Aalto University
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THE DATA-DRIVEN DECISION-MAKING IN START-UPS

Master's Thesis
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Abstract

Various researchers have highlighted the important role of data analytics in shaping modern businesses and economies. The importance of data to support decision-making has been recognized both in the start-up environment and among more mature companies. However, in previous research it was recognized that despite the recognition of the potential of data, startups perceive data analytics as less impactful compared to other resource allocations.

This thesis answers the research problem of how data-driven the decision-making should be in start-up environment. The research problem is investigated through following research questions: 1. How does data-driven decision-making in start-up environments differ from decision-making in more mature companies? 2.What are the main advantages and challenges of data-driven decision-making in a start-up environment?

Semi-structured interviews were used to explore the research questions, with 7 interviews conducted. The interviewees' experiences varied by industry and their experiences were also based on start-ups at different stages.

This thesis concludes that in the beginning start-ups needs to make more decisions with intuition. However, the more years a company has been in place and the more its maturity increases, the more the start-up will move towards the same models of decision-making as more established companies use.

Keywords Data-driven, decision-making, start-up

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Tiivistelmä

Useat tutkijat ovat korostaneet data-analytiikan tärkeää roolia nykyaikaisten yritysten ja talouksien muokkaamisessa. Datan merkitys päätöksenteon tukena on tunnistettu sekä startup-yrityksissä että kypsemmissä yrityksissä. Aiemmissa tutkimuksissa on kuitenkin tunnistettu, että huolimatta datan potentiaalin tunnistamisesta startup-yritykset pitävät data-analytiikkaa vähemmän tärkeänä verrattuna muihin resursseihin.

Tässä tutkielmassa vastataan tutkimusongelmaan siitä, kuinka datapohjaista päätöksenteon tulisi olla startup-ympäristössä. Tutkimusongelmaa tutkitaan seuraavien tutkimuskysymysten avulla: 1. Miten dataan perustuva päätöksenteko start-up-ympäristössä eroaa kypsempien yritysten päätöksenteosta? 2. Mitkä ovat datapohjaisen päätöksenteon tärkeimmät edut ja haasteet start-up-ympäristössä?

Tutkimuskysymysten tutkimiseen käytettiin puolistrukturoituja haastatteluja, joita tehtiin 7 kappaletta. Haastateltavien kokemukset vaihtelivat toimialoittain, ja heidän kokemuksensa perustuivat myös eri vaiheissa oleviin start-up-yrityksiin.

Tässä tutkielmassa päädytään siihen, että alkuvaiheessa start-up-yritysten on tehtävä päätöksiä enemmän intuition avulla. Kuitenkin mitä useamman vuoden yritys on toiminut ja mitä enemmän sen kypsyys lisääntyy, sitä enemmän start-up siirtyy samoihin päätöksentekomalleihin, joita vakiintuneemmat yritykset käyttävät.

Avainsanat data-ohjautuva, päätöksenteko, start-up

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1 Introduction

In their 2023 study, Varma, D. and Dutta, P. highlighted the importance of data analytics and data science as key drivers of the modern economy and modern businesses. They highlighted the awareness among organizations of the central role of data in facilitating informed decision-making. In addition, A 2018 study by Berg et al. highlighted the need for companies to strengthen their capabilities in (big) data analytics in order to succeed in an increasingly digitalized environment. The study identified data analytics as critical to the success of digital businesses, particularly given the impact that digitization and big data analytics are having on traditional business paradigms. Berg et al. (2018) further noted that companies, including start-ups, are increasingly aware of the huge potential of the data they generate. As a result, many firms, both established and start-ups, are actively pursuing strategies to leverage the power of data with the aim of increasing value, securing competitive advantage, and enhancing various areas of human existence. However, previous research by Berg et al. (2018) found that in start-up environments, activities related to data analytics are perceived as less impactful in terms of value creation compared to product development efforts.

In their 2018 study, Berg et al. highlighted the pivotal role of big data analytics in enabling value-driven management decisions. Furthermore, Niu et al. (2021) highlighted the transformative potential of big data for business intelligence (BI), enabling companies to gain deeper insights from customer behavior, enhance marketing strategies, facilitate personalized experiences, and quickly identify real-time challenges and opportunities. In that study, they found a trend, that has been observed in recent years, about the growing interest in big data use because of its ability to create market value.

In their 2021 study, Niu et al. highlighted the role of business intelligence in deriving key insights from diverse, unstructured data sets and transforming them into actionable information that is critical for informed decision-making and improving business efficiency and productivity. However, previous research has pointed out that the integration of extensive valuable knowledge from unorganized and existing data can lead to an imperfect understanding of the facts and a biased decision-making process (Gao, Wang & Shen, 2020;

Nguyen et al., 2021). Therefore, it is crucial to understand the potential challenges associated with data-driven decision-making.

1.1 Research questions and scope of research

The main research problem of this thesis is how data-driven decision-making should be in a start-up environment. The problem will be approached with the following research questions:

1. How does data-driven decision-making in start-up environments differ from decision-making in more mature companies?
2. What are the main advantages and challenges of data-driven decision-making in a start-up environment?

This research focuses on exploring the research problem by looking at how much data is currently used in more mature companies and businesses to support decision-making. It is also explored through the advantages and challenges that have been identified for using data to support decision-making, particularly in the start-up environment.

1.2 Research method

The research method for this thesis is as follows. Firstly, previous research on the topic will be studied and then semi-structured interviews on the topic will be conducted. Then, based on the previous research and the results of the semi-structured interviews, a discussion and conclusions will be presented.

The most cited articles were found by searching for articles related to start-ups, data-driven decision-making, and knowledge-based decision-making. Previous studies were selected for this thesis based on the number of citations the article has received and when the article was published. The same keywords were used in both cases.

Most of the articles were found by using Scopus and Google Scholar, but also by looking at the references used in the articles. In addition, the publications of the top authors

in this specific field were also studied for this thesis. Articles were found by using the keywords “data-driven”, “startup”, “start-up”, “decision-making”, and “knowledge-based”.

Semi-structured interviews were used to explore the research questions in more detail, and 7 interviews were conducted. The interviewees' experiences varied by industry and were also based on start-ups at different stages.

1.3 Definitions of key concepts

Start-ups are described as dynamic organizations with many ups and downs that happen quickly. An important element of start-ups is that there is minimal hierarchy, where everyone can be part of the decision-making and where the work culture is not so formal. (Varma, D. and Dutta P., 2023) A mature company could be described as one that is well established in the industry in which it operates. The process of Data-Driven Decision-Making (DDDM) is about using facts, metrics, and data to support critical business strategies and decisions that are aligned with your goals, objectives, and initiatives (Jia, L. et al., 2015).

1.4 Structure of the research

The structure of the thesis is as follows. Chapter 2 presents general findings from previous research. Chapter 3 discusses the methodology used to conduct the semi-structured interviews. Chapter 4 presents the findings of the semi-structured interviews. Chapter 5 contains the discussion of this thesis. Chapter 6 presents conclusion of this thesis. Finally, the limitations of this thesis and suggestions for future research are discussed.

2 Previous studies/Background

This chapter covers the previous studies from earlier literature. First, it covers the importance of use of data in business decisions in general. Secondly, it covers the importance of data in the start-up context.

2.1 The importance of data in business decisions

In a previous study, Berg et al. (2018) observed that big data and its analytics have received considerable attention in various fields and contexts, given the generation of data with each transaction in the digital world. Furthermore, Varma, D. and Dutta, P. (2023) pointed out that the importance of data analytics and data science has been identified as a key driver for the new economy and today's businesses. They also pointed out that organizations have realized the importance of data in making informed decisions. According to Niu et al. (2021), "The importance of data is consistent and steadily growing in decision-making. This enables companies to create new business opportunities and generate more income. It moreover helps to predict future trends. Thus, companies make or break data-driven business decisions". In a 2018 study, Berg et al. found that in an increasingly digital world, companies need to develop and evolve their capabilities and competencies in (big) data analytics. This is essential for a successful digital business, especially considering the disruptive impact of digitalization and big data analytics on traditional business models. Furthermore, Berg et al. (2018) noted that the development of the digital economy, combined with (big) data analytics, is challenging current business models, with many start-ups actively disrupting established companies. Thus, these disruptions highlight the importance of adapting to the changing environment and adopting innovative approaches in response to the evolving dynamics of the digital era.

2.1.1 The challenges of using data in general

Niu et al. (2021) noted that “Business intelligence helps gather essential information from a wide variety of unstructured data and convert them into actionable information that allows

firms to make informed policy decisions and improve business efficiency and productivity". However, previous research has identified that an imperfect understanding of the facts and a partial decision-making process can result from the use of unorganized and existing information that is not analyzed properly (Gao, Wang & Shen, 2020; Nguyen et al., 2021). Therefore, when organizations integrate big data into their decision-making processes, the key objectives should be to minimize errors and narrow the scope of the data (Niu et al., 2021). Niu et al. (2021) noted that "without analysis and processing, data is useless". Collaboration between data scientists and decision makers is crucial to improve the efficiency of big data. It is important to ensure that decision-making procedures are carefully managed to reduce gaps in understanding (Cockcroft & Russell, 2018). While big data enables organizations to gain a strategic advantage over their competitors in many ways, it also presents several challenges. Key obstacles to big data analytics include the lack of intelligent big data sources, limited access to real-time analytics capabilities, and the need for adequate network capacity to run applications (Araz et al., 2020).

2.1.2 Advantages of utilizing data

Gao, Wang and Shen (2020) noted that "big data analytics can address a large number of today's problems". The potential of generated data for value creation, business transformation and social change is increasingly recognized by diverse social actors, including industry, public and private organizations, entrepreneurs, academia and civil society, as noted by Berg et al. (2018). This recognition has led many companies to actively pursue the use of big data with the aim of increasing value, securing competitive advantage, and contributing to the improvement of various aspects of human life. In their study, Zhao, Yu, Shakeel and Montenegro-Marin (2021) found that business intelligence (BI) plays a critical role in improving efficiency by identifying new opportunities, uncovering potential risks, providing deeper industry insights and enhancing decision-making frameworks. Furthermore, Berg et al. (2018) found that big data analytics plays a critical role in the context of value-creating management decisions, even to the extent of complementing or replacing human labor with machines. In addition, Niu et al. (2021) noted that "Big data now enables BI to provide insights that would allow companies to understand their customers better, improve marketing technology, make personalization possible and identify real-time

problems and opportunities. Big data has received much interest in recent times, given its ability to create market value." They also discovered that by using data analysis, managers can make decisions based on statistical facts. These facts can guide future business growth by assessing the market and long-term competition. Data analytics enables managers to consider all relevant facts when making important operational decisions. In 2021, Niu et al. cited a study by Thomson that found the top benefits of business intelligence include fast and reliable reporting, improved market selection, improved customer service and increased company revenue.

2.2 Start-ups and their use of data

In the next section, the definition and basic principles of start-ups are explained. Second, the use of data in the start-up environment is discussed. Thirdly, the main challenges of data-driven decision-making in a start-up environment are discussed.

2.2.1 Definition and principles of a start-up

Varma, D. and Dutta P. (2023) described start-ups as follows:

> *"Start-ups can be described as dynamic organizations, with ups and downs happening quickly. They have minimal hierarchy with a not-so-formal work culture, allowing everyone to be a part of decision-making".*

They also noted that, unlike large organizations, it is typical for start-ups to have individuals who take on multiple roles as needed in non-core functions. This practice allows most of the available human capital to focus on core business activities. According to Berg et al. (2018), start-ups are newly created companies that have a significant impact on the global economy. In a context of extreme uncertainty and limited economic, human and physical resources, start-ups face unique challenges in terms of product development and innovation methods to produce cutting-edge technologies. In a start-up environment, the risk of failure is high, mainly due to self-destruction rather than competition. Start-ups operate in a fast-changing,

competitive, high-risk environment where continuous experimentation is essential to learn and bring products to market quickly. Nguyen et al. (2017) described that "The primary objective of start-ups is to speed up the product development in the early-stages, streamlining the learning process". Berg et al. (2018) found that in the fast-paced environment of start-ups, long-term planning is not feasible, so flexibility and responsiveness are crucial. Start-ups typically respond to rapidly changing customer needs and demands by speeding up the decision-making and design processes, using evolutionary improvements.

Previous research (Berg et al., 2018; Pantiuchina et al., 2017) has found that start-ups prefer ad hoc development approaches that are customized to their own needs and minimize administrative overheads, rather than using repeatable and controlled processes. With a focus on the productivity and freedom of their teams, start-ups take advantage of reactive, low-precision engineering practices. In an experimental environment, where there is a constant trade-off between speed and quality, certain agile practices (e.g. regular refactoring and test first) may not be beneficial, as excessive administrative overhead may inhibit business experimentation. As Berg et al. (2018) found, it is important for businesses and decision makers to build on their key resources, including people, processes, and technology. This allows them to respond to market needs and increase their operational agility. An iterative and incremental approach, combined with frequent releases, is essential for start-ups to be able to respond quickly to frequent changes and align prototyping with business strategy.

2.2.2 Use of data in start-ups

As Berg et al. (2018) found, companies, including start-ups, are increasingly realizing the potential of the data they generate. As a result, many companies, including start-ups, are actively seeking to leverage the potential of big data. Their aim is to add value, secure competitive advantage and contribute to the improvement of various aspects of human life. Big data analytics, as critically highlighted by Berg et al. (2018) in the context of value-creating management decisions, is essential for every company. Therefore, developing and evolving capabilities and competencies in (big) data analytics is essential to achieve digital business success and mitigate the risk of failure, especially for start-ups. Furthermore, Varma, D. and Dutta, P. (2023) pointed out the importance of data analytics and science in

shaping the new economy and the current business environment. Various organizations, including start-ups, are actively working on leveraging data across different sectors to facilitate well-informed decision-making.

However, in a previous study, Berg et al. (2018) found that activities related to data analytics were considered less important for value creation in the start-up sector compared to product development activities. They cited the study in which one start-up commented on the findings as follows: "data amount is still a little too small to do any proper analysis of it, and we do not collect enough personal info yet to perform the analysis".

2.2.3 Challenges in use of data in start-ups

Many researchers have found that companies and start-ups have realized the power of using data in their decision-making (Berg et al., 2018; Niu et al., 2021; Varma, D. and Dutta, P., 2023). However, many researchers have found that there are challenges and barriers to using the data, particularly in the start-up sector (Berg et al., 2018; Niu et al., 2021). Berg et al. (2018) found that although start-ups and established companies recognize the clear benefits of data analytics, the results showed that there are several barriers and challenges for start-ups to create value from it, especially related to resource constraints, time management and privacy issues. Furthermore, Niu et al. (2021) recognize that companies and start-ups that use business intelligence in their decision-making face challenges due to planning failures, lack of preparation, resource failures and risk-taking ability.

As previous research has noted, data is useless without analysis and processing (Niu et al., 2021). In addition, previous research has found that unorganized information can lead to an incomplete view of the facts and a partial decision-making process (Gao, Wang & Shen, 2020, Nguyen et al., 2021). Niu et al. (2021) noted that "Business Intelligence uses current and historical data, while Business Analytics uses previous data to extract insights and conduct business activities to drive customer requirements and increase productivity." In many cases, start-ups do not have historical data and therefore may face challenges in performing business analytics.

Furthermore, as mentioned earlier in this study, one of the recognized challenges in the use of data in start-ups is the lack of resources, in particular the lack of talented people (Berg et al., 2018; Niu et al., 2021). More specifically, Berg et al. (2018) found that one of the

biggest challenges in generating value from (big) data is acquiring people with the necessary data analytics knowledge and skills. It is not easy for start-ups, which are looking for team members with knowledge in a wide range of areas (boundary-spanning knowledge), to focus heavily on data analytics skills and knowledge. Berg et al. (2018) also found that the intense competition among start-ups and their limited resources require strict prioritization. Furthermore, engaging in data analytics efforts may further strain already limited financial and time resources. Moreover, collecting the necessary data may require additional spending on components (such as sensors and IoT technology) and human capital investments. As such, such efforts may not align with start-ups' current priorities, as expressed by one start-up: “At the time this [data analytics] is not something we priorize”. However, it is not always just a lack of talented resources, as Berg et al. (2018) found, limited understanding of the impact and benefits of data analytics by business leaders can also be a challenge. As Berg et al. (2018) found, business managers mentioned that they had limited knowledge of the added value that data analytics could bring to their decision-making and design processes. Therefore, Berg et al. (2018) suggested that by increasing these managers' understanding of the potential benefits, the organization could improve the integration of data analytics into its business models. The use of big data analytics in start-ups, with their characteristics of short-term planning and frequent releases, enables data-driven decisions. These decisions can be faster and of increased quality, in line with the agile environment in which most start-ups operate. (Berg et al., 2018)

3 Methodology

Semi-structured interviews were used to explore the research questions, with 7 interviews conducted. The interviewees' experiences varied by industry and their experiences were also based on start-ups at different stages. Semi-structured interviews are commonly used in qualitative research analysis and provide an exploratory approach. It allows participants the freedom to articulate their views and share personal experiences that relate to the research topics, thus providing a more informed understanding (Oates, B.J., 2005). This chapter covers how the interview questions were identified, how the data were collected and the validity process.

3.1 Interview Questions Identification

The interviewees were asked nine open questions to which they were able to respond at their own choice. The questions were formulated based on previous studies. The following questions were asked of all interviewees:

Q1: How do you see the role of data in decision-making in the start-up environment?

Q2: For what are you currently using data in your business?

Q3: Where do you see the biggest advantages of using data to support decision - making in a start-up environment?

Q4: What challenges have you faced in using data to support decision-making in the start-up environment?

Q5: How do you see how these challenges could be solved?

Q6: What changes have you seen in the role of data in decision support in the start-up environment over the last few years?

Q7: How important do you consider the use of data for decision support compared to other resources (time/money)?

Q8: What practical examples can you give of how data has helped you or others in your start-up environment to make decisions?

Q9: How do you see the role of data in the start-up environment growing or changing in the future?

3.2 Data Collection and Analysis Procedure

The Semi-Structured interviews were conducted in Finnish to ensure that everyone could communicate in their native language. This allowed them to express themselves more freely and provide more detailed explanations. It was therefore necessary to translate the interviews as they were being transcribed. When the interviews were conducted, notes were not written word-for-word. However, the interviews were audio-recorded so that the interview responses were available for later review. The interviews were transcribed into 27 pages of notes, which were analyzed. Section 4 presents the findings from the analysis process. The interviews lasted between 30 and 50 minutes and were conducted over a period of two weeks. They were conducted remotely. There were 7 interviews, and the interviewees' experiences were based on start-ups at different stages. The interviewees' backgrounds included experience in various fields such as healthcare services, healthcare technology, e-commerce, technical research and development, and software design and manufacturing. In addition, the interviewees' previous experience other than working in start-ups may have included involvement in start-up organizations during their studies or working in venture capital (VC) firms. The roles of the interviewees varied and included co-founders, CEOs, sales, marketing, HR, finance, operations, strategy & technology and product management.

3.3 Validity Procedure

The validity must be addressed to ensure findings are trustworthy. To ensure validity, the following guidelines were used in the semi-structured interviews. Prior to the interviews, the companies' websites were visited so that before the interview some knowledge of the company and its industry was available. However, respondents were first asked for basic information about the company and their role.

The interviewees selected for the interviews had to have worked in a start-up company for at least one year. In addition, the interviewees had to be a member of the management

team or otherwise in a position with decision-making authority. The field of the interviewees was not predefined, and the respondents were from different functions and responsible for different matters in the company.

Notes were taken during the interviews, but the interview notes were reviewed after the interview by using a video recording. However, the interview notes were not transcribed word-for-word. The maximum time allowed for each interview was 1 hour.

4 Results

The next section presents all the questions and the answers that emerged from the interviews, question by question. There were 9 questions that participants were allowed to answer freely in a semi-structured interview.

4.1 Data-driven decision-making in general in start-ups

In the area of start-ups, the role of data in decision-making appears to be a critical factor, and participants acknowledged its importance, with some even describing it as "vital in order to build a successful start-up". However, alongside this acknowledgement, many underlined the importance of integrating intuition into decision-making processes, particularly in the early stages when relying solely on data is challenging. Nevertheless, decisions need to be grounded in some degree of concreteness, and data serves as a guideline. While data is widely recognized as critical to decision-making, interviews showed a disconnect between its acknowledged importance and its actual role in current practices within start-ups.

The lack of historical data in early-stage start-ups was identified as a significant challenge to data-driven decision-making. As one participant said, who was responsible of operational side of the company:

> *"I think the role of data is extremely important and it should be used and understood more from the beginning".*

Participants recognized the importance of setting the stage early for future data collection and analysis at an early stage, by considering which data points will be crucial in the long term, even if they are not available now. One of the respondents who was responsible for the general strategy of the company stated as follows:

> *"Action needs to be taken from the beginning to consider what data needs to be collected and in what format".*

However, there were differences in the level of importance placed on data by different functions within start-ups due to lack of reliable data. For example, reliable measurement of brand equity in marketing was identified as a particular challenge for start-ups. Another thing that was identified in interviews was that start-ups often have a large amount of available data, but the challenge is determining what to measure and selecting the most relevant metrics. As one respondent, who was responsible of marketing, pointed out it as follows:

> *"It's not about measuring things blindly - it's about measuring the right things".*

It was also acknowledged that data can sometimes be a double-edged sword, potentially leading to over-dependence and inhibiting the speed of iteration. Furthermore, iteration speed as presented in Figure 1, "try fast, fail faster" was identified as a vital factor for a start-up to succeed. However, it was recognized that over-maximizing the rate of iteration can also be a disadvantage. As one participant, who was responsible of HR, expressed it concisely:

> *"The fast pace takes away from data-driven decision-making; often decisions are made before the analysis is complete. There is a general bias towards experimentation over data-driven decision-making, especially among those who have no prior experience in data-driven management."*

In summary, while data plays an important role in the start-up environment, its integration into decision-making processes is a complex challenge, requiring a balance between data-driven insights and intuitive judgement, as well as a forward-thinking approach to data use.

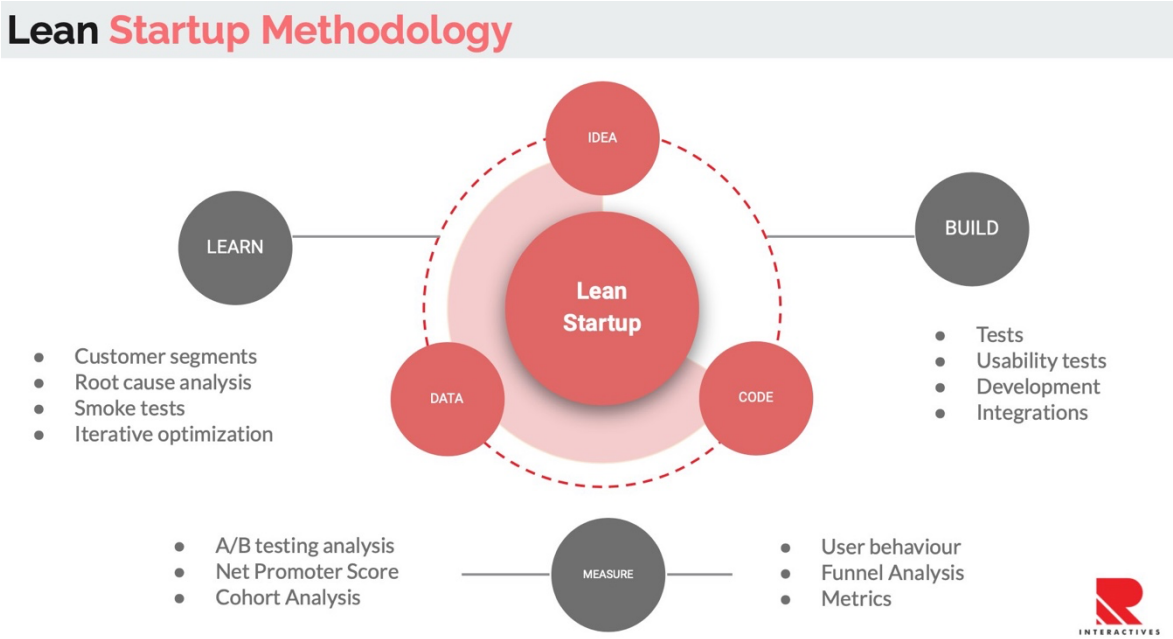

Figure 1. Lean start-up methodology – basic of iteration concept in start-ups. (Source: Gadekar, 2024)

4.2 Use of data in start-ups

Several key points were identified in the interviews regarding the different uses of data in organizations. Participants highlighted a wide range of uses, including product development, market research, investment decision-making, identifying competitive advantage, maximizing efficiency and productivity, understanding customers, product iteration, competitor analysis, sales monitoring, lead channel validation, business unit analysis, profitability assessment, forecasting, activity tracking, impact monitoring, service quality monitoring, marketing and financial sustainability. Especially, sales were identified as being very data-driven, highlighting the importance of analyzing sales data to make informed decisions. However, it was noted that in some cases start-ups tend to focus on historical sales data without benchmarking against competitors' performance.

Data was used not only to track financial goals, but also for operational goals using tools such as OKRs. OKR means Objectives and Key Results. It is a goal-setting framework used by organizations to define and track objectives and their results. Objectives are the high-level goals that an organization or team wants to achieve, providing direction and focus. Key Results are specific, measurable outcomes that indicate progress towards the goals.

OKRs are typically set and tracked within specific time frames, such as quarterly or annually, and help align individual, team and organizational efforts towards common goals.

Respondents acknowledged the importance of data in enabling agile responses to market changes and customer behavior. In addition, in one company, the need for data was driven by the constraints of a small team and the need to avoid wasting time. One interviewee, who was responsible of product development and co-founder of the company, noted a lack of tracking of data after conducting data analysis prior to launching the new product:

> *"Despite extensive pre-launch planning, I observed that performance tracking was often ignored post-launch".*

It was also noted that while the potential of data in decision-making across functions was recognized, it was often under-utilized in early-stage companies, with an increase in data-driven decision-making observed as operations expanded. The background of the founders and their perception of the security of data-driven decisions played a significant role in determining the extent to which data was used in the companies.

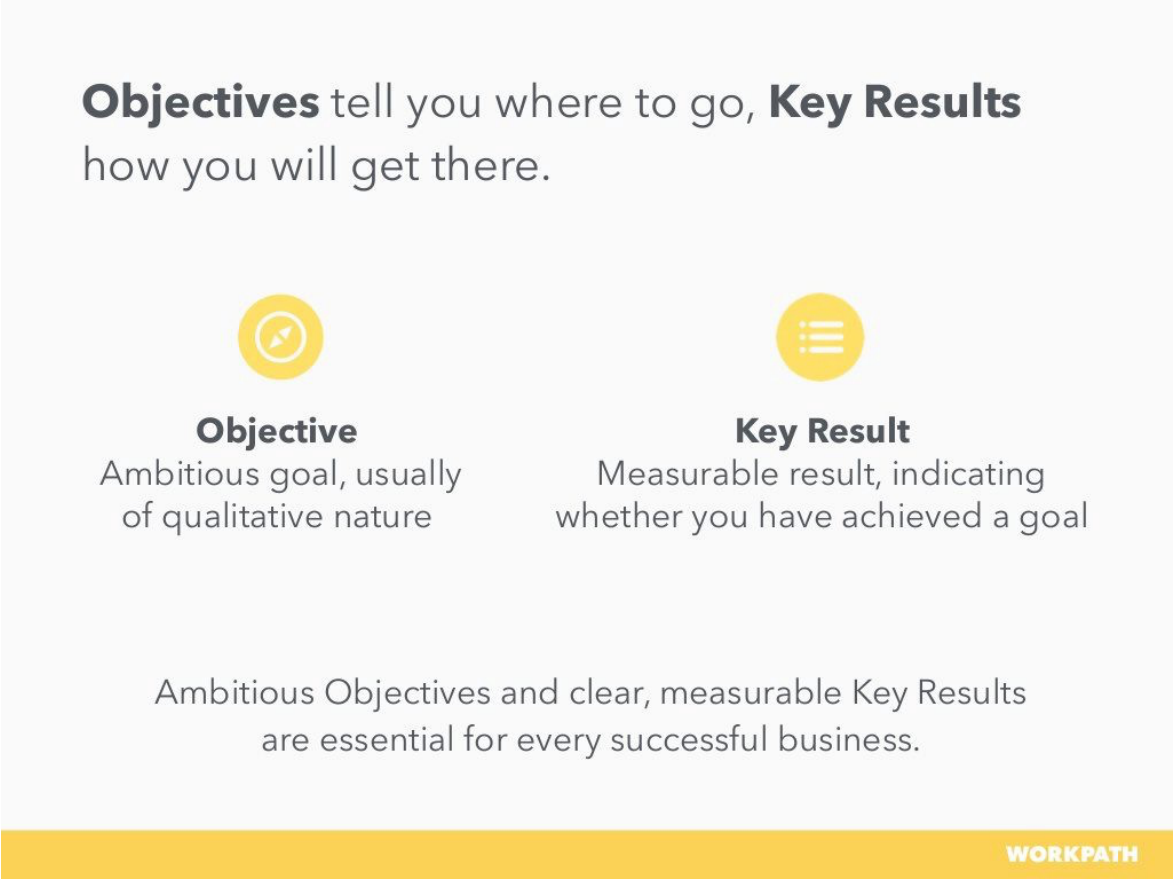

Figure 2. OKR (Objective and Key Result) definition (Source: Müller, 2024)

4.3 Advantages of using data to support decision-making

In the fast-paced environment of start-ups, the use of data to improve decision-making was seen as a critical advantage with multiple benefits. All respondents identified that the biggest advantage of using data to support decision-making is to justify things internally, externally, and also to themself. As one interviewee, who was co-founder of the company, described it as follows:

> *"Data also helps in being able to justify why you are doing something to co-founders, teams and investors - and especially to yourself, to get support that this makes sense when you think about it at night."*

It was acknowledged that decisions need to be objectively justified and that the use of data to support decision-making makes this possible. In particular, it was highlighted in the

interviews that many felt that the use of data was also key to justifying decisions to Board of Directors and investors. One interviewee, who has background from Venture Capital (VC) in addition to start-up experience, described it as follows:

> *"It is important to be able to show investors and Board of Directors the facts through data, as compared to having to justify it to them in a way that makes you believe my gut feeling. It gives a much more professional image of the founders when you justify things through data.".*

Another interviewee, who was co-founder of the company, summarized it up as follows:

> *"When you communicate to stakeholders, it's easier to show and prove things - not just tell but really show results - to the Board of Directors, to investors, but also internally."*

Another major aspect that was identified in the interviews was the use of data to support decision-making and help understand realities. As one interviewee, who was responsible of sales, summarized it as follows:

> *"You need to understand and be able to make decisions based on data. In the best case, your business will grow and become more profitable because you understand and are able to make decisions based on data. Data tells you very clearly where to focus your resources and where you can get the most growth."*

It was also acknowledged that the data brutally shows the reality and removes blind spots for the decision maker that the decision maker might not want to know or might accidentally miss.

One interviewee, who was co-founder of the company, also raised the point that there are so many question marks in the air, especially in the early stages of a business, that data can help you somehow navigate it in the right direction. It was also identified that start-ups often have a lack of processes, and it is difficult to see the big picture, however it was identified that once a company is able to start using data, it makes it easier to see the big picture. Certainty in decision-making was also acknowledged as an advantage of using data

to support decision-making. Interviewees identified that using data can reduce the risk of making bad decisions and thus speed up the process of making the right decision. As one interviewee, who has been responsible of operations and product, summarized it as follows:

> *"Start-ups are all about doing it for the first time - if you don't rely on any data, you make decisions on a hunch, which is like rushing around in the dark forest everywhere and you end up failing or it takes a long time to succeed."*

4.4 Challenges start-ups face in data-driven decision-making

A number of different challenges were identified in relation to the use of data to support decision-making. However, the main one that was identified was the lack of a skilled resource. Especially in early-stage start-ups, resources are limited and getting skilled employees was seen as a challenge. It was recognized that the lack of skilled resources is a challenge in data collection, analysis and interpretation. The lack of resources was also associated with a lack of skilled labour, as well as a lack of tools to collect data reliably. It was recognized that, particularly in the early stages, tools have not yet been set up to collect data in the format required. In addition, the lack of historical data was identified as one of the challenges to using data to support decision-making. It was recognized that when tools are not yet set up in the early stages to support the use of data, it takes time before enough data starts to accumulate to allow decisions to be made based on the data. One interviewee, who has been responsible of finance and HR, reflected on the lack of historical data in the following way:

> *"It has been a challenge to do scenario analysis on future new markets when there is no data on the comparative situation, for example in situations where we are opening a new market and we know that our operations have become more efficient compared to the last market opening, we cannot use that data."*

However, it was also acknowledged that many felt later in the start-up timeline that there is so much data available that it may not be understood to select only the most relevant ones to

track. One of the interviewees, who has been responsible of operations and product, summarized it as follows:

> *"There's plenty of data available, but when it hasn't been processed, it doesn't tell anything meaningful. Even if we wanted to utilize it, there's no time or resources/expertise for data processing - we're aware that despite the potential for various types of information to support decision-making, it's not recognized to be the most crucial resource allocation at that moment."*

In addition, it was identified that understanding why something is being measured and how to measure it, but also understanding what those metrics tell us and how to use them, is also a critical skill. In addition, there needs to be a competence in the team to be able to dig into certain data points before decisions are made.
It was identified that it's crucial for data analysts to collaborate seamlessly with those who have a deep understanding of the business. One respondent, who has been responsible of sales, remarked on this issue as follows:

> *"The challenge also lies in the fact that business owners may not necessarily have the expertise to interpret the data, and data analysts may not necessarily understand the business. If the collaboration between these two functions works well, this problem can be solved."*

Furthermore, another interviewee pointed out that using data can quickly become more of a burden than a benefit if those who need the data cannot interpret the analysis, or if the data analyst does not understand the business issues.

Data reliability also identified as a challenge in using data for decision-making. One participant, who has been responsible of sales, summarized the issue as follows:

> *"You have to be able to trust the data; you cannot do anything with data that has been collected incorrectly or that you cannot rely on. In that case, you cannot make decisions based on that data."*

It was acknowledged that in start-up environments, where data collection processes are not yet refined, there are often situations where data is not trustworthy. Furthermore, even when systems are set up to standardize data, there is still room for human error. This could ultimately lead to a situation described by one participant, who has been responsible of operations and product, as follows:

> *"If there's no trust in the data, then ultimately the decisions aren't really based on the data when decisions are made".*

In addition, it was identified as a challenge that data analysts tend to have their own biases, which can influence data analysis and lead to biased results. One respondent, who has been co-founder of the company, summarized the issue as follows:

> *"By analyzing data, you can get a desired result, so the outcome may depend on the analyst's own bias".*

The decrease in iteration speed was also considered as a challenge in using data in decision-making. As one interviewee, who has been responsible of marketing, noted as follows:

> *"Decisions have to be made quickly, and therefore sometimes decisions have to be made based on intuition with a higher risk because there isn't enough time for extensive data analysis; we have to keep moving forward."*

It was recognized that an over-reliance on data could become problematic as you can easily spend a significant amount of time analyzing data, as one respondent, who was responsible of finance and HR, noted as follows:

> *"it's easy to get hooked into it and spend a long time fine-tuning it."*

It was acknowledged that a challenge could occur when decisions could no longer be made without data support, ultimately slowing down the speed of iteration.

In addition, it was recognized that human factors can also raise challenges in the use of data for decision-making. As one interviewee, who has been responsible of HR, described the situation as follows:

> *"For example, there may be an unwillingness to let go of people who have been hired, even if the data suggests otherwise."*

It was also noted that many start-ups are creating something completely new that does not exist in the market, so the data may not always support your idea, as one interviewee, who has been responsible of marketing, pointed out as follows:

> *"There are many examples where the data didn't support it, but it was believed - when you're doing something new, there's no existing data, you don't know what to measure or how to measure it. The basic principle of a start-up is that a lot of ideas are just crazy, and you're creating something new, something that no one ever thought could be done 20 years from now, so the data doesn't support those crazy ideas."*

4.5 How to solve the challenges

It was acknowledged that start-ups should not only rely on data but also make intuitive decisions. In particular, it was noted that intuitive decisions are often appropriate, e.g. in marketing. It was also identified that it is important to make an assessment of the risk versus the time required to do the data analysis. In the case of a low-risk experiment, it is often more sensible to just try rather than spend time analyzing the data, thus improving the speed of iteration. However, it was found that market situation has an impact on the likelihood of decisions being made using data with less risk, as opposed to intuition with more risk. As one interviewee, who has been responsible of HR, commented it as follows:

> *"When the market situation was different and money was almost free, more decisions were made intuitively. Now that money is tight from the investors' side, there is not so much room for error, so data-driven decision-making is raising its head to minimize the risk of making the wrong decisions."*

It was recognized that the background of the founders plays an important role, the founders need to identify their own areas of strength and seek outside help in areas that are not under their own strengths. As one respondent, who has been responsible of strategy, noted on the topic as follows:

> *"If data is not an area of strength, external help should be used, e.g. through an advisory board."*

It was also recognized that the first recruitments are important, from the beginning you have to hire people who understand the importance of data, even if they are not able to handle data as a founder. On the other hand, the background of the founder plays a big role in deciding whether a data scientist needs to be hired or whether the founder is able to bring the expertise into the company himself or herself.

The importance of structure was highlighted, it is important to create processes at the beginning to support later decision-making with data, even if data is not available at the moment, for example due to a lack of historical data. Related to this, several people raised the point that it is worth considering investing in an external consultant at the beginning, for example, who will look at the data use plan if there is no possibility to hire in-house expertise. It was also identified that in addition to creating a data collection plan at the beginning, it is also important to update this to reflect the needs of the business. One interviewee, who has been responsible of operations and product, summarized it as follows:

> *"Don't make too complicated a monster of data utilization - in the start-up world trends change at a fast pace and your business especially in the early stages is constantly changing - data needs to follow the pace - make a good plan but also have the courage to shoot it down and adapt the data plan to reflect the current state of the business."*

The importance of training within the company was also identified, as described by one participant, who has been responsible of strategy:

> *“Start-ups should invest in training within the company so that all staff understand why data is important, what data means and why it is measured. This will also help reduce human error and improve data quality."*

The importance of investing in the presentation of the data also was raised, as described by one another participant, who has been responsible of HR:

> "The presentation of the data should be designed in a way that it is accessible and easy to understand, even for those who are not data-driven or data-native. It is also important that discussions and speeches are able to open things up in a popular and understandable way."

Network that includes people who will drive decision-making towards a more data-driven approach was also recognized to be beneficial. The importance of support networks to mitigate the human biases of founders emerged. It's important that the ecosystem support network helps founders make more data-driven decisions, while also providing support for decisions that don't always justify extensive data analysis.

It was also identified that it's important to remember that even indicative data is better than no data at all, especially when there are challenges with data quality. As one participant, who has been responsible of marketing, noted as follows:

> *"We need to trust data as indicative rather than absolute truth. It's always better to trust it as a guide than not to make data-driven decisions at all."*

It was also highlighted that it's important for those conducting data analysis to work closely with business leaders who have a deep understanding of the business. This helps to reduce the likelihood of performing analysis that is not truly beneficial to the business.

4.6 Evolution of the role of data in decision-making

The role of data was recognized to have changed significantly and there is much more discussion around it and its importance is increasingly recognized. In particular, the

importance of data was noted because it has become so much easier to collect, process and visualize. One participant, who has been responsible of sales, commented on this as follows:

> *"The role of data has changed significantly. Technology is so much more advanced now than it was 10 years ago, when you think about what you can measure and what data is readily available - It used to be in the spreadsheets of finance people, whereas now you can get it from many systems at the touch of a button."*

It was acknowledged that technological solutions have an impact on the increasing importance of data in decision-making. It was identified that as technology advances, so does the quality, quantity and processing of data, including data cleansing.

It was also identified that while the general importance of data in the world has increased, its role is also expanding as the business grows. As one participant, who has been responsible of operations and product, expressed as follows:

> *"As the company grows, the importance of data has increased - as complexity increases, so does the importance of data."*

It was acknowledged that in the early stages, data is not used as much as in later stages; decisions are more often made intuitively. It was also recognized that it is easier to make data-driven decisions the longer the company has been in business. This is because historical data is available, expertise is built up, markets are known, the regulatory environment is understood, and it becomes easier to make knowledge-based decisions as the company operates over a longer period of time. It was also noted that the reliability of data improves as the company operates over time, making it easier to make knowledge-based decisions. On the other hand, some participants felt that they rely on data in the early stages as one participant commented, who has been co-founder of the company as follows:

> *"Especially in the beginning, when there are so many question marks, data helps to guide you in the right direction"*

It was identified that the market situation affects how many decisions are made based on less risky by using data-driven decision-making. One participant, who has been responsible of HR, commented as follows:

> *"The market situation also affects how many decisions need to be made with data, in other words, how much risk you can take in decisions - when money was free, it creates the illusion that you can try with more risk more easily - whereas when investors' money is tight, it leads to a situation where there is not as much risk tolerance in decisions as in a good market situation."*

However, it was noted that there are areas where there used to be more talk about being data-driven than there is now. One participant, who has been responsible of marketing, commented it as follows:

> *"Five years ago, we used to talk about data-driven marketing all the time, but the discussion around it has decreased significantly - probably it has found its place, but it has also been understood that in marketing you also have to rely on intuition because, for example, brand value is still not properly/easily measurable."*

It was also identified that critical thinking has recognized, i.e. there is an understanding that not all data can be blindly trusted, but that one must always think critically. As one respondent, who has been responsible of operations and product, put it as follows:

> *"You can't look at data too black and white - you have to dare to question it."*

4.7 Importance of the role of data compared to other resources in start-ups

Data analysis was identified as very important in relation to other resource allocations, with some respondents identifying it as the most important. However, it was recognized that while the use of data for decision support is critical, it is part of a bigger picture, as one participant, who has been responsible of sales, commented as follows:

"I think it's very important, but it's part of a bigger picture. Data is one part of it, but there are other business aspects involved. You have to be able to integrate that data and apply it to other business principles - but making decisions based on data only leads to other business decisions."

However, it was acknowledged that without data, the basics that keep the business going, such as sales, are vital. Nevertheless, the importance of data was understood, as interviewee who has been responsible of sales continued as follows:

"However, with data it's possible to save time, streamline processes and do things more intelligently - to create value for the company, data quickly becomes very important to do things right, but you still need sales, for example, to have something to analyze."

It was recognized that over-allocating resources to the use of data could risk taking too many resources away from the core business.

It was identified that data plays a critical role in other resource allocations such as investor relations, future investment rounds and board work. One respondent noted that a company that can use data to demonstrate to investors and the board that it is doing things smartly from the beginning will be in a better position. It also makes it easier to seek external help, such as mentors, consultants or other advisors, if you can explain issues and problems with data.

It was recognized that the role of data increases as the business progresses. As one respondent, who has been responsible of strategy of the company, commented as follows:

"When thinking about resource allocation, it's important to remember that you don't need a data set-up equivalent to a public company that's been running for 10 years, but you should be thinking about doing things smarter and better every year, including in the data set-up."

It was also noted that as the company progresses, both the board and investors begin to demand data to support decisions, if it is not already available. However, it was

acknowledged that there is a risk in this approach as one participant, who has been responsible of marketing, described it as follows:

> *"If a lot of time is spent on data manipulation and decisions are not made quickly enough. This in turn leads to a loss of iteration speed, which is the key to success for start-ups."*

It was identified that the founder's own background plays a significant role in determining the amount of resources allocated to support data-driven decision-making. If the founder's background supports the importance of data, data-driven decision-making is often applied from the early stages of the company and more resources are allocated to it than if the founder does not have a data background but, for example, a marketing background. In such cases, the founder tends to invest resources in his or her area of expertise, even if it's not the smartest move. In addition, it was highlighted that both the founder's background and the background of the people selected for the management team strongly determine how many data-driven decisions are made and how many resources are allocated to enable data-driven decision-making.

4.8 Practical examples of use of data that has helped to make decisions

Various practical examples were identified in the interviews, depending on the area in where person was operating, which highlighted the wide use of data and its impact. For example, it was noted that some products that are sold require accurate data tracking for successful sales. However, it was also recognized that the use of data in practice varies; sometimes data is at the centre of daily work, while at other times it does not play a role at all.

In particular, in sales there were several practical examples. For example, data was used to drive sales by understanding the most valuable customers with the highest lifetime value. Precise customer insights enable targeted marketing to the right target groups. In addition, both improving the customer experience and product development require data to support decision-making, as one respondent, who has been responsible of operations and product, summarized it as follows:

"Monitoring customer behavior is a practical example of where data is absolutely necessary to drive product development and improve customer retention, thereby increasing customer lifetime value."

Furthermore, practical examples of the use of data in decision-making were identified in various management systems and indicators. For example, close monitoring of Key Performance Indicators (KPIs) enables rapid identification of areas requiring change to align with Objectives and Key Results (OKRs). As a result, quick action can extend the existing runway forecast, i.e. cash position. In addition, "real-time feedback on the previous period's performance is critical for evaluating resource allocation and making quick decisions and adjustments," as one participant, who was responsible of company strategy pointed out. In essence, the data provides the ability to monitor the efficiency of resource allocation and trigger corrective action if any aspect is not working.

In addition, successes were also linked to decisions made based on data and its monitoring. As one participant, who has been responsible of marketing, expressed it as follows:

"When you can justify internally and/or to investors with data, and then find that your hypothesis was correct, it gives you a lot of confidence. Confidence comes from being able to demonstrate through data that things have unfolded as predicted based on data-driven scenarios and proposals."

On the other hand, it was also recognized that data can reveal and encourage recognition of successes that might have gone unnoticed without comparison with historical data points. One participant, who has been responsible of finance and HR, summarized this viewpoint as follows:

"Data helps to identify successes that might not have been noticed without comparing them to historical data points; this has a significant impact on people and motivation - successes are celebrated."

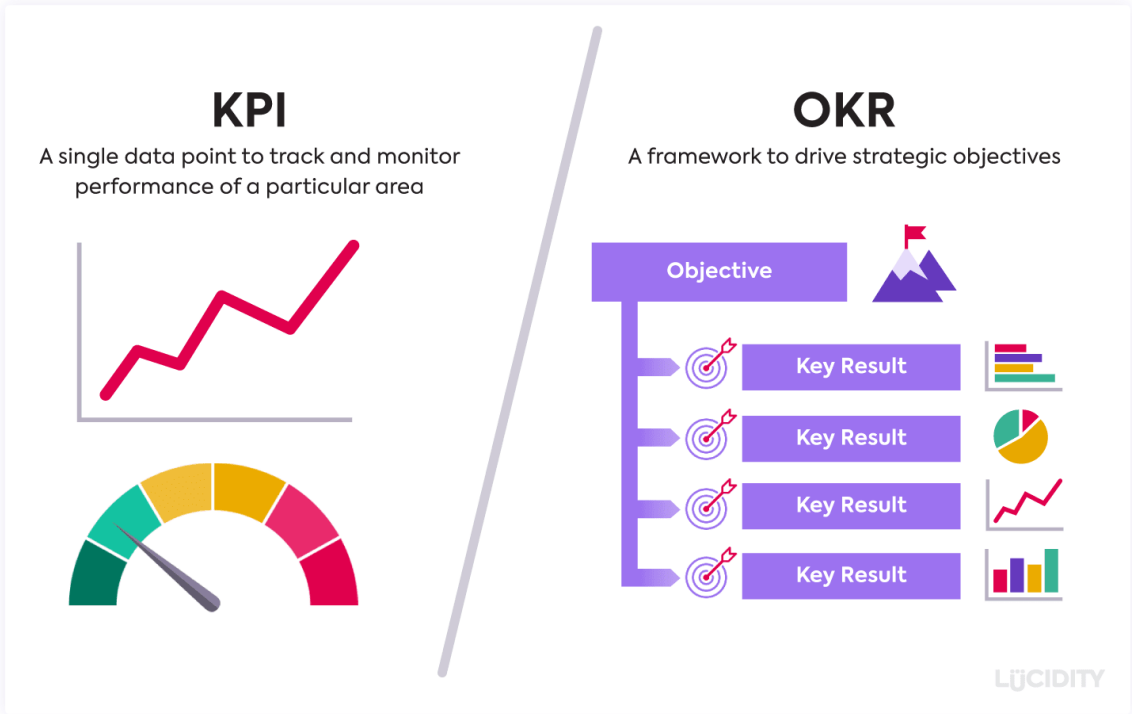

Figure 3. Difference between KPIs and OKRs (Source: Lucidity, 2024)

4.9 Future role of data in decision-making in the start-up environment

Interviewees acknowledged that the role of data in decision-making will grow and become increasingly important in start-up environments. On the other hand, it was also noted that many companies are already effectively using data to support decision-making today.

The future utilization of AI in data-driven decision-making was mentioned in multiple interviews, with the belief that it would solve challenges related to resource limitations. It was identified that, in the future, companies themselves can use AI programmers as tools for analyzing data, thereby speeding up data analysis. In addition, it was acknowledged that AI enables the establishment of new start-ups that provide better software solutions for businesses. As one participant, who has been responsible of marketing, noted as follows:

> *"Advanced analytics will become stronger in the future, for example in marketing, which means that the ways to collect/use data will become easier with new*

innovations as new companies will be created that sell data analysis services that use AI directly."

However, there was still uncertainty about whether the quality of data in AI-driven analytics would be sufficient, or whether it would take more time. Concerns about cybersecurity in the use of AI were also noted, with one participant, who has been responsible of company strategy, noting it as follows:

"However, in the future, for example with the use of AI, cybersecurity issues will become more precise and significant as cybersecurity issues are clarified."

In addition, it was highlighted that in the future investors will certainly demand the use of data in decision-making, both at earlier stages and more broadly in mature companies, for example in board governance. It was also noted that it may take a while for the market situation to return to the era of so-called "free money", which also supports the notion that companies should make less risky decisions, i.e. use data in their decision-making.

On the other hand, it was also mentioned that decision-making based on intuition will certainly remain in start-ups. The speed of iteration is so crucial for start-ups that intuitive and quick solutions will always be present in start-up decision-making, especially in early-stage companies.

5 Discussion

In this Chapter, firstly, the summary of results from previous research is presented through research questions. Secondly, the summary of results from the interviews is presented through research questions. Finally, the summary of findings from both the previous research and the interviews will be discussed through the research questions.

5.1 Summary of results from previous research

The next chapter covers the research questions based on the results of the previous research.

5.1.1 Similarities in data-driven decision-making in start-ups and more mature companies

When comparing data-driven decision-making in the start-up environment with more mature business environments, similarities in the use of data in decision-making were identified. In both environments, the need for data-driven decisions in order **to increase market value** is recognized, highlighting the importance of data in this process (Berg et al., 2018; Niu et al., 2021; Varma, D. and Dutta, P., 2023). It was also recognized that **the role of data will grow** in the future (Berg et al., 2018; Niu et al., 2021).

Previous research identified the challenge that incomplete data can lead to a situation where decisions are made with imperfect information and understanding, which leads to **biases in the decision-making process** (Gao, Wang & Shen, 2020; Nguyen et al., 2021). As Niu et al. (2021) pointed out, "without analysis and processing, data is useless." Therefore, when organizations integrate big data into their decision-making processes, the key objectives should be to minimize errors and narrow the scope of the data (Niu et al., 2021).

Furthermore, in a previous study, Cockcfoft & Russell (2018) identified the challenge of creating a process for using data in decision making to avoid **gaps between business managers and data scientists**. Thus, they suggested that collaboration between

data scientists and decision makers needs to be seamless and it is crucial to ensure that decision-making processes are carefully managed to reduce gaps in understanding.

In addition, previous research has identified a lack of intelligence big data sources, limited access to **real-time data** and the need for **adequate network capacity** to run applications as challenges (Araz et al., 2020).

5.1.2 Advantages and challenges

A previous study identified the benefits of data-driven decision-making in a start-up environment to **increase the market value** of the company (Berg et al., 2018). Berg et al. (2018) found that start-ups are increasingly realizing the potential of the data they generate, and they highlighted it to be critical in order to make value-creating management decisions. In addition, previous research identified that start-ups understand that data-driven decision-making **reduces the risks** associated with the decisions they make and that was seen as an advantage (Berg et al., 2018).

Although start-ups recognize the clear advantages of data analytics, there are several barriers and challenges for start-ups to create value from it. Previous research identified that one of the challenges for data-driven decision making in start-ups is resource constraints, and particularly **the lack of talented people** (Berg et al., 2018; Niu et al., 2021). In addition, previous research identified **time management** and **privacy issues** as a challenge (Berg et al., 2018). Furthermore, previous studies have identified **the limited amount of data** and **lack of historical data** as one of the challenges (Berg et al., 2018; Niu et al., 2021). In the Berg et al. (2018) study, one of the respondents commented on the challenge as follows:

> *"Data amount is still a little too small to do any proper analysis of it, and we do not collect enough personal info yet to perform the analysis."*

In addition, it was identified that **incomplete data or data analysis** can lead to a partial decision-making approach, which in turn can lead to incorrect conclusions in the decision-making process (Gao, Wang & Shen, 2020, Nguyen et al., 2021). In addition, one of the challenges identified in previous research was the **lack of understanding** among business leaders **of the use of data and its potential** to support decision-making (Berg et al., 2018).

Therefore, Berg et al. (2018) suggested that by increasing these managers' understanding of the potential benefits, the organization could improve the integration of data analytics into its business models.

5.2 Summary of interview results

The next chapter covers the research questions based on the results of the interview.

5.2.1 Advantages and challenges

The interviews showed that the start-up environment recognized the importance of data-driven decision-making in **increasing market value**. Through the interviews, different perspectives on increasing market value through data emerged, such as improving sales, better understanding customer behavior, improving production efficiency, etc. In addition, the interviews showed that data can be used to **explain things** more effectively internally, externally and to oneself, and this was seen as an advantage. As one interviewee, who was co-founder of the company, described it as follows:

> *"Data also helps in being able to justify why you are doing something to co-founders, teams and investors - and especially to yourself, to get support that this makes sense when you think about it at night."*

However, it was recognized that **intuitive decisions** are also important, especially in the early stages, in order to maintain the fast iteration speed that is critical for start-ups. It was also identified that the challenge is the **limited amount of data** and the **lack of historical data** to make proper analyses. It was also identified as important to think as early as possible about what data points will be needed in the future. As one of the respondents who was responsible for the general strategy of the company stated as follows:

> *"Action needs to be taken from the beginning to consider what data needs to be collected and in what format."*

On the other hand, the interviews result also identified that data is available, but it is a challenge to find the **right metrics to track**. As one respondent, who was responsible of marketing pointed out it as follows:

"It's not about measuring things blindly - it's about measuring the right things."

But on the other hand, the **systematic monitoring of data**, the **lack of skilled people**, but also the **lack of tools** to collect data reliably were identified as challenges. It was also identified as important that decision-makers and **business leaders work seamlessly with those who conduct the data analysis**. Furthermore, it also emerged strongly from the interviews that the **decision maker's background** played an important role in how much decisions were made intuitively and how much data-driven.

5.3 Discussion based on results from previous research and interviews

The next chapter will cover a discussion based on summary of results from previous research and interview results. The first chapter will answer the first research question, after which the second research question will be covered.

5.3.1 Similarities in data-driven decision-making in start-ups and more mature companies identified

Both interviews and previous research highlighted the important role of data in increasing market value and that its role will increase in the future (Berg et al., 2018; Niu et al., 2021). In addition, both interviews and previous research highlighted the importance of the accuracy of data analysis (Niu et al., 2021; Gao, Wang & Shen, 2020; Nguyen et al., 2021). As Niu et al. (2021) stated in their study, as follows:

"Without analysis and processing, data is useless."

In addition, both interviews and previous research showed that collaboration between business managers and data scientist is crucial and that the process needs to be considered to reduce gaps in understanding (Cockcroft & Russell, 2018). The challenge of finding data sources was also identified in both previous research and interviews, as was the availability of real-time data (Araz et al., 2020). However, the interviews did not identify the challenge faced by start-ups in terms of adequate network capacity to run applications, which in turn was identified in previous research (Araz et al., 2020).

5.3.2 Advantages and challenges in data-driven decision-making recognized

Both previous research and interviews identified the importance and usefulness of data to increase market value (Berg et al., 2018). In addition, both interviews and previous research highlighted that one of the benefits identified was the use of data to reduce risk (Berg et al., 2018). However, the interviews identified that data could be used to explain things more effectively internally, externally, and to oneself, and this was seen as one of the advantages not identified in the previous research.

Both interviews and previous research identified the same challenges associated with data-driven decision making. For example, both highlighted the challenge of the limited amount of data available to conduct appropriate analysis and the impact of the lack of historical data (Berg et al., 2018; Niu et al., 2021). In addition, resource constraints and time management were raised in both the interviews and previous research (Berg et al., 2018; Niu et al., 2021). However, the issue of privacy was not raised in the interviews, although it did emerge in previous research (Berg et al., 2018). It was also noted in both the interviews and the earlier research that incomplete data or data analysis can lead to incorrect conclusions (Gao, Wang & Shen, 2020; Nguyen et al., 2021). This was also linked to the need for collaboration between business managers and data analysts (Gao, Wang & Shen, 2020, Nguyen et al., 2021). In addition, the lack of understanding of decision makers and their lack of understanding of the use of data and its potential to support decision making was a challenge identified in both previous research and interviews (Berg et al., 2018).

In turn, the interviews identified issues that were not as apparent in the earlier research. For example, the interviews highlighted that intuitive decision making is also

important, particularly in the early stages. The interviews also highlighted the challenge of identifying the right metrics to track. Systematic monitoring of data extractions also emerged from the interviews as a challenge that was not clearly reflected in the earlier research.

6 Conclusion

The main purpose of this thesis was to answer the research question of how data-driven decision-making should be in a start-up environment. This research question was approached with the following questions:

1. How does data-driven decision-making in start-up environments differ from decision-making in more mature companies?
2. What are the main advantages and challenges of data-driven decision-making in a start-up environment?

We can make a conclusion to the first research question based on this thesis that there is a difference between start-ups and mature companies when comparing data-driven decision-making. The main difference is that start-ups are more likely to have a lack of historical data than mature companies. In addition, iteration speed played a more important role in start-ups than in mature companies. On the other hand, privacy issues were pointed out when discussing challenges among mature companies. Overall, both environments understand the importance of data to support decision-making and its future relevance in building market value.

We can make a conclusion to the second research question based on this thesis that the main benefits and challenges differ depending on whether the company is in a mature or a start-up phase. The main conclusion is that the biggest challenge for start-ups is the history of data and the speed of iteration. However, finding skilled human resources also emerged as a challenge and thus challenges related to process of analyzing the data was emerged. The main advantage that has the biggest impact can be concluded to be the reduction of decision-related risks when making decisions with data.

As a summary to the research question of how data-driven decision-making should be in a start-up environment, we can conclude that in the beginning start-ups needs to make more decisions with intuition. However, the more years a company has been in place and the more its maturity increases, the more the start-up will move towards the same models of decision-making as more established companies use. Thus, to answer the main research question about how data-driven the decision-making should be in start-up environment - It can therefore be concluded that in a start-up environment, decision making should not be as data-driven as in more mature companies from the very first day.

6.1 Limitations

It should be noted that the interviews were conducted with individuals with different job titles and areas of responsibility. Therefore, it should be considered one of the limitations, that the reliability of the interview responses might have been higher if the interviews had been conducted with several people with the same area of responsibility.

Furthermore, the second limitation is that the author's background is in the start-up environment, specifically in the role of Finance responsible for data-driven decision-making within the company. As a result, the research may be biased towards the author's personal opinions.

In addition, a third limitation is that the number of interviews conducted was limited to 7, so the sample size is relatively small, which may affect the conclusions made.

6.2 Future research

In future research, it is very important to continue to explore the potential correlation between the founder's background and its impact on data-driven decision-making at different stages of a start-up. In addition, it would be beneficial to expand research to examine the influence of roles and different areas of responsibility on data-driven decision-making. Exploring potential differences between functions such as marketing and operations could provide valuable insights. There is also a need to further research the relationship between

the level of investment and the use of data-driven decision-making, as well as the impact of market conditions to data-driven decision-making.

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Resources (Figures)

Figure 1: Gadegar, Rahul, 2024, Digital Marketing case Study Evolve Back Resorts, https://www.rinteractives.com/blog/en/digital-marketing-case-study-evolve-back-resorts/

Figure 2: Müller, Johannes, 2024, Objectives and Key Results (OKR) - A Definition, https://www.workpath.com/magazine/okr-definition

Figure 3: https://getlucidity.com/strategy-resources/okrs-kpis-whats-the-difference/