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A STUDY ON THE FAILURE REASONS OF TECHNOLOGY STARTUPS IN
ESTONIA

Master Thesis

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I have written this Research paper/Master Thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

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Abstract

This study investigates the failure reasons of technology startups in Estonia, employing a mixed-methods approach to identify common patterns of failure and provide insights for mitigating startup failure and promoting the sustainability of the startup ecosystem. Through analysis of survey results and thematic interviews with startup founders, critical factors contributing to startup failures in Estonia's technology sector are revealed, including inadequate financial planning, external environmental challenges, misalignment with market demands, deficiencies in team expertise, ineffective pivoting strategies, and suboptimal customer experiences. The study contributes theoretical insights by exploring these factors within the unique context of Estonia's startup ecosystem, offering practical implications for entrepreneurs, investors, and policymakers. While acknowledging limitations such as a small sample size for interviews, the research highlights the importance of continued investigation and adaptation to foster an environment conducive to startup success in Estonia and beyond.

Keywords: technology startups, Estonia, failure reasons, mixed-methods approach, startup ecosystem

Introduction

Startup success factors and failure reasons have been investigated in the literature for the past 50 years. There is a complementary balance between these studies. Many studies addressing startup success factors (Gill 2002; Marmer et al. 2012; Silva et al. 2015; Cockayne 2016; Prohorovs et al. 2019; Cohen 2019; Kee 2020; York 2020; Al sahaf 2021; Gerhardt 2021; Diaz -Santamaria 2021 etc.), many studies are focusing on the failure factors of startups (Ucbasaran et al., 2013; Bednar, 2017; Triebel et al., 2018; Cantamessa et al., 2018; Klotins et al., 2019; Mikle, 2020; Rafiq et al., 2021; Sahtiya et al., 2021; Ilyas et al., 2021).

The environment of uncertainty that startups are in and the factors brought by this environment are closely linked to the success of startups (Gerhardt, 2021). Recent studies in this field are either studies with particular specificity like a study on the digital media sector (Cockayne, 2015), effects of the lack of engineering practices on startups (Klotins et al., 2019), COVID-19 effect on startup failures (Ilyas et al., 2021) or global studies with certain limitations and data scarcity (Bednar, 2017; Cantamessa et al., 2018).

However, despite abundant research, a notable gap exists in the Estonian startup landscape. While extant literature has underscored universal failure factors such as cash depletion, market misalignment, and flawed business models (Bednar & Tariskova, 2017; Cantamessa et al., 2018; York, 2020; Mikle, 2020), its applicability within the unique Estonian context remains underexplored. Thus, this study aims to bridge this gap by addressing the central research question: 'What are the reasons for the failure of technology startups in Estonia?' This question will guide our investigation through various methodological approaches and analyses.

To achieve this objective, the study will undertake several research tasks and questions, including analysing relevant literature to identify overarching patterns and trends in the failure of technology startups, giving an overview of common patterns of errors to understand their role in startup failures, conducting surveys and interviews with founders and employees of failed startups to uncover specific reasons for failure, introducing results and describing impacts of failure, and providing actionable recommendations based on the findings to guide future entrepreneurs in mitigating risks and enhancing their chances of success in the Estonian technology startup landscape.

This paper aims to investigate the reasons for the failure of technology startups in Estonia and identify common failure patterns.

The rest of the article is structured as follows: The first part is a literature review covering the success and failure factors obtained in past studies of the startup ecosystem in Estonia. The second part covers the structure of the empirical study. The third part contains the study results, discussion, and conclusion.

CERCS code: S180

1. Literature Review

1.1. An overview of the startups and the differences between technology startups

The term "startup" literally means to initiate something. Oxford Dictionary defines this term as "The starting up of a business." Longman Dictionary, on the other hand, interprets this concept as "a new company that has been started fairly recently." While there is no universally accepted definition for this term in the literature, it is commonly used to refer to businesses that have recently commenced their operations.

Startup companies, by their very nature, represent newly established businesses that exhibit a distinctive blend of entrepreneurship and innovation. These enterprises are typically situated in the initial phases of their development, with a primary focus on pioneering novel products, services, or entirely innovative business models in the marketplace. (McRobbie, 2002) Characterised by their remarkable flexibility, adaptability, and a penchant for high-risk endeavours, startups aspire to either revolutionise existing industries or pave the way for entirely new ones. Often navigating through ever-changing and dynamic environments, they seek to harness technology, creativity, and unconventional strategies to address the evolving demands of the market. (Gill, 2002)

There are different approaches to defining the success of startups in the academic literature. (Kee, 2020) defines success in the context of startup firms as a multidimensional concept that can be evaluated through financial and non-financial indicators. According to

Gerhardt (2021), success is shaped by various success factors in the uncertain environment in which startups operate. According to another approach, definitions of startup success vary. Some include product/market fit, time/money balance, profitability, and growth (York, 2020). On the other hand, Díaz-Santamaría (2021) associates the success of startups with the ability to generate significant revenue.

Startups, particularly technology startups, are characterised by a greater emphasis on innovation and a higher likelihood of product innovation than established firms (Hölttä-Otto, 2013; Criscuolo, 2008). This is due to their focus on addressing global markets through technological, process, or business model innovation (Aulet, 2013). In contrast, traditional businesses have more resources and established routines but lack startups' agility and risk-taking propensity (Gonzalez, 2019).

1.2. Startup ecosystem in Estonia

The startup ecosystem, given its pivotal role in fostering economic expansion and propelling innovation across diverse sectors, has garnered considerable attention within the realms of academic and entrepreneurial research. Nevertheless, despite the delicate equilibrium that underpins their success, a significant portion of startups ultimately succumbs to failure. According to Gill (2002), integrating individuals into the workforce via startup employment is deemed socially significant and economically advantageous. As per McRobbie's (2002) perspective, startups represent an expedited and contemporary iteration of the conventional business paradigm.

As defined by Ziakis et al. (2022), start-up ecosystems encompass localised cultural outlooks, social networks, investment capital, and active economic policies crucial for innovation-based businesses. Escalfoni et al. (2020) elaborate, emphasising the ecosystem's role in providing infrastructure, administrative services, and networking to facilitate access to resources and funding. Tripathi et al. (2019) further refine the concept, emphasising the geographically limited region where stakeholders collaborate to support and nurture start-ups, aiming to boost domestic product development and generate jobs. The start-up ecosystem, as described by Ziakis et al. (2022), comprises vital players such as businesses, governments, universities, investors, and support organisations, collectively fostering an environment supportive of innovation-based businesses and entrepreneurship. This supportive environment

includes localised cultural outlooks, social networks, investment capital, and active economic policies essential for start-up growth and development. Interconnectedness and collaboration among ecosystem actors are vital for sustainability, particularly for high-tech and globally-oriented start-ups. Escalfoni et al. (2020) elaborate on this, highlighting the ecosystem's role in providing infrastructure, administrative services, and networking opportunities crucial for accessing resources like suppliers, funding, and technological support. They liken the relationships within the ecosystem to biological ecosystems, stressing the importance of interdependence and co-evolution for innovation and productivity. Tripathi et al. (2019) underscore the ecosystem's influence on start-ups through supportive interactions among stakeholders, available skills, financial support, market dynamics, and education, ultimately contributing to economic development by fostering the creation of successful start-ups.

Estonia, with a population of 1.3 million, is a small Baltic country. This small country has been an important starting point for technology startups over the past 20 years. Through several vital factors, Estonia transitioned from a resource-driven country to an innovation-driven one. One significant factor was the political focus on entrepreneurial values and economic policies prioritising innovation. Additionally, the state played a crucial role through its infrastructure decisions and educational programs, contributing to talent growth and the knowledge base of the entrepreneurial ecosystem (Trabskaja & Mets, 2019). The introduction of the Tiger Leap program into Estonian schools in 1996 was a pivotal moment in that growth (Mets, 2017). Estonia's startup ecosystem has rapidly evolved into a vibrant hub of innovation, propelled by a unique blend of factors, including government support, a tech-savvy population, and a culture fostering entrepreneurship. The country's digital infrastructure, epitomised by initiatives like e-Residency, provides a fertile ground for startups to flourish in various sectors such as fintech, e-governance, and cybersecurity. Estonia's commitment to nurturing startups is evident through initiatives like Startup Estonia, which provides vital support mechanisms, including mentorship, funding opportunities, and access to international networks.

Additionally, world-class accelerators like Startup Wise Guys and Lift99 amplify the growth potential for startups in Estonia. Successful entrepreneurs in Estonia, known for the "Skype-effect," also played a role in shaping the ecosystem (Trabskaja & Mets, 2019). This dynamic ecosystem, characterised by a supportive regulatory environment and a culture of

innovation, positions Estonia as a vital player in the global startup landscape. According to Dumas (2014), three significant factors enabled the Estonian startup atmosphere to what we can see today:

1. Being a small country lowered the barriers to launching innovative initiatives compared to other bigger nations.
2. Estonian startups tend to expand their operations internationally because the domestic market is small.
3. This small and dynamic environment has been effective in companies turning to agile solutions instead of traditional solutions.

Today, Estonia has reached an innovation-driven society and a high level of opportunity-driven entrepreneurship ecosystem, attracting the potential unicorns of future technology startups by providing a scalable, dynamic, feasible, and efficient environment.

1.3. Possible factors of technology startups failure and results of recent studies

There are many definitions of failure in the literature. Bednar (2017) explicitly mentions that failure can be attributed to inadequate product definition, incorrect estimation of customer needs and market potential, and issues with the revenue model. Cantamessa et al. (2018) define failure as a much more frequent outcome than success in the entrepreneurial context. The success factors and failure reasons of startups are closely reviewed in this subchapter

Although the success of technology startups is a complex phenomenon, this success and/or failure is highly affected by both the internal and external factors that the business is exposed to and the impact of the human factor on the process. Cockayne (2016) asserts that achieving success as a startup necessitates the attraction of potential funding, the establishment of a horizontal, non-hierarchical organisational structure, and the provision of flexible working conditions for employees. In the research conducted by Al Sahaf (2021), the impact of fundraising, experience, partnership, and knowledge was explored as potential determinants influencing the success of startups. It was observed that experience and knowledge positively contribute to achieving success in this context.

The impact of experience on the success trajectories of startups can manifest in diverse ways. Such variations may be contingent upon the founder's expertise in the relevant field, the knowledge and prior experience of the employees pertaining to the subject matter, and their engagement in the success or failure dynamics of a startup that operated within a comparable domain. According to Ucbasaran et al. (2013), previous encounters with failure can instil a sense of reluctance in founders towards pursuing future innovative opportunities, potentially leading to the transformation of failure into a persistent paradox. Lack of knowledge and experience of the founder in implementing business ideas; It leads to predictions that are far from reality and inadequate perspective evaluation. However, it causes difficulty in controlling operations without details (Prohorovs, et al., 2019). Cohen (2019) states that the background of entrepreneurs impacts accelerator programs and affects the startup's success in many ways.

Silva et al. (2015) state that pivoting significantly affects start-up success. Research conducted by Marmer et al. (2012) suggests that start-ups that pivot once or twice are associated with raising to 2.5 times more capital, experiencing growth up to 3.6 times better, and being 52% less likely to prematurely attempt business escalation compared to those start-ups that have pivoted more than twice or not at all. Other essential factors include hybrid working compatibility, ensuring profit/cost balance, and customer experience (Silva et al., 2015).

Sahtiya et al. (2021) highlight that the need for software quality assurance practices contributes to hurdles in the progress of start-ups, especially those with limited resources and a rush to market. It emphasises that while start-ups understand the importance of software quality assurance principles, a strict commitment to these practices can hinder the pace at which these companies operate.

Triebel et al. (2018) explore the reasons for start-up companies' failure by highlighting internal and external factors. The research shows that internal factors, such as omissions within a start-up, are often the primary cause of failure, while external factors, like the choice of location or lack of investors, play a lesser role. The research also indicates that the main reasons for start-up failures can be grouped into five categories: capital procurement, technological concept/implementation risks, market opportunities/market hurdles, and personal or team-specific reasons. The research emphasises that start-up failures are often not

due to a single factor but a combination of various factors, with team-internal reasons being particularly significant. These team-internal reasons include personal factors, team dynamics, market challenges, and technological issues that impact the success of a start-up. The Start-up Genome Project Survey 2012 identified problems related to rapid growth, lack of customers, immature products, team issues, ineffective business models, and capital shortages as critical factors contributing to start-up failures (Marmer et al., 2012). The results of some complementary studies also confirm this information. Mikle (2020) explains the main reasons for startup failure as lack of a market need for the product, insufficient capital and misapplication of capital, building the wrong team or not having a diverse team with different experiences, and poor marketing strategies, including not knowing the customer segment or how to attract and retain customers. Another study (Rafiq et al., 2021) highlights wrong product market fit, not listening to customers, absence of a learning process, spending too much time developing the product, and wrong marketing and business strategies as crucial contributors to the failure of technology startups.

Based on the information provided in the research conducted by Ilyas et al. (2021), the COVID-19 pandemic has been identified as a significant factor contributing to the failure of start-ups. The study found that out of 151 start-ups surveyed, 31 (21%) had stopped operating during the pandemic. The most common reasons these start-ups failed were a lack of market demand (58%) and health issues (39%) related to the pandemic. The sectors most affected by business failures during the COVID-19 pandemic were IT, manufacturing, agriculture, food security, energy, health and medicine, and transportation. These findings highlight how the pandemic has impacted various industries and led to challenges such as declining sales, production constraints, and distribution issues for start-ups, ultimately resulting in business closures.

Some researchers in the literature (Klotins et al., 2019) attribute the reasons for the start-up failures to inadequacies in product engineering rather than just traditional reasons like poor business models, market issues, or insufficient funding. It highlights that failures that may seem to be marketing or business-related could stem from issues in software product engineering. Some specific reasons for failures mentioned in the research include product uncertainty, poor product quality, and team breakup.

Academic literature clearly shows the reasons for the failure of technology startups and how the lack of success factors results in failure in various global studies conducted in this field. When we look at these studies, it is obvious that studies conducted in different fields and periods reveal different factors. For this reason, each work should be evaluated by its own time and conditions of that time. A summary of the reviewed literature is in Table 1.

Table 1. Summary of findings in reviewed literature

Topic	Findings	Author
Financial strategy	Startup success is a multidimensional concept that can be evaluated through financial indicators such as time/money balance, profitability, revenue generation, funding	Kee 2020; York 2020; Díaz-Santamaría 2021; Bednar 2017; Cockayne 2016; Al Sahaf 2021; Silva et al. 2015; Cantamessa et al. 2018; Triebel et al. 2018
External environment	Success is shaped in the uncertain environment in which startups operate	Gerhardt 2021
Product market fit	Failure can be attributed to incorrect estimation of market potential	York 2020; Bednar 2017; Mikle (2020); Cantamessa et al. 2018; Rafiq et al. 2021
Flexible working conditions	Hybrid working compatibility is an essential factors on failure of startups	Cockayne 2016; Silva et al. 2015; Triebel et al. 2018
Previous experience	Lack of experience and knowledge harms possibility of startup success	Al Sahaf 2021; Ucbasaran et al. 2013; Prohorovs et al., 2019; Cohen 2019
Pivoting	Start-ups that pivot once or twice are associated with raising up to 2.5 times more capital compared to those start-ups that have pivoted more than twice or not at all.	Silva et al. 2015; Marmar et al. 2012
Customer experience	Not knowing the customer segment or how to attract and retain customers	Cantamessa et al. 2018; Silva et al. 2015; Mikle (2020); Rafiq et al. 2021:

Lack of technical practices	Lack of Q&A practices affects success. Failures that may seem to be marketing or business-related could stem from issues in software product engineering	Sahtiya et al. 2021; Klotins et al. 2019
COVID - 19	The most common reasons these start-ups failed were a lack of market demand during the pandemic	Ilyas et al. 2021

The selection of literature sources in this study was driven by the aim of comprehensively investigating the reasons for the failure of technology startups in Estonia. Given the specific focus on understanding the multifaceted dimensions of startup failures within the technological landscape, drawing from the literature that directly addressed this niche area of inquiry was imperative. The chosen articles were meticulously curated based on their relevance to studies exploring the intricacies of startup failures, particularly within the context of technology-driven enterprises. Each selected source offered valuable insights into various aspects of startup failures, ranging from financial strategies and external environmental factors to product-market fit, flexible working conditions, and the impact of the COVID-19 pandemic. By aligning with studies that scrutinised failure from diverse perspectives, this research aimed to construct a robust foundation for understanding the nuanced interplay of internal and external factors contributing to startup failures.

In conclusion, the success or failure of technology startups is a multifaceted outcome influenced by many internal and external factors. This chapter has synthesised a range of research findings, revealing that financial strategies, the external environment, product-market fit, flexible working conditions, previous experience, pivoting strategies, customer experience, lack of technical practices, and the impact of the COVID-19 pandemic are critical determinants in the trajectory of startup ventures. The interplay of these factors underscores the complexity of startup dynamics, with each contributing uniquely to the outcome. Moreover, while some failures may stem from traditional business issues or market challenges, a deeper analysis reveals the significance of product engineering and software quality assurance practices. Understanding these diverse factors is essential for entrepreneurs, investors, and policymakers alike to foster an environment conducive to startup success and resilience in the face of inevitable challenges. As technology continues to evolve and disrupt industries, ongoing research, and adaptation will be crucial in navigating the ever-changing landscape of startup entrepreneurship.

There are some recent studies investigating the reasons for the failure of startups. These studies were conducted using limited data sets and resources obtained globally. Many of the startups researched in the studies are technology startups. For this reason, these studies are sources that help understand the reasons for the failure of today's technology startups.

The research conducted by Cantamessa et al. (2018) focuses on analysing startup failures using an incremented methodology based on the SHELL methodology, typically used in the aviation sector to describe accident causes. The study on startup failures in this research analysed 214 startups extracted from the databases of Autopsy.io and CB insights. The top startup failure reasons highlighted in the paper are :

1. Absent or wrong business model (35% occurrence).
2. Lack of business development (28% occurrence).
3. Running out of cash (21% occurrence).
4. Lack of product/market fit (18% occurrence).

These reasons for startup failure are mainly attributed to the need for a more managerial perspective and focus on business development. The SHELL classification perspective also shows that failures are mainly related to Software and Liveware/Organization components—a chart of causes in this research is in Figure 1.

Reasons of the Startup Failure

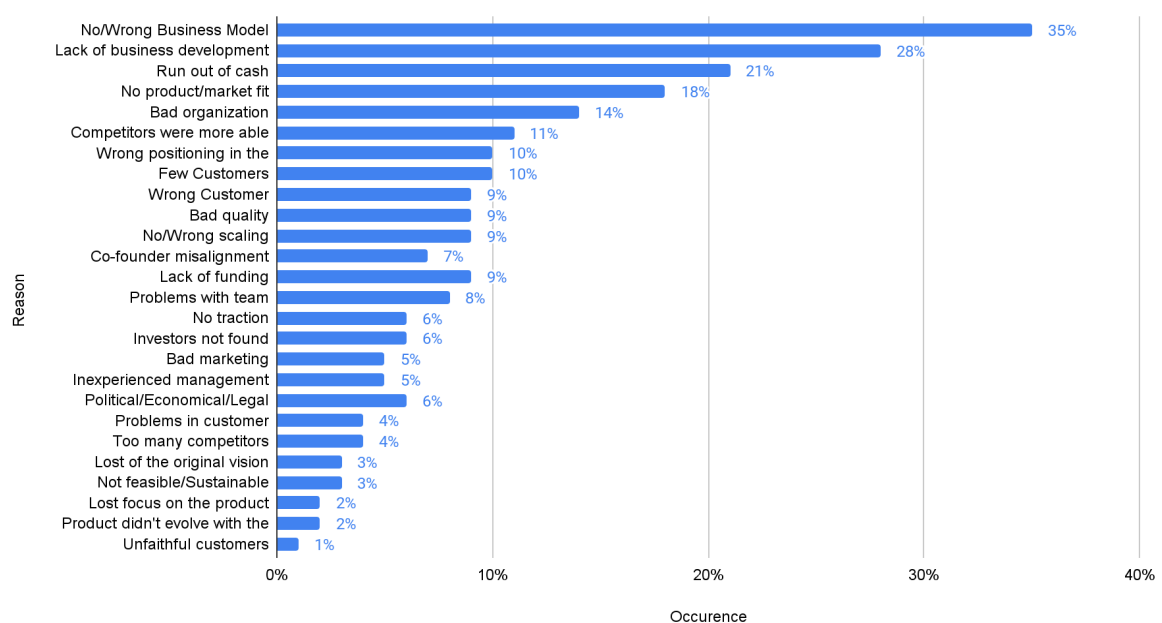


Figure 1. Reasons of the Startup Failure

Source : Cantamessa et al. (2018), compiled by the author

(Bednar & Tariskova, 2017) focus on identifying the factors leading to the failure of startups by comparing scientific literature, creating a structured questionnaire based on startup founders' statements, and analysing testimonials from the Autopsy.io database. The results highlight issues such as inadequate product pricing, poor cost estimates, lack of capital, market need, and team inefficiencies as crucial reasons for startup failures—a chart of causes in this research is in Figure 2.

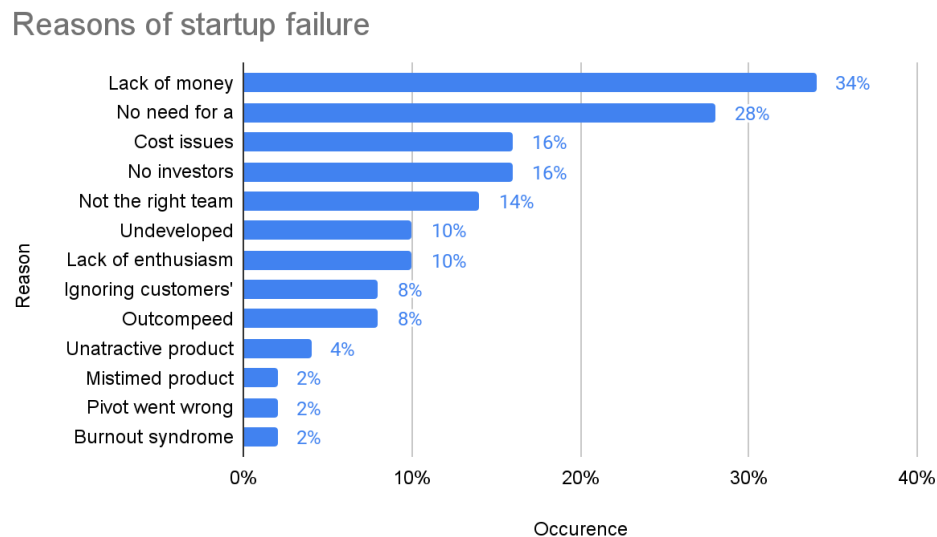


Figure 2. Reasons of startup failure

Source: Bednar & Tariskova (2017)

When we examine the most critical failure factors from two studies, running out of cash and the market not needing the product are common factors in all three. Insights and Cantamessa et al. (2018) found that the flawed business model is emphasised as another essential criterion. Other vital factors are losing out in the competition, lack of business development, and the need to be the right team, respectively. A summary of the studies is in Table 2.

Table 2. Summary of the practical studies

Cantamessa et al. (2018)	Bednar & Tariskova (2017)
Ran out of cash	Ran out of cash
No market need	No market need
Flawed business model	Lack of capital
Lack of business development	Not the right team

Source : Cantamessa et al. (2018), Bednar & Tariskova (2017), compiled by the author

It is crucial to consider insights from academic literature and practical studies to understand the reasons behind technology startup failures better. Table 3 summarises failure factors identified in both sources, highlighting commonalities and unique insights.

Table 3. Summary of the failure factors identified in literature and practical studies

Failure Factor	Literature	Practical Studies
Inadequate Financial Planning	✓	✓
Market Misalignment	✓	✓
Team Deficiencies	✓	✓
External Environmental Challenges	✓	✓
Ineffective Pivoting Strategies	✓	✓
Bad Customer Experiences	✓	
Impact of COVID-19	✓	
Importance of Software Engineering Practices	✓	

Source : Compiled by the author

The success or failure of technology startups is a nuanced outcome shaped by a myriad of internal and external factors. This synthesis of research findings underscores the pivotal role of financial strategies, product-market fit, flexible working conditions, previous experience, pivoting strategies, customer experience, and the impact of external factors such as the COVID-19 pandemic. Traditional issues like market demand and business models remain significant, while an emerging theme highlights the importance of software engineering practices in startup success. Recent studies by Cantamessa et al. (2018) and Bednar & Tariskova (2017) delve into the specifics, revealing common factors such as running out of cash and lack of market need as primary contributors to startup failure. These findings emphasise the need for a holistic understanding of startup dynamics, informed by ongoing research and adaptation, to navigate the evolving landscape of entrepreneurial ventures effectively. This comprehensive view will guide the subsequent investigation into the reasons for the failure of technology startups in Estonia.

2. Methodology and Data

This study investigates the reasons for the failure of technology startups in Estonia. To comprehensively answer the research question, 'What are the reasons for the failure of technology startups in Estonia?', this study employs a mixed-methods approach combining quantitative surveys and qualitative thematic interviews with startup founders.

Startups were identified for inclusion in the study using networks established within the startup ecosystem, Estonian-based incubators, and social media platforms. Approximately 100 potential startups meeting specific criteria were identified. Subsequently, the study focused on 10 of these startups. The criteria for selecting potential startups within the study's scope were as follows:

1. The startups must have operated in the field of technology.
2. The startups must have commenced their activities in Estonia.
3. The startups must not be currently operational.

All ten startups involved in this study completed the survey, yet only two consented to participate in an interview. To ensure the privacy of the startups, their names have been concealed and replaced with numerical identifiers such as "startup1," "startup2," and so forth. Table 4 provides an overview of general information about these startups.

Table 4. Overview of startups included in the study

Startup	Working area	Active years	Completed the survey	Gave an interview
Startup 1	is a application for digital nomads who travels often and work remotely	2018-2020	Yes	Yes
Startup 2	automation for dining operations for diners and restaurants	2022-2023	Yes	No
Startup 3	Detecting breast cancer remotely and non-invasively	2019-2022	Yes	No

Startup 4	Anonymous feedback tool	2017-2020	Yes	No
Startup 5	Blockchain based rating application	2017-2022	Yes	No
Startup 6	Peer-to-peer renting app.	2014-2016	Yes	No
Startup 7	Computer-Assisted CBT	2010-2011	Yes	No
Startup 8	Ready made content autobranding for companies	Na	Yes	No
Startup 9	App for street artists promotion & event management	Na	Yes	No
Startup 10	Cloud Solution for HoReCa: QR Code Menu for View, Order and Pay + Cashless tips	2022-2023	Yes	No

Source : Compiled by the author

This study employed a mixed methods approach to comprehensively investigate the factors contributing to the failure of technology startups in Estonia. It also used qualitative and quantitative methods to offer a holistic understanding of startup failure dynamics, capturing insights from multiple perspectives. The research design involved extensive interviews and surveys with founders and key employees from failed technology startups in Estonia, leveraging their experiences and insights to address the research questions effectively.

Qualitative data collection involved semi-structured interviews designed to delve deeply into the operational intricacies and contextual nuances of startup failure. The interview questions, crafted precisely and informed by existing literature, covered various topics such as experience, motivation, funding, product development, team dynamics, and critical failure factors. Thematic analysis was employed to identify recurring themes and patterns within the qualitative data, illuminating the underlying processes and challenges technology startups face.

Simultaneously, quantitative data was gathered through surveys, which included Likert scale statements meticulously formulated to capture prevalent factors identified in academic literature. These statements, organised under distinct categories such as financial strategy, external environment, product-market fit, and customer experience, aimed to quantify respondents' perceptions and attitudes towards various aspects contributing to startup failure. Descriptive statistics, including mean, median, and standard deviation, were calculated to analyse the survey responses, providing quantitative insights into the magnitude and prevalence of different failure factors.

Appendices 1 and 2 provide detailed repositories of Likert scale statements and semi-structured interview questions. These appendices serve as structured frameworks for data collection, ensuring comprehensive coverage of the multifaceted dimensions of startup failure. By integrating qualitative insights from interviews with quantitative data from surveys, this mixed-method approach enriches the analytical toolkit employed in this study, facilitating a nuanced understanding of the complex interplay of factors influencing startup outcomes. Through the synthesis of qualitative and quantitative findings, this research aims to inform strategies for mitigating startup failure and fostering the sustainability of the startup ecosystem in Estonia.

Furthermore, this study sought to empirically examine the extent to which the reasons for failure identified in the literature review align with the experiences of technology startups in Estonia. By comparing the prevalent failure factors elucidated in academic literature with the findings derived from our mixed-method investigation, we aimed to assess their applicability and significance within the specific context of the Estonian startup ecosystem. Through rigorous analysis of qualitative insights from interviews and quantitative data from surveys, we endeavoured to identify the most influential failure factors and discern any discrepancies or convergences between theoretical frameworks and real-world experiences.

This comparative analysis serves as a critical lens through which to evaluate the relevance and efficacy of existing theoretical models in explaining startup failure phenomena within the unique socio-economic landscape of Estonia.

3. Results and Analysis

3.1. Results of the survey

The survey questions were categorised based on the factors outlined within the study's scope and were directed toward the participants. Appendix 3 illustrates the responses provided regarding "Financial strategy".

Based on the responses provided by startups to the survey regarding financial strategy, it is evident that startups exhibit varied approaches to money management. While some have well-defined financial plans, they have not prioritised regular updates to these plans. Conversely, others initially need a clearer plan but actively revise and update their strategies. Consequently, these startups demonstrate a diversified approach, enhancing their preparedness for potential financial challenges. Notably, the data indicates that nearly all startups have managed to secure external financial resources, such as investments, grants, or support. Likert scale descriptive statistics results of the answers to each survey question in "Financial Strategy" failure dimension are shown in Table 5.

Table 5. Likert scale descriptive statistics results of survey replies given in the "Financial Strategy" failure dimension

Financial Strategy			
Question	Mean	Median	Standard Deviation
Our startup had a clear plan for managing money.	3,2	3	1,54
We regularly reviewed and adjusted our financial plans.	3,12	3,5	1,35
We looked for ways to get money from investors/grants/support	3,8	4,5	1,54
We had plans in place to deal with money problems.	2,62	2,5	1,06

Source : Compiled by the author

The Likert scale statistics for the "Financial Strategy" category reveal varying perceptions among respondents regarding different aspects of financial planning and management within their startup. Overall, respondents showed a moderate level of agreement that their startup actively sought funding from various sources, with a mean score of 3.80 and a median of 4.5, suggesting a generally positive attitude toward seeking funding. However, opinions were more divided regarding the clarity of financial plans and contingency plans for financial challenges, as indicated by mean scores of 3.20 and 2.62, respectively, and median scores of 3 and 2.5, respectively. The standard deviation values of 1.54 for the first and third questions and 1.35 for the second question indicate moderate variability in responses, suggesting differing levels of agreement among respondents. These findings highlight potential areas for improvement in financial planning and management practices within startups, suggesting a need for greater clarity and preparedness to address financial challenges.

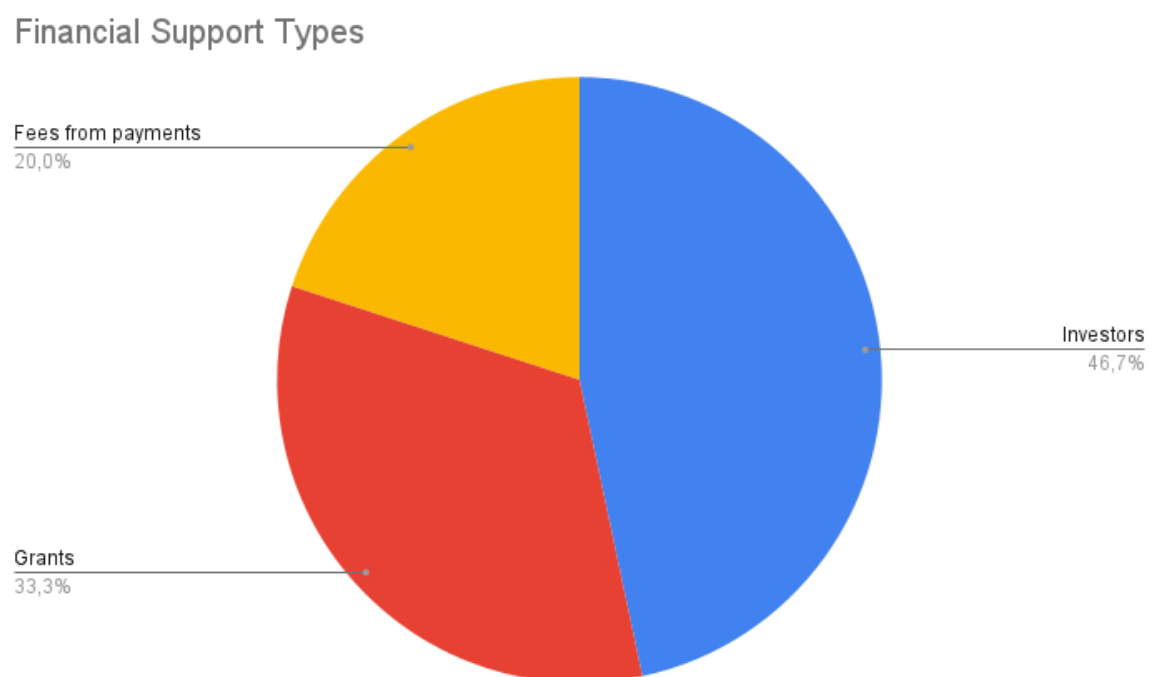


Figure 3. Financial support types

Source: Compiled by the author

The predominant sources of financial support for startups consist of investments (46.7%) and grants (33.3%), with payments from fees contributing minimally (20%) in comparison. These findings suggest that situations wherein financial resources sourced from

investors and grants fail to translate into revenue from customers have a detrimental impact on the success of technology startups.

As presented in Appendix 4, representing the "External Environments" section—the second segment of the survey—startups commonly express varied perceptions regarding the influence of external factors on their operations. However, their viewpoints converge concerning the impact of environmental factors beyond their control on their startup endeavours. Likert scale descriptive statistics results of the answers to each survey question in "External Environment" failure dimension are shown in Table 6.

Table 6. Likert scale descriptive statistics results of survey replies given in the "External Environment" failure dimension

External Environment			
Question	Mean	Median	Standard Deviation
The external market conditions significantly impacted our startup's performance.	3,9	4	1,28
We faced challenges from competitors in the external market.	3,25	3,5	1,28
External factors beyond our control affected our startup's operations.	4,5	4,5	0,52
Economic regression, such as recession or economic downturn, negatively impacted the performance the startup.	2,25	1,5	1,58
The COVID-19 pandemic significantly disrupted our startup's operations. (If applicable)	3,14	4	1,77

Source: Compiled by the author

The likert scale statistics for the "External Environment" category indicate varying perceptions among respondents regarding the impact of external factors on their startup's operations. Overall, respondents reported a high level of agreement that external market conditions significantly impacted their startup's performance, with a mean score of 3.90 and a median of 4. This suggests a consensus among respondents regarding the influence of external market conditions on startup performance. Similarly, respondents agreed that their startup faced challenges from competitors in the external market, with a mean score of 3.25 and a median of 3.5. However, opinions were more divided regarding the impact of economic

regression, such as recession or economic downturn, on startup performance, as indicated by a mean score of 2.25 and a median of 1.5. This suggests that while some respondents acknowledged the negative impact of economic regression, others may have perceived it differently.

Additionally, respondents reported a high level of agreement that external factors beyond their control affected their startup's operations, with a mean score of 4.50 and a median of 4.5, indicating a solid consensus on the influence of external factors. Furthermore, for startups affected by the COVID-19 pandemic, respondents expressed moderate agreement that it significantly disrupted their startup's operations, with a mean score of 3.14 and a median of 4. The standard deviation values for each question indicate varying variability in responses, reflecting differing perceptions among respondents. These findings underscore the importance of considering external environmental factors in startup operations and strategic planning.

As illustrated in Appendix 5, 60% of startups encountered challenges in identifying their target market. Furthermore, a significant majority need to improve in analysing the needs of their target customers. Overall, startups have recognised that their products/services need to be more effectively aligned with the market and face difficulties differentiating them from competitors. Likert scale descriptive statistics results of the answers to each survey question in "Product Market Fit" failure dimension are shown in Table 7.

Table 7. Likert scale descriptive statistics results of survey replies given in the "Product Market Fit" failure dimension

Product Market Fit			
Question	Mean	Median	Standard Deviation
Our startup struggled to identify a target market for our product/service.	2,6	2	1,57
We faced challenges in understanding the needs and preferences of our target customers.	3,37	3,5	0,74
We encountered difficulties in positioning our product/service effectively in the market.	3,37	4	0,91
We found it challenging to differentiate our offering from competitors in the market.	3	3	1,30
We did not regularly update our customer segmentation strategies based on feedback or market changes.	3	3	1,30

Source : Compiled by the author

The Likert scale statistics for the "Product Market Fit" category indicate various challenges and perceptions among respondents regarding the alignment of their startup's product/service with the market. Overall, respondents reported moderate levels of agreement with statements related to identifying a target market, understanding customer needs and preferences, and positioning their product/service effectively in the market, as indicated by mean scores ranging from 2.6 to 3.37. The median scores generally align with the mean scores, suggesting that the middle values of responses fall within the "agree" to "neutral" range for most questions. The standard deviation values, ranging from 0.74 to 1.57, indicate varying levels of variability in responses, reflecting differing perceptions among respondents. These findings underscore the importance of addressing market fit challenges and continuously adapting strategies based on customer feedback and market dynamics to enhance the competitiveness of startups in the marketplace.

As depicted in Appendix 6, not all startups responded to the section concerning flexible working conditions in the survey. Upon analysis of the received responses, it becomes apparent that, except for one startup, no deficiencies were reported in the flexible working conditions section. One startup highlighted in the study mentioned its inability to furnish the necessary technology and tools for remote work.

Likert scale descriptive statistics results of the answers to each survey question in "Flexible Working Conditions" failure dimension are shown in Table 8.

Table 8. Likert scale descriptive statistics results of survey replies given in the "Flexible Working Conditions" failure dimension

Flexible Working Conditions			
Question	Mean	Median	Standard Deviation
Our startup provided flexibility in work hours to accommodate employees' personal needs.	4,75	5	0,46
Employees in our startup had the option to work remotely or from different locations.	4,75	5	0,46
We encouraged employees to manage their own schedules to meet project deadlines.	4,5	4,5	0,53
Our startup provided access to technology and tools for remote work.	4	4	1,30

Source : Compiled by the author

The Likert scale statistics for the "Flexible Working Conditions" category indicate a positive perception among respondents regarding the flexibility and support their startup provides regarding working conditions. Overall, respondents reported high levels of agreement with statements about providing flexibility in work hours, offering remote work options, and encouraging employees to manage their schedules, as indicated by mean scores ranging from 4.0 to 4.75. The median scores, consistently aligning with the mean scores, suggest that the middle values of responses fall within the "agree" to "strongly agree" range for all questions. The standard deviation values, ranging from 0.46 to 1.30, indicate relatively low to moderate variability in responses, reflecting a consistent perception among respondents regarding flexible working conditions. These findings highlight the importance of flexible work arrangements in promoting employee satisfaction, productivity, and work-life balance within startups.

In examining the survey responses outlined in Appendix 7, it becomes apparent that viewpoints on the influence of previous experiences among startup founders and team members vary considerably. While half of the respondents express confidence in the relevance of founders' expertise and business knowledge (e.g., Startups 1, 5, 6, and 9), the remaining respondents either hold reservations or remain neutral on these aspects (e.g., Startups 2, 4, 7, and 8). This disparity suggests a divergence in perceptions regarding how much founders' backgrounds impact startup success.

Moreover, acknowledging challenges arising from a lack of industry-specific experience among team members underscores the critical role of talent acquisition and team composition. Startups facing shortages in industry-specific talent (e.g., Startups 2, 3, 4, and 10) may need help navigating market intricacies, tailoring solutions to meet customer needs, or building credibility within their respective industries. Likert scale descriptive statistics results of the answers to each survey question in "Previous Experience" failure dimension are shown in Table 9.

Table 9. Likert scale descriptive statistics results of survey replies given in the "Previous Experience" failure dimension

Previous Experience			
Question	Mean	Median	Standard Deviation
Our startup's founders had relevant expertise and knowledge in the industry.	3,2	3,5	1,47
Our startup's founders had previous business knowledge/experience	3,4	3,5	1,26
Our startup faced challenges due to a lack of industry-specific experience among team members.	3,12	3	1,24

Source : Compiled by the author

The Likert scale mean calculations for the "Previous Experience" category reveal varying perceptions among respondents regarding the level of expertise and experience among startup founders and team members. Overall, respondents reported moderate levels of agreement with statements related to the founders' relevant expertise and knowledge in the industry, as well as their previous business knowledge/experience, as indicated by mean scores ranging from 3.2 to 3.4. The median scores generally align with the mean scores, suggesting that the middle values of responses fall within the "agree" to "neutral" range for these questions. However, respondents disagreed slightly with the statement that the startup faced challenges due to a lack of industry-specific experience among team members, as indicated by a mean score of 3.12. The median score of 3 suggests a similar perception among respondents, with some response variability. The standard deviation values, ranging from 1.24 to 1.47, indicate varying responses, reflecting differing perceptions among respondents regarding the level of experience within the startup team. These findings underscore the importance of leveraging relevant expertise and experience in driving startup success while addressing gaps in industry-specific knowledge among team members.

The survey responses in Appendix 8 reveal mixed sentiments regarding the effectiveness and impact of pivoting among the participating startups. Notably, a considerable portion of the respondents needed to respond to the questions in this domain, suggesting that pivoting may not be applicable or relevant to every startup's context. However, among those who did respond, approximately half indicated that their startup's attempts to pivot its business model yielded different outcomes than they did. Despite this, an exciting trend

emerges as respondents also express the belief that these outcomes did not have a detrimental effect on the startup's overall success.

This suggests that while pivoting efforts may only sometimes achieve the intended results, they may not necessarily impede the overall trajectory of the startup. This nuanced perspective underscores the importance of understanding the context and rationale behind pivoting decisions and the broader implications for the startup's strategic direction and long-term viability. Likert scale descriptive statistics results of the answers to each survey question in "Pivoting" failure dimension are shown in Table 10.

Table 10. Likert scale descriptive statistics results of survey replies given in the "Pivoting" failure dimension

Pivoting			
Question	Mean	Median	Standard Deviation
Our startup's attempts to pivot its business model did not lead to desired outcomes.	2,85	2	2,03
Pivoting negatively affected our startup's success	2,42	3	0,78

Source : Compiled by the author

The Likert scale mean calculations for the "Pivoting" category indicate mixed perceptions among respondents regarding the impact of pivoting on their startup's success. Overall, respondents reported moderate levels of agreement with statements about the outcomes of pivoting attempts, with mean scores of 2.85 and 2.42 for the two questions, respectively. The median scores, however, suggest some variability in responses, with values of 2 and 3, indicating that the middle values of responses fall within the "neutral" to "agree" range for both questions. The standard deviation values, particularly notable for the first question at 2.03, indicate significant variability in responses, reflecting differing perceptions among respondents regarding the effectiveness of pivoting attempts and their impact on startup success. These findings underscore the complexity and variability in the outcomes of pivoting strategies within startups. They also highlight the importance of carefully evaluating and strategizing pivot decisions to maximise their potential benefits while minimising associated risks.

The responses to the customer experience inquiries depicted in Appendix 9 exhibit a normal distribution pattern. Half of the startups assert that customer satisfaction has no bearing on acquiring new customers. Likert scale descriptive statistics results of the answers to each survey question in "Customer Experience" failure dimension are shown in Table 11.

Table 11. Likert scale descriptive statistics results of survey replies given in the "Customer Experience" failure dimension

Customer Experience			
Question	Mean	Median	Standard Deviation
Our startup struggled to meet the needs and expectations of our target customers.	3,5	4	1,17
We received negative feedback from customers regarding the usability or functionality of our product/service.	2	2	0,92
Customer dissatisfaction contributed to our startup's inability to retain or attract new customers.	2,25	2,5	0,88
We failed to build strong relationships with our customers, leading to decreased loyalty and retention.	2,625	2,5	1,40

Source : Compiled by the author

The Likert scale statistics for the "Customer Experience" category indicate varying perceptions among respondents regarding the satisfaction and relationship-building efforts with their startup's customers. Overall, respondents reported moderate levels of agreement with statements related to struggling to meet customer needs and expectations and customer dissatisfaction contributing to the inability to retain or attract new customers, as indicated by mean scores ranging from 2.25 to 3.50. The median scores generally align with the mean scores, suggesting that the middle values of responses fall within the "agree" to "neutral" range for most questions. However, respondents strongly agreed that they received negative feedback from customers regarding the usability or functionality of their product/service, as indicated by a mean score of 2.00 and a median of 2.00. The standard deviation values, ranging from 0.88 to 1.40, indicate varying variability in responses, reflecting differing perceptions among respondents regarding the effectiveness of their startup's customer experience efforts. These findings underscore the importance of prioritising customer satisfaction and relationship-building strategies to enhance customer loyalty and retention within startups.

The Likert scale results presented in Appendix 10 shed light on the perceptions of surveyed startups regarding the impact of lacking technical practices on their operations. While some startups strongly disagree with the statements, suggesting a belief that inadequate testing protocols and structured development processes do not significantly contribute to their challenges, others express varying degrees of agreement or neutrality. This diversity of perspectives underscores the complexity of addressing technical practices within startup environments, with factors such as organisational culture, resource availability, and project management methodologies likely influencing perceptions and priorities. Understanding these nuanced perspectives is crucial for implementing targeted interventions and support mechanisms to enhance technical capabilities and foster startup success. Likert scale descriptive statistics results of the answers to each survey question in "Lack of Technical Practices" failure dimension are shown in Table 12.

Table 12. Likert scale descriptive statistics results of survey replies given in the "Lack of Technical Practices" failure dimension

Lack of Technical Practices			
Question	Mean	Median	Standard Deviation
The absence of adequate testing protocols resulted in frequent bugs and errors in our product/service.	1,87	2	0,83
The absence of a structured development process contributed to delays and inefficiencies in delivering technical solutions.	2,2	2,5	0,91

Source : Compiled by the author

The Likert scale statistics for the "Lack of Technical Practices" category indicate varying perceptions among respondents regarding the impact of technical practices on their startup's product/service development process. Overall, respondents reported moderate levels of agreement with statements about the absence of adequate testing protocols, resulting in frequent bugs and errors, and the absence of a structured development process contributing to delays and inefficiencies, as indicated by mean scores ranging from 1.87 to 2.20. The median scores generally align with the mean scores, suggesting that the middle values of responses fall within the "disagree" to "neutral" range for most questions. The standard deviation values, ranging from 0.83 to 0.91, indicate relatively low to moderate levels of variability in

responses, reflecting some consistency in perceptions among respondents regarding the impact of technical practices on product/service development. These findings underscore the importance of implementing robust testing protocols and structured development processes to minimise errors, delays, and inefficiencies in delivering technical solutions within startups.

3.2. Themes of the interviews

Of the ten startups included in the study, only two, namely Startup 1 and Startup 2, participated in the interview. The thematic analysis derived from these interviews is elegantly presented in Appendix 11 and Appendix 12.

Based on the thematic analysis presented in Appendix 11, it becomes evident that Startup 1 encountered several challenges across various aspects of its operation. The interview with the founders shed light on their experiences and motivations, revealing a passion for innovation within the flexible working environment. Startup 1 founder said, "We were driven by our passion for travel, remote working, and sports, which inspired us to initiate the startup." This initial drive, coupled with the team's technical expertise, facilitated rapid progress in technical structures and initial customer acquisition, as affirmed by another founder, "Our IT knowledge enabled us to develop the technical infrastructure quickly, while marketing skills helped attract our first customers." However, despite these strengths, the lack of adequate business experience emerged as a critical obstacle. One founder said, "We lacked experience in certain business aspects, which hindered our strategic direction and networking efforts." This deficiency likely impacted the startup's ability to navigate challenges effectively and capitalise on growth opportunities.

Furthermore, while the startup demonstrated resilience in product development and differentiation from competitors, the unforeseen impact of the COVID-19 pandemic exacerbated existing challenges. As stated by one founder, "The COVID-19 outbreak significantly disrupted our operations and customer engagement, leading to financial strain and eventual closure." Thus, the thematic analysis suggests that the absence of essential business expertise, compounded by external adversities, significantly contributed to the failure of Startup 1.

The thematic analysis of Startup 2's interview provides valuable insights into the challenges and factors contributing to its eventual failure. Despite the founder's significant backend engineering experience and previous involvement in startups, crucial gaps in business acumen, particularly in management science and sales, hindered the startup's progress. As the founder candidly admitted, "We lacked experience in management science. I also do not have sales experience, which affected the startup negatively." These shortcomings underscore the critical role of a well-rounded skill set in navigating the complexities of startup ventures.

Furthermore, funding constraints, coupled with challenges in product development and execution, posed significant hurdles for the startup. The lack of a fully defined team composition and clear roles further compounded operational challenges, reflecting the importance of effective team management and coordination. Despite active networking efforts and a unique marketing strategy, intense competition from dominant market players and the inability to differentiate offerings effectively further exacerbated the startup's struggles. Ultimately, reflecting on the startup's failure, the founder identified the lack of business experience in the domain and limited experience in startups as the primary contributing factors. This introspective analysis highlights the importance of continuous learning, adaptability, and a robust business strategy to ensure startup ventures' success in competitive markets.

The thematic analyses of Startup 1 and Startup 2 interviews offer valuable insights into the challenges encountered by technology startups and the factors influencing their failure. Despite differences in backgrounds and experiences, common themes emerge, shedding light on critical areas impacting startup success. Startup 1, established by individuals with expertise in IT and marketing, faced challenges related to business management, funding, and team composition. Limited experience in sales and gaps in product development hindered its progress, while networking efforts and unique marketing strategies showed promise amidst fierce competition. Conversely, Startup 2, led by founders with substantial backend engineering experience, struggled with similar challenges, including funding constraints, inadequate team composition, and intense market competition. Both founders identified a need for more business experience and limited exposure to startup environments as critical contributors to their ventures' failure. These insights underscore the importance of a comprehensive skill set, strategic planning, and adaptability in navigating the dynamic landscape of technology startups, emphasising the need for continuous learning and resilience in overcoming challenges and fostering success in competitive markets.

3.3. Analysis results

The analysis of the survey results and thematic analysis of the interviews provide valuable insights into the primary factors contributing to startup failures in the technology sector. Several common themes emerge across the various categories examined, shedding light on critical areas that impact startup success. Figure 4 illustrates the conceptual model of analysis results.



Figure 4. Conceptual Model: Dynamics of Startup Failure in the Technology Sector
Source: Compiled by the author

1. **Financial Strategy:** The survey responses indicate varying financial planning and management approaches among startups. While some have clear plans for managing money and actively seek funding from investors, grants, or support, others need more clarity in their financial plans and help address money problems. This suggests a more significant emphasis on financial planning and preparedness to address potential challenges, such as securing external financial resources and developing contingency plans.
2. **External Environment:** Startups acknowledge the significant impact of external factors, such as market conditions, competition, and economic regression, on their operations. While most respondents agree that external market conditions and

challenges from competitors affect startup performance, opinions are divided regarding the impact of economic regression. Additionally, startups affected by the COVID-19 pandemic recognize its disruptive effect on their operations. These findings underscore the importance of considering external environmental factors in strategic planning and decision-making processes.

3. **Product Market Fit:** Startups face challenges in identifying target markets, understanding customer needs and preferences, and positioning their offerings effectively in the market. The survey results highlight the need for startups to align their products/services more effectively with market demands and differentiate themselves from competitors through regular updates to customer segmentation strategies based on feedback and market changes.
4. **Flexible Working Conditions:** Most startups provide flexible work hours and remote work options, encouraging employees to manage their schedules. However, some startups may face challenges in providing access to technology and tools for remote work, highlighting the importance of supporting flexible working arrangements to promote employee satisfaction and productivity.
5. **Previous Experience:** Respondents have mixed perceptions regarding the relevance of founders' expertise and business knowledge in startup success. While some startups benefit from founders' relevant expertise and previous business experience, others need more industry-specific experience among team members. These findings underscore the importance of leveraging relevant expertise and experience while addressing gaps in industry-specific knowledge within startup teams.
6. **Pivoting:** Startups exhibit mixed perceptions regarding the effectiveness and impact of pivoting on their success. While some startups believe that pivoting efforts did not lead to desired outcomes, others maintain that pivoting did not negatively affect their overall success. These findings highlight the complexity of pivoting strategies and the importance of carefully evaluating and strategizing pivot decisions to maximise potential benefits while minimising associated risks.
7. **Customer Experience:** Startups need help to meet the needs and expectations of target customers, receive negative feedback regarding product/service usability or functionality, and face challenges in retaining or attracting new customers. These findings underscore the importance of prioritising customer satisfaction and relationship-building strategies to enhance customer loyalty and retention within startups.

8. Lack of Technical Practices: Startups recognize the importance of adequate testing protocols and structured development processes in product/service development. However, some startups may experience challenges related to frequent bugs and errors due to the absence of testing protocols and delays in delivering technical solutions due to the absence of structured development processes. These findings underscore the importance of implementing robust technical practices to minimise errors, delays, and inefficiencies in delivering technical solutions within startups.

The analysis reveals that factors such as inadequate financial planning, external environmental challenges, misalignment with market demands, deficiencies in team expertise, ineffective pivoting strategies, and suboptimal customer experiences often influence startup failures in the technology sector. Addressing these challenges requires a comprehensive approach emphasising strategic planning, continuous learning, adaptability, and a customer-centric mindset to foster success in competitive markets.

Comparing these findings with the literature review highlights several critical alignments and divergences. Both the literature and our analysis underscore the pivotal role of financial strategies in startup success or failure. Literature sources like Cantamessa et al. (2018) and Bednar & Tariskova (2017) emphasise running out of cash and inadequate financial planning as primary failure factors, which align with our findings of financial planning deficiencies in Estonian startups.

The impact of the external environment, including market conditions and the COVID-19 pandemic, is another common theme. Our analysis corroborates this, reflecting the significant challenges posed by market dynamics and economic disruptions on startup performance, as detailed by Ilyas et al. (2021).

Product-market fit is highlighted in the literature and our analysis as a critical determinant of startup success. Our findings align with Mike's (2020) and Rafiq et al.'s (2021) findings, identifying misalignment with market need as a primary reason for startup failure.

Team expertise and the importance of previous experience are consistent across our findings and the literature. Studies by Al Sahaf (2021) and Prohorovs et al. (2019) confirm that team expertise and industry-specific knowledge deficiencies can significantly hinder startup success.

The literature review and our findings both highlight the role of pivoting strategies. However, our analysis reveals mixed perceptions about pivoting's effectiveness, suggesting that while pivoting is crucial, its success depends on strategic execution, as Silva et al. (2015) indicated.

Customer experience is another common factor in the literature, and our analysis points to the importance of understanding and meeting customer needs. Poor customer experience, highlighted by Cantamessa et al. (2018) and Mikle (2020), is a significant reason for startup failures, which our findings also support.

Lastly, while the literature underscores the significance of software engineering practices (Klotins et al., 2019), our analysis identifies explicitly the lack of technical practices as a critical issue. This emphasises the emerging theme in the literature that stresses the importance of robust product engineering and quality assurance in preventing failures.

In conclusion, our findings reinforce and expand upon the insights from the literature review, underscoring the multifaceted nature of startup success and failure. This comprehensive understanding highlights the need for a holistic approach to managing startups, integrating robust financial planning, market alignment, team expertise, effective pivoting, superior customer experiences, and addressing technical and environmental challenges.

Discussion and conclusion

The findings of this study provide comprehensive insights into the failure of technology startups in Estonia. . Addressing the research question, 'What are the reasons for the failure of technology startups in Estonia?', the findings highlight several critical factors contributing to startup failures in Estonia's technology sector. External environmental factors, customer experience challenges, and financial strategy struggles emerged as prominent themes. Interviews with startup founders further emphasised the significance of limited business management experience, funding constraints, and inadequate team composition in contributing to startup failures.

Aligning with existing literature, our findings underscore the multifaceted nature of startup success and failure. The importance of financial strategies, market conditions, product-market fit, previous experience, and customer experience in shaping the trajectory of startup ventures has been well-documented in prior research. Recent studies globally corroborate these findings, emphasising the importance of a managerial perspective, business development, and addressing market needs.

Analysis of survey results and thematic interviews with startup founders in Estonia corroborates many findings from the existing literature. Financial planning and management, external environmental factors, product-market fit, flexible working conditions, previous experience, pivoting strategies, customer experience, and technical practices are critical factors influencing startup success and failure in the Estonian context.

However, our study reveals several nuances specific to Estonia's startup ecosystem. While financial strategies and external environmental factors remain significant, the impact of local market dynamics and regulatory frameworks on startup operations is highlighted. Additionally, the importance of cultural factors and regional networks in shaping startup trajectories is underscored.

Theoretical contributions of this study include an in-depth exploration of the factors influencing technology startup success and failure within the unique context of Estonia's startup ecosystem. This thesis contributes to a more comprehensive understanding of startup dynamics by synthesising existing literature and empirical research findings. It offers insights that can inform theoretical frameworks and practical interventions to promote startup resilience and sustainability.

A notable limitation of the study was the reluctance of founders to discuss their failures, resulting in a small sample size for interviews. Despite this limitation, the study contributes valuable insights into the challenges faced by technology startups in Estonia. These insights have practical implications for entrepreneurs, investors, and policymakers in the startup ecosystem. This research can inform decision-making processes to foster startup success and resilience by identifying common failure patterns and offering practical suggestions.

Future research directions could focus on expanding the sample size to include a more diverse range of startup founders and exploring additional factors influencing startup success and failure. Longitudinal studies tracking the trajectories of startups over time could provide valuable insights into the dynamics of the startup ecosystem.

In conclusion, this study provides a comprehensive understanding of the reasons for the failure of technology startups in Estonia. By applying additional context to the existing literature, the research offers insights that can inform strategies for enhancing the sustainability and resilience of the startup ecosystem. Through continued research and adaptation, stakeholders can navigate the ever-changing landscape of startup entrepreneurship and foster an environment conducive to startup success in Estonia and beyond.

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APPENDICES

Appendix 1. Likert scale statements and theoretical reasonings

Topic	Statements	Theoretical Reasoning
Financial strategy	<ul style="list-style-type: none"> ● Our startup had a clear plan for managing money. ● We regularly reviewed and adjusted our financial plans. ● We looked for ways to get money from investors/grants/support (Which financial support types you looked for : <ul style="list-style-type: none"> ○ Investors ○ Grants ○ Other : Specify). ● We had plans in place to deal with money problems. 	Kee 2020; York 2020; Díaz-Santamaría 2021; Bednar 2017; Cockayne 2016; Al Sahaf 2021; Silva et al. 2015; Cantamessa et al. 2018; Triebel et al. 2018
External environment	<ul style="list-style-type: none"> ● The external market conditions significantly impacted our startup's performance. ● We faced challenges from competitors in the external market. ● External factors beyond our control affected our startup's operations. ● Economic regression, such as recession or economic downturn, negatively impacted the performance the startup ● The COVID-19 pandemic significantly disrupted our startup's operations. 	Gerhardt 2021

Product market fit	<ul style="list-style-type: none"> ● Our startup struggled to identify a target market for our product/service. ● We faced challenges in understanding the needs and preferences of our target customers. ● We encountered difficulties in positioning our product/service effectively in the market. ● We found it challenging to differentiate our offering from competitors in the market. ● We did not regularly update our customer segmentation strategies based on feedback or market changes. 	York 2020; Bednar 2017; Mikle (2020); Cantamessa et al. 2018; Rafiq et al. 2021
Flexible working conditions	<ul style="list-style-type: none"> ● Our startup provided flexibility in work hours to accommodate employees' personal needs. ● Employees in our startup had the option to work remotely or from different locations. ● We encouraged employees to manage their own schedules to meet project deadlines. ● Our startup provided access to technology and tools for remote work. 	Cockayne 2016; Silva et al. 2015; Triebel et al. 2018
Previous experience	<ul style="list-style-type: none"> ● Our startup's founders had relevant expertise and knowledge in the industry. ● Our startup's founders had previous business knowledge/experience ● Our startup faced challenges due to a lack of industry-specific experience among team members. 	Al Sahaf 2021; Ucbasaran et al. 2013; Prohorovs et al., 2019; Cohen 2019

Pivoting	<ul style="list-style-type: none"> ● Our startup's attempts to pivot its business model did not lead to desired outcomes. ● Pivoting negatively affected our startup's success 	Silva et al. 2015; Marmar et al. 2012
Customer experience	<ul style="list-style-type: none"> ● Our startup struggled to meet the needs and expectations of our target customers. ● We received negative feedback from customers regarding the usability or functionality of our product/service. ● Customer dissatisfaction contributed to our startup's inability to retain or attract new customers. ● We failed to build strong relationships with our customers, leading to decreased loyalty and retention. 	Cantamessa et al. 2018; Silva et al. 2015; Mikle (2020); Rafiq et al. 2021:
Lack of technical practices	<ul style="list-style-type: none"> ● The absence of adequate testing protocols resulted in frequent bugs and errors in our product/service. ● The absence of a structured development process contributed to delays and inefficiencies in delivering technical solutions. 	Sahtiya et al. 2021; Klotins et al. 2019

Source : Compiled by the author

Appendix 2. Semi structured interview questions

Categories	Questions
Experience	<ul style="list-style-type: none"> ● Can you provide a brief overview of your professional background and prior experience before startup? ● How do you believe your previous experiences influenced your approach to running the startup? ● Looking back, do you feel there were any gaps in your experience or skill set that may have contributed to the failure of the startup?
Motivation	<ul style="list-style-type: none"> ● What initially motivated you to start the failed startup?
Education	<ul style="list-style-type: none"> ● What level of education or academic background do you and your co-founders possess?
Age/gender structure	<ul style="list-style-type: none"> ● Can you provide some insight into the age and gender distribution among the founders and key team members of the startup?
Funding	<ul style="list-style-type: none"> ● Did the availability or lack of funding impact the strategic direction or growth trajectory of the startup?
Product development	<ul style="list-style-type: none"> ● Did the startup encounter any specific challenges or roadblocks during the product development process? If so, how were they addressed?
Business plan	<ul style="list-style-type: none"> ● Did the startup have a formalised business plan or strategic roadmap outlining its goals, objectives, and growth strategies?
Network	<ul style="list-style-type: none"> ● How did the startup leverage its network for mentorship, collaboration, or business opportunities? ● Were there any specific networking events, programs, or platforms that the startup actively participated in? ● Did the startup encounter any challenges or barriers in building and maintaining its network of contacts? If so, how were they addressed?
Potential Customers	<ul style="list-style-type: none"> ● Can you describe the process of identifying and targeting potential customers for the startup's product or service?
Competitors	<ul style="list-style-type: none"> ● Who were the primary competitors or key players in the market space targeted by the startup? ● How did you assess and analyse the competitive landscape, and what strategies did you employ to differentiate the startup from competitors?

Flexible working environment	<ul style="list-style-type: none"> • How did your startup approach flexible working arrangements for employees? • Looking back, what lessons did you learn about the benefits and limitations of flexible working arrangements within the startup?
Team	<ul style="list-style-type: none"> • Can you describe the composition of your startup team, including the roles and responsibilities of key members? • Looking back, what lessons did you learn about team management and dynamics from the experience of running the startup?
Missing parts	<ul style="list-style-type: none"> • Were there any critical components or resources that you feel were missing or lacking within the startup?
Key failure factors	<ul style="list-style-type: none"> • Looking back, what do you believe were the primary factors that contributed to the eventual failure of the startup?

Source : Compiled by the author

Appendix 3. Survey replies in “Financial Strategy” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/Survey Replies	Our startup had a clear plan for managing money.	We regularly reviewed and adjusted our financial plans.	We looked for ways to get money from investors/grants/support	We had plans in place to deal with money problems.
Startup 1	4	4	5	4
Startup 2	1	1	4	1
Startup 3	5	5	5	2
Startup 4	2	4	4	3
Startup 5	2	2	2	2
Startup 6	2	2	5	3
Startup 7	2	Na	2	Na
Startup 8	5	Na	1	Na
Startup 9	5	3	5	2
Startup 10	4	4	5	4

Source: Compiled by the author

Appendix 4. Survey replies in “External Environment” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/ Survey Replies	The external market conditions significantly impacted our startup's performance.	We faced challenges from competitors in the external market.	External factors beyond our control affected our startup's operations.	Economic regression, such as recession or economic downturn, negatively impacted the performance the startup.	The COVID-19 pandemic significantly disrupted our startup's operations. (If applicable)
Startup 1	5	5	5	1	5
Startup 2	4	4	4	3	2
Startup 3	1	1	4	1	4
Startup 4	3	3	5	1	1
Startup 5	4	4	4	5	4
Startup 6	5	2	4	1	1
Startup 7	5	Na	4	Na	Na
Startup 8	3	Na	5	Na	Na
Startup 9	4	3	5	2	5
Startup 10	5	4	5	4	Na

Source: Compiled by the author

Appendix 5. Survey replies in “Product Market Fit” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/ Survey Replies	Our startup struggled to identify a target market for our product/service.	We faced challenges in understanding the needs and preferences of our target customers.	We encountered difficulties in positioning our product/service effectively in the market.	We found it challenging to differentiate our offering from competitors in the market.	We did not regularly update our customer segmentation strategies based on feedback or market changes.
Startup 1	2	3	4	4	2
Startup 2	4	4	4	4	4
Startup 3	3	3	3	3	3
Startup 4	1	3	2	3	4
Startup 5	2	2	2	2	1
Startup 6	2	4	4	1	3
Startup 7	5	Na	Na	Na	Na
Startup 8	1	Na	Na	Na	Na
Startup 9	1	4	4	2	2
Startup 10	5	4	4	5	5

Source: Compiled by the author

Appendix 6. Survey replies in “Flexible Working Conditions” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/ Survey Replies	Our startup provided flexibility in work hours to accommodate employees' personal needs.	Employees in our startup had the option to work remotely or from different locations.	We encouraged employees to manage their own schedules to meet project deadlines.	Our startup provided access to technology and tools for remote work.
Startup 1	5	5	5	5
Startup 2	5	5	5	5
Startup 3	5	5	5	1
Startup 4	4	4	4	4
Startup 5	4	4	4	4
Startup 6	5	5	4	5
Startup 7	Na	Na	Na	Na
Startup 8	Na	Na	Na	Na
Startup 9	5	5	4	4
Startup 10	5	5	5	4

Source: Compiled by the author

Appendix 7. Survey replies in “Previous Experience” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/ Survey Replies	Our startup's founders had relevant expertise and knowledge in the industry.	Our startup's founders had previous business knowledge/experience	Our startup faced challenges due to a lack of industry-specific experience among team members.
Startup 1	5	3	2
Startup 2	1	1	4
Startup 3	3	5	4
Startup 4	1	3	5
Startup 5	4	4	2
Startup 6	4	4	2
Startup 7	2	2	Na
Startup 8	3	3	Na
Startup 9	5	4	2
Startup 10	4	5	4

Source: Compiled by the author

Appendix 8. Survey replies in “Pivoting” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/ Survey Replies	Our startup's attempts to pivot its business model did not lead to desired outcomes.	Pivoting negatively affected our startup's success
Startup 1	1	3
Startup 2	1	3
Startup 3	1	1
Startup 4	2	2
Startup 5	Na	Na
Startup 6	5	2
Startup 7	Na	Na
Startup 8	Na	Na
Startup 9	5	3
Startup 10	5	3

Source: Compiled by the author

Appendix 9. Survey replies in “Customer Experience” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/ Survey Replies	Our startup struggled to meet the needs and expectations of our target customers.	We received negative feedback from customers regarding the usability or functionality of our product/service.	Customer dissatisfaction contributed to our startup's inability to retain or attract new customers.	We failed to build strong relationships with our customers, leading to decreased loyalty and retention.
Startup 1	2	1	1	1
Startup 2	4	2	3	2
Startup 3	3	1	1	1
Startup 4	4	4	3	4
Startup 5	2	2	2	2
Startup 6	5	2	2	5
Startup 7	5			
Startup 8	2			
Startup 9	4	2	3	3
Startup 10	4	2	3	3

Source: Compiled by the author

Appendix 10. Survey replies in “Lack of Technical Practices” (Values 1 as “Strongly disagreed” and 5 as “Strongly agreed”)

Startups/ Survey Replies	The absence of adequate testing protocols resulted in frequent bugs and errors in our product/service.	The absence of a structured development process contributed to delays and inefficiencies in delivering technical solutions.
Startup 1	1	3
Startup 2	3	3
Startup 3	1	3
Startup 4	2	3
Startup 5	2	2
Startup 6	2	1
Startup 7	Na	1
Startup 8	Na	2
Startup 9	3	3
Startup 10	1	1

Source: Compiled by the author

Appendix 11. Thematic analysis of interview with Startup 1

Category	Findings
Experience	Established by one IT specialist and one marketing specialist with relevant experience in their respective fields. Technical expertise facilitated fast technical structures, while marketing skills enabled initial customer acquisition.
Motivation	The founders' passion for travel, remote working, and sports was the primary motivation behind initiating the startup.
Education	One founder holds a master's degree in computer science, while the other holds a master's degree in TV production.
Age/gender structure	Founders are male, 22 years old, and female, 24 years old.
Funding	Lack of time to seek funding due to customer engagement; however, insufficient funding indirectly impacted the startup's operations.
Product development	No specific challenges were encountered during the product development phase.
Business plan	No formalised business plan; operations were guided by a roadmap.
Network	Leveraged incubator programs and received mentorship support for networking.
Potential Customers	Utilised segmentation and social media ads to identify and target potential customers.
Competitors	Successfully differentiated from competitors, providing unique services.
Flexible working environment	Operated fully remote with physical facilities available.
Team	The team comprised a software engineer and a marketing specialist with distinct responsibilities.
Missing parts	The lack of business experience was identified as a critical missing component.
Key failure factors	Cited the COVID-19 outbreak as a primary factor contributing to the startup's failure.

Source : Compiled by the author

Appendix 12. Thematic analysis of interview with Startup 2

Category	Findings
Experience	The founder of Startup 2 brings substantial backend engineering experience, spanning over eight years, and previous involvement in startups for about 6-7 years. Although possessing knowledge of startup terminology, the founder needed to gain experience in management science and sales, which negatively impacted the startup's operations. The founder's motivation to initiate the startup stemmed from their previous experiences in the industry.
Motivation	The founder's motivation to start Startup 2 was primarily fueled by the knowledge gained from previous experiences in the industry, highlighting the importance of past learnings in shaping entrepreneurial endeavours.
Education	Both founders hold Bachelor's degrees, one in computer science and the other with a degree in management, suggesting a diverse educational background within the founding team.
Age/gender structure	The age and gender distribution among the founders are varied, with a female founder aged 26 and two male founders aged 22 and 28, respectively, reflecting diversity within the startup's leadership.
Funding	Startup 2 faced funding constraints, with the founder covering operational costs personally. Despite attending a pre-incubation program and engaging with investors, a lack of proper planning hindered successful fundraising efforts.
Product development	The startup encountered challenges in product development, including a need for more understanding of minimum viable product (MVP) development and limited practical execution. Overemphasis on theoretical aspects and inadequate support from the incubation program contributed to these challenges.
Business plan	Despite having a formalised business plan, the startup faced execution challenges, possibly stemming from business experience and planning gaps.
Network	Startup 2 actively leveraged its network for mentorship and collaboration, participating in idea hackathons, pre-incubation programs, and mentorship sessions. The founder's networking efforts in coworking spaces facilitated the expansion of contacts without significant barriers.

Potential Customers	The startup employed a unique marketing strategy to target potential customers, highlighting creativity in customer acquisition efforts.
Competitors	Competition from a dominant competitor, controlling nearly 90% of the market, posed a significant challenge. Attempts to differentiate the startup's offerings were thwarted by the competitor's decision to expand features.
Flexible working environment	Startup 2 adopted a fully remote working model, providing flexibility but potentially introducing communication and coordination challenges.
Team	The startup needed a fully defined team composition and clear roles and responsibilities, indicating team management and coordination challenges.
Missing parts	Critical components such as business experience, self-confidence, and sales skills needed to be improved within the startup, affecting its ability to navigate challenges effectively.
Key failure factors	<ul style="list-style-type: none"> • Lack of business experience in the domain and limited experience in startups were identified as the primary factors contributing to the eventual failure of Startup 2.

Source : Compiled by the author

Resümee

EESTI TEHNOLOOGIA IDUFIRMADE LÄBIKUKKUMISE PÕHJUSED

Berker Şahin

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