

NTNU SCHOOL OF ENTREPRENEURSHIP

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**A Multiple Case Study on Outsourcing of  
Technical Development in Early-stage  
Ventures**

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## *Abstract*

This study investigates startups' use of outsourcing for technical tasks in their early stage of development, an examination hampered by lack of empirical evidence for technical prototyping development and inadequate study of outsourcing in startups. Few empirical works have focused on the agile, milestone-based ordering and working methods of startups' use of outsourcing, there is the need for a more holistic view in all dimensions. Hence, we aim to provide a more secure foundation for cross-disciplinary technical development. The paper intends to examine how startups outsourcing for technical tasks affects development speed, market insights, and technical learning. A multi-case approach was chosen as well as in-depth semi-structured interviews to ensure a complete understanding of the data. The result showed there is a strong correlation between agility and dynamics, a negative correlation to hassle from cooperation, a moderate correlation to development, and a weak one with learning and market insights. There is no correlation between communication and the amount of development gained from outsourcing. It further showed that Startups' use of outsourcing is beneficial but startups that implement concretization of tasks, with technical competencies within their core team get better results from outsourcing. The study showed that whether the outcome of the outsourcing met expectations or not, the process gives startups a foundation for Research and Development. Consequently, it asserts that there is a need for the Startups' outsource to agree on a clear delivery goal. It further recommends that entrepreneurs should make sure that there is relevant technical knowledge within the startup and the external, and there exists effective communication between both parties.

## *Summary in Norwegian*

Dette studiet undersøker startups bruk av outsourcing for tekniske oppgaver i deres tidlige utviklingsfase, en undersøkelse hemmet av mangel på empirisk litteratur mot teknisk prototypeutvikling og lite litteratur som fokuserer på av outsourcing hos nystartede oppstarter. Lite empiriske arbeid har fokusert på den agile, milepælsbaserte bestillingen og arbeidsmetodene for oppstartsbedrifters bruk av outsourcing. Det er behov for et mer helhetlig syn i alle dimensjoner. Derfor har vi som mål å gi et sikrere grunnlag for tverrfaglig teknisk utvikling. Oppgaven har til hensikt å undersøke hvordan oppstart outsourcing av tekniske oppgaver påvirker utviklingshastighet, markedsinnsikt og teknisk læring. En fler case tilnærming ble valgt, samt inngående semi-strukturerte intervjuer for å sikre en fullstendig forståelse av dataene. Resultatet viste at det er en sterk sammenheng mellom agile metoder og dynamikk, en negativ sammenheng med problemer fra samarbeid, moderat sammenheng med utvikling, og en svak korrelasjon med læring og markedsinnsikt. Det er ingen sammenheng mellom kommunikasjon og hvor bra utvikling man får fra outsourcingen. Funnene indikerer startups bruk av outsourcing er gunstig, men startups som implementerer konkretisering av oppgaver, med tekniske kompetanse innen kjerneteamet, får bedre resultater fra outsourcing. Studiets funn viser at om outsourcingen oppfylte forventningene eller ikke i stor grad er avhengig av forberedelsene og rammene startupen legger til grunn. Med dette som fundament anbefales det at Startups som skal outsource skal bli enige om et klart leveranssmål. Det anbefales videre at gründere må sørge for at det er relevant teknisk kunnskap innen oppstart og ekstern, og det eksisterer effektiv kommunikasjon mellom begge parter.

## *Preface*

It has been a very different year with COVID-19 happening. The pandemic has forced us out of some of our habits and made us more digitized. Since we are two writers on this thesis, working together has been a lot different than we thought. However, we did manage to create a routine and work together somewhat painlessly.

We would like to thank our advisor, Haakon Thue Lie for all the deep discussions and feedback about this topic. It's been a very educational year and we will take this knowledge further into the startup world. We appreciate all the time you gave us and the great ideas. We are glad that you found this topic interesting.

We would also like to thank the close ones that have helped us iterate on the thesis and pushed us further to accomplish results. A special thanks to Bernt, Ingeborg and Fernanda for their constant support and help, we love you very much.

It has been an incredible two years at the NTNU School of Entrepreneurship and we are sad to see it end. But we are also very excited for a new phase of our lives to begin and see what's to come.

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# Contents

<b>List of Figures</b>	<b>iii</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Research Questions and hypothesis . . . . .	1
<b>2 Theory</b>	<b>3</b>
2.1 Entrepreneurship . . . . .	3
2.2 Transaction cost Theory . . . . .	3
2.3 Resource-Based View . . . . .	4
2.4 Resource Dependence Theory . . . . .	5
2.5 Knowledge-based View . . . . .	5
2.6 Unique and Dynamic Capabilities . . . . .	5
2.7 Outsourcing and freelancers . . . . .	6
2.8 Agile/milestone based management . . . . .	7
2.9 Milestone Based Outsourcing . . . . .	7
2.10 Entrepreneurial Outsourcing . . . . .	8
2.11 Core enhancing . . . . .	8
2.12 Purpose . . . . .	9
2.13 Contribution . . . . .	9
<b>3 Methodology</b>	<b>10</b>
3.1 Research Design . . . . .	10
3.1.1 Qualitative Method . . . . .	11
3.1.2 Semi-structured interview . . . . .	11
3.2 Research Approach . . . . .	13
3.3 Case Study Research Strategy . . . . .	13
3.4 Data Acquiring . . . . .	13

---

3.4.1	Selection of interview subjects . . . . .	13
3.4.2	Acquiring Interview Subjects . . . . .	14
3.4.3	Data . . . . .	14
3.5	Data Analysis . . . . .	15
3.6	Evaluation and limitations . . . . .	16
<b>4</b>	<b>Result</b>	<b>17</b>
4.1	Motivation, expectation and results . . . . .	18
4.2	Preparation . . . . .	20
4.3	Cooperation and Learning . . . . .	21
4.4	Technical domain knowledge . . . . .	22
4.5	Dependent variables . . . . .	23
<b>5</b>	<b>Discussion</b>	<b>26</b>
5.1	Hypothesis . . . . .	27
5.2	Research Question 1 . . . . .	27
5.3	Research Question 2 . . . . .	29
5.4	Research Question 3 . . . . .	29
<b>6</b>	<b>Conclusions</b>	<b>30</b>
6.1	Recommendations to entrepreneurs . . . . .	32
6.2	Implications for further research . . . . .	33
	<b>Bibliography</b>	<b>34</b>
	<b>Appendix</b>	<b>38</b>
A	Appendix Interview Code . . . . .	38
B	Appendix Correlation . . . . .	57

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## List of Figures

1	Transaction Cost Theory . . . . .	4
2	Startups' Technical Outsourcing . . . . .	17
3	Illustration of Expectation and Delivery Outcomes . . . . .	28

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# 1 Introduction

When the epidemic hit the west by full force during the spring of 2020, much of society closed. This led to many losing their jobs. For those who could, remote work was quickly adopted. People working from home and many needing to find an alternative source of income lead to an explosion within online freelancer platforms, like Upwork, Fiverr, and freelancer.com, all increasing their stock price from three to six times their value in May 2020 to May 2021. With more people than ever before renting out their services and online cooperative work being as viable as ever before, we wanted to explore its viability for startups. Outsourcing is a key method for getting jobs done for many companies. It gives different companies the ability to focus more exclusively on their core capabilities to be more competitive in the marketplace and provide more value. As the marketplace is becoming more international, you can outsource certain activities and processes to actors from all over the globe. “Core competency strategy” is a strategy that helps decide what activities to outsource and not. Prahalad and Hamel (1990) argues you should keep core competencies in-house (Hamel and Prahalad 1990). Amit and Schoemaker (1993), and Prahalad and Hamel (1990) emphasize SMEs need to focus the limited resources on core activities – those being activities that contribute to the firm’s competitive advantage (Amit and Schoemaker 1993; Beaumont and Sohal 2004; Di et al. 2009; Hamel and Prahalad 1990). But what are the prioritized core activities of a technology startup in its initial phases? Early-stage startups are categorised by not having confirmed their value propositions and repeatable and scalable business model. They are in an exploitative phase and do not know what their core activity will be. From a business perspective, a startup’s core activity is to test its business model hypothesis and find a repeatable and scalable one (Blank and Dorf 2012). The exploratory phase often demands a considerable variation of tasks to be executed and a lot of learning to be done, and many startups fail during the early phase. Our thesis will look closer into the viability of tech startup’s use of outsourcing in their early stages.

## 1.1 Research Questions and hypothesis

There are several key events and decisions from a startup point of view that would be valuable both for the present study and for future research. We would like to discover these crucial points in a startup’s decision-making and elaborate upon their choices and the effects on the development of the startup. We did not want these questions nor the answers to be looked upon as solutions for the problems that occur, but rather to point in the right direction. There are several “traps” and mistakes a startup can fall into and we want to find out when and how these take place. We did a literature study prior to this thesis. Our hypothesis and research questions are based upon our findings within this study.

In this study we are focusing on technical prototypes. When developing the value proposition in such an advanced manner, iteration is important. Having an agile workframe is important for



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R&D purposes when it comes to development (Tucker J Marion and Meyer 2010). Therefore we have a hypothesis that builds upon this theory.

***Hypothesis:*** *Startups that implement concretization of tasks and agile methodology see a greater gain from outsourcing, in regards to the startups development speed, market insight and technical insight.*

While researching the topic further, we wondered if the startups that outsource their projects were satisfied with the outcome. Is outsourcing tasks that go beyond administrative work worth doing? This led us to wonder if startups in general are satisfied with their technical outsourcing product (note that product is used as a term for the outcome of outsourcing and not as the final product), leading to our question being:

***RQ1:*** *How does the technical outsourced product live up to the expectations of the startup?*

We were curious if the products that the startups receive are at a satisfactory level or if it's something different from what they expected. This implies to assess whether the product proves itself to be useful (or not) for the startup for different reasons such as pivot during the development phase, new discoveries in the market, or poor knowledge and specification of how the product should be developed. Could it give value in other ways and who is at fault for potential misalignment and poor product delivery?

Some startups possess technical knowledge relevant to the outsourced project. It is still uncertain what influence the relevant technical knowledge has on delivery and the startups' experienced value, leading to the following question:

***RQ2:*** *What effect does relevant technical competence in a startup have on outsourcing performance, in regards to the startup's development speed, market insight and technical insight?*

Startups and businesses outsource a task that has to be done either because they do not have the competence, or the time themselves. By outsourcing their task they get more time to focus on what matters and they can receive the task completed in a professional way. However, we are interested to see if there are any other benefits, or hidden dangers from outsourcing which affects the startup development.

***RQ3:*** *How does the use of external technical knowledge in a startups early phase affect the startups development?*

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In this thesis we will start with introducing the relevant theory we discovered related to our research in Chapter 2, followed by the methodology used for the interviews and organisation of data in Chapter 3. We then present our results from the research and interviews in Chapter 4. These results will be discussed further and elaborated upon in Chapter 5. Our conclusion for this research will be presented in Chapter 6. The whole thesis is built around the research questions above. The process and data gathering is designed to provide relevant data for us to use and discuss. We would like to share our findings and further show how our data collection can provide some answers to the research questions.

During the research of this thesis we discovered a field with limited theoretical coverage. Our conclusion will provide applicable discoveries to this study and relevant future research that can be done to further understand the complexity around startups and outsourcing.

## **2 Theory**

In this section, we will introduce the theoretical framework for the thesis. It will present fundamental entrepreneurial and business theory. It lays the foundation for theory related to outsourcing, innovation development, entrepreneurial use of outsourcing, and the literature status quo. In addition, it gives the context of the thesis motivation, hypotheses and research questions, value of insight, and how it relates to existing literature.

### **2.1 Entrepreneurship**

Entrepreneurship has many different definitions depending on the context. Considering its relevance within the global economic field, it is possible to confirm that the subject is yet to be further explored (Mittet and Leira 2020; Sergiu Rusu 2012). Several authors are pointing at different and sometimes conflicting definitions of the term. It is relevant to highlight that due to the large array of definitions, there are various adjectives that are considered subdomains of the word (Carree and Thurik 2006; Gedeon 2010). However, one of the most recent generic definitions describes entrepreneurship as “finding a repeatable and scalable business model” (Blank and Dorf 2012). Innovation does not have to be revolutionary or novel, but can combine existing technologies in new ways and in new markets as well. In spite of what preceded, we aim to cover the most relevant academic literature regarding entrepreneurship and outsourcing for this thesis.

### **2.2 Transaction cost Theory**

Transaction cost theory bases itself around minimizing the costs of exchanging resources in the environment and the costs of managing these inside the organisation (Ketokivi and Mahoney 2017).

By optimizing efficiency within the company, they can reduce internal transaction costs. However, when the internal transaction cost is, or will be, greater than the external transaction cost due to a lack of know-how, competence, or other relative complications. That is when venture startups start to look for outsourcing opportunities.

Figure 1 helps to show the concept of the theory. A company will be able to scale up when the external transaction costs are higher than the internal ones. The institutions in the market help to establish coordination in the economic transactions.

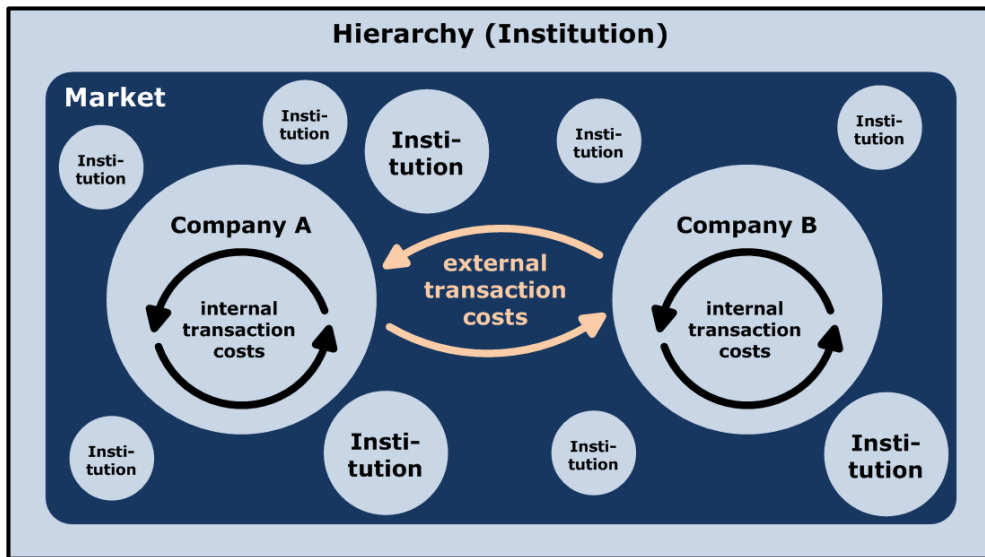


Figure 1: Transaction Cost Theory

Source: coase1991nature

### 2.3 Resource-Based View

The resource-based view looks at firms' different resources and how they can help to provide a competitive advantage. They can be separated into homogeneous and heterogeneous resources. Coase (1991) argues that a firm's competitive advantage comes from only the heterogeneous resources (Coase 1991). These resources are categorised as valuable, rare, inimitable and non-substitutable (Barney and Wright 1998).

The work related to the resource-based view has received criticisms for not applying to dynamic environments and therefore had little relevance for the study of such important topics as entrepreneurship, innovation, technical change, competitive dynamics, etc. (Fleming and Bromiley 2000; Foss and Knudsen 2003; Lu et al. 1994; Mosakowski and McKelvey 1997; Priem and Butler 2001). With the addressing of these criticisms, a response in light of new literature relates to the "dynamic resource based view" (Helfat 2007).

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## 2.4 Resource Dependence Theory

Resource-Dependence Theory is the level of dependency one has to external factors, mostly firms. If your firm is to a large extent dependent on another firm, without the other firm being dependent on you, you are highly at risk of getting a bad deal from the other companies or risk losing the needed access from that firm. It is primarily proposed five actions to minimize environmental dependencies: (a) mergers or vertical integration, (b) joint venture and other inter organisational relationships, (c) boards of directors, (d) political actions, and (e) executive succession (Salancik and Pfeffer 1978).

As startups and entrepreneurs are at a resource-based deficit, they are often largely dependent on other firms and customers to deliver a complete product or service. Opportunities might be rare, making the companies extra dependent on the opportunities and partners coming their way.

## 2.5 Knowledge-based View

A knowledge-based view of a firm is an organisational concept for providing competitive advantage. It considers knowledge as the most strategically significant resource. Tom Baur identified in the book titled "Human Resource Management for Tourism, Hospitality and Leisure: An International Perspective" two methods for distributing knowledge. Knowledge-based resources are categorised by difficulty being imitated, making it similar to heterogeneous resources, and having social complexity. Knowledge management accelerates in work cultures that portray flexible organisation, such as human relation organisation. It is categorised with a flat internal structure that emphasizes employee empowerment, interpersonal relations, and staff development.

## 2.6 Unique and Dynamic Capabilities

Innovation is closely related to knowledge work. A startup is often as valuable as the knowledge the startup members possess. It is crucial to gather knowledgeable people to the startup and continuously develop their knowledge. In doing so, startups are more likely to create a valuable competitive advantage by possessing the value of unique expertise in their team. However, the beginning phases of a startup have a lot of uncertainty. Getting to a stage where they can test their assumptions efficiently may require a lot of knowledge and development by itself. To produce a capable prototype to do the necessary testing may require adequate knowledge in several fields. It may require months of learning and digging for the initial team to accomplish this task. Accomplishing this development may not necessarily require exclusive best in the world knowledge in all its aspects. The uniqueness can come from the combination of two or more state-of-the-art technologies in a new way. Therefore, using existing knowledge accessible through external knowledge partners and a unique combination or direction of expertise can help create and speed up

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innovation. If the combination is fruitful, it is advantageous to have this knowledge internally in the team. Using external partners may slow down the innovation process. The complexity of the combination of expertise makes it harder to have a plug-and-play approach to competencies.

Dynamic capabilities are a firm's capability of sensing, seizing and transforming from change (D. J. Teece 2007). For certain industries, this capability is crucial for the survival of a firm. In general, larger and older firms have more limited dynamic abilities compared to a younger and smaller company, opening the room for those companies to thrive. A firm with strong dynamic capabilities enables the creation and implementation of effective business models, which in turn is influenced by the design of the organisation (D. Teece et al. 2016). Organisational agility can be explained through first understanding what deep uncertainty is. Deep uncertainty is referred to as "unknown unknowns".

## 2.7 Outsourcing and freelancers

Research suggests outsourcing is used more and more for purposes like strategic considerations (such as faster growth or reducing risk), making up for a lack of internal skills, and to increase business' flexibility (Banalieva et al. 2015; Beaumont and Sohal 2004; Bustamante 2018; Fan 2000; Gonzalez et al. 2010; Tucker J Marion and Meyer 2010; Murphy et al. 2012; C. Saunders et al. 1997).

In an article from 2008, Samimath explored how outsourcing affects financial performance of entrepreneurial firms (Salimath and Cullen 2008). The category which was the youngest, smallest, and most innovative - most related to startups - demonstrated a clear positive financial effect from outsourcing. The entrepreneurial firms with the best financial gains aligned their configuration characteristics with outsourcing.

Outsourcing is typically thought of in regards to external firms, but freelancers represent a large share of the market for hired knowledge. Freelancers are self-employed and take on tasks from external clients. Typically, they do not have full-time employee relationships with the companies. Instead, they temporally work for a short duration to successfully execute some outsourced task. Freelancers can be used to bridge the gap of in-house expertise, or help on a continuous basis. In contrast, consultants are typically linked to advising from their expertise in a particular field exclusively. Freelancers join to execute, but may have an advisory role as well. Research has shown that outsourcing to experienced freelancers positively affects innovation for startups working with software, both in early and late phases. They provide expertise as workers and insight from customers (Gupta, Fernandez-Crehuet and Hanne 2020a; Gupta, Fernandez-Crehuet, Hanne and Telesko 2020a). A systematic mapping study argued that using freelancers could foster innovation, and act as an efficient and effective member of the software development team (Gupta, Fernandez-Crehuet and Hanne 2020b). Startups using freelancers in continuous innovation gained the most

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market success and increased market share. The article indicates that freelancers' involvement with core business operations could reduce development costs, shorten time to market, and increase customer satisfaction. The study showed the greatest impact for businesses that used freelancers across multiple value proposition activities.

## **2.8 Agile/milestone based management**

Software developers were the first to apply the agile management concept (Abbas et al. 2008). However, throughout the years, it is widely spread that the term represents the development of both products and solutions. It advocates the process of prototyping, testing, and learning in a fast and iterative way in order to bring success to businesses (Dennehy et al. 2016; Jensen et al. 2017; May 2012; Ries 2011).

There are several frameworks that are based on learning through trying and experimenting in an iterative manner, such as Design Thinking and milestone-based methods. The former focuses its efforts on understanding, developing, and consolidating ideas in a non-linear manner. The latter refers to the capabilities of completed tasks, being extensively employed, and ensuring that projects are well-equipped in terms of teamwork, technical learning, and market intelligence.

A prototype is a preliminary version of a product and helps demonstrate the look and feel of the product. It can be used to verify a concept and is suitable when confident in the feasibility of your idea and want to test the concept. Minimum Viable Product (MVP) is the minimum version of a product that still solves the customers' problem. An MVP is a version of a new product that allows a team to collect the maximum amount of validated learning about customers with the least effort (Ries 2011).

Creating innovative technical solutions, on the other hand, can demand in-depth technical knowledge in a variety of areas. One of the key incentives for outsourcing is access to skills, capabilities, and experience that would take years to acquire internally (Beaumont and Sohal 2004; Di et al. 2009; Murphy et al. 2012; Musteen and Ahsan 2013).

## **2.9 Milestone Based Outsourcing**

We see theory emphasising that outsourced knowledge work should have an agile and milestone-based ordering. Tauqeer and Bang state that outsourcing is nearly vital for startup companies aiming to become a high growing company (Tauqeer and Bang 2019). They developed a decision tree focusing on measuring standardisation or specification of the activity, receiving input for innovation, having barriers to entry in place, and keeping correct contract agreements set up with the suppliers, with corresponding measurements.

Similar to Grant (2008), Tauqeer and Bang (2019) suggest the importance of understanding if

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the task is explicit and explainable, compared to implicit(Grant 2008; Tauqeer and Bang 2019). Of the themes mentioned in the decision tree, the article addresses that this decision is the most critical factor. Marion and Mayer’s (2010) article focusing on startup innovation outsourcing for development and commercialisation(Tucker J Marion and Meyer 2010). It states that successful startups adopted an agile development process in their outsourcing relations, for a more immediate impact on production performance. The most successful firms from the study had a clear focus of what was needed to get the project completed. Positive results from agile outsourcing development seem to span across both software and hardware (Duc and Abrahamsson 2017; Gupta, Fernandez-Crehuet, Hanne and Telesko 2020a,b; Tucker J. Marion and Friar 2012).

## **2.10 Entrepreneurial Outsourcing**

Entrepreneurial Outsourcing is a term presented in a master thesis from 2019. It is defined as “the concept of flexibly adjusting a startup’s access to competence, resources, and capacity according to rapid internal or external changes by sourcing products or services from external providers” (Appelhans et al. 2019). It outlines the difference compared to traditional outsourcing.

In consideration of the foregoing, the term serves as a precise description of an interesting and underdeveloped area in the literature. Having more terms in the literature helps to avoid confusion and redefinitions on several phenomena within the subject. From our understanding, the definition provides a precise description that distinguishes the term from traditional outsourcing done by established firms and is used during the thesis.

## **2.11 Core enhancing**

Traditionally, strategic management literature views outsourcing decisions from a transaction-cost framework (Grant 2008). It usually applies that outsourcing activities is only a good option for a company’s non-critical or non-core activities. Elango (2008) gave the discussion more nuance when using a framework incorporating supplementary and complementary aspects for SMEs outsourcing (Elango 2008).

The article argues that some core activities of a firm can be complemented by outsourcing. An example of this would be research. The article does not contradict that an organisation should protect its core competencies, instede how this nuance can benefit SMEs. Core activities that are not suited for outsourcing if the activity is implicit, with knowledge based on experience and culture, and are hard to communicate.

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## 2.12 Purpose

We see the potential of using external technical knowledge in startup development and technical development. There are some key differences separating startups outsourcing compared to traditional companies. Very few frameworks for outsourcing that are applicable for startups exist, and the literature is still in its infancy. This is especially the case for technical prototyping development, although critical for a startups success, and expertise is often needed. The literature indicates that technical outsourcing is used by many startups(Duc and Abrahamsson 2017). Experiences vary, demonstrating the need for more insight into the matter.

With the supporting literature related to agile and milestone-based ordering and working methods, we wanted to help provide a more secure foundation for the theory related to cross-disciplinary technical development. We also wanted to look at how it affects development speed and market- and technical learning. This leads us to the only deductive research goal and hypothesis:

Startups that implement concretization of tasks and agile methodology see a greater gain from outsourcing, in regards to the startups development speed, market insight and technical insight.

We wanted to get a better insight into overarching themes related to technical outsourcing for startups for our three exploratory research questions. besides this, we also would like to learn more about the relationship between delivery and expectation, leading to our first research question:

How does the technical outsourced product live up to the expectations of the startup?

From our hypothesis related to concretisation of task and agile methodology, we wondered what effect relevant technical domain knowledge had for these, and how the delivery performed in general, resulting in our second research question:

What effect does relevant technical competence in a startup have on outsourcing performance, in regards to the startup's development speed, market insight and technical insight?

Outsourcing core activities and technical development have many challenges, and can leave the startup exposed. As our final research question, we wanted to understand better how the startups further development was affected.

How does the use of external technical knowledge in a startups early phase affect the startups development?

## 2.13 Contribution

By exploring these questions and conducting this thesis, we hope to develop the research field at a critical point related to technical outsourcing for startups. The exploratory questions aims to give insight into this underdeveloped theme of technical-entrepreneurial outsourcing. In addition,



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our hypothesis will test and provide more case-based data for the milestone-based development and concretization of tasks in a technical and cross-disciplinary perspective. We hope to provide valuable insight into common challenges and guide startups. The development and findings can contribute to quicker development and make technical tools and solutions more accessible to market needs.

Our motivation for doing literature research and writing this thesis was from our working experience in technology startups. We will use our findings for future development and hope they also can be valuable for other entrepreneurs.

## 3 Methodology

Chapter tree includes a description of the thesis methodology, which includes discussing the overarching study design. Selections on study preparation, participant selection, and data collection and analysis will follow. Lastly, the Chapter concludes with afterthoughts, including a reflection of the limitations around the chosen methods.

### 3.1 Research Design

This thesis aims to explore the processes used by startups in finding, hiring, and using external resources in early-stage development and how external resources affect the startup. Within this topic, our main focus is to explore the field of technical development in early phase startups. And explore the experiences startups had from and the effects of outsourcing methods to gain insight into how and when they could be a viable solution. While working on the literature review for this thesis, a systematic mapping process was used to discover and organize findings(Mittet and Leira 2020). The process revealed a lack of existing research within startups' utilization of outsourcing resources. Most of the existing literature focused on how SaaS startups or well-established companies use outsourcing. There is limited literature regarding best practices for outsourcing in general (Tauqeer and Bang 2019). The identified gap was intriguing, prompting a further investigation into the topic. Due to the underdevelopment of research related to entrepreneurial outsourcing and its relation to technical development, it was difficult to identify and select effects that were the most interesting and measure them. Therefore, a qualitative method was selected as this method can be more exploratory and flexible. Therefore, it is easier to discover details and mechanisms easily overlooked in quantitative data (Graebner et al. 2012).

A comparative case study design was used to analyze the data. Utilizing a comparative case study supports researchers to find patterns and better understand the context of, contribution to, and attribution of outcomes. The richness of comparative case studies can significantly and positively assist in finding best practices. This relative contextual investigation includes examining and

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unionizing multiple cases to find similitudes, contrasts, and examples across them and shapes a typical concentration (Yin 2003). Using a case study approach and qualitative research enables us to answer "how" and "why" types of questions while taking into consideration how a phenomenon is influenced by its context (Baxter, Jack et al. 2008; Yin 2003).

### **3.1.1 Qualitative Method**

Outsourcing, in many instances, is a complex activity that includes numerous variables. Given this fact, it is challenging to measure its success or failure rate only by numbers. Thus, a qualitative method proves a more suitable and effective approach for this case study. Capturing opinions, experiences, and other factors that are difficult to measure in quantitative metrics allows us to use analytic methods to find the details that led to the outcome for the startups (Dalland 2012). Qualitative data is also a vital means to capture the context that qualitative research can provide (Bharti and Singh 2014; Corbin and Strauss 1990). When determining that the research questions are best answered using a qualitative case study, the case and its boundaries must be determined (Yin 2003). This thesis focuses on the process of startups initiating and relationship with external workers for technical development. Some startups achieve success by outsourcing specific tasks, while others fail. We used an exploratory study method to research and develop an understanding of outsourcing outcomes. By pinpointing certain key factors, it will be easier to create a best practice guide on how to use outsourcing. As the research focused on tech startups' use of outsourcing to their advantage, opinions, experiences, and other non-qualitative factors were crucial to developing understanding. An interview was chosen as the primary data collection method. Interviews are verbal interchanges where one or more interviewers attempt to gather information from one or more participants in different ways. There are three types of interviews: Structured, unstructured, and semi-structured, where the grade of structure in the last mentioned is between fully structured and unstructured (Longhurst 2003). We specifically utilized semi-structured interviews. Semi-structured interviews have been identified as key in supporting researchers to expand their understanding of a research subject (Dubois and Gadde 2002). In addition, the semi-structured interview allowed the extraction of more specific information from the interviewee.

### **3.1.2 Semi-structured interview**

In a Semi-structured interview, the interviewer prepares a list of predetermined questions, the same as they would for a structured interview. However, semi-structured interviews differ from structured interviews in that they move beyond "yes" or "no" answers, allowing open responses inviting elaboration in the participants' own words, which offers participants opportunities to explore issues they feel are significant (Longhurst 2003). This type of interview also makes it possible to ask open-ended questions where the participants are free to address the question in the way they feel is the most suitable. By specifying the topic and making the subjects take

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the initiative, the possibility opens up for a voluntary response sample (Agresti et al. 1990). Semi-constructed interviews give insight into individual experiences and views, which will give the listener a deeper understanding of the research topic on an individual level. Moreover, using semi-constructed interviews opens up possibilities of gaining deep insight into various topics with enough structure to cover various interrelated topics within the research while leaving space for participants to utter their opinion and give their new meanings to the study at hand (Galletta 2013). Additionally, semi-structured interviews are more easily segmented due to their hybrid nature.

The semi-structured interview as a data collection method supports question probing and clarification. Insights gained from open-ended questions can facilitate movement into more theoretically driven questions. The easy shift into theoretically driven questions has been identified as a critical benefit of using a semi-constructed interview (Galletta 2013; Politis 2005). As participants share lived experiences, they naturally open to theoretically driven questions.

While semi-structured interviews have been found effective and supportive for gathering qualitative data, there are several associated potential challenges. On the other hand, Adams et al. (2015) explains that there are many disadvantages to this method (Collyer et al. 2015). A semi-structured interview is labor-intensive, time-consuming, and requires interviewer sophistication. The process, including preparing, set-up, conducting, analyzing, and transcribing the interviews, can be very time-consuming. They also argues that another drawback of the semi-structured interview is the significant amount of time and personnel needed to collect a large enough sample to yield precise results unless the interviews are conducted with a small group or organization. Thus, the semi-structured interview proves additionally well-suited for this research study as startups are usually composed of a small number of people.

The Semi-structured interviews included some closed questions that the interviewee answered. Interviewees were provided a three-point Likert scale from which to answer all closed-ended questions. The three-point scale included Satisfactory/High, Neutral/Moderate, and Inadequate/Low. This approach provides a more objective overview and is adaptable for statistical measurements. In addition, it provides a quick indication if there are any contradictions of the previous research conducted in the field. Interviewees were asked to rank their impression of (1) the cooperations' dynamic (Satisfactory - Inadequate); (2) amount of communication they had (High - Low); (3) developments made (Satisfactory - Inadequate); (4) market insight and learning (High - Low); (5) knowledge transfer or learning from the freelancer (High - Low); and (6) the level/amount of problems that occurred during the outsourcing period (High - Low).

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## 3.2 Research Approach

The selected research approach combines inductive and deductive approaches, with the main focus on inductive. A conceptual framework was developed, and research questions were identified to answer based on a literature review, typical of a deductive approach (Mittet and Leira 2020). However, as mentioned previously, the research field of outsourcing for startups is still young and underdeveloped. According to Saunders (et al. 2009) and Easterby-Smith (et al. 2008), an inductive research approach should be chosen when a research topic is new, and little literature on the topic exists (Easterby-Smith et al. 2012; M. Saunders et al. 2009). We included some inductive approaches due to some reliance on previous research from entrepreneurial outsourcing and comparing it to traditional outsourcing. Miles and Huberman (1994) conclude that induction and deduction are linked research approaches and both are valuable (Miles and Huberman 1994). However, which is better suited for a study depends on the research emphasis (M. Saunders et al. 2009). The decision to include some deductive approaches was motivated by the limitations of the existing literature related to startups' use of outsourcing. While literature is present, few studies exist, and those that do are small, new, lack sufficient scrutiny, and have not been published in journals. By providing data stemming from deductive approaches and testing its legitimacy through the study data, we were able to test previous indications and supply a more robust data foundation for the literature.

## 3.3 Case Study Research Strategy

Due to the state of the entrepreneurial outsourcing literature and research questions, including the best approach, researchers quickly realized that a multiple case study could be best suited. Yin 2003 state that choosing to do a multiple case study design compared with a single case study is more generalizable, compelling, and robust and is more likely to produce higher-quality findings (Yin 2003). We chose an embedded approach to address the research topics, focusing on external technical resources cooperation while still gathering enough information to picture the circumstances surrounding it accurately. While a holistic approach can provide a more robust picture of the whole set, we decided to focus on fewer factors to have more time for multiple cases.

## 3.4 Data Acquiring

### 3.4.1 Selection of interview subjects

In selecting the interview objects, the sample frame and the criteria interviewees would have to fulfill were identified. We wanted to engage with companies that provide technical products and services and used external technical resources within their early-stage development. Early-stage

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development is defined as all development pre-launch. There are several means of acquiring external resources, mainly consultants, freelancers, or crowdsourcing. Since the goal was to determine tendencies for all outsourcing methods, to this aspect was treated as a homogenous one. Still, consulting firms and freelancers are represented in the data set. Hardware and software jobs were treated as heterogeneous. The same did companies that had failed, succeeded, and startups too young to determine. Interviewees were from the companies in close contact with the outsource partners and had a critical role. It felt crucial to interview an individual who could give accurate information about the companies, cooperation, and effects. This individual ended up being the CEO or CTO of the startups interviewed. Interviewing the CEO or CTOs allowed researchers to gather accurate information on both the motivation for outsourcing, expectation, preparation, cooperation, delivery, the startup's evaluation, and following actions.

### **3.4.2 Acquiring Interview Subjects**

The acquisition process began by looking for interview subjects by asking startups from NTNUs school of entrepreneurship. A minority of them met the study requirements and were available to participate. However, it was later realized that this might lead to biased samples because they only approached the people close to us, leading to a convenience sample (Agresti et al. 1990). It was decided to reach out to a couple of Facebook forums that discuss entrepreneurship and startups, in general, to get a more proper sample. While this method of sampling is appropriate to avoid a biased sample, no relevant responses were received from attempts to reach out to startups. It was decided to do a snowball sample from the subjects interviewed. This approach gives a slightly biased sample because there is no equal chance for all relevant startups to be chosen. However, an advanced search for relevant subjects from the population could not be accomplished due to time and resource constraints.

### **3.4.3 Data**

Due to the Covid-19 pandemic, and the consequential need to reduce social contact points, all interviews were digital. We strived to recreate a similar environment as possible for all the interviews. All the interviews were therefore done with the same interviewer and with the same observer present. The observer's primary role was to be an extra layer of security if some answers were unclear or part of the interview guide was skipped. According to Cohen and Crabtree (2006), semi-structured interviews are best performed when one person does the interview once and several are present to collect the data(Cohen and Crabtree 2006). In this case, we only had one observer and one interviewer. It was also critical to create trust with the interviewees and a natural dynamic. Respondents were encouraged to speak and answer openly about the startup and the questions given. The utilization of subjective information empowers scientists to unfold circumstances and causation in an essential way(Graebner et al. 2012). The respondents were encouraged to speak

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openly about themselves, the hatchery, and the assets given. A benefit of utilizing subjective information is for examining measure marvels' that empower unfurl circumstances and causal systems in an essential and modern way(Graebner et al. 2012). The inquiries were made with openness and sincerity. Meetings offer adaptability to seek after intriguing points(Yin 2003).

The interview questions were developed based on hypothesis, research questions, the semi-structured interview framework, and recommendations from (Longhurst 2003, Galletta 2013). It had several iterations from tests internally and input and tests with supervisors. There was also a pilot interview for a last evaluation and adjustments.

### 3.5 Data Analysis

The data gathered from the interviews was transcribed for later review and analysis. Several programs and methods were used to give the best overview of the data gathered and the quality of analysis.

The interviews provide rich data. Elements from the interview relevant to the research questions were sorted and categorized for comparative analyses. Data management was inspired by the Brown and Clarke thematic analysis method, following the six steps of reflexive thematic analysis(Clarke and Braun 2014). The case selection and triangulation method are inspired by the Eisenhardt method, while data analysis, sorting, and presentation of narrative data are inspired by the Gioia method(Eisenhardt and Graebner 2007; Gioia et al. 2013). The motivation for using a combination of approaches was to attain a reliable method for each study phase that suited both the nature of the study and the time limitations.

First, the interviews were transcribed in Norwegian, as the interviews were in the same language resulting in roughly 80 pages. The analysis was separated into three phases: (1) an initial run-through marking of relevant parts; (2) a more thorough with a written summary of each interview; and (3) extraction and categorization. Step two ensured a deep familiarity with each interview. In step three, quotes were separated into sections and categorized in Excel by:

- The startups' phase and age
- Type of industry
- Motivation for outsourcing
- Preparation steps
- Having or not having relevant technical domain knowledge internally
- Agile and not agile development
- Close or autonomous working dynamic

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- Result in delivery
  - Reflection

In the Correlation Appendix we formed from this categorization the following variables:

- Dynamic of cooperation
- Level of communication
- Development
- Market insight
- Learning
- Hassel
- Technical domain knowledge

The “third-order” coding and analysis were used to find broader meaning from the quotes. Using this approach gave an overview of each case from the initial go-through. It also gave concrete comparative data for the same theme and questions over several cases and allowed us to spot patterns across cases. The steps in the data analyzing process aimed to confirm or affirm hypotheses developed by previous literature and provided further insight answers into the research questions. Most of the cases had unfolded, and questions included descriptions of situations and their experience with them and some qualitative questions. Reviewing previous cases provided a glimpse into the interviewees’ experience from the cases and their behavior afterward. Looking at Eisenhardt’s method, this approach enables a more robust foundation of data.

We decided not to use a data processing software such as Nvivo after discovering their university license did not support Norwegian text, combined with the limited size of the dataset. Translating the data and learning the software would be insufficient use of resources compared to its value. The programs used were Google Docs for collecting the information and Google Sheet for sorting and tagging. In combination, these tools allowed us to combine, extrapolate and analyze the information. Values from the scale section were plotted into Google Sheets. Pearson correlation analysis between aspects was done through the correlation function. Functions as averages and the number of occurrences were used to help with the data.

### **3.6 Evaluation and limitations**

One indicator of quality is a study’s trustworthiness (Halldorsson and Aastrup 2003; Tjora 2012). Tjora (2012) and Lincoln and Guba (1985) propose that trustworthiness should include the following four elements; credibility, dependability, transferability, and confirmability(Lincoln and Guba 1985; Tjora 2012).

Halldorsson and Aastrup (2003) state that credibility is the agreement between responses, constructions, and researchers' presentations (Halldorsson and Aastrup 2003). Credibility aims to demonstrate that an accurate picture of the cases and phenomena is presented, and this relation is robust to scrutiny. The interviews were recorded to ensure a reliable data gathering foundation and used a multiple case study to strengthen the representability of the data by having a comparative dataset.

Dependability is related to data stability over time. Additionally, data collection is affected by different environments and individuals participating in the study. The data was structured according to a theoretical framework to address this and provide cross-case compatibility.

## 4 Result

In this section, the results from the data acquired and the analysis of the studies are outlined. The hypothesis and research questions were tested based on analytic narrative and data extracts, and contextualising the analysis in relation to the existing literature. To provide answers to our research questions we used an incorporated grounded theory approach. The analysis for mechanism at play was based on the Gioia method with triangulated argumentation (Gioia et al. 2013).

### *General quantitative results from the study:*

In total, eleven cases were conducted, separated into five startups and interviews. Three of them were CTOs, while two were CEOs. Two of the startups had three outsourcing relations, two startups had two and one had one. The outsourcing relationship lasted between a couple of days to the longest lasting over one year. Seven of the cases lasted between two and seven months. Six of the cases were outsourced from the startup to a consulting house, two to freelancers taking on one task, and three to freelancers with a larger involvement. The Interviews lasted between 45 and 90 minutes each. All of the startups interviewed were focused on technology, where four were focused on pure software and one on hardware. Four were currently active while one was terminated. Four of them were university spin offs. The companies aged between one and four and a half years, where four out of five were between one and two years old when interviewed. An overview of the results are summarized in figure 2.

Startups' technical outsourcing			
<b>Motivation &amp; Expectation</b> <ul style="list-style-type: none"> <li>• Speed</li> <li>• Knowledge compensation</li> <li>• Show potential customers</li> <li>• Creating MVP to iterate on</li> </ul>	<b>Preparation</b> <ul style="list-style-type: none"> <li>• Specification list vs ongoing cooperation</li> <li>• Onboarding</li> </ul>	<b>Cooperation</b> <ul style="list-style-type: none"> <li>• Wide range in autonomy and quality of communication</li> <li>• Agility</li> <li>• Technical domain knowledge</li> <li>• Insentivation concerns</li> </ul>	<b>Result</b> <ul style="list-style-type: none"> <li>• Delivery not being used</li> <li>• Technical learning</li> <li>• Market insight</li> <li>• Extra value</li> <li>• Reflection and future decision</li> </ul>

Figure 2: Startups' Technical Outsourcing



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## 4.1 Motivation, expectation and results

Of the 11 cases, all outsourcing decisions were partially or fully motivated by the lack of needed knowledge in-house. Five of the cases thought they could complete the outsourced tasks themselves, but were motivated to outsource due to cheaper and faster delivery.

Two cases that outsourced at an early stage wanted to get to a MVP state, both for market testing and being able to continue development in-house.

We define motivation as the reason why the startup decided to outsource the given work. Relevant quotes were sorted and tagged, as seen in the appendix. Below are the quotes related to motivation.

"We were going to create an android plugin that none of my developers really have the expertise to create."

"The developers I have now did not have the skills to do just that. They could have done it, but it would have taken more time and would have been more expensive."

"They are professional developers so they can do this job much better than I could. So it's really just delegating the work to someone who is a pro at it. Then I can rather focus on what I am best at, like finding money for example."

"It's simply to get started a little faster and have something we could bring to the customer and start testing and to find out a little more about the flow of the system."

"The motivation was to develop something technical, which we did not have the competence to do at that time. The team consisted of me and one more, who were 2 business developers, and we had no technical expertise on the team."

"We worked with recruitment, but found it challenging to find the right people. To start off a little early, we used [consulting company], and when they were finished, the developers should be ready to take over."

"It was simply to bring in skilled people who are skilled in user-centered design and UI design who have a background in getting their eyes and input on the platform and simply raising the usability of the platform."

"It's to increase the bandwidth of things that we do not consider to be really the core of what we do, since we are only three people."

"If there is a specific assignment where we do not have the expertise we use regularly, then it often pays to use freelancers, since it can go twice as fast."

We define expectation as what the startup wanted from the outsourcing delivery going into the cooperation. Result is defined as quotes that reflect the finished delivery from the outsourcee.

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These are grouped together as we are interested in seeing similarities and differences in expectation compared to results. The interviewees also had a tendency to mention both aspects combined.

”Basically, we wanted someone we felt was on our team, but we did not have to feel such a great responsibility to follow up. Because it is a very big responsibility when you actually have people on your team. We would not have any responsibility for training etc, these would just start working and solve straight away. They were to understand everything without further explanation. That was really what we wanted. We actually push all the time to achieve that. But in retrospect, we realize that it is really completely impossible to achieve.”

”We could certainly have prepared much more. But I do not know if we were quite able to know what to prepare for. Because we looked at them as experts who just had to solve the problem.”

”It was far from an MVP. It was more a proof of concept of a technical functionality of the total solution. And we got to use this to show our potential customers that we had something, and it was actually developed.”

”They carried out according to the expectations we had at the time and they delivered what they were supposed to based on the requirements we had made and we gave them full freedom to use the frameworks they thought were right, because we did not have the competence to decide it. But in retrospect, we have been told that from our developers who have a pretty good idea of some things that it was not optimal the framework they have used and the way they have done it. It was not optimal for scaling.”

”It was far from an MVP. It was more a proof of concept of a technical functionality of the total solution. And we got to use this to show our potential customers that we had something, and it was actually developed.”

“We want to make a technical prototype that could prove that we were able to do some of the technical things to the customers. And the intention was to prove it was technically feasible, but also that this could be the beginning of an MVP. That we should be able to use what is being made here to further develop the solution into something more to something that was ready for launch. It turned out not to be the case, i.e. that we could not use this here for any proper solution.”

”It turned out that we had not learned everything about our concept yet. This was what we knew at the time. We were not aware of the whole picture and how this should work, so one thing was that the functionality was far too small. What is made there, but it was still what we agreed on, so it did not matter that they did not deliver what they were supposed to because they did. The functionality did not measure up to a finished solution, and we had to develop much more anyway. In addition to this, the code we received from them was not designed for a proper industrial solution and was not designed to be able to use large amounts of data and expand to be a functional product. It was a simple technical prototype and more of a form of proof of concept at a very low level. Yes, it is not used for anything”

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”We ended up switching programming languages and the database system, and much more because we found that even though we were almost there, there were some choices we felt we could make that would make the system much better for the future.”

”I think potentially it could delay us by a couple of months, and just because at that time we did not quite know what to make and how to get started. We just throw something on the wall to see what sticks.”

”We did not get to use any of it really, but it was very useful in the form that we got to test quite a lot with the customers and found out a lot of things that did not work and a lot of misunderstandings. A lot of things that we had to shift some focus on that I did not realize in our earliest designs.”

”In hindsight, it could well be that we could solve a lot. Have meetings with the same things and present a better and more thorough design as a more thorough prototype.”

## 4.2 Preparation

Preparation is defined as conscious efforts and considerations done prior to the use of externals in order to better the cooperation and delivery.

”We had a sum we were willing to pay, and then we had certain criteria we wanted to include and we want it to change to such a, but a little more mentoring role in the long run.”

”It’s a dialogue, but that’s exactly what’s damn good. We do not have to sit down to sit down and write demands or white paper or something else, because we sit close together.”

”So that, it has worked well in the sense that we have, like I said, we have stopped sitting down and somehow really explained exactly what to deliver. Things have changed a bit along the way, while we have been working on them.”

”We set a deadline for the project, when we started the project and had a date for when it was to be completed and it was met, as far as I remember.”

”What has NOT worked is the clear deliveries. I think we could have gotten more out of it if we were clearer on what results we are looking for.”

”Basically, we might want someone we felt was on our team. But as we did not have to feel such a great responsibility to follow up. Because it is a very big responsibility when you actually have people on your team. We would not have any responsibility for training etc, these would just start working and solving straight away. They were to understand everything without further explanation. That was really what we wanted. We actually push all the time to achieve that. But in retrospect, we realize that it is really completely impossible to achieve.”

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”We could certainly have prepared much more. But I do not know if we were quite able to know what to prepare for. Because we looked at them as experts who just had to solve the problem.”

”I made a design in adobe xd that turned out to be quite flawed, so I noticed there was a lot I had forgotten. Also made requirements specifications and drafts for architecture and class diagrams.”

### 4.3 Cooperation and Learning

We define cooperation as efforts and considerations that aim to improve or maintain an ongoing cooperation and delivery from external knowledge. Following are some example quotes.

”The communication was awful. He almost didn’t understand english”

”My permanent external team is Ukrainian and we used a Russian. It was a combination of communication and competence.”

”My lead developer spent maybe 4 or 5 hours of his time guiding him [the freelancer]. He did not know what to do, even though he said he could do it. So the communication between them can be said to be very close ..”

”He knew what to do, and there was no communication. He was given the assignment, we did not communicate during the period and he delivered the product.”

”I think it [the trust] has increased and gotten better. It’s something I focus on and think is an important thing. I want to keep these for quite some time”

”With my senior developer the communication level is low, because he fixes things himself. He is more independent.”

”They were relatively independent. It was not a very close collaboration.”

”We had a slack channel where we had some communication along the way where they asked us if there was anything they were wondering about, we also had a more formal midway meeting where we came to the office and talked to the developers. We also had a final meeting where we reviewed what had been done and took over the software. So the communication was all the way, but it was only if it was necessary, and there was no such thing that we had to have a weekly follow-up or something like that. It was more like that only when it was needed.”

”After the project was started, it was really straight forward from what I remember. Then there was no more saving on what was to be done and what functionality was to be included.”

”Those with experience immediately understood what to work with. And that led to much less coordination needs.”

”I briefed him quickly and forwarded him to the lead doubter, who then explained exactly what

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we needed and it was delivered.”

”It could have been that he did not have the competence either, but since the communication was so clear, because it was in Russian, there was no doubt.”

”I think it is a key thing when using freelancers that communication is good. What you specify that they should do, they must understand, because if they misunderstand you, it will not work.”

”Absolutely iterative along the way. If we take the sprint for example, it was very iterative. Then it goes very much through customers and that kind of thing and we even helped those who worked on design and those things there. And get the prototype tested and designed with our customers.”

”We want to work with them in such a way that we only use them for the absolutely most necessary. It was not very easy because it creates a lot of tension since they have their timing and we have ours.”

”After they had understood what we were working on, it became a little more “can you do this here now and what does it cost? Also they would say ”yes it costs 5800 kroner” also we say ”Ok, you can do it”. It was divided into many such projects.”

”What made it gradually challenging was that we constantly pushed that they should not absolutely do more than what is most necessary.”

”Then the CEO said that ”you must take responsibility for defining the problem, and then we will try to deliver on it”. Instead they also take the job of leading the project.”

”He just ran away and made his very own solutions. And took great liberties, and we liked that, but at the same time he sometimes followed a different path than we did.”

”He just wants to get started, but we felt that we had the same understanding, and then he took a completely different direction and we a different one, and when we then wanted to talk together, so I found out that this ... We did not have such a common understanding anyway.”

#### **4.4 Technical domain knowledge**

We define technical domain knowledge as technical knowledge possessed by the startup’s internal team which is directly relevant to the domain for the task that is being outsourced.

”I made a design in adobe xd that turned out to be quite flawed, so I noticed there was a lot I had forgotten. Also made requirements specifications and drafts for architecture and class diagrams.”

”I had learned to draw to simulate doing all these things myself. It meant that I had also developed the language that might be needed to communicate well with her, that we could exchange models and simulations and things like that and work on it instead of a little more fluent descriptive level. We worked a little more in detail.”

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”I have a bachelor in data science and took some master courses.”

”When it comes to development, coding and those aspects I do not have any managerial responsibility. I do not possess the knowledge.”

”We had no idea what was required to develop a solution. We lacked information in regards to the technical and conceptual sense.”

”We gave a simple speck list and they followed it. You could say lack in delivery was our fault”

”I have the overall responsibility, when it comes to what we want to develop conceptually. but when it comes to the development perspective of it, the code and such, I have no management responsibility there because I do not have the competence for it myself yet.”

## 4.5 Dependent variables

To quantify correlation between values, we used the Pearson correlation method (Freedman2007), used through google sheets (from 12.05.2021). The sample size is not large enough for significant statistical findings. It still provides some quantitative values for consideration. See the Correlation appendix for the matrix.

Not surprisingly, the quality of dynamic for the cooperation and problems related to cooperation are very strongly negatively related. This will by many be considered one of the same. What might be more surprising is seeing no connection between the amount of communication and the impression of how good the work dynamic was.

Illustrative examples:

”We don’t communicate that frequently. When we do, it’s more on the technical side, and we think that works out well.”

”So one of the freelancers didn’t know what he was supposed to do, even though he initially said he could do it. So the problem was that he used my lead developer to guide him and show him how to do the task. My lead developer used maybe four or five hours of his time just to guide this freelancer [...] In that regard you can say that the communication was close. For the other freelancer, he actually knew what he was supposed to do. There was almost no communication. He got the assigned task and didn’t say a word during the whole task and just delivered.”

When asked about the communication level for long-term freelancers he said:

”When it comes to our senior developer, we don’t communicate a lot because he figures out stuff by himself. While the other developer. It started off with me having to follow up on him all the time and constant questions. It almost became annoying, but he has become a lot more self-going.”

There is no correlation between the amount of communication and how the startup perceived the

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development.

Illustrative example:

”Those with experience immediately understood what to work with. And that led to much less coordination.”

Two freelancers working on solving the same task:

”My lead developer spent maybe 4 or 5 hours of his time guiding him [the freelancer]. He did not know what to do, even though he said he could do it. So the communication between them can be said to be very close..”

”He knew what to do, and there was no communication. He was given the assignment, we did not communicate during the period and he delivered the product.”

Except for the cooperation dynamic, the lack of development is what startups feel was the most problematic.

Illustrative example:

”What happened was that he delivered a product and said he was done, but when we tested it it did not work at all, and this happened again and again and again.”

We defined market insight as any positive market insight resulting from the externals, including direct learning from the externals and prototype development that helped market learning and insight.

Illustrative example:

”It was difficult for us to see that the first developer did not have the expertise because he said he had it. In addition to that, the communication was poor.”

”What you specify that they should do, they must understand, because if they misunderstand you, it will not work.”

Both five cases registered high and low on learning, with only one case registering moderate. That compared to only two cases registering high market insight, eight registering low and one moderate. The variables have a moderate positive correlation Illustrative example:

”We could take this software with us and actually test with real files they could upload. The feedback lasted a little longer and we got to uncover quite a lot in the form of feedback, wishes and needs from the customer.”

”It gave us the opportunity to do some tests with the customer early. As mentioned, you could solve the same thing with better designed prototypes, but it was a skill we lacked. We did not have such extensive prototyping expertise internally in the team at that time.”

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”The product we got had in a way no value in itself. But the learning we got internally from everything that happened was very good. It forced us to put the concept together much faster and in an understandable way, and taught us to convey the concept, and it taught us to understand what we are missing along the way and what we need to develop further. So there was a lot of learning.”

”We did not get to use any of it really, but it was very useful in the form that we got to test quite a lot with the customers and found out a lot of things that did not work and a lot of misunderstandings. A lot of things that we had to shift some focus on that I did not realize in our earliest designs.”

From this limited overview, the dynamic cooperation e.s. it’s quality seems to be most related to the development. Keep in mind that delivery can retrospectively affect the interviewees interpretation of the cooperation dynamic, and the dynamic influencing delivery.

The overview also separates the quality of a co-operation and the quantity of communication.

We look at the average values for delivery to provide some quantifiable data between expectation and delivery. Eight out of eleven cases were considered to have a high rate of development for the startup, while only two registered a low development.

Illustrative examples:

”The quality dropped as the job progressed..”

”They carried out according to the expectations we had at the time and they delivered what they were supposed to based on the requirements we had made..”

To use the quantifiable data to give insight into the effect of concretisation of task and agility, we gave each case a low, moderate or high rating in each aspect. We give each task a high rating if both agility in work method and concretisation of tasks are high, moderate if only one of the aspects are high, and low if neither.

From these values we see a moderate to strong correlation on dynamic and development, with a similarly negative value for hassle.

”If we take the sprint for example, it was very iterative. Development goes very much through customers, and the prototype is tested and designed with our customers.”

”He just wants to get started. We felt that we had the same understanding[as us], and then he took a completely different direction and we a different one.”



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## 5 Discussion

We saw nine of the eleven cases were motivated to use external knowledge due to the lack of specific technical knowledge internally and insufficient time to learn or develop themselves. Four of the cases outsourced the initial technological development to start the process and create something to build on, while seven used the externals to supplement existing development with unique knowledge.

Startups that lacked domain-specific knowledge showed some or all of the following: they lacked some of the ability to order what they needed, did not understand the requirement and magnitude of the order, and/or could not evaluate candidates and the final solution.

After receiving the outsourced delivery two cases rebuild a new solution from scratch, rather than improving upon what they received. However, by having something that was not directly implemented, it developed and gave more depth to the development conversation. The core team got a better understanding as to what was wrong, what knowledge was needed, and what might be missing. For two of the software cases, we saw them build their platform on another architecture than the external delivery that was provided due to scaling and add-on problems.

One case has a long lasting cooperation with a senior developer. The developers insisted on using more time to create a robust and scalable architecture. This initially frustrated the founder, but later he realized the importance of having a solid architecture and was thankful for the input and decision.

Founders often are at a technical debt, lack experience, and have a strong time constraint. Many are initially motivated to outsource tasks for help and expertise, and let them focus on their parts of the company. At the same time, delivering new, often closely integrated solutions demands the proper knowledge to do the right orders and be able to iterate on the deliveries. For short-term technical assignments, it seems to boil down to asking for a concrete product request, the external understanding of the request, and knowing how to solve it. Success or failure in this aspect is often a result of the deliverer and/or recipient lacking domain-specific knowledge and/or language barriers.

While having domain-specific knowledge to do orders, select candidates, and evaluate is essential, a lot of communication between external and core teams is not. From our sample, we see no correlation between the amount of communication in relation to performance and delivery experience. What seems to be more important is the framework for work and cooperation. Agile methods seem to be an efficient, robust, and flexible method for internal teams and external ones. Our findings indicate that this makes for efficient execution, alignment of tasks, and company goals while enabling the external to use their knowledge to best solve the task and give the core team extra learning. This is supported by the article (Gupta, Fernandez-Crehuet, Hanne and Telesko 2020b). However, not all sample cases implemented agile methods to outsourcing.

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From the data we gathered, we saw a pattern between those who outsource small tasks and those who outsourced a whole project. The ones who did not have relevant domain-knowledge for the prototype they wanted to make, only the features it should provide, had problems realizing the complexity of the prototype. This led to them outsourcing a whole project with insufficient knowledge on the time period and costs such a project should have. Per contra those with domain-knowledge had a sufficient understanding of the complexity the prototype provides. With the indicated knowledge they were able to split the whole project into small-scale tasks instead of a whole project. By doing so they could provide an easier explanation to how the prototype should be built and could more easily explain what part of development should be prioritized.

All the startups from our sample opted or are planning to move their technical development related to core activities in-house, resonating with conventional outsourcing theory on core activities. Two interviewed startups specifically wanted to move all development in-house before launch. Their motivation and reasoning was because of better agility and interaction value on development but also cost. Their main concern, however, was related to the risk of having some, if not all of their value proposition outsourced to a non-partner. Having someone work on their product where the main motivation was not aligned with their own created a risk and uncertainty they were not comfortable with. The third reason was related to challenges with incentives, this will be further elaborated upon in 5.4.

## 5.1 Hypothesis

*Startups that implement concretization of tasks and agile methodology see a greater gain from outsourcing, in regards to the startups development speed, market insight and technical insight.*

As a means to develop the field of entrepreneurial outsourcing, we wanted to test a previous study on preparation for outsourcing, and agile cooperation during outsourcing Tucker J Marion and Meyer 2010; Tauqeer and Bang 2019. Regarding preparations we saw nine cases focusing on concretisation of tasks. The nine tasks that did concretise varied in their level of concretisation. Comparatively, the cases where startups did not implement concretisation of tasks had some frustrations and performance difficulties. This separation with concretisation seems to be largely indicated by the team's technical domain knowledge.

As a result we see indications of concretisation of tasks being beneficial to development and technical learning, and thereby supporting the cited articles. Market insight does not seem to be a natural consequence of concretisation of tasks, but has to be deliberately included.

## 5.2 Research Question 1

*How does the outsourced delivery live up to the expectations of the startup?*

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We have seen that all are motivated due to partial or fully lacking the knowledge needed, as well as some being motivated by the increased efficiency, saving money, speed of delivery or interest to the core team.

Only three cases worked in parallel with the outsourced partner on the same task, while five cases outsourced part of the development project, three cases worked to outsource the whole project.

The first gap we see between expectations and delivery is when we look at how the delivered technical solution is actually being applied. Many of the cases seemed motivated and wanted to reach a state where they had a working MVP or technical solution that could be shown to potential customers and iterated on.

There seems to be two main reasons for this. The first one is faults in ordering, the second is changes in understanding of needs that makes the delivery partially or completely obsolete. The two cases that outsourced the complete development project and wanted a working solution at the other end seemed to have been lacking in how they wished the solution should be for further development. It was mentioned in both of the orders, but the depth of agreement and understanding seemed to be lacking.

One of the startups that was a spin-out from consulting and sat in the same offices did not have the same problem, and was pleased with how the externals were always in the loop and how this enabled the alignment to match. The startups working agile or in parallel and agile seemed to also dodge these development misfits.

The second gap we noticed between expectation and delivery comes from preparation and onboarding. Due to the time constraint and often lack of resources, founders are frequently motivated to delegate the whole project and neglect necessary onboarding, back-and-forth communication and time for the outsourcee to get a deep understanding of the case, visualized in figure 3.

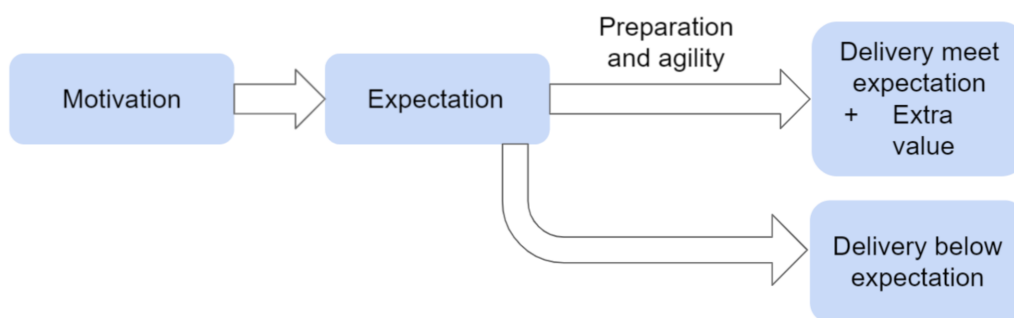


Figure 3: Illustration of Expectation and Delivery Outcomes

Extra value seems to mainly stem from market insight. We see instances of extra value from technical input and guidance during the process. The technical input seems critical for delivery to live upto expectations, if the orders are inaccurate or misunderstood the prospect of undesired delivery increases. Few cases reflected that basic questions regarding technical development or the market were valuable for further development, as the new perspective provided an original point

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of view.

### 5.3 Research Question 2

*What effect does relevant technical competence in a startup have on outsourcing performance, in regards to the startup's development speed, market insight and technical insight?*

For development speed, we see that the flexibility of outsourcing and the development of a solution help the startup development speed. It also helps the startups to develop their technical insight and help them see what they will need internally. In two of the early stage cases, we see that the delivered product is not being used. They rather redesigned a new solution from scratch. With that being said, having the external develop something that was not implemented still gives the startups better insight for their next development.

The nine cases that had technical domain knowledge internally seemed to gain the most from technical outsourcing. They were able to give more specific orders and to do a deeper evaluation of the result.

With respect to market insight, we saw eight cases registering low, one case at medium and two cases at high. One of our initial motivation to include the market insight aspect was to see how outsourcing early phase technical development potentially could create a MVP as defined by "the lean startup" (Ries 2011). By doing so, one could potentially gain valuable market insight to validate and iterate. None of the cases interviewed were able to achieve this through its outsourcing as of the time of the interviews.

### 5.4 Research Question 3

*How does the use of external technical knowledge in a startup's early phase affect the startups development?*

The data provided does not give us clear insight into how the company will perform due to early-stage outsourcing in the long term. However, we see that the delivery helps the startup's initial development, both technical- and market insight. Eight out of the eleven cases register that they have had a good development from outsourcing. As mentioned above, we argue that the cases could have received more marked insight for the external development considerably if it had focused on providing an MVP or similar solutions. From the data related to development, we argue that this type of outsourcing seems to be positive for the startup's future development.

We see cases that struggle with iterative work over distance. Several cases depict the importance of the whole team sitting close together when working since things change and the importance of an interdisciplinary team sitting together. Nine cases have moved or are planning to move the

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development internally in the near future, motivated by incentive and agility issues.

One of the startups thought of and worked consciously on incentive mechanisms for external, and in general, all of the startups felt that this was challenging. The only startup that registered any incentivizing harmony between external and startup was a dividend from a consulting company. The company had assets and sat at the same offices. This resonates well with the article (Duc and Abrahamsson 2017), which states that successful collaborations should focus on making external partners.

For incentivization, the founder feels that they have less control over the external ones, understandably enough. It seems to be challenging to make them dedicated to the case over time, which resonates well with the article (Gupta, Fernandez-Crehuet, Hanne and Telesko 2020b) on challenges to incentivize long term cooperation. In addition, the price of effort quickly becomes a challenge for many, and the founders feel they get more blood, sweat, and tears for the money internally. After all, startups have limited resources, apart from future values and convincing about vision and the future picture.

Many startups have used external competencies in connection with conditional funding, which means that the expense does not seem to be too large a trade-off. The development does not burden the founder's time too much. Furthermore, the startups seem to get further in their development by using external technical resources, both with concern to technical development and market insights.

## 6 Conclusions

The purpose for this study was to develop the understanding of how startups used outsourcing and explore potential differences for startups outsourcing relative to conventional corporations. We have applied a multi-case research design where eleven cases divided on five startups have been interviewed during the spring of 2021. Interview data was gathered, analysed and discussed. The hypothesis was discussed using existing literature as a framework and our research questions used thematic analysis.

**Hypothesis:** *Startups that implement concretization of tasks and agile methodology see a greater gain from outsourcing, in regards to the startups development speed, market insight and technical insight.*

The case data gathered from the study indicates agreement with our hypothesis, and therefore agrees with Tauqeer and Bang 2019 concretisation of tasks and Tucker J Marion and Meyer 2010 on milestone based outsourcing development Tucker J Marion and Meyer 2010; Tauqeer and Bang 2019. From our sample we see the majority of cases do not implement a complete agile approach when working with externals, while ten out of eleven cases gave concretisation of tasks. The quality of concretisation of tasks also varies largely.

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**Research Question 1:** *How does the outsourced delivery live up to the expectations of the startup?*

Out of the eleven cases explored, we saw six where the expectations of the startup matched the delivery from the outsourcee, and five cases where the delivery did not live up to the expectation of the startup.

The six cases where expectations matched or preceded their expectations, all of them had a conscience relating to preparation and/or work method. Of the five cases we saw three types of reasons for the under-delivery. This was a mismatch between orders given and expectations, outsourcee unable to deliver on promised order, and alignment/incentives difficulties.

We discovered four cases where extra value was added for the startup due to the delivery. These were largely related to market or business related knowledge. The act of the outsourcee learning about the case gave them the foundation to ask questions regarding the startups business and market valuable for the startup and acting.

For the cases that under-delivered, we saw two where the delivery acted as an prototype, giving extra technical insight to the core team and to a large extent influenced development as an iteration step.

**Research Question 2:** *What effect does relevant technical competence in a startup have on outsourcing performance, in regards to the startup's development speed, market insight and technical insight?*

Our findings indicate that the startups which had technical competence within their core team got better results from the outsourcing compared to the ones that did not have the technical competence. Their ability to understand the challenges and problems with the project made it possible for them to pinpoint and specify what tasks needed more work, and divide the project into smaller tasks. This gives the outsourced project a more detailed and structured process that is easier for the "outsourcers" to understand and work upon. Including the utilization of agile methods such as continuous integration, simple designs, and test driven development, gave everyone involved the same impression of what the final product should look like.

Operating with such methods while having a technical competence within the outsourced area gives more value than just the finished product. Throughout the outsourcing process everyone involved in the project gives the opportunity to create a foundation to gain more experience and learn from each other which could be necessary for further development. Iterative work within the technical domain is something that is necessary, especially with outsourced projects.

**Research Question 3:** *How does the use of external technical knowledge in a startup's early phase affect the startups development?*

Whether the outcome of the outsourced project was at a satisfactory level or not; our studies show that the process gave the startup a better foundation for further R&D. If the startup took part

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during the process they would have gained some experience with the development of their product no matter the outcome. This provides greater market insight and understanding which can lead to improved iteration regarding the final product. However, in the cases of startup's not involving themselves in the outsourcing process, an insignificant amount of experience and learning would be gained from the project. Nevertheless the startup will be able to acquire a functional prototype or an MVP which could be used to strengthen their value proposition

## 6.1 Recommendations to entrepreneurs

Outsourcing technical tasks in an early phase have several strengths and weaknesses. There are also factors worth considering to manage such relations. As the literature is underdeveloped, we need more research to give a robust and holistic recommendation. Still, we present some recommendations and observations from the study and literature that can be valuable for entrepreneurs.

The founders' motivation for outsourcing is often to lighten the workload or help where internal knowledge is lacking. Proper screening, preparation, framework, and goal selection will often help both technical and market learning, development and save time and money. Outsourcing technical development tasks is associated with many pitfalls. For an entrepreneur it is important to have a clear picture of how the outsourced task will fit in with the rest of the companies and development picture.

We recommend that the startup's outsource partner agree on a clear delivery goal that aligns with further development, technical knowledge transfer, and/or reaches a state where the delivery is a tool for market insight and iteration. The framework for work is important, while the amount of communication is not. An agile approach seems to be preferred.

Be wary of outsourcing the whole development phase. It can lead to the startup's needs and the delivery not aligning, thus not implementing the solution. A startup is particularly prone to this if it lacks relevant technical knowledge or the outsourcing partner is inexperienced.

Evaluating candidates and tasks of a technical character can be separated into three areas. One is the relevant technical knowledge within the startup, the second is the relevant technical knowledge of the external, and the third is communication between the parties. Communication seems to largely depend on the two previous factors and common language ability.

If the startup works together in parallel on one project with an external partner, separating the delivery into smaller tasks is a best practise extracted from the responses to our survey. The tasks should be concretized with clear goals for each delivery, requiring relevant technical knowledge from both parties. From our data, the agile development framework seems to be an efficient tool for entrepreneurial outsourcing and enables developers to be aligned and agile. Focusing on goals also enables the external knowledge workers to implement all their knowledge and experience.

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## 6.2 Implications for further research

The literature for entrepreneurial outsourcing is in its infancy. There is a need for more exploratory research. In particular, there is a need to do more precise research to narrow down effects and limitations from entrepreneurial outsourcing. We suggest further research on how startups can use external technical knowledge to create an MVP or prototype, defined in relation to the lean startup (Ries 2011). This includes exploring entrepreneurial outsourcing to create MVPs and how it influences market insight is of special interest. We also see the need for more literature to create a framework for startups for onboarding the externals, as well as a framework on how to have an outsourced project ready takeover, iterate or further develop.

By refining the topic of entrepreneurial outsourcing and its use for technical development, we hope this thesis will give entrepreneurs a better understanding of using technological tools for developing their product. This understanding in turn can make the technology more accessible for the world and provides startups a higher success rate.



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Quotes from interview	Case alias	Category
"I posted the assignments on "upwork" where I detailed exactly what we wanted. I got many offers from people who said they could do it. I chose the ones that I thought were most competent and based on the hourly rate."	A2	Acquiring
"I accepted the assignment from another person first and it was a total failure, it was a waste of money and a waste of time."	A2	Acquiring
"I got a lot of respondents, I got approximately 15. But based on what I read on their profile, they did not believe them. I thought they were bullshitting me and that's probably the danger of this. That people say they know something they do not know."	A2	Acquiring
"He said he could do it, but I should have caught that he was bullshitting. Same on freelancer.com when I read on the profile what he had done before, I was really in doubt if there was anything he could do. They had no experience with it."	A2	Acquiring
"I read his profile and had a conversation with him. I was a little in doubt and should not have given him the doubt for good there, but we were really desperate because we had to get this done."	A2	Acquiring
"We approached two design agencies and had such an intro meeting with both 2 and sparr a little about what we in a way wanted and how much resources we had to spend on it."	C2	Acquiring
"We know who we want. We do not always get them. The right people are not always available. And then we have to go round and think "ok if we take in a person here who has to get better acquainted with the technology we use" for example, to be able to solve the task, and then we know that it is more time consuming and money-intensive"	E	Acquiring
"She was very good and easy to work with, but she had to get to know what this is about."	B2	Acquiring
"We got to know him through my work in [consulting house]. He worked there from the first phase onwards. And we liked him very	B3	Acquiring Motivation

<p>much because we thought he comes with a lot of good and creative input and had quite significant expertise that was quite broad that we did not have."</p>		
<p>"The communication was awful. He almost didn't understand english"</p>	A2	Cooperation
<p>"My permanent external team is Ukrainian and we used a Russian. It was a combination of communication and competence."</p>	A3	Cooperation
<p>"My lead developer spent maybe 4 or 5 hours of his time guiding him [the freelancer]. He did not know what to do, even though he said he could do it. So the communication between them can be</p>	A2	Cooperation

said to be very close ..		
"He knew what to do, and there was no communication. He was given the assignment, we did not communicate during the period and he delivered the product."	A3	Cooperation
"I think it [the trust] has increased and gotten better. It's something I focus on and think is an important thing. I want to keep these for quite some time"	A1	Cooperation
"My senior developer the communication level is low, because he fixes things himself. He is more independent."	A1	Cooperation
"They were relatively independent. It was not a very close collaboration."	C1	Cooperation
"We had a slack channel where we had some communication along the way where they asked us if there was anything they were wondering about, we also had a more formal midway meeting where we came to the office and talked to the developers. We also had a final meeting where we reviewed what had been done and took over the software. So the communication was all the way, but it was only if it was necessary, and there was no such thing that we had to have a weekly follow-up or something like that. It was more like that only when it was needed."	D	Cooperation
"After the project was started, it was really straight forward from what I remember. Then there was no more saving on what was to be done and what functionality was to be included."	D	Cooperation
"Those with experience immediately understood what to work with. And that led to much less coordination needs."	B	Cooperation Reflection
"I briefed him quickly and forwarded him to the lead doubter, who then explained exactly what we needed and it was delivered."	A3	Cooperation Result
"It was difficult for us to see that the first developer from India did not have the expertise because he said he had it. But in addition to that the communication was poor."	A2	Cooperation Result
"It could have been that he did not have the competence either, but	A3	Cooperation

since the communication was so clear, because it was in Russian, there was no doubt."		Result
"I think it is a key thing when using freelancers that communication is good. What you specify that they should do, they must understand, because if they misunderstand you, it will not work."	A3	Cooperation Result
"In terms of time, we really only want to make a plan that we should have an intensive period, and go over our design towards the start of the pilot. And then after that we could have a period of 2 to 4 months where we spent the remaining hours in the price depending on whether we needed mentor services on design or if we wanted some other specific tasks, so there it is. Have we hit pretty well inside since we could scale up and scale down a bit based on what we needed."	C2	Cooperation Preparation
"The developer has a lot of good input, he has built the entire architecture of the game. It is very decoupled and scales well, which is something that is very good. If I had taken a worse developer this would probably not have happened."	A1	Extra value
"Among other things, there was some silicone-based material they came up with and from which we made quite a few concepts and tests. and it was very promising. So we got something out of it Even though it did not solve the problem completely."	B1	Extra value
"There was a certain legitimacy from working with them."	B1	Extra value
"We had imagined more that the technical work would provide more value, but it was really more the questions like, "but can we take a step back and think a little new? What exactly is this product supposed to do for something? What do we need here? ""	B1	Extra value
"So I think we made quite a lot of money on what was not really the product itself, but which were ideas for How the product could be when we were out and presented to customers and partners and stuff like that."	B1	Extra value Market insight
"In addition to raising the design of the platform considerably, they	C2	Extra value



<p>have given us some tools to run workshops to discuss the processes that will form the basis for new designs, new functionalities and gain a common understanding of things."</p>		<p>Market insight Result</p>
<p>"We do not necessarily always know the decision before we go into that work. We wanted new websites. What should the message be on it then? How do we test what? It's just as much what they help us with."</p>	E	<p>Extra value Market insight Result</p>
<p>"If we had shown those things here beforehand, we could just as easily have gone to Eastern Europe or India."</p>	E	<p>Extra value Market insight Result</p>
<p>"Then you only get exactly what you ask for and it is not certain that was what you really wanted. We think we would have an API that does these things, but then you discover that the customer needs other things that we have not thought of."</p>	E	<p>Extra value Result</p>
<p>"I think it was very important because it made us think "ok, now we were out for something, we were up and running". We thought it would be a little more professional for the startup."</p>	B1	<p>Extra value Team</p>
<p>"We can talk a little more about data integration and data delivery the customer wants. And not least, it has helped with our "pitch deck" as well. We do a lot of iterations ourselves, but they have helped us get started."</p>	E	<p>Extra value Market insight</p>
<p>"I think they have slowed down to gain this insight we have today. If we had not done the outsourcing. It's about us realizing when to make something and actually trying to make it. Then you suddenly realize what you do not know and what you do not have. This helped us realize relatively quickly that we could not actually use this, even though we had made it."</p>	D	<p>Extra value Learning</p>
<p>"The plan is actually to get a core team in Norway that can get this experience so we can own this code base ourselves. This way, we are not so dependent on these freelancers in the long run."</p>	A1	<p>Future</p>

"We are far too dependent [of the external], this is perhaps one of the biggest challenges BitPet has. The problem is that in theory, these developers could end the day. And then I am left with a code base that no one in our team has the expertise to develop."	A1	Future
"We expect to use them for two more years, but this is hard to predict. They are skilled and cheap, and after we start developing a core team I want to use them for knowledge transfer."	A1	Future
"We want to be very, very close to developers and that developers and designers should sit close and collaborate because things change so fast and you want to be flexible."	C1	Future
"[After the collaboration], we have had a strong focus on having competence internally. What is our main product, we want to be our core competence."	C1	Future
"Vi har enda ikke en cto som har ansvaret for dette, men det kommer vi til å skaffe i løpet av høsten, så fort som mulig. Vi har hatt delt ansvar for det tekniske, kan du si."	D	Future
"We try as much as possible to do things ourselves and hire people ourselves. We see that the sprint with the consequences of development time cost us a month and a half with "runway". So it will always be cheaper for us to do it ourselves. But the problem is that then you have to have the skills to do it."	E	Future
"I see a need to take more ownership of the "last mile delivery" that I talked about earlier. Since it gets so much cheaper. So it's challenging to use this consultant model. Since you want the same people every time and it is sometimes problematic to get them."	E	Future
"As it is now, developers in Ukraine are not so strongly intensified now. They get paid and I have given them a bonus. But that's one of the problems, they look at it as just a job."	A1	Incentives
"I'm thinking of incentivization. Because I want to motivate you to become committed to [the startup]"	A1	Incentives

"We could have gained that market insight without having the prototype, to a certain extent because we have something in game content / video that we have published that has received a good response."	A1	Learning
"The technical knowledge transfer was good because our internal developers joined the sprints towards the end of the project."	C1	Learning
"But then really by chance, we decided to hire developers in house and brought with us the developers we have today, and therefore there was no talk of outsourcing again, and we are happy that we did and did not retrospect, we think it was much better, a much better outcome."	D	Future
"The product we got made had in a way no value in itself. But the learning we got internally from everything that happened was very good. It forced us to put the concept together much faster and in an understandable way, and taught us to convey the concept, and it taught us to understand what we are missing along the way and what we need to develop further. So there was a lot of learning."	D	Learning
Knowledge transfer and learning: "Worked well physically. Worked very poorly when we sat each for ourselves."	B1	Learning
"We could take this software with us and actually test with real files they could upload. The feedback lasted a little longer and we got to uncover quite a lot in the form of feedback, wishes and needs of the customer."	C1	Market Insight
"It gave us the opportunity to bring some tests with the customer early. As mentioned, you could solve the same thing with better designed prototypes, but it was a skill we lacked. We did not have such extensive prototyping expertise internally in the team at that time."	C1	Market Insight
"We were going to create an android plugin that none of my developers really have the expertise to create."	A2	Motivation

<p>"The developers I have now did not have the skills to do just that. They could have done it, but it would have taken more time and would have been more expensive."</p>	A2	Motivation
<p>"They are professional developers so they can do this job much better than I could. So it's really just delegating the work to someone who is a pro at it. Then I can rather focus more on what I am best at. Which is finding money for example."</p>	A1	Motivation
<p>"It's simply to get started a little fast and have something we could bring to the customer and start testing and to find out a little more about the flow of the system."</p>	C1	Motivation
<p>"We worked with recruitment, but found it challenging to find the right people. To start off a little early, we used [consulting company], and when they were finished, the developers should be ready to take over."</p>	C1	Motivation
<p>"It was simply to bring in skilled people who are skilled in user-centered design and UI design who have a background in getting their eyes and input on the platform and simply raising the usability of the platform."</p>	C2	Motivation
<p>"It's to increase the bandwidth of things that we do not consider to be really the core of what we do, since we are only three pieces."</p>	E	Motivation
<p>"If there is a specific assignment where we do not have the expertise we use regularly, then it often pays to use freelancers, since it can go twice as fast."</p>	A	Motivation Reflection
<p>"We had a sum we were willing to pay, and then we had certain criteria we wanted to include and we want it to change to such a, but a little more mentoring role in the long run."</p>	C2	Preparation
<p>"It's a dialogue, but that's exactly what's damn good. We do not have to sit down to sit down and write demands or white paper or something else, because we sit close together."</p>	E	Preparation
<p>"So that, it has worked well in the sense that we have, like I said, we have stopped sitting down and somehow really explained exactly</p>	E	Preparation

<p>what to deliver. Things have changed a bit along the way, while we have been working on them."</p>		
<p>"</p> <p>We set a deadline for the project, when we started the project and had a date for when it was to be completed and it was met, as far as I remember."</p>	D	Preparation
<p>"What has NOT worked is the clear deliveries. I think we could have gotten more out of it if we were clearer on what results we are looking for."</p>	E	Preparation Result Reflection
<p>"Basically, we might want someone we felt was on our team. But as we did not have to feel such a great responsibility to follow up. Because it is a very big responsibility when you actually have people on your team. We would not have any responsibility for training etc, these would just start working and solving straight away. They were to understand everything without further explanation. That was really what we wanted. We actually push all the time to achieve that. But in retrospect, we realize that it is really completely impossible to achieve."</p>	B1	Preparation Reflection
<p>"We could certainly have prepared much more. But then I do not know if we were quite able to know what to prepare for. Because we looked at them as experts who just had to solve the problem."</p>	B1	Preparation Reflection
<p>"I made a design in adobe xd that turned out to be quite flawed, so I noticed there was a lot I had forgotten. Also made requirements specifications and drafts for architecture and class diagrams.</p>	C1	Preparation Technical domain knowledge
<p>"Because in-house, you have a lot of control over what you make. You are much faster and faster and smoother to turn things around, and you have common interests in creating a good result. But outsourcing is very ... It's either hourly or project based, but they do not have a clear incentive to create something that is above expectations while it was released. Here they are motivated to make something good, and it is much easier to communicate with</p>	D	Reflection

<p>them in general.</p> <p>Less salary, but can get assets in the long run. It is much cheaper for us who do not have that much money at this time."</p>		
<p>"I think the most important takeaway is the somewhat open discussions and questions that are asked, and the experience these people have that is not related to our product. We were too preoccupied with working together and diving right into our product, our problem, solving it now, rather than those who had experience designing oil platforms and apps and whatnot. They could use those perspectives into our concept and really redefine the whole way we should understand the concept and our starting point"</p>	B	Reflection
<p>"What happened was that he delivered a product and said he was done, but when we tested it it did not work at all, and this happened again and again and again."</p>	A2	Result
<p>"I chose based on the description they had on their profile and they seemed professional. They provided the service very well, so I continued the collaboration."</p>	A1	Result
<p>"It was far from an MVP. It was more a proof of concept of a technical functionality of the total solution. And we got to use this to show our potential customers that we had something, and it was actually developed."</p>	D	Result
<p>"We thought the money was being used up too fast"</p>	B1	Result
<p>"We ended up switching programming languages and the database system, and much more because we found that even though we were almost there, there were some choices we felt we could make that would make the system much better for the future."</p>	C1	Result Future
<p>"I do not know if it made sense with so much documentation. It did not take very long before most of that work was changed, but it at least gave a common understanding of what I envisioned then."</p>	C1	Result Preparation Learning

<p>"We were at a very early stage in the first collaboration, and chose an extremely cheap and not so serious player just to get started a little fast and with effects and results we got in a way what you paid for, and they did the job we expected they should do.</p> <p>While the latter was a less extensive task that could be solved extremely well by a serious player."</p>	C	Result Reflection
<p>"We were much better prepared and knew more about what we wanted in collaboration no. 2. So that's one aspect. The second is probably that .. I experience that it may be more difficult to have people who work with what should be the core focus of our team externally versus having a kind of advisory role really."</p>	C	Result Reflection
<p>"I think potentially it could delay us by a couple of months, and just because at that time we did not quite know what to make and how to get started. We just throw something on the wall and see what sticks."</p>	C1	Result Reflection
<p>"My experience, at least of those deadlines, was that there was a clear linear relationship between how much you paid per hour and how slack these deadlines became."</p>	B	Result Reflection
<p>"With [consultant], it was more traditional consultant ordering. Then we saw that tasks such as technical drawing, simulation, strength, assessments, all that was core activity and not something you only did once in a while. This was much more a need to work interactively on than we envisioned."</p>	B1	Result Reflection
<p>"In the beginning we were very dependent on them. Eventually we became less and less dependent. A bit because we could not use them well enough, so eventually we just had to figure it out ourselves."</p>	B1	Result Reflection
<p>"They had a process they were used to. Things they felt provided value to us did not necessarily do so. And we as a start-up moved very quickly and confusingly in relation to the large customers they are used to."</p>	B1	Result Reflection Cooperation

<p>"The quality dropped as the job progressed since it was a package price, so they were more and more interested in just completing the job rather than delivering good quality"</p>	C1	Result Incentives
<p>"They carried out according to the expectations we had at the time and they delivered what they were supposed to based on the requirements we had made and we gave them full freedom to use the frameworks they thought were right, because we did not have the competence to decide it. But in retrospect, we have been told that from our developers who have a pretty good idea of some things that it was not optimal the framework they have used and the way they have done it. It was not optimal for scaling."</p>	D	Result Learning Dynamic
<p>"We did not get to use any of it really, but it was very useful in the form that we got to test quite a lot with the customers and found out a lot of things that did not work and a lot of misunderstandings. A lot of things that we had to shift some focus on that I did not realize in our earliest designs."</p>	C1	Result Market Insight
<p>"In hindsight, it could well be that we could solve a lot. Have meetings with the same things and present a better and more thorough design as a more thorough prototype."</p>	C1	Result Market Insight
<p>"It was far from mvp. It was more a proof of concept of a technical functionality of the total solution. And we got to use this to show our potential customers that we had something, and it was actually developed."</p>	D	Result Learning
<p>"Did not feel we got any extra value no. We think they are very easy to deal with. But they did not spend more hours on the project than we could expect, but it was not an hour-based project. It was a simple milestone based project.  But the quality of the product was what we expected."</p>	D	Result Learning
<p>"But whether it was necessary to do it, to actually develop something real rather than show someone conceptually on paper or both visual prototype, i'm not so sure. So the value of the project. Medium minus but it cost us through 20,000, and it was</p>	D	Result Learning



<p>20,000 kroner that we had intended to spend on something like that anyway."</p>		
<p>"The motivation was to develop something technical, which we did not have the competence to do at that time. The team consisted of me and one more, who were 2 business developers, and we had no technical expertise on the team. We want to make a technical prototype that could prove that we were able to do some of the technical things to the customers. And the intention was to prove technically that the technical was feasible, but also that this could be the beginning of an MVP. That we should be able to use what is being made here to further develop the solution into something more to something that was ready for launch. It turned out not to be the case, i.e. that we could not use this here for any proper solution."</p>	<p>D</p>	<p>Result Motivation</p>
<p>"It turned out that we had not learned everything about our concept yet. This was what we knew at the time. We were not aware of the whole picture and how this should work, so one thing was that the functionality was far too small. What is made there, but it was still what we agreed on, so it did not matter that they did not deliver what they were supposed to because they did. The functionality did not measure up to a finished solution, and we had to develop much more anyway. In addition to this, the code we received from them was not designed for a proper industrial solution and was not designed to be able to use large amounts of data and expand to be a functional product. It was a simple technical prototype and more of a form of proof of concept at a very low level. Yes, it is not used for anything"</p>	<p>D</p>	<p>Resultat Learning</p>
<p>"The board members and mentor help develop game features and design.  I translate this into step by step tasks for the developers."</p>	<p>A1</p>	<p>Structure</p>
<p>"I have continuous contact with developers, almost on a daily basis. They can clarify if there is any ambiguity."</p>	<p>A1</p>	<p>Structure</p>

<p>"We used to have deadlines in the beginning, but we stopped doing that after a while. It turned out that it did not work for their part because they spent much more time than they had estimated. We want to hold on to them for as long as possible, because they are good at their job."</p>	A1	Structure
<p>"I write down tasks continuously and have most tasks "on hold" because it is not 100% clear on what they should look like and they may be dependent on other tasks. So the individual tasks that we are going to do are "queued" after priority. We are also in meetings every week where we discuss what is the next do to"</p>	A1	Structure
<p>"With the other developer, he does small tasks. We have frequent contact. He skype texts me to clarify little things, and I answer on a daily basis."</p>	A1	Structure
<p>"I first made a technical spec for what was to be made. It was rather detailed with a lot of content on the functionalities we wanted in the technical prototype. We then had a meeting with them and proceeded to present our solution and wished product for them."</p>	D	Structure
<p>"It's no problem to ask them about things. They can even spend a few hours each month working with us, although we may have to do the work, they can give us some advice and hints and help with parts of it."</p>	E	Structure
<p>"It was a little frustrating last time. What does it take before we can finish the work? Always more that could be done, so we should probably have been a little better at setting goals and saying goodbye."</p>	E	Structure
<p>"We may have received a better price from others, but because we know the expertise and the people so well then, we have a much lower risk. In addition, they have a stake in us making success."</p>	E	Structure Aquiaring
<p>"Absolutely iterative along the way. If we take the sprint for example, it was very iterative. Then it goes very much through customers and that kind of thing and we even helped those who</p>	E2	Structure Cooperation

worked on design and those things there. And get the prototype tested and designed with our customers."		
"We want to work with them in such a way that we only use them for the absolutely most necessary. It was not very easy because it creates a lot of tension since they have their timing and we have ours."	B1	Structure Cooperation
"After they had understood what we were working on, it became a little more "can you do this here now and what does it cost? Also they would say "yes it costs 5800 kroner" also we say "Ok, you can do it". It was divided into many such projects."	B1	Structure Cooperation
"What made it gradually challenging was that we constantly pushed that they should not absolutely do more than what is most necessary."	B1	Structure Cooperation
"Then the CEO said that we must take responsibility for defining the problem, and then we will try to deliver on it". Instead they also take the job of leading the project."	B1	Structure Cooperation
"He just ran away and made his very own solutions. And took great liberties, and we liked that, but at the same time he sometimes followed a different path than we did."	B3	Structure Cooperation
"He just wants to get started, but we felt that we had the same understanding, and then he took a completely different direction and we a different one, and when we then wanted to talk together, so I found out that this ... We did not have such a common understanding anyway."	B3	Structure Cooperation
"Initially, we had some workshops in order to get an overall understanding of the team in the domain and in users and in the needs and problems that our software will cover."	C2	Task
"Then you did a design review for us. After that they have had a mentor role where they have helped us with design and spar with us, before they now again now towards the end of the process took a new round with a design review and finally they have also taken a	C2	Task

round on the graphic profile spring."		
"I had learned to draw to simulate doing all these things myself. It meant that I had also developed the language that might be needed to communicate well with her, that we could exchange models and simulations and things like that and work on it instead of a little more fluent descriptive level. We worked a little more in detail."	B2	Technical domain knowledge
"I have a bachelor in data science and am taking some master courses."	A	Technical domain knowledge
"When it comes to development, coding and those aspects I do not have any managerial responsibility. I do not possess the knowledge."	D	Technical domain knowledge
"We had no idea what was required to develop a solution. We lacked information in regards to the technical and conceptual sense."	D	Technical domain knowledge
"We gave a simple speck list and they followed it. You could say lack in delivery was our fault"	D	Technical domain knowledge
"I have the overall responsibility, when it comes to what we want to develop conceptually. but when it comes to the development perspective of it, the code and such, I have no management responsibility there because I do not have the competence for it myself yet."	D	Technical domain knowledge

\* Quotes were originally in Norwegian, then translated to English

	Dynamic	Level of communication	Development	Market insight	Learning	Hassel
Dynamic of cooperation						
Level of communication	-0,14763					
Development	0,48649	0,14763				
Market insight	0,10811	-0,14763	-0,25676			
Learning	0,24384	0,26640	0,12192	0,48769		
Hassel	-0,93243	0,01476	-0,55405	-0,04054	-0,36576	

	Dynamic	Level of communication	Development	Market insight	Learning	Hassel	Agility
Technical domain knowledge							
Agility	0,05774	-0,23452	0,01890	0,07071	-0,39445	0,15119	0,44000
	0,68156	0,14892	0,68156	0,13631	0,33541	-0,68156	

	Average	Low	Moderat	High
Dynamic of cooperation	2,5	2	2	7
Level of communication	2,2	2	5	4
Development	2,5	2	1	8
Market insight	1,5	8	1	2
Learning	2,0	5	1	5
Hassel	1,5	8	1	2
Technical domain knowledge	2,2	2	3	4
Sum	2,0	29	14	32