day. And it is about these things.”

Prior to the start-ups coordinated actions, triggered by the action learning method, the received information are first embedded in the start-up team and later, after verification, integrated into the organization as a whole.

4.2.4. Recommendations for technology – based start-ups development

These recommendations can be formulated based on the results of the research:

Technology-based start-ups in the seed stage should focus on identifying customer for their product / service, product / service development process and acquisition of business knowledge, as these areas present major challenges at this stage. Based on the analysed start-up’s experiences, it is recommended to communicate with potential customers on a regular basis, as this process simplifies the client's identification challenge and avoids the deployment of excess functionality and waste of time in the product development process when it is not fully purified. This can be overcome with the use of organizational learning behavioural method when the feedback from potential clients has to be discussed together in the team and further product adjustment processes are overcome by correcting the mistakes that have been made so far in the product. It is also important to constantly monitor and analyse the market, to try to anticipate its tendencies, both in the identification of the clients and in the creation of the product, as it was the most frequently used opportunities for the analysed start-up's in seed stage, which helped to deal with mentioned challenges. As business knowledge deficiencies are also raising challenges at this stage, it is advisable for start-up developers to participate regularly in the start-up's ecosystem before starting the start-up and during the first development phases, which can provide the

primary knowledge needed for business development, especially when it comes to acquiring certain required information using cognitive learning method.

Since the start-up stage is the most challenging phase in the development of analysed start-ups, it is recommended to focus on the areas of product / service development, human resource and organizational management at this stage in the activity of Lithuanian technology – based start-ups as these areas are identified as the most problematic by research respondents. As with the seed stage, communication with potential or existing customers is also important at this phase to overcome product / service development challenges. This challenge can be decreased by monitoring competitors on the market, by analysing their product / service and finding some gaps that would be relevant to consumers, thus overcoming possible practices of the action learning method. Responding to the challenge of human resource management, based on the results of the study, it may be recommended to look for alternative ways to increase employee motivation – which are more common in labour market for start-up teams, business partners - which, if necessary, allow them to hire highly qualified specialists for a certain period of time or in a shortage of some expertise – to prepare and train such specialists inside the start-up environment. In order to solve the challenges of organizational management as smoothly as possible, it is advisable to consult with partners from outside (cognitive learning) or to overcome the behavioural method of organizational learning by learning from mistakes.

Since the start-ups in the technology – based field are still facing challenges with human resource management in early stage, it is advisable at this stage to continue to look for alternatives to increase employee motivation and ways to keep them in the organization. Most of the challenges at this stage arise in the area of financial acquisition and management, which is why it is important while trying to attract investment have a clear financial and business plan and while managing financial resources within the organization to avoid financial errors, not to start or try to do more than it is possible at that moment from financial perspective. It is in such situations that the action learning process is used most often because of a quick reaction and problem solving at a given moment.

Of the 7 analysed start-ups, 2 have reached the late stage, resulting in recommendations for technology-based start-ups operating at this stage only of two start-up practices. At this stage, human resource management processes are still challenging, which is why it is advisable until this stage to create a clear human resource management system that includes employee motivation, work culture and a targeted employee redirection process to achieve common organization and personal goals. At this stage, it is also important to keep the market under constant monitoring as the main potential possibilities arise from it and help avoid other challenges that may arise at this stage. It is also recommended that at this stage all organizational learning methods be institutionalized throughout the start-up organization.

CONCLUSIONS

1. Having analysed the current general situation of the international start-up's market and the start-ups of Lithuania, it can be stated that the start-ups of the Lithuanian and global markets are mostly established in various *technology* sectors, face the same challenging areas (such as factor of entrepreneur, team, market, finance and business knowledge) and acknowledge the benefits of start-up learning (major positive impact). However, the combination of technology-based start-ups and the challenges they face in their growth is not explored or analysed only in a fragmentary way, and the role of organizational learning in technology-based start-ups is almost intact. Since the problem is not addressed holistically, based on the analysis of the problem, it is necessary to investigate the challenges of technology – based start-up's activities, as this field of start-up's is the widest, and statistics show that more than 50 percent of start-ups fail during their first five years, that's why identified challenges, their possible solutions, and analysed and enabled learning in technology – based start-ups can contribute to their success.
2. Analysed scientific literature have revealed that start-up activities are influenced by all the components within and inside its environments, such as the start-up's founder - the entrepreneur, the type of start-up itself, the processes it implements and the surrounding ecosystem. Each stage of start-up growth has its own characteristics and activities, but the refined key eight challenges (customer identification, financial acquisition and management, human resource management, lack of business knowledge / development, organizational management, product / service creation, product / service market penetration and sales) of start-ups are not correlated with a particular stage (seed, start-up, early, late) of start-ups growth – they occur and recur in several different stages. Similarly, the scientific work clearly defines the aspects of organizational learning – its methods (behavioural, cognitive, action), dynamic processes (intuiting, interpreting, integrating and institutionalizing) and the benefits of its application, such as enhancing competitive advantage, constant market monitoring, promoting a common organizational culture, and ensuring inter-knowledge sharing. As a result, it can be stated that the theoretical analysis has revealed eight major challenges for start-ups and developed benefits of enabled organizational learning. Also a theoretical framework has been formed. The framework is based on the conceptualization of a start-up's entrepreneur, types, processes, and ecosystem, with different start-up development stage and challenges arising from them. Similarly, it defines organizational learning and the benefits it provides are acquired through different learning methods and dynamic processes. The developed framework defines possible solutions to the challenges of start-up growth by adapting organizational learning practices.
3. Methodology was created for qualitative research of case analysis, used method of data collection: semi – structured individual interviews with data enriching from additional material about the analysed start-ups. Four critical criteria were applied to the respondents, which is why the research results are only applicable to SME's operating in Lithuania, in the field of technology and not to the whole sample. The study was implemented in five steps sequence while respecting the confidential principles.

4. The conducted qualitative research showed that:
 - 4.1. Lithuanian technology-based start-ups face these challenges: customer identification, financial acquisition and management, human resource management, lack of business knowledge / development, organizational management, product / service creation, product / service market penetration and sales. The research also identified the challenge of duplication of technology – based start-ups, which was not enlisted in the theory. After analysing trends in the emergence of challenges at different start-ups' stages, it could be stated that technology – based start-ups face the most challenges in the start-up and early stage.
 - 4.2. Lithuanian technology – based start-ups explore and exploit opportunities by analysing technological innovation, market, competitors, communicating with potential customers and colleagues working in the same field, and exploring their hobbies or even by accident. These explored and exploited opportunities can help to meet demand and market sales, identify customer profiles, create attractive and functional products / services, and provide missing business management and development knowledge. The exploitation of opportunities is directly linked to more efficient start-up activities and the reduction of emerging challenges.
 - 4.3. Lithuanian technology – based start-ups use three organizational learning methods for their learning: an error-learning approach, learning both from their own mistakes and from externally named, experienced and deliberately assured learning method, when start-up teams learn from their own entrepreneur with the necessary knowledge or from other external individuals who can provide the required knowledge and quick responses method, where fast team and manager decisions are made in a time-consuming environment. Learning mentioned in their activities is accepted intuitively, later interpreted and integrated, but Lithuanian technology-based start-ups have not yet institutionalized the benefits of organizational learning.

Based on the results of the research, recommendations are formulated that relate to each stage of start-ups development. Future research might cover analysis of the challenges and organizational learning practices of start-ups, it is recommended to focus more on a ways to solve the challenges through the use of organizational learning benefits. Try to find a closer relationship between the challenges faced by start-ups and organizational learning practices. More extensive researches (e.g. quantitative) can be carried out covering different sectors.

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APPENDICES

Appendix 1. Questionnaire of the research

Stages:

Seed Stage: the new venture founder has only the idea of a potentially profitable business

Start-up stage: formed business; product in development, being introduced to the market

Early Stage: slowly expanding, producing and delivering their products and services.

Late stage: the company is mature and profitable; usually still tend to expand.

1. How did you create the current start-up? How did everything start?

- Networking
- Learning
- Other

2. How did you managed to recognize the opportunity?

- In different stages of the start-up
- Recognition of opportunities in international markets
 - exploration
 - exploitation
- Opportunities depends on start-up stage and may be related to:
 - Market opportunities
 - Business model opportunities
 - Product / service opportunities
 - Resources

3. How did you cope with the challenges (such as product, team building, markets, technology, etc.) posed by innovation?

- Opportunities identified in the previous question helped the innovations to emerge. What challenges did they bring that the start-up had to face?
 - New competencies
 - Increased demand of resources
 - Barrier of the market
 - Other
- Implemented solutions
 - What helped when challenges was faced
 - Vidiniai veiksniai (entrepreneur competencies, i.e.)
 - External factors (cooperation with investors, i.e.)
 - Other
- Learning:
 - Start-up experience
 - Management experience
 - Team building stages
 - Inter-organizational, organizational

- Specific industry experience

4. How your learning as an entrepreneur did took place (individual level)?

- Personal characteristics
- Education
- Experience

5. How did your network expand? How has it evolved?

- Bottom to top:
 - Intra-Community Relations (family, friends, homogeneous acquaintances / connections)
 - Extra communities (organization support based on communities)
- Top to bottom:
 - Connections of private sector (for example, banks);
 - Connections of public sector (government organizations).
- Networking connections “goals and benefits”:
 - Funding
 - Partnership
 - Key executives
 - Recruitment
- Forms of networking:
 - Business angles
 - Other
- Knowledge/financial resources/connection to networks/ other:
 - Activities
 - Opportunities
 - Other
- Stakeholders networking expansion and deepening mechanisms.

6. When did you face the biggest challenges? How did you manage to deal with them?

- Main challenges / problems
 - When?
 - Why?
 - How?
 - What?
- Mistakes
- Challenges:
 - While understanding identity
 - While discovering identity
 - While “creating” identity (realizing, consolidating, implementing)
- Success factors.

7. Is there anything else you would like to add on this topic or share your experience?

Appendix 2. Code categories and subcategories of the research

1. CHALLENGES

- 1.1. Customer identification;
- 1.2. Financial acquisition and management;
- 1.3. Human resource management;
- 1.4. Lack of business knowledge and development;
- 1.5. Organizational management;
- 1.6. Product / Service creation;
- 1.7. Product / Service market penetration;
- 1.8. Sales;
- 1.9. *Duplication.

2. OPPORTUNITIES

- 2.1. Accidentally;
- 2.2. From colleagues;
- 2.3. From competitors;
- 2.4. From founder itself;
- 2.5. From market;
- 2.6. From potential users;
- 2.7. From technologies.

3. ORGANISATIONAL LEARNING

- 3.1. Behavioural learning / Interpreting;
- 3.2. Behavioural learning / Integrating;
- 3.3. Cognitive learning / Intuiting;
- 3.4. Cognitive learning / Interpreting;
- 3.5. Cognitive learning / Integrating;
- 3.6. Action learning / Interpreting;
- 3.7. Action learning / Integrating.

4. STAGE

- 4.1. SEED STAGE
- 4.2. START-UP STAGE
- 4.3. EARLY STAGE
- 4.4. LATE STAGE