

THE ENTREPRENEURIAL TEAM AND EARLY STAGE  
SUCCESS OF START-UPS

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by  
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## ABSTRACT

This research examines early-stage new technology ventures and the factors that contribute to their success. Innovation and technology are increasingly critical components in modern economy, and new technology ventures play a key role in creating and leading it. In recent years, the number of new ventures and the amounts of resources invested in them has grown rapidly, further emphasizing their already high importance. This study builds on upper echelons theory and human capital theory and applies them to the entrepreneurial ecosystem. By focusing on early-stage new technology ventures founded in Israel in recent years, and empirically testing the influence of factors such as entrepreneurial, senior management, industry experience and education background within the entrepreneurial team as well as the size of the entrepreneurial team on the early-stage survival and success of the ventures, this study found that previous experience is positively associated with a decrease in the risk of failure and with an increase in the funds raised by the new venture. This study also found that the size of the entrepreneurial team is positively associated with a reduction in the risk of failure. The second part of this research involved the examination of a sample of companies that had achieved outstanding early-stage success and, through a multiple case study, examined the same factors as the empirical model with a different method and from a different perspective. This study's findings also demonstrate the potential of the data collected and approach taken in investigating technology start-ups, and, in the future, could also assist in setting up a base for a more automated and standardized investment decision process for start-ups.

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## TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGEMENTS.....	iii
LIST OF TABLES.....	vi
LIST OF FIGURES.....	vii
CHAPTER	
<u>1. INTRODUCTION</u> .....	1
<u>2. LITERATURE REVIEW</u> .....	5
Entrepreneurs and Entrepreneurial Teams.....	10
Start-ups and New Ventures.....	11
Early Stages.....	12
Success and Failure.....	13
Characteristics and Outcomes in Research.....	14
Israel and Entrepreneurial Team Research.....	15
Research on Israeli Start-ups.....	18
AI and New Venture Success Prediction.....	19
Model and Hypotheses.....	20
Previous Entrepreneurial Experience within the Entrepreneurial Team....	21

Previous Senior Management Experience in the Entrepreneurial Team ...	22
Previous Industry Experience within the Entrepreneurial Team .....	23
Educational Levels Within the Entrepreneurial Team.....	24
Entrepreneurial Team Size and New Venture Success.....	26
<u>3. DATA AND METHODS</u> .....	27
Variables .....	29
Dependent Variables .....	29
Independent variables .....	31
Control Variables .....	37
Analysis.....	38
<u>4. RESULTS</u> .....	40
<u>5. MULTIPLE CASE STUDY</u> .....	57
Description of the Cases. ....	63
Case analyses .....	74
<u>6. DISCUSSION AND CONCLUSION</u> .....	79
Limitations and Gaps .....	81
Contributions.....	82
REFERENCES .....	83

## LIST OF TABLES

Table	Page
1. Variables	29
2. Employees per company	31
3. Founder Characteristics	31
4. Number of Founders	36
5. Companies by Sector	38
6. Failure explained by entrepreneurial experience	41
7. Failure explained by senior management experience	44
8. Failure explained by industry experience	46
9. Failure explained by highest education level	48
10. Founding amount (OLS)	51
11. Number of employees (OLR)	54
12. Summary of the Cases	63

## LIST OF FIGURES

Figure	Page
1. R&D spending by OECD countries as a percentage of GDP 2019 .....	16
2. KM survival curves by Entrepreneurial experience.....	32
3. KM survival curves by Management experience.....	33
4. KM survival curves by Industry experience .....	34
5. KM survival curves by highest education level .....	35
6. KM survival curves by number of founders .....	37

## CHAPTER 1

### INTRODUCTION

Technology entrepreneurship is gaining increasing importance to the global economy and development. The Organization for Economic Cooperation and Development (OECD, 1998) has emphasized the importance of the role played by entrepreneurship in tackling unemployment and poverty, given the competitive nature of global markets. Many of the world's current leading companies began as new technology ventures (NTVs), and technology entrepreneurship continues to spearhead innovation and workforce changes in cultures around the world (Colombo & Grilli, 2005). According to Kelley and Nakosteen (2005), start-ups are an important factor in the growth of economies, especially for developing countries. Sulayman et al. (2014) added that governments have acknowledged the positive contribution made by start-ups to economic growth, stability, and job creation. Additionally, Bower and Christensen (1996) claimed that high tech entrepreneurship plays a central role in economic development, with new ventures increasing employment and introducing disruptive technologies.

The expansion of internet access that started in the 1990s, alongside the proliferation of mobile technology access of the 2000s, has contributed to the increasingly rapid pace at which new technologies are created and adopted, and the duration of development cycles has likewise shortened dramatically. Notably, this is the case for both large established corporations and new ventures. Whereas, in large companies, development cycles typically last between five and 10 years (Ries, 2011), in smaller companies or start-ups, the cycle is even shorter, with some innovative ideas being developed, tested, and adopted in one or two years, or even in a matter of months (Benkler, 2006). This discrepancy is largely attributed to the structured organization and

bureaucracy commonly found in large companies, which tend to hinder innovation. For example, Blank and Dorf (2012) found that start-ups provide an effective means to promote innovation in the software industry, as their more flexible structures are better suited for the development of innovative ideas. There is, however, an intrinsic risk involved with most high-tech start-ups, which follow a high-risk, high reward model that, in most cases, destines them either to failure or considerable success. This model and strategy suit the investors—including venture capitalists (VCs)—that fund them and accept such risks and uncertainties (Cantamessa et al., 2018). In some cases, early-stage investors make their decisions before a feasible new product is available or there is even indication of the existence of a market for it.

Out of the key elements in start-ups—the technology, the market, the business model, and the entrepreneurial team—there are indications that the entrepreneurial team is the most critical (Picken, 2017). The entrepreneurial team receives a lot of attention, with universities investing in entrepreneurship programs, entrepreneurial teams being the subjects of movies and television shows, and more than 150 articles addressing start-up teams having been published over the last 10 years (Knight et al., 2020). There are various accounts but no clear answer or direction as to why some entrepreneurial teams are more effective than others (Klotz et al., 2014; Knight et al., 2020). Therefore, the research question that this study aims to address is: which entrepreneurial team characteristics significantly influence the early-stage success of a start-up?

Answering this research question will provide a number of benefits. First, as many entrepreneurs are inexperienced, this information will enable them to better understand and address the needs of new technology ventures. Additionally, investors, including VCs—can use this information to better assess the status and future of their investments. Furthermore, all parties will benefit from improved survival rates and the avoidance of team composition

mistakes. Scholars can gain additional knowledge from findings pertaining to the effects of team composition on venture success, and further develop codification and standardization related to forecasting the early-stage success of investments.

Israel was selected as the research context for this study due to the great suitability of its ecosystem for the testing of questions regarding high-tech companies. In Israel, technology-based start-ups exert a dramatic influence on both the economy and culture. The 2011 book *Start-up Nation*, by Dan Senor and Saul Singer, provides an overview of the Israeli start-up ecosystem and of its effects on the country, with its title coming to symbolize the state itself. With its vibrant start-up community, high penetration of technology, and limited local markets, Israel has become an innovation cluster second only to California's Silicon Valley. Therefore, it represents a great test case (Marom & Lussier, 2014) with the potential to provide generalizable indications.

Having been personally involved in the setting up of several new ventures, I have witnessed the impact that choosing the right path in the early life of the venture—which is full of uncertainties, with many decisions being made based on gut-feeling—can have on future success. Some of the changes linked to the constant development of both technology and markets have had revolutionary impacts, and research on the composition of the entrepreneurial team is a field that is of high relevance, enabling analysis and knowledge building.

The increasing importance of technology-based new ventures is attracting ever wider recognition within the academic world as a result of growing interest in entrepreneurship. This can be seen in the rapid increase in the number of courses, programs, conferences, journals, and research centers dedicated to the area (Cooper, 2003). Hence, this study includes a review of some of the expanding literature on the subject, conducted with the aim of demonstrating its

importance and impact, and then presents details of both the findings of previous research on top management teams and their influence on new venture performance, and of what questions are still open. This study also involves an examination of the variables or antecedents that contribute to the early-stage success of a venture, their measurements, and some of the consequences. Finally, it presents a review of the Israeli start-up ecosystem and provides some background on the Israeli market, its importance, and why it provides a good test case for other countries.

In the second part of my research, I took a multiple case study approach to perform an in-depth analysis of the cases of high impact start-ups—companies with outstanding growth and success. To this end, I used an extreme sampling technique to select six cases that had achieved outstanding success. I then described the cases and analyzed them, looking for indications of links between their entrepreneurial teams' characteristics and their early-stage success. Such links have the potential to shed light on the relationships between the variables and results tested in the empirical model.

## CHAPTER 2

### LITERATURE REVIEW

An investigation of the field of entrepreneurship and of the important role played in it by the entrepreneurs themselves can start with the definition and description of the phenomenon. Eckhardt and Shane (2003, p. 336) defined entrepreneurship as “the discovery, evaluation, and exploitation of future goods and services,” while Kirzner (2015, pp.19-20) wrote that “entrepreneurship consists of the competitive behaviors that drive the market process.” Drucker (1985) pointed at technological innovation as a key component in entrepreneurship, while Schumpeter (1934) emphasized the importance of the individual as the driving force behind it. Penrose (1959, p. 5) stated, “the experience of management will affect the productive services that all its other resources are capable of rendering.” This literature review concentrates on the analysis of the unit that is the focus of my dissertation—the entrepreneurial team—and the relationships between it and early-stage start-up success. Using upper echelons theory and human capital theory, both of which demonstrate the importance of the founders, their backgrounds, and experiences, I link those entrepreneurial team resources or human capital to company-level outcomes and early-stage venture success. Then, I review what a start-up or a new technology venture is; specifically, I examine what is considered as the early-stage success or failure of its operations, look at models that analyze and predict success or failure, and review Israel’s innovation and entrepreneurship ecosystem and previous research on Israeli start-ups.

Upper echelon theory is a leading framework in the strategic management literature that researches the effect of team characteristics on firms’ outcomes. It was developed by Hambrick and Mason (1984), who stated that organizational performance can be partially predicted by examining the characteristics of top management team members. The model uses bounded

rationality (March & Simon, 1958) to explain the actions of top management team members, as based on their personalized interpretations of the situations they face, and their strategic decisions based on their construed reality. Moreover, it argues that the management team members' personalities, values, and previous experiences have an impact on the way they interpret situations and consider alternatives, thereby affecting their strategic decisions. In other words, firms are, in effect, a representation of their top management teams' characteristics (Hambrick 2007).

In a 2009 published interview with Albert Cannella, Donald Hambrick stated the three main points considered when developing the upper echelon approach. First, he claimed that, to a great extent, an organization reflects its top managers, who act based on their “incomplete, filtered, and highly stylized understanding of their situations.” In order to understand organizations, their decisions, the ways they operate, and their outcomes, it is imperative to understand the “experiences, values, motives, and biases of the top executives.” Second, Hambrick clarified the importance of understanding the characteristics of the top management team as a whole—as opposed to those of individual managers—in order to develop a much greater ability to understand the way the company operates and to make accurate predictions on organizational outcomes. Third, he stated that certain demographic characteristics could partially be looked at as indicators of more complicated or subtle personality attributes of the managers, psychological or otherwise. However, Hambrick claimed that “demographics are exceedingly limited, imprecise, and noisy surrogates for executive and team psychology.” Since then, research has demonstrated that top management team composition and characteristics do have a strong effect on organizational outcomes (Hambrick, 2007). A strategic choice model built under bounded rationality theory demonstrated that the attributes of team members, such as their

experiences or personalities, affect their perceptions and interpretations of situations and thereby influence the decisions they make. This effect is even more dramatic in entrepreneurial teams due to the more uncertain and dynamic environment that characterizes entrepreneurship. Team heterogeneity, with the diversity of skills and perspectives it entails, has a positive impact on performance (Finkelstein et al., 1996; Hambrick & Mason, 1984).

The characteristics and composition of the top management team—or, in the case of new ventures, of the entrepreneurial team—can contribute to explaining certain business and organizational results. The effect of team characteristics on performance is expected to be stronger in new ventures due to the importance of managerial discretion and increased job demands (Hambrick & Finkelstein, 1987). By performing a meta-analysis, Jin et al. (2017) demonstrated that entrepreneurial team characteristics have strong and unique effects on new venture performance, as the entrepreneurial venture situation is unique in its job demands and requires greater managerial discretion (Hambrick & Finkelstein, 1987). Upper echelons theory further claims that the importance of these factors is positively correlated with the degree to which the top entrepreneurial team's characteristics are reflected on organizational outcomes. The top management team's influence on organizational outcomes does not remain constant over time; it is expected to be greater in smaller or younger organizations (Miller & Droge, 1986).

Upper echelons theory has been used in some studies to research entrepreneurial teams—i.e., the groups that had founded and developed an organization and that are often responsible for leading and operating it (Beckman, 2006; Ensley et al., 2006). Such studies aim to explore the effects of entrepreneurial team characteristics, with some researchers aggregating them (Beckman & Burton, 2008; Kor, 2003). Upper echelon theory views the attributes of human capital as critical components in the success of new ventures in achieving their goals.

Another theory used to explain and explore these entrepreneurial characteristics and their correlation to company level outcomes is human capital theory. This theory had been originally developed to predict or assess the distribution of income among employees as a function of their investments in human capital (Becker, 1964). According to Becker (1964), human capital is the sum of the abilities and knowledge obtained through investments in education, professional training, and other forms of experience. Becker found that individuals with more human capital are expected to be more successful (Becker, 1964).

Starting from the days of Becker and Mincer, in the 1960s, human capital researchers have paid little attention to psychological aspects, weather processes, or mechanisms (Unger et al., 2011), with human capital theory not explaining how human capital is transferred, but just stating that investment in human capital improves knowledge and skills and thereby increases “money or psychic incomes” (Becker, 1964, p. 11). Individuals can develop human capital over time and are able to transfer it to others, which makes it significantly different from other human attributes—such as personality traits—and therefore suited to exert greater influence on firm level outcomes.

The assumption that human capital is positively correlated with firm-level success can be based on several reasons. A firm’s leaders’ abilities to explore and exploit business opportunities are increased by the addition of human capital, which endows them with a greater ability to obtain other resources, such as investments, financing, and know-how. In the entrepreneurial context, this is emphasized by human capital improving a firm leaders' capabilities to perform the key entrepreneurial missions of exploring and exploiting business opportunities (Shane & Venkatraman, 2000), and enabling entrepreneurs to find and exploit business opportunities that might otherwise go unnoticed (Shane, 2000). Forbes et al. (2006) stated that, with

entrepreneurial teams, the performance of a firm can be seen as a proxy for a return on their human capital, and that a positive association can be expected between individual human capital and a firm's performance. Human capital was found to be positively associated with the planning and setting of venture strategy, with those factors having a positive effect on chances of success (Baum & Silverman 2004; Unger et al., 2011).

Human capital theory has been extensively applied to the field of entrepreneurship, with many studies looking at human capital factors as predictors or indicators of entrepreneurial outcomes—mainly of success or failure (Delmar and Shane, 2003; Kor, 2003). Davidsson & Honig, (2003) found human capital to have an especially strong influence in young businesses. Bernstein et al. (2017, p. 8) studied early-stage start-ups, producing evidence “of the importance of human capital assets at the earliest stages of the firm.” When examining the individual entrepreneur, research has suggested that human capital is positively correlated to new venture performance (Unger et al., 2011). Bruderl et al. (1992) proposed separating human capital into general and specific forms, with the former encompassing items like education levels and the latter such characteristics as work and industry experiences. Both the general and specific forms of human capital are expected to increase entrepreneur productivity. Some studies concentrated on the positive effects of general human capital, with Lazear, (2004) stating that an entrepreneur should be a jack of all trades but master of none while others, like Shane (2000) and Colombo and Grilli (2005), focused on specific human capital effects.

To summarize, when applied to the study of new ventures, the theoretical frameworks of upper echelons theory and human capital theory focus on entrepreneurs and entrepreneurial teams, the groups of individuals that start and lead ventures.

## Entrepreneurs and Entrepreneurial Teams

Schumpeter (1934) wrote that entrepreneurs are faced with the challenge of finding and using new ideas in the market, and identified five ways in which they may successfully promote innovation: 1) by developing new products or services; 2) by developing new methods of production; 3) by finding new markets; 4) by discovering new sources of supply, and 5) by reorganizing firms or operations.

Recent research has shown that new ventures are more frequently set up by teams and not by lone entrepreneurs (Klotz et al., 2014; Kamm et al., 1990). Beckman (2006) found that 90% of the new ventures she sampled had been started by teams and not by individuals. Wasserman, (2012) found that entrepreneurial teams create 85% of new companies in technology industries. Steffens et al. (2012) stated that ventures founded by teams are not only more common but also tend to have relatively greater representation amongst high performers. Ensley et al. (2006) found that shared leadership or entrepreneurial teams contribute positively to performance and account for a variance of 10% to 15% above sole leadership in regard to firm performance. Carland and Carland (2012) explained that teams usually perform better than individuals because they tend to be more creative, robust, and adventurous. Almus (2002) found that the expected performance of start-ups established by entrepreneurial teams is higher than that of their individual entrepreneur-created counterparts.

According to Finkelstein et al. (2009, p. 3), the management team is “the small group of people at the top of an organization” that “can dramatically affect organizational outcomes.” Entrepreneurial research features many works that focus on entrepreneurial teams—i.e., the groups that are responsible for founding, developing, and leading new ventures (Beckman, 2006;

Ensley et al., 2006). The literature refers to those teams by a few different terms—e.g., entrepreneurial teams, founding teams, or start-up teams. Klotz et al. (2014, p. 227) defined the entrepreneurial team as a “group of individuals that is chiefly responsible for the strategic decision making and ongoing operations of a new venture,” Additionally, in many cases, entrepreneurial team members are not allocated clear formal roles or titles and switch leadership responsibilities relatively frequently.

### Start-ups and New Ventures

Start-ups and new ventures can be defined in several ways. According to Klotz et al. (2014), start-ups are generally early-stage firms with respect to their development and growth. Those authors related that, although some researchers define new ventures based on firm age and/or size criteria, they had avoided doing so due to the limitations it would impose. Krejci et al. (2015) defined start-ups as new and temporary companies with business models based on innovation and technology. They further stated that start-ups have the potential to grow (scale up) fast. Medcof (1999) broadly defined high-tech ventures as companies the main activities of which are concentrated and dependent on innovation in science and technology. Entrepreneurial research is research that is mainly focused on the entrepreneurial teams, which are responsible for founding, developing, and leading ventures through their various development stages (Beckman, 2006; Ensley et al., 2006). In order for a start-up to be established, its entrepreneurial team needs to set out a vision for its future and find a way to convince other stakeholders to believe in that vision in order to find and hire employees and to attract the capital and resources needed to develop the new venture (Baum et al., 1998). According to Picken (2017), in its development from a concept to maturity, a new venture usually goes through the three stages of start-up, transition, and scaling.

When examining the differences between the roles played by entrepreneurial teams that lead new ventures and those of the top management teams of larger organizations, the former have considerably more discretion and do not face as much bureaucracy, with the latter usually having more structured hierarchies, more defined targets, and more structured processes to guide them (Ensley et al., 2006).

### *Early Stages*

Start-up companies operate under high conditions of uncertainty, and their business models involve high risk, high reward components (Cantamessa et al., 2018). In itself, the establishment of a start-up can be considered as its first success, given that a considerable proportion of those who attempt to start a business fail to do so (Van Gelderen et al., 2005). On a global scale, the failure rates of start-ups or new technology ventures have been consistently high (Colombo & Grilli, 2005).

Scholars have yet to reach a consensus on what actually determines the success or failure of a venture and on what factors contribute to that success or failure and how (Sulayman et al., 2014), with Jovanovic (1982) writing that efficient firms survive, and inefficient ones fail. Going back to Van de Ven et al. (1984), studies have aimed to identify, analyze, and discuss the main factors that influence the success of start-ups. As the empirical results have, in many cases, been debatable and inconclusive, it is important to continue to strive to identify these critical success factors, as such knowledge can help to reduce the risks of failure. Although Picken (2017) stated that several factors could be involved, management failings are the most commonly cited cause of failure.

While the definitions and measurements of early-stage success vary, they all share a common criterion: the survival of the company. In order to successfully survive the early stages

of its existence—which are characterized by high pressures and limited funds—a start-up must avoid some critical mistakes, with the wrong business model and team related issues being the most common reasons for failure (Cantamessa et al., 2018). Achieving growth is an indication that a start-up’s product or service has the potential to attract customers or, at least, create interest, or that the company has, at a minimum, succeeded in convincing investors or the market of the probability of that scenario.

### *Success and Failure*

The definition and measurement of the success and failure of early-stage start-ups are neither clear nor simple matters. Looking at success for firms in general, Penrose (1959, p. 810) stated that “positive profits can be treated as the criterion of natural selection—the firms that make profits are selected or ‘adopted’ by the environment, others are rejected and disappear.”

Most early-stage start-ups are private companies that are usually at the point at which revenues are immaterial or non-existing and do not present financial results; therefore, research needs to look for indicators elsewhere Gimeno et al. (1997) stated that, in the case of start-ups, survival is not strictly a function of economic returns, but of performance relative to a firm-specific threshold.

Several other theories have been used in attempts to find links between the entrepreneurial team and new venture performance. A few success vs. failure models based on indicators are being employed to predict the success or failure of a venture. An example of these is the Lussier model, which includes 15 variables and aims to predict the success or failure of small and medium enterprises (SMEs). This model has been tested in many contexts, including Israel (Marom & Lussier, 2014), and is claimed to be effective in prediction. Researchers have

found that success vs. failure models are better than financial ones at predicting the fate of new ventures or SMEs (Cooper et al., 1991).

### Characteristics and Outcomes in Research

Various researchers have studied different entrepreneurial team characteristics and their effects on a venture's performance. Some of them have divided these characteristics into categories—such as aggregated entrepreneurial team characteristics (Beckman & Burton, 2008; Kor, 2003; Zhao et al., 2013), entrepreneurial team heterogeneity (Ensley & Hmieleski, 2005; Hmieleski & Ensley, 2007; Souitaris & Maestro, 2010), and entrepreneurial team size (Bruton & Rubanik, 2002). Steffens et al. (2012) argued that research on the composition of the top management teams of traditional organizations is usually focused on characteristics such as age, gender, and experience, and on the influences they exert on the firm. Following Hambrick and Mason (1984)—in the use of upper echelons theory to describe how the characteristics of top management team members are reflected in firm performance—Jin et al. (2017) claimed that these factors are more influential in new ventures due to the importance of the founders and entrepreneurial teams for such firms' organization and operation.

Numerous dependent variables have been used to investigate the effects of the entrepreneurial team on the performance of a new venture; in some cases, several measurements have had to be used to account for the different dimensions of the outcomes (Amason et al., 2006).

When examining the consequences of new venture success, it is important to first define such success, whether in terms of finance (i.e., growth of sales or profit), size (e.g., growth in the number of employees), development of new products or services, or even the survival of the venture itself. Further, entrepreneurs define success differently from investors or clients. While

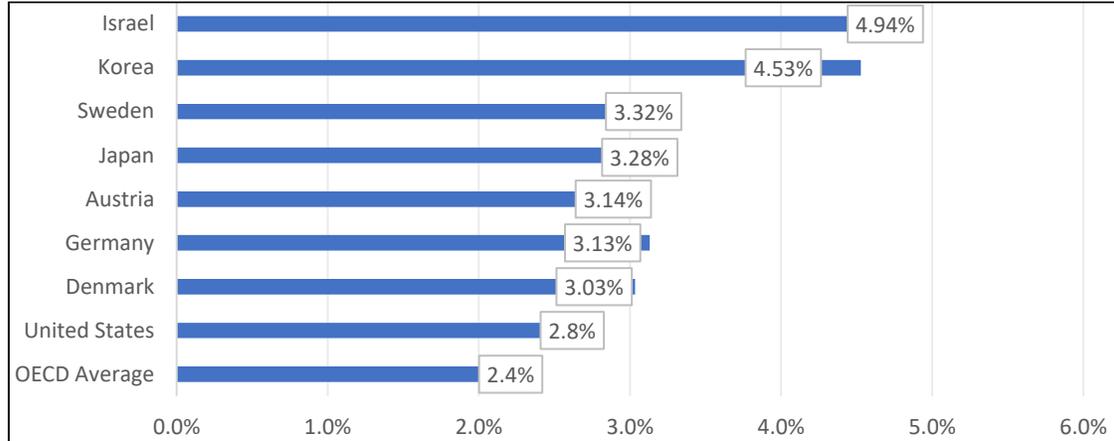
financial measurements such as sales growth (e.g., Ensley et al., 2002) are the most commonly used, some researchers use others, such as growth in the number of employees (e.g., Colombo and Grilli, 2005 ( Beckman et al., 2007) added the abilities to raise funding and to succeed in an IPO as measurements of venture success, claiming that those two indicators are most important for investors and VCs. Bernstein et al. (2017) found entrepreneurial team characteristics to be important in fundraising and therefore, ultimately, for success, Hsu (2007) found a positive correlation between the human capital of entrepreneurs and venture capital funding.

### Israel and Entrepreneurial Team Research

Despite being a relatively small country, with an area of 8,522 sq miles and a population of nine million (which rank it 150<sup>th</sup> and 99<sup>th</sup> in the world, respectively), and being faced with security problems and geographical isolation from its main markets, Israel has a developed and vibrant economy. A member of the EOCED since 2007, Israel has a GDP of US\$353.645 billion (PPP 2019) and a per capita GDP of US\$39,106 (PPP 2019) (both according to the IMF, 2019) with a growth rate of 3% (Israeli Central Bureau of Statistics, 2107). It has an unemployment rate of 4.3% and an inflation rate of 0.2% (CIA World Fact Book 2017 estimates). The Israeli economy was ranked as the third most stable economy in the world by the Bloomberg Financial News Agency in April 2017 and is 22<sup>nd</sup> in the United Nations Human Development Index, which places the country towards the top of the ‘Very Highly Developed’ category, indicating high standards of living.

The Israel Science and technology sector leads the economy and economic growth, as emphasized by a growth rate that is the highest of all the country’s industrial sectors. Figure 1, below, presents a comparison of the amounts spent on R&D as a percentage of the economy in various OECD countries; Israel leads with 4.94% of GDP, followed by Korea with 4.53%.

Figure 1. R&D spending by OECD countries as a percentage of GDP 2019 (Source OECD)



The Israeli workforce also influences and is influenced by the dominance of the science and technology sector. With 140 scientists and technicians per 10,000 employees, Israel has the highest number of scientists and technicians per capita in the world; in comparison, there are 85 per 10,000 in the United States. Such dominance also produces innovation. In 2019, Israel was ranked the world's fifth most innovative country by the Bloomberg Innovation Index. Taylor and Wilson (2012) argued that being a small country with limited natural resources can be an advantage for innovation. The Israeli high-tech industry is strongly involved in innovation, in the creation of high value-added production, and in the successful penetration of foreign markets. Its dominance drives other sectors by increasing productivity and creating high-wage jobs (Harpaz & Meshoulam, 2004).

Israel's technology sector is greatly influenced by start-ups and the start-up ecosystem. Such companies take up a large part in the economy and culture of the country, which is home to the second-largest number of start-ups in the world, after the United States (Senor & Singer, 2011). According to a ranking reported by Telefónica Digital (2012), the Israeli start-up

ecosystem is considered the second best in the world. Eric Schmidt, the former CEO of Google, stated in an interview that “The decision to invest in Israel was one of the best that Google has ever made.” Not only Google, but most of the world’s big technology firms have purchased Israel-based technology firms (in Google’s case, Waze). The first such investment was made by Intel, which opened its first development facility outside the United States in Haifa in 1974. Today, more than 220 US-based multinationals carry out some innovation-related activity in Israel. De Haan (2011) found that most leading IT companies—including Intel, IBM, Microsoft, Google, HP, Yahoo!, Facebook, Oracle, SAP, Cisco, Siemens, and Motorola—operate R&D centers in Israel. Likewise, over 650 Israeli technology companies have subsidiaries in the United States.

A 2017 report by the World Economic Forum stated that, between 1999 and 2014, Israelis set up 10,185 companies, 2.6% of which had annual revenues of more than US\$100 million by 2017. Israel is also home to the third-largest number of NASDAQ-listed companies, after the United States and China. According to the Israeli Ministry of Economy and Industry, the Tel Aviv ecosystem benefits greatly from its local human resources’ professional expertise, with roughly 49% of personnel now employed in at least their second start-up, a proportion that is 21% greater than the average found in Europe. Additionally, Israeli start-ups raise venture capital per capita at two-and-a-half times the rate of their U.S. counterparts and 30 times that of those of Europe (WEF, 2017). Israel is ranked first in the world for venture capital raised per capita, with a large percentage (85%) of these funds coming from foreign investors (MOEI Israel). When New York Mayor Bloomberg developed an ambitious high-tech program aimed at transforming New York into the largest innovation center in the world, a partnership between Cornell University and the Israeli Technion was chosen to lead the way in 2013.

The Israeli start-up ecosystem can not only be a good representation of other small countries but, due to its global exposure, also gives indications to global start-up and innovation sectors. Studying key the key factors that drive the development of a successful ecosystem in Israel, Kon et al. (2014) concluded that many of its components are essential for any successful start-up ecosystem in the world. De Haan (2011) asserted that a defining aspect of the Israeli start-up ecosystem is the creation of a large number of short-lived start-ups which are either forced to grow internationally and/or be acquired in an early stage.

#### Research on Israeli Start-ups

Not much research has focused on Israeli high-tech start-ups or on the factors that lead to their success or failure. Chorev and Anderson (2006, 2008) built a model aimed at identifying critical factors for success. They divided these factors into internal ones such as team, product, and marketing, and external ones such as economic, geopolitics, and education. Their research was based on a literature review and survey with an empirical component based on interviews conducted with Israeli high-tech industry and venture capital respondents. Their study identified: (1) team commitment, (2) team expertise, (3) customer relationships, (4) core team expertise, (5) management, (6) strategy, (7) R&D, and (8) the idea itself as the critical factors for success. The external factors were found to not be critical.

Marom and Lussier (2014) selected a sample of 205 companies using the Lussier 15-variable business success vs. failure prediction model. Their results showed that the model is indeed valid in Israel; however, their research and the Lussier model in general deal with SMEs (small and medium businesses), not just technology start-ups. The authors accounted for the relatively high proportion of entrepreneurship in Israel and quoted previous research (Schwartz & Malach-Pines, 2007), showing the differences between high technology entrepreneurs (HTE)

and small business owners (SBOs), which include level of education and leadership experience. Gimmon and Levie (2010) used human capital theory and signaling theory to research the effect of new high technology venture founder characteristics on a firm's ability to attract external investment, which thereby increases their chance of survival in the early stages. Their sample of 173 high tech start-ups featured only companies based in incubators, each of which had a sole founder (not an entrepreneurial team) with no previous start-up experience. They found that the founders' business management expertise and academic status attracted external investment, but their general technological expertise did not.

### AI and New Venture Success Prediction

One possible outcome of empirical research conducted on the factors that influence the early-stage survival of a new technology ventures is that, by codifying certain variables, it could assist in developing a model that, in the future, could possibly enable the use of machine learning to better predict a start-up's chances of success. Dellerman et al. (2017, p. 1) analyzed the potential of the use of machine learning to determine whether to invest in early-stage start-ups or to forecast their chances of success, they suggested that machine learning would "combine the complementary capabilities of humans and machines in a Hybrid Intelligence method". Machines are able—or will be in the near future—to perform most basic and technical decisions better and more efficiently than humans. This will reduce the time and resources needed for such tasks. Human judgment is inconsistent and limited by bounded rationality in making predictions; humans tend to rely on accessible information, which can result in biased interpretations, rather than in the optimization of their decisions (Simon, 1986). In contrast, machines follow a consistent 'clean' decision process and have the ability to analyze large amounts of raw data to identify patterns and then make predictions based on the results of such analysis.

When the full picture is unavailable, decision makers usually look for indicators of the likeliness or direction of future outcomes. When observing a venture or an investment, these indicators may be ‘hard’ (e.g., industry, specific team characteristics, or capital raised). Artificial intelligence presents a great advantage—which improves as the amount of data increases—in regard to the kind of analysis that is based on historic data and already identified patterns. The limitations linked to the use of artificial intelligence currently pertain to the processing and interpretation of ‘soft’ information (i.e., information that cannot be quantified) and to making predictions in situations of extreme uncertainty in which risk cannot be quantified.

### Model and Hypotheses

A new technology venture or start-up faces great challenges on its path to success, it is therefore of great importance to try and identify the factors that will contribute to a positive outcome. Many researchers have identified the critical role the entrepreneurial team plays in the success of a start-up, with various and lasting entrepreneurial effects on the firm’s life cycle (Eisenhardt & Schoonhoven, 1990; Ensley & Hmieleski, 2005; Beckman & Burton, 2008).

According to the upper echelons theory (Hambrick & Mason, 1984; Hambrick, 2007), the decisions made by the top management team (or, in the case of a start-up, by the entrepreneurial team) are a reflection of its members’ experience and personality; in turn, such decisions play a critical part in the outcomes of the firm. Human Capital theory claims that an individual with a higher level of human capital is expected to be more successful and achieve better returns. (Becker, 1964). Penrose (1959, p. 5) stated that, “the experience of management will affect the productive services that all its other resources are capable of rendering,” and Forbes et al. (2006) stated that, in the context of entrepreneurial teams, the performance of the firm is a proxy for the return on their human capital and a positive association can be expected to be found between an

individual's human capital and the performance of the firm. Stuart and Abetti, (1990) found that investors assign high importance to the entrepreneurs' experiences in their evaluations of the potential of a venture.

*Previous Entrepreneurial Experience within the Entrepreneurial Team*

When, within the entrepreneurial team, there is at least one member who had previously been involved, at least once, as a founder or a member of a founding team in another venture, he/she can be expected to add to the start-up's chances of success. Having such entrepreneurial experience in developing a new venture helps in dealing with some common challenges as obtaining capital, hiring employees, and organizing the entity. Singer (1995) claimed that entrepreneurial experience is one of the most consistent predictors of entrepreneurial performance. And Wasserman (2012) suggested that chances of success are higher for experienced entrepreneurs.

Dyke et al. (1992) conducted an empirical study and found that entrepreneurial experience increases the probability of venture success or survival. They claimed that an entrepreneur who has experience as a founder can make better decisions than one who does not, and that having entrepreneurial experience in new ventures is a contributing factor to success.

By performing structural event analysis, Terjeses and Davidsson, (2012) demonstrated that any previous start-up experience of team members improves performance. McGee et al. (1995) found that firm performance was the highest when the functional experience of the entrepreneurial team members was aligned with their competitive strategy. Previous entrepreneurial experience can assist the start-up with overcoming liabilities of newness (Gimeno et al., 1997; Shane & Khurana, 2003) by obtaining relevant knowledge on what is needed when creating a new venture having been learned by actually doing so (Jovanovic, 1982).

Experienced founders know what needs to be done to successfully organize a new firm having previously faced such issues as hiring employees, raising capital, and developing a new product. Carroll and Mosakowski (1987) noted that entrepreneurial experience provides a unique type of human capital that is otherwise difficult to obtain. Similarly, Ericsson and Smith (1991) suggested that experienced founders have a better understanding of which organizational activities upon which to focus, and therefore do a better job than inexperienced founders of establishing the start-up.

It has also been established that other stakeholders, in particular investors or venture capitalists, assign significance to start-up experience, viewing it as one of the main factors underpinning success (Hall & Hofer, 1993). Aldrich (1990) found that start-up experience provides legitimacy in the eyes of important stakeholders of a new venture, in turn facilitating the process of obtaining resources and organizing new firm operations. Studies often refer to ‘serial entrepreneurship’, wherein experienced entrepreneurs are expected to have better managerial skills, better social networks, and better access to resources, and therefore to be better equipped to locate and exploit new business opportunities (Delmar & Shane, 2006). We therefore formulated the following hypothesis.

Hypothesis 1. The presence within the entrepreneurial team of members with previous entrepreneurial experience is positively linked to start-up success.

*Previous Senior Management Experience in the Entrepreneurial Team*

When, within the entrepreneurial team, there is at least one member with previous experience in senior management positions, a correlation is expected to be found between previous start-up experience and management experience as many founders hold senior management positions in their companies. Employees with managerial experience are expected

to be better at carrying out supervisory duties (Kor, 2003; Van Gelderen et al., 2005). Gimeno et al. (1997) found prior managerial experiences to positively influence economic performance, but to have no significant impact on survival. According to Groenewegen and De Langen, (2012), in many successful start-ups, the CEO had previous experience in company management. Stuart and Abetti (1990) found a strong positive correlation between performance and the entrepreneurial and managerial experiences of the founders. In start-ups, managerial experience may significantly reduce the liability of newness (Cooper et al., 1991) and confer an advantage, as it is a resource difficult for competitors to imitate (Kor, 2003). People who have experience in carrying out managerial duties are expected to be better positioned to identify business opportunities and to secure access to capital, and to thereby be able to establish larger and better-equipped businesses (Colombo & Grilli, 2005). Such people are also expected to gain the skills and experience in leadership that are needed to develop and organize new businesses (Shane, 2000; Eckhardt and Shane, 2003).

Hypothesis 2. The presence within the entrepreneurial team of members with previous senior management experience is positively linked to start-up success.

#### *Previous Industry Experience within the Entrepreneurial Team*

Industry experience is an asset possessed by those who had previously worked in relevant industry to the one in which the start-up operates. This experience equips individuals with information about industry rules and norms, customer and supplier networks, and employment practices (Delmar & Shane, 2003) and has been found to help overcome liabilities of newness (Gimeno et al., 1997). Bosma et al. (2004) found that firm performance is improved by any previous experience accrued by founders in the same industries in which they are starting their

new businesses. Past empirical research indicates that any new ventures set up by entrepreneurs with no industry experience face an increased risk of failure or mortality rate (Bruderl et al., 1992; Cooper et al., 1991). Delmar and Shane (2003) also stated that many of the capabilities and much of the information needed to successfully exploit business opportunities can only be learned through industry employment. Individuals with work experience in a specific industry are expected to have accrued industry experience human capital, which may include market know-how and information, technological knowledge, and the ability to develop a professional and social network of contacts. Such experience and connections should improve the availability of technical knowledge and industry resources. People with industry experience are also expected to be better at using new knowledge and technological developments to target any unfulfilled customer needs (Shane, 2000).

Various surveys found that some stakeholders—most importantly, investors and venture capitalists—consider the industry experience previously accumulated by a start-up’s founders as one of the most important determinants of new venture success (Hall & Hofer, 1993). Eisenhardt and Schoonhoven (1990) found that functional diversity among top management positively impacts firm performance.

Hypothesis 3. Previous industry experience within the entrepreneurial team is positively linked to start-up success.

#### *Educational Levels Within the Entrepreneurial Team*

In human capital theory, skills and abilities are acquired through education (Becker, 1962). Education is related to knowledge, skills, problem-solving ability, discipline, motivation, and self-confidence (Cooper et al., 1991), with higher levels of education being expected to endow an entrepreneur with stronger problem-solving and decision-making abilities. Davidsson

and Honig (2003) found that highly educated individuals are more likely to identify opportunities for entrepreneurship, while Shane (2000) stated that, through their formal education, individuals develop the skills they need to learn about markets and technologies and to identify and exploit opportunities. Bates (1990), Brüderl et al. (1992), and Gimeno et al. (1997) found education to be positively correlated with success. Gimmon and Levie (2010) stated that higher education levels signal entrepreneurial team competency to stakeholders and improve a team's ability to raise money. University education provides the ability to process complex information (Heijke et al., 2003); however, the nature of the impact of education has not been much researched. Notably, Almus and Nerlinger (1999) showed that German start-ups established by individuals with technical degrees enjoyed higher growth rates.

Educational level is one of the most studied attributes of human capital and has been found to assist entrepreneurs in identifying and exploiting business opportunities (Cooper et al. 1991). The level of education achieved by an entrepreneur at school or through professional training can be considered to be a proxy of the amount of knowledge obtained by the entrepreneur through formal education prior to starting the venture (Rauch & Rijsdijk, 2013) and is expected to provide structure to the knowledge and capabilities an entrepreneur puts into play when performing the tasks ahead. However, high levels of education are not always found to be positively correlated with performance, Stuart and Abetti (1990) found a nonsignificant negative relationship between education and performance, largely due to the relatively poor performance of third degree education holders. Entrepreneurs may also take advantage of the social contacts they made while in education to further create and build resources.

Hypothesis 4. Higher education levels within the entrepreneurial team are positively linked to start-up success.

### *Entrepreneurial Team Size and New Venture Success*

The size of the entrepreneurial team is expected to contribute to the performance of a venture, with Haleblian and Finkelstein (1993) having previously show that the size of top management teams contributes to the performance of large companies. Size can contribute both through added experience and added diversity, thus increasing the human capital resources available to the company. A larger entrepreneurial team has a superior ability to collect and process information, thus providing a company with better information and with the ability to perform complicated tasks (Eisenhardt & Schoonhoven, 1990; Haleblian & Finkelstein, 1993). Kozlowski and Bell (2012) explained that the performance advantages brought by larger teams can also depend on their composition. As new ventures are frequently subject to higher levels of complexity and uncertainty, larger entrepreneurial teams are assumed to be better equipped to face and handle the intricacies involved with the strategic choices they need to make. (Bruton & Rubanik, 2002)

Hypothesis 5. The number of entrepreneurial team members is positively linked to start-up success.

## CHAPTER 3

### DATA AND METHODS

The data for this study were initially drawn from a comprehensive database of Israeli start-up companies obtained from Startup Nation Central (SNC), an independent non-profit organization that promotes Israeli innovation. SNC, which collects and researches data on the entire Israeli start-up population and the Israeli start-up ecosystem, is considered to be an established, comprehensive and reliable resource of information, and its publications are quoted by the Israeli central bureau of statistics (ICBS 2018) and others (Van Balen et al., 2019). SNC<sup>1</sup> provides information on start-up companies, founders, management teams, funding, venture activities and investors (Van Balen et al., 2019). The dataset, which included 1,274 high tech companies from seven sectors (see Table 5 companies by sector) that had started their operations between 2014 and 2016, was comprised of companies that had been able to raise funds. In order to avoid selection bias, all the companies founded between January 1<sup>st</sup>, 2014 and December 31<sup>st</sup>, 2016 were included. Companies from the following sectors, which have different dynamics due to their longer product or development life cycles and different funding needs, were excluded from this research: Agrotech, Cleantech, Pharmaceuticals, Medical Technologies, and Consumer Electronics. Once those had been removed, the sample encompassed 801 start-up companies. All the information available in the dataset, from the day the sample companies had been established to either the day they had closed down or the end of the observation period (December 31, 2019) was included.

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<sup>1</sup> ([www.startupnationcentral.org](http://www.startupnationcentral.org))

Data were collected on the 1,697 individuals identified as founders for all the companies in the dataset, with the number of founders per company between 1 and 6. No information was available on the identities of the founders of 30 companies; those companies were therefore excluded from the sample.

For each founder, a detailed search was performed in publicly available sources, and the personal characteristics and information thus retrieved were collected in a comprehensive database. Emphasis was placed on collecting characteristics such as the founders' previous experiences in founding start-ups, holding senior management positions, and operating in relevant industry, and their specific educational levels.

The sources used to gather information on the founders included LinkedIn.com, startupnationcentral.org, and Crunchbase.com. LinkedIn.com was defined as the primary source, and the data were thus initially collected from each individual's LinkedIn profile. In all those cases in which data were found to be missing from a LinkedIn profile, Crunchbase and other public sources were searched. Additional searches were conducted to look clarify any conflicting information and corroborate the findings. For robustness, further information on employment or entrepreneurship entries was sought for each founder, also looking at the periods that had followed the founding of the sample start-ups for any indicators or red flags of important changes. Each such instance was then investigated in order to understand the reasons behind it. In the few cases in which conflicting information was found on the amount of funds raised, startupnationcentral.org was used as the prevailing source. Random quality testing was performed on the collected data to validate both their accuracy and completeness; the tests included verification against the original source and against alternative ones.

## Variables

The main statistics and variables in the sample are summarized in Table 1. A sample of 771 companies with three dummy variables for previous experience (entrepreneurial, senior management, and industry), two dummy variables for higher education (third degree and second degree), and one variable for the number of founders.

Table 1					
<i>Variables</i>					
Variable	N	Mean	SD	Min	Max
Previous entrepreneurial experience	771	0.6	0.5	0	1
Previous senior management experience	771	0.7	0.5	0	1
Previous Industry experience	771	0.7	0.5	0	1
Highest education level: second level education	771	0.5	0.5	0	1
Highest education level: third level education	771	0.1	0.3	0	1
Number of Founders	771	2.2	0.9	1	6
Gender diversity	771	0.1	0.3	0	1
Total funding amount (M\$)	650	10.4	30.7	0.002	480
Survival	771	0.2	0.4	0	1

Researching the influence of the founding team characteristics on the survival of the start-up for a period of a minimum of three years. As the last date in the observation period is December 31, 2019, those start-ups that had been founded after December 31, 2016, were not included in the research, and therefore, the minimum time period was achieved. Over the observation period, 20% of the companies had not survived.

### *Dependent Variables*

Outcomes in early-stage start-ups cannot be measured by financial metrics, as these are irrelevant at that point (Maxwell et al., 2011).

### *Venture success or failure*

For the purpose of this research, a successful start-up was defined as a one that had: 1) gone through an IPO; 2) been sold for a sum larger than the one invested in it; or 3) remained active for the observation period and at a minimum of three years from its inception. A failed start-up was defined as one that had been: 1) closed down within the observation period or 2) sold for a sum smaller than the one invested in it. Those companies for which information on the exit price could not be found, therefore making it impossible to determine whether they had failed, were censored.

### *Funding amount*

All the capital raised from various sources and through different investment rounds was aggregated for each sample company. For 121 of them, the exact amount raised was not available, and the analysis was thus limited to 650 companies. Most companies (95%) had gone through three investment rounds. No discounting was applied due to the short time period and to the low interest rates prevalent during the observation period.

Companies that raise more funds are less likely to fail; the sample companies that had failed during the study period had raised, on average, 1.5 million US\$, whereas those that had survived had raised, on average, 12.7 million US\$.

### *Number of Employees*

The number of employees reported by SNC for each company was grouped by numerosity. On that basis, I developed a categorical dependent variable. Table 2 shows a breakdown of the categories of employees per company.

Table 2		
<i>Distribution of companies by number of employees</i>		
Number of employees	N	%
1-10	386	50
11-50	309	40
51+	75	10

The sample companies with 1 to 10 employees had recorded a failure rate of 39%; for the rest, the failure rate had been lower than 8%.

### *Independent variables*

Table 3 summarizes the main characteristics that were tested as independent variables in the models.

Table 3						
<i>Founder Characteristics</i>						
Variable	No	% No	Yes	% Yes	Total	SD
Previous entrepreneurial experience	338	44	433	56	771	0.497
Previous management experience	258	33	513	67	771	0.472
Previous industry experience	221	29	550	71	771	0.452
First education level	127	16	644	84	771	0.371
Second education level	344	45	427	55	771	0.497
Third education level	684	89	87	11	771	0.317

### *Previous Entrepreneurial Experience*

Previous entrepreneurial experience was defined as having previously been a founder of at least one company prior to the start-up company in the sample. For each entrepreneur, a search was conducted in publicly available sources mostly self-reported by him/her, like LinkedIn, CrunchBase, and company websites. Then, the results were aggregated for each company, assigning a value either a yes or no for the presence of entrepreneurial experience. Out of the 771

sample companies, 433 (56%) had at least one founder with previous entrepreneurial experience, while 338 (44%) had none.

The results of the Kaplan Meier (KM) analysis performed for entrepreneurial experience show that previous entrepreneurial experience increases survival probability. These results are presented as a univariate analysis, as can be seen in Figure 2.

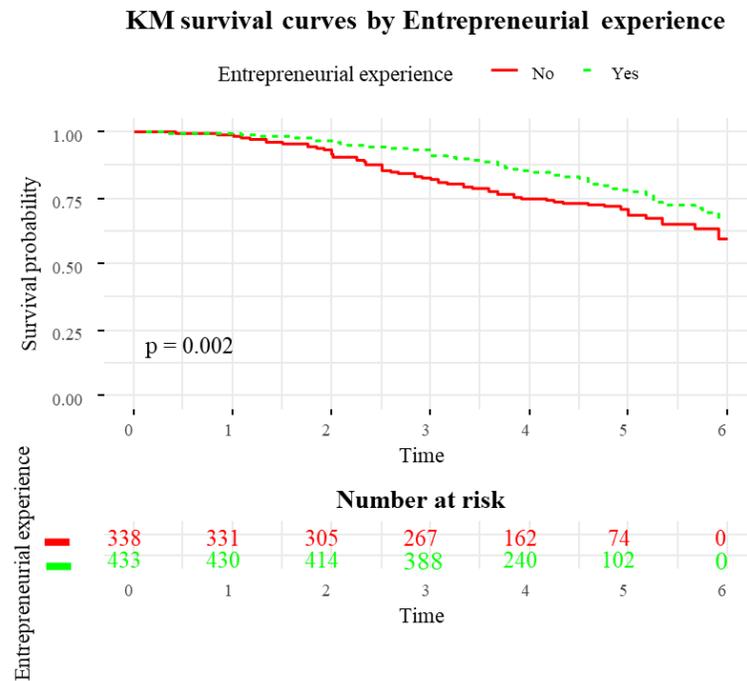


Figure 2. KM survival curves by Previous entrepreneurial experience.

### *Previous Senior Management Experience*

Previous senior management experience was defined as having previous experience in a senior management position in at least one company prior to the sample start-up. The senior management positions considered were C-level ones—CEO, COO, CFO, CTO, or VP R&D—which are usually key roles in technology companies. For each entrepreneur, searches were

performed on publicly available source mostly self-reported by the entrepreneurs themselves, like LinkedIn, CrunchBase, and company websites for information on previous senior management experience. Then, the results were aggregated for each company, and either a yes or no entry was assigned for the presence of previous senior management experience. Of the total sample of 771 companies, 513 (67%) had founders with previous senior management experience, while 258 (33%) had none.

The results of the Kaplan Meier (KM) analysis performed for previous senior management experience show that such experience increases start-up survival probability. These results are presented as a univariate analysis as can be seen in Figure 3,

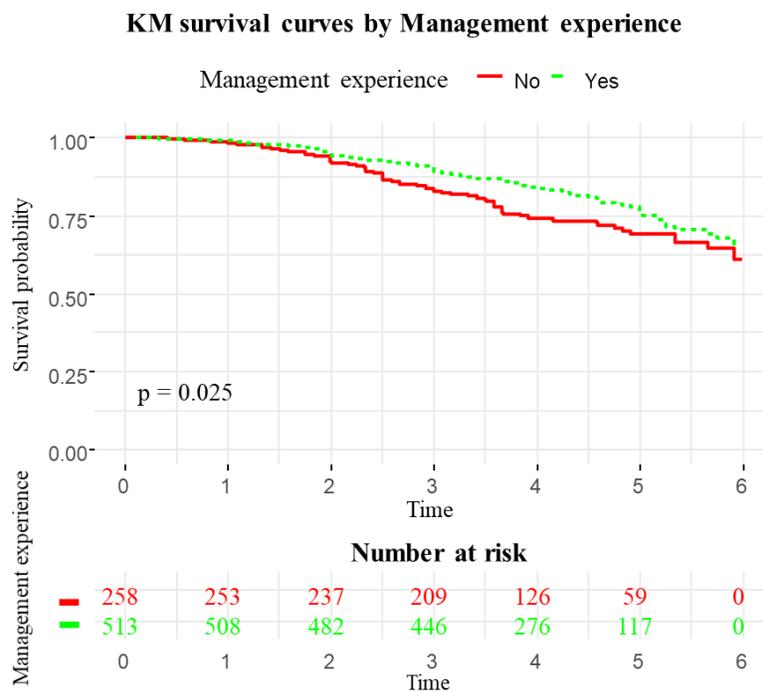


Figure 3. KM survival curves by Previous senior management experience

### Previous Industry Experience

Previous industry experience was defined as having work experience in a technological position in at least in one company prior to the sample start-up. For each entrepreneur, searches were conducted in publicly available sources mainly self-reported by the entrepreneurs themselves, like LinkedIn, CrunchBase, and company websites. Then, the results were aggregated for each company, and either a yes or no entry was assigned for the presence of previous industry experience. Out of the total sample of 771 companies, 551 (71%) had at least one founder with previous industry experience, while 221 (29%) had none.

The results of the Kaplan Meier (KM) analysis performed for previous industry experience show that such experience increases start-up survival probability. These results are presented as a univariate analysis, as can be seen in Figure 4.

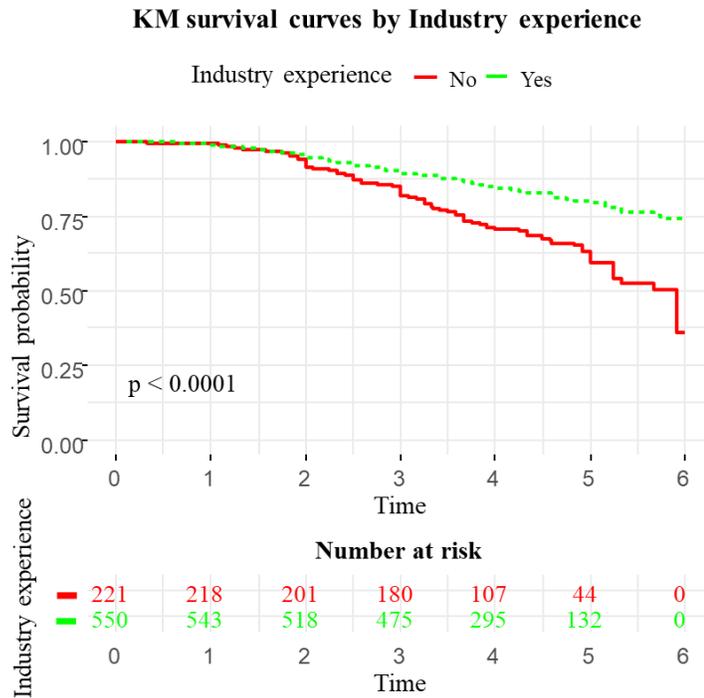


Figure 4. KM survival curves by Previous industry experience.

### Education Level

The highest education level attained by each founder was collected from publicly available sources self-reported by the entrepreneurs themselves. The searches were conducted in LinkedIn and, in some cases, in company websites or other sources. The data were then aggregated at the company level, and the highest level achieved by any member of each company’s entrepreneurial team was assigned to that company. Then, a yes or no (binary) entry was attributed to both second and third degree as the highest level of education, creating a dummy variable for each. I found that, for 36% of the sample start-ups, first level education was the highest to have been achieved by the members of the entrepreneurial team, for 52%, it was second education level, and, for 12%, it was third.

These results are presented as a univariate analysis as can be seen in Figure 5.

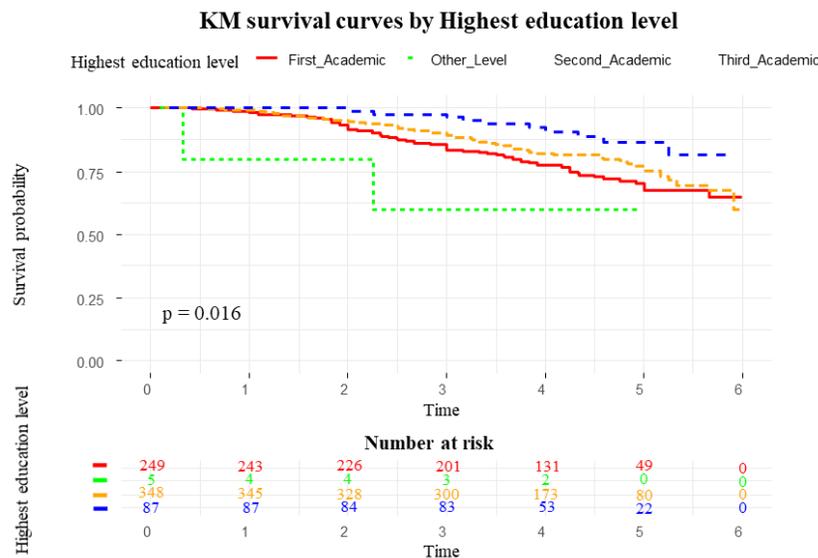


Figure 5. KM survival curves by highest education level

### *Number of Founders*

Number of founders is an independent variable that represents the number of individuals that were identified in the SNC database as the founders of each start-up company. Most of the companies (70%) had been founded by teams of two or three founders, 23% companies by one person, 6% by four, and only 1% (eight companies) by five or six.

The sample companies with small founder teams had a higher rate of failure; indeed, those founded by only one person had had a failure rate of 37%, against 21% for those with two-person teams, 16% for three-person teams, and 13% for four-people ones. The distribution of founder numerosity per company can be seen in Table 4.

Table 4		
<i>Number of Founders</i>		
Number of Founders	Frequency	% of Total
1	175	22.7
2	329	42.67
3	213	27.63
4	46	5.97
5	7	0.91
6	1	0.13
Total	771	100

These results presented in a Kaplan Meier analysis can be seen in Figure 6.

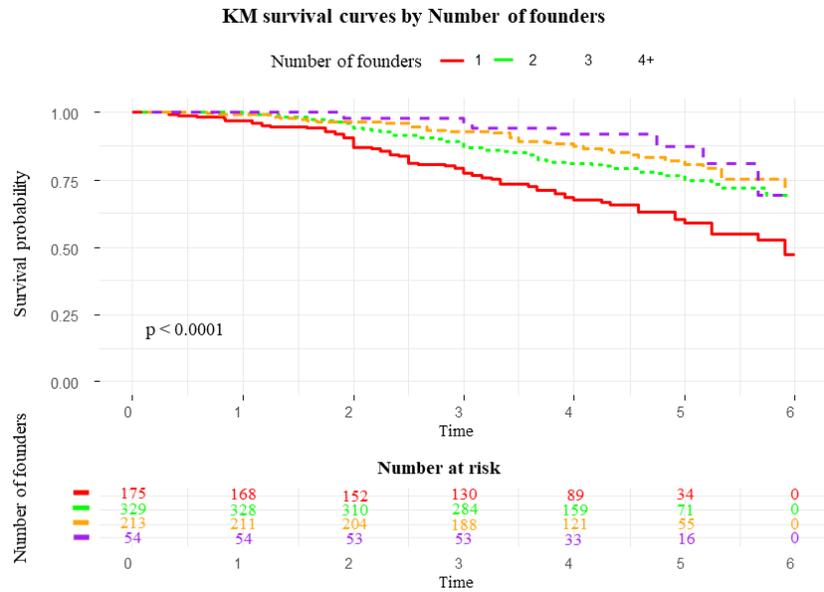


Figure 6. KM survival curves by number of founders.

### *Control Variables*

**Industry sector** data were collected for all the start-ups in the sample. In the models, the industry sector variable was controlled for in order to account for the influence of varying investment trends between sectors, and of any differences in sector-specific entrepreneurial team composition and needs. All models included sector fixed effects. Table 5 details the breakdown of the data by sector.

Table 5		
<i>Companies by Sector</i>		
Sector	Frequency	% of Total
Education and Knowledge Technologies	30	3.89
Enterprise Solutions	100	12.97
Fintech and eCommerce	152	19.71
Mobile and Telecom Technologies	55	7.13
Security and Safety Technologies	145	18.81
Social Media and Advertising	156	20.23
Software Applications	133	17.25
Total	771	100

### *Year of Establishment*

The models controlled for the years of incorporation in order to mitigate any potential effects of differences. The year fixed effect was included in all models.

### *Gender*

Gender diversity was controlled for, as a dummy variable, as it could affect entrepreneurial team composition and size. The data revealed that only 14% of the start-ups had gender-diverse entrepreneurial teams. For the majority of start-up companies, the entrepreneurial team was composed exclusively of males (84%) with 2% only females. Gender diversity was controlled as a dummy variable.

### Analysis

Start-up success or failure, as a binary outcome, was studied using several approaches. First, I used logistic regression to estimate the probability of failure in order to gain a more comprehensive picture of the association between certain entrepreneurial team characteristics and start-up success rates. In the next step, I studied the time to failure, or lack thereof, within the observation period, using a time to event or survival model. This model accounted not just for

the probability of the event, or the occurrence of the outcome, but also for its timing. Audretsch & Mahmood (1995), among others, used such model to analyze the survival of new ventures. I used the Kaplan-Meier a non-parametric approach, the Cox proportional hazard semi-parametric model, and Weibull, which is a parametric model. First, I examined the univariate distributions and, based on them, I dichotomized or categorized the variables. Next, I used bivariate models to describe the unadjusted (crude) relationship with the outcomes. I then built the multivariate models to understand the relationship of the predictors with the outcomes while controlling for all the relevant known factors. First, I examined the Kaplan Meier survival curves, and assessed whether there were any significant differences. Next, I used the Cox model, which enables to control for covariates, including dichotomous, categorical, and continuous. I described the effect of each covariate to identify the factors that were more strongly associated with the time to failure. The results are expressed as Hazard ratios, which represent the risks (increasing or decreasing) compared to those of reference categories. In further analysis, to corroborate the findings, I used the Weibull survival model—a parametric model that is more flexible than the Cox one and does not require the proportional hazard assumption. Hazard proportionality is the assumption, required for the Cox model, that risks are distributed evenly over time in the two groups that are being compared, without a parametric description of that function. To study the funding amount, I modeled the logarithm of that amount as an outcome—i.e., a continuous dependent variable. I used an Ordinary Least Squares (OLS) model, clustered by industry sector, which accounted for the different industry sectors in the standard error. To provide further robustness, I studied number of employees, as a dependent variable, using an Ordinal Linear Regression (OLR) model, with employee numerosity categorized into three groups.

## CHAPTER 4

### RESULTS

Table 6 includes all the results of the empirical analyses conducted in regard to previous entrepreneurial experience within an entrepreneurial team and to how it is associated with the success or failure of a start-up company. The table includes four different models: OLS, Logistic, Cox hazards, and Weibull.

As can be seen in Table 6, columns 1 to 8, the coefficient for previous entrepreneurial experience is significant and negative. The Weibull coefficient is positive, but it represents a similar reduction to the one in the Cox hazards model, as can be observed by the similarity in hazard ratios. Additionally, founder numerosity is significant at the 1% level, which indicates that any increase in the number of founders reduces the risk of failure. Both the OLS regressions (columns 1 and 2) have negative and significant coefficients. The coefficient in column 1 is equal to -0.069, indicating that entrepreneurial experience reduces the risk of failure by 6.9%. For founder numerosity, the coefficient in column 1 is -0.067, indicating that each additional founder reduces the risk of failure by 6.7%. The interaction effect, presented in column 2 for number of founders and previous entrepreneurial experience, is insignificant, meaning that the existence of previous entrepreneurial experience has an impact regardless of the number of founders in the entrepreneurial team. The logistic regression model, presented in columns 3 and 4, also shows significant results, with entrepreneurial experience reducing the probability of failure by 33%, while each additional team member reduces the risk of failure by 22%. This reemphasizes the fact that the risk of failure is reduced by the existence of entrepreneurial experience and by increases in the number of founders.

Table 6

*Failure explained by entrepreneurial experience*

Variable									Hazard Ratio			
	OLS		Logit		Weibull		Cox		Weibull		Cox	
	1	2	3	4	5	6	7	8	9	10	11	12
Entrepreneurial experience	-0.069**	-0.192*	-0.403**	-0.908*	0.193**	0.425**	-0.374**	-0.816**	0.684	0.434	0.688	0.442
	(0.034)	(0.099)	(0.184)	(0.477)	(0.080)	(0.201)	(0.155)	(0.392)	-	-	-	-
N_Founders	-0.067***	-0.102***	-0.432***	-0.574***	0.200***	0.264***	-0.391***	-0.513***	0.675	0.595	0.676	0.599
	(0.026)	(0.020)	(0.115)	(0.172)	(0.052)	(0.075)	(0.099)	(0.143)	-	-	-	-
Gender diversity	0.052	0.053	0.353	0.354	-0.148	-0.152	0.276	0.285	1.338	1.350	1.318	1.329
	(0.041)	(0.040)	(0.270)	(0.270)	(0.118)	(0.118)	(0.231)	(0.232)	-	-	-	-
Entrepreneurial experience X N_Founders	-	0.058	-	0.254	-	-0.121	-	0.230	-	1.268	-	1.258
	-	(0.036)	-	(0.221)	-	(0.095)	-	(0.187)	-	-	-	-
Constant	0.509***	0.575***	0.404	0.649	1.657***	1.548***	-	-	-	-	-	-
	(0.068)	(0.042)	(0.477)	(0.525)	(0.197)	(0.214)	-	-	-	-	-	-
Industry sector fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year started fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	771	771	771	771	771	771	771	771	-	-	-	-
R2	0.082	0.086	-	-	-	-	0.073	0.075	-	-	-	-
Adjusted R2	0.069	0.071	-	-	-	-	-	-	-	-	-	-
Residual Std. Error	0.405	0.405	-	-	-	-	-	-	-	-	-	-
Model significance	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-
Log Likelihood	-	-	-381.770	-381.107	-620.887	-620.079	-1,065.376	-1,064.620	-	-	-	-
Akaike Inf. Crit.	-	-	787.540	788.213	-	-	-	-	-	-	-	-
Pseudo R square	-	-	0.078	0.079	-	-	-	-	-	-	-	-

\* p &lt; 0.10. \*\* p &lt; 0.05. \*\*\* p &lt; 0.01.; Standard error in parentheses

Columns 5 to 8 show two separate time-to-event models (the Weibull model in columns 5 and 6 and the Cox hazard one in columns 7 and 8) that both produce similar results to the OLS and logistic regressions. In columns 9 to 12, the Hazard coefficients from columns 4 to 8 are translated into ratios, all of which are below 1 for both models and show a decrease of 31% in the probability of failure for start-ups founded by teams that included at least one founder with previous entrepreneurial experience. Overall, the results in Table 6 strongly support hypotheses 1 and 5.

Table 7 presents the results of the empirical analyses performed in regard to previous senior management experience within the entrepreneurial team and to how it is associated with the success or failure of a start-up. The table includes four models: OLS, Logistic, Cox hazards, and Weibull.

As can be seen in columns 1 to 8 of Table 7, the coefficient of previous senior management experience is partially significant. The Weibull coefficient is positive, but it represents a similar reduction to the one in the Cox hazards model, as can be observed by the similarity in hazard ratios. Founder numerosity can also be seen to be significant at the 1% level; thus, an increase in the number of founders reduces the risk of failure. Both OLS regressions (columns 1 and 2) have negative and significant coefficients. In column 1, the coefficient for previous senior management experience is -0.041, indicating that such experience reduces the risk of failure by 4.1%. Also in column 1, the coefficient for number of founders is -0.069, meaning that each additional founder reduces the risk of failure by 6.9%. The interaction effect, presented in column 2 for number of founders and previous senior management experience, is insignificant, meaning that the existence of

such experience in the entrepreneurial team has an impact regardless of the number of founders.

The logistic regression model presented in columns 3 and 4 shows no significant results for senior management; however, there is a strong significance for number of founders, meaning that the risk of failure is reduced by 22% by each increase in the number of founders.

Table 7												
<i>Failure explained by senior management experience.</i>												
Variable	OLS		Logit		Weibull		Cox		Hazard Ratio			
									Weibull		Cox	
Senior Management experience	-0.041*	-0.016	-0.230	0.129	0.091	-0.045	-0.169	0.105	0.837	1.091	0.844	1.111
	(0.023)	(0.074)	(0.190)	(0.478)	(0.081)	(0.200)	(0.159)	(0.392)	-	-	-	-
N_Founders	-0.069***	-0.061***	-0.447***	-0.327*	0.207***	0.161**	-0.405***	-0.313**	0.667	0.729	0.667	0.731
	(0.024)	(0.015)	(0.116)	(0.184)	(0.053)	(0.080)	(0.100)	(0.154)	-	-	-	-
Gender diversity	0.053	0.054	0.359	0.363	-0.146	-0.146	0.272	0.272	1.331	1.331	1.313	1.312
	(0.042)	(0.042)	(0.269)	(0.270)	(0.118)	(0.118)	(0.231)	(0.230)	-	-	-	-
Senior Management experienceX N_Founders	-	-0.012	-	-0.189	-	0.074	-	-0.149	-	0.866	-	0.861
	-	(0.034)	-	(0.230)	-	(0.099)	-	(0.194)	-	-	-	-
Constant	0.510***	0.495***	0.416	0.216	1.653***	1.730***	-	-	-	-	-	-
	(0.074)	(0.041)	(0.478)	(0.536)	(0.199)	(0.224)	-	-	-	-	-	-
Industry sector fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year started fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	771	771	771	771	771	771	771	771	-	-	-	-
R2	0.078	0.078	-	-	-	-	0.068	0.068	-	-	-	-
Adjusted R2	0.065	0.064	-	-	-	-	-	-	-	-	-	-
Residual Std. Error	0.406	0.406	-	-	-	-	-	-	-	-	-	-
Model significance	0.234	0.008	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-
Log Likelihood	-	-	-383.448	-383.112	-623.284	-623.010	-1,067.750	-1,067.456	-	-	-	-
Akaike Inf. Crit.	-	-	790.896	792.225	-	-	-	-	-	-	-	-
Pseudo R square	-	-	0.074	0.074	-	-	-	-	-	-	-	-

\* p < 0.10. \*\* p < 0.05. \*\*\* p < 0.01.; Standard error in parentheses

Columns 5 to 8 show two separate time-to-event models (the Weibull model in columns 5 to 6 and the Cox hazard one in columns 7 to 8), leading to similar results as in the Logistic regressions. In columns 9 to 12, the Hazard coefficients from columns 5 to 8 are translated into ratios, all of which show no significance. The results in Table 7 strongly support hypothesis 5 and partially support hypothesis 2.

Table 8 presents the results of the empirical analyses conducted in regard to previous industry experience within the entrepreneurial team and to how it is associated with the success or failure of a start-up. This includes four models: OLS, Logistic, Cox hazards, and Weibull.

As can be seen in columns 1 to 8 of Table 8, the coefficient for previous industry experience is significant and negative. The Weibull coefficient is positive, but it represents a similar reduction to the one in the Cox hazards model, as can be observed by the similarity in hazard ratios. Also, founder numerosity is significant at the 1% level, indicating that an increase in the number of founders reduces the risk of failure. Both OLS regressions (columns 1 and 2) have negative and significant coefficients. In column 1, the coefficient for previous industry experience is -0.11, indicating that such experience reduces the risk of failure by 11%. In column 1, the coefficient for number of founders is -0.05, indicating that each additional founder reduces the risk of failure by 5%. The interaction effect, presented in column 2, is insignificant, indicating that the existence of previous industry experience in the entrepreneurial team has an impact regardless of the number of founders. The Logistic regression model presented in columns 3 and 4 shows significant results, as shown in the OLS regressions, reemphasizing that the risk of failure is reduced by the existence of industry experience and by any increase in the number of founders.

Variable									Hazard Ratio			
	OLS		Logit		Weibull		Cox		Weibull		Cox	
Industry experience	-0.110*** (0.025)	-0.169* (0.097)	-0.552*** (0.210)	-0.685 (0.505)	0.208** (0.089)	0.246 (0.212)	-0.412** (0.174)	-0.483 (0.416)	0.665 -	0.617 -	0.662 -	0.617 -
N_Founders	-0.050** (0.022)	-0.077** (0.036)	-0.337*** (0.124)	-0.392* (0.227)	0.164*** (0.056)	0.179* (0.094)	-0.320*** (0.107)	-0.348* (0.184)	0.724 -	0.703 -	0.726 -	0.706 -
Gender diversity	0.043 (0.045)	0.047 (0.042)	0.308 (0.271)	0.316 (0.272)	-0.128 (0.118)	-0.130 (0.119)	0.235 (0.232)	0.240 (0.233)	1.285 -	1.291 -	1.265 -	1.271 -
Industry experience X N_Founders	- -	0.033 (0.052)	- -	0.076 (0.263)	- -	-0.022 (0.111)	- -	0.041 (0.218)	- -	1.044 -	- -	1.042 -
Constant	0.509*** (0.072)	0.553*** (0.079)	0.359 (0.476)	0.445 (0.562)	1.679*** (0.197)	1.657*** (0.227)	- -	- -	- -	- -	- -	- -
Industry sector fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year started fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	771	771	771	771	771	771	771	771	-	-	-	-
R2	0.087	0.088	-	-	-	-	0.073	0.073	-	-	-	-
Adjusted R2	0.074	0.073	-	-	-	-	-	-	-	-	-	-
Residual Std. Error	0.404	0.404	-	-	-	-	-	-	-	-	-	-
Model significance	0.050	0.010	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-
Log Likelihood	-	-	-380.747	-380.704	-621.160	-621.141	-1,065.522	-1,065.504	-	-	-	-
Akaike Inf. Crit.	-	-	785.493	787.409	-	-	-	-	-	-	-	-
Pseudo R square	-	-	0.080	0.080	-	-	-	-	-	-	-	-

\* p < 0.10. \*\* p < 0.05. \*\*\* p < 0.01.; Standard error in parentheses

Columns 5 to 8 show two separate time-to-event models (the Weibull model in columns 5 and 6 and the Cox hazard one in columns 7 and 8), leading to the same results as the OLS and Logistic regressions. In columns 9 to 12, the Hazard coefficients from columns 5 to 8 are translated into ratios, all of which are below 1 for industry experience and number of founders. Both the Cox and Weibull models show a decrease in the probability of failure (34% and 33% respectively) for start-ups founded by teams that include at least one founder with previous industry experience. Overall, the results presented in Table 8 strongly support hypotheses 3 and 5.

Table 9 presents the results of the empirical analyses conducted in regard to the highest education level found within the entrepreneurial team and to how it is associated with the success or failure of a start-up. The table includes four models: OLS, Logistic, Cox hazards, and Weibull. Columns 1 to 8 in Table 9 show that the coefficient of highest education level is insignificant for second level education, and significant and negative for third level education. The Weibull coefficient is positive, but it represents a similar reduction to the one in the Cox hazards model, as can be observed by the similarity in hazard ratios. The number of founders also can be seen to be significant at a 1% level; thus, an increase in the number of founders reduces the risk of failure. Both OLS regressions (columns 1 and 2) have negative and significant coefficients for third level education and no significance for second level. In column 1, the coefficient for third level education is -0.085, indicating that third level education reduces the risk of failure by 8.5%. In column 1, the coefficient for founder numerosity is -0.068, indicating that each additional founder reduces the risk of failure by 6.8%. The interaction effect presented in column 2 is significant, indicating that third level education as the highest education level has a stronger impact as the number of founders in the entrepreneurial team decreases.

<b>Table 9</b>												
<i>Failure explained by highest education level.</i>												
Variable									Hazard Ratio			
	OLS		Logit		Weibull		Cox		Weibull		Cox	
Second level education	-0.013	-0.048	-0.074	-0.113	0.044	0.072	-0.084	-0.134	0.917	0.869	0.919	0.874
	(0.025)	(0.126)	(0.190)	(0.504)	(0.082)	(0.210)	(0.160)	(0.412)	-	-	-	-
Third level education	-0.085*	0.346***	-0.678*	-2.302**	0.321*	1.061*	-0.619*	-2.059*	0.533	0.125	0.539	0.128
	(0.044)	(0.114)	(0.376)	(1.171)	(0.176)	(0.561)	(0.342)	(1.093)	-	-	-	-
N_ Founders	-0.068***	-0.086**	0.434***	0.494***	0.200***	0.226***	-0.391***	-0.442***	0.676	0.642	0.676	0.643
	(0.024)	(0.036)	(0.116)	(0.159)	(0.053)	(0.071)	(0.100)	(0.135)	-	-	-	-
Gender diversity	0.054	0.048	0.360	0.353	-0.150	-0.152	0.280	0.283	1.343	1.348	1.323	1.327
	(0.044)	(0.044)	(0.269)	(0.270)	(0.118)	(0.119)	(0.231)	(0.233)	-	-	-	-
E level: 2nd_Level X N_ Founders	-	0.018	-	0.027	-	-0.017	-	0.032	-	1.034	-	1.032
	-	(0.050)	-	(0.236)	-	(0.102)	-	(0.200)	-	-	-	-
E level: 3rd_Level X N_ Founders	-	0.101**	-	0.635	-	-0.292	-	0.568	-	1.774	-	1.765
	-	(0.049)	-	(0.417)	-	(0.198)	-	(0.386)	-	-	-	-
Constant	0.502***	0.546***	0.382	0.513	1.645***	1.592***	-	-	-	-	-	-
	(0.079)	(0.112)	(0.481)	(0.531)	(0.202)	(0.222)	-	-	-	-	-	-
Industry sector fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year started fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	771	771	771	771	771	771	771	771	-	-	-	-
R2	0.079	0.083	-	-	-	-	0.071	0.073	-	-	-	-
Adjusted R2	0.065	0.066	-	-	-	-	-	-	-	-	-	-
Residual Std. Error	0.406	0.406	-	-	-	-	-	-	-	-	-	-
Model significance	0.028	0.133	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-
Log Likelihood	-	-	382.363	381.203	-621.932	-620.847	1,066.416	-1,05.348	-	-	-	-
Akaike Inf. Crit.	-	-	790.726	792.406	-	-	-	-	-	-	-	-
Pseudo R square	-	-	0.076	0.079	-	-	-	-	-	-	-	-

\*  $p < 0.10$ . \*\*  $p < 0.05$ . \*\*\*  $p < 0.01$ ; Standard error in parentheses

The Logistic regression model presented in column 3 and 4 shows the same significant results for third level education as shown in the OLS regressions, demonstrating a 49% reduction in the risk of failure by the existence of third level education as highest education level in the entrepreneurial team and by an increased number of founders. No significant results are shown for second level education.

Columns 5 to 8 show two separate time to event models (the Weibull model in columns 5 and 6 and the Cox hazard one in columns 7 and 8). In columns 9 to 12, the Hazard coefficients from columns 5 to 8 are translated into ratios, all of which are below 1 for third level education as the highest education level and number of founders, indicating a reduction in the risk of failure of 46% in the Cox model and 47% in the Weibull one. These results support hypothesis 4 for third level education as the highest education level and strongly support hypothesis 5.

I include another indicator for early-stage success and in order to provide robustness to the binary variables in Table 10. This table shows success as a continuous variable measured by the amount of funds invested in a start-up company.

Examining the relationship between funding amount in USD millions, as a dependent variable, and a number of independent variables, an OLS regression was used while controlling for industry sector, gender diversity, and year the company had been established. The independent variables that were tested are: previous entrepreneurial experience within the entrepreneurial team (dummy variable, presented in columns 1 and 2), previous senior management experience within the entrepreneurial team (dummy variable, presented in columns 3 and 4), previous industry experience within the entrepreneurial team (dummy variable, presented in columns 5 and 6), second level

education as the highest educational level within the entrepreneurial team, third level education as the highest educational level within the entrepreneurial team (dummy variables, both presented in columns 7 and 8), and the number of founders (continuous variable, presented in columns 1 to 8).

Table 10								
<i>Founding amount (OLS)</i>								
Variable	1	2	3	4	5	6	7	8
Entrepreneurial experience	0.349*	0.900**	-	-	-	-	-	-
	(0.192)	(0.384)	-	-	-	-	-	-
Senior Management experience	-	-	0.246**	0.402	-	-	-	-
	-	-	(0.117)	(0.354)	-	-	-	-
Industry experience	-	-	-	-	0.277*	0.060	-	-
	-	-	-	-	(0.143)	(0.342)	-	-
Highest education level								
2nd_ level education	-	-	-	-	-	-	0.087	-0.415
	-	-	-	-	-	-	(0.194)	(0.649)
3rd_ level education	-	-	-	-	-	-	0.517**	0.565
	-	-	-	-	-	-	(0.201)	(0.532)
N_Founders	0.516***	0.674***	0.521***	0.574***	0.493***	0.397***	0.515***	0.422***
	(0.048)	(0.111)	(0.042)	(0.113)	(0.051)	(0.119)	(0.050)	(0.101)
Gender diversity	-0.386*	-0.387*	-0.395*	-0.395*	-0.360	-0.349	-0.396*	-0.410
	(0.208)	(0.205)	(0.235)	(0.233)	(0.221)	(0.217)	(0.238)	(0.256)
Ent. experience X N_Founders	-	-0.254**	-	-	-	-	-	-
	-	(0.118)	-	-	-	-	-	-
Management experience X N_Founders	-	-	-	-0.076	-	-	-	-
	-	-	-	(0.126)	-	-	-	-
Industry experience X N_Founders	-	-	-	-	-	0.121	-	-
	-	-	-	-	-	(0.155)	-	-

Table 10.								
<i>(continued)</i>								
Variable	1	2	3	4	5	6	7	8
E level: 2nd_Level X N_Founders	-	-	-	-	-	-	-	0.227
	-	-	-	-	-	-	-	(0.237)
E level: 3rd_Level X N_Founders	-	-	-	-	-	-	-	0.009
	-	-	-	-	-	-	-	(0.240)
Constant	-1.495***	-1.803***	-1.525***	-1.623***	-1.471***	-1.305***	-1.485***	-1.275***
	(0.114)	(0.252)	(0.127)	(0.263)	(0.102)	(0.227)	(0.137)	(0.296)
Industry sector fixed effect	Yes							
Year started fixed effect	Yes							
Observations	650	650	650	650	650	650	650	650
R2	0.198	0.201	0.194	0.194	0.194	0.194	0.196	0.199
Adjusted R2	0.184	0.186	0.180	0.179	0.180	0.179	0.181	0.181
Residual Std. Error	1.789	1.787	1.794	1.795	1.794	1.795	1.792	1.792
Model significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
* p < 0.10. ** p < 0.05. *** p < 0.01 ; Standard error in parentheses								

The results, as presented in Table 10, show significance for previous entrepreneurial experience; having such experience in the entrepreneurial team increases the expected amount of invested funds, on average, by USD 1,410,000. The interaction of previous entrepreneurial experience and number of founders is significant, meaning that the relative importance of such experience decreases with any increase in the number of founders. Table 10 also shows significance for previous industry experience; having this experience in the entrepreneurial team increases the expected amount of invested funds on average by USD 1,310,000. For companies with third level education as the highest educational degree within the entrepreneurial team (coefficient = 0.517), the amount of invested funds is expected to be, on average, USD 1,670,000 greater than for those having first level education as highest level. An examination of the number of founders (with a coefficient of 0.516) shows that, for each unitary (founder) increase in number of founders, there is, on average, an increase of USD 1,520,000 in the amount of invested funds.

Based on the results above, it can be concluded that Hypothesis 1 (the positive link of previous entrepreneurial experience with start-up success) is strongly supported by the findings. Hypothesis 2 (the positive link between previous managerial experience and success) and Hypothesis 3 (the positive link between previous industry experience and success) are partially supported by the findings in Table 10. For Hypothesis 4 (the positive link between third level education and the amount of funds raised) is supported by the findings with the presence of such level of education being expected to increase, on average, the amount raised by US\$1,670,000. However, no significant link was found between second level education, as the highest education level, and success. It can also be concluded that the findings presented in Table 10 show a strong support for Hypothesis 5 (the positive link between number of founders and success).

To provide further robustness to the results presented above, Table 11 presents success as a variable measured by the number of employees in each start-up company.

Variable	Model 1		Model 2		Model 3		Model 4	
Entrepreneurial experience	0.571***	1.600***	-	-	-	-	-	-
	(0.153)	(0.422)	-	-	-	-	-	-
Senior Management experience	-	-	0.417**	0.633	-	-	-	-
	-	-	(0.163)	(0.427)	-	-	-	-
Industry experience	-	-	-	-	0.079	-0.692	-	-
	-	-	-	-	(0.189)	(0.445)	-	-
Highest education level								
2nd_Education	-	-	-	-	-	-	0.076	-0.628
	-	-	-	-	-	-	(0.160)	(0.433)
3rd_Education	-	-	-	-	-	-	0.442*	-0.024
	-	-	-	-	-	-	(0.247)	(0.747)
N_Founders	0.601***	0.901***	0.610***	0.682***	0.636***	0.296	0.622***	0.464***
	(0.088)	(0.146)	(0.088)	(0.159)	(0.095)	(0.202)	(0.088)	(0.126)
Gender diversity	-0.425*	-0.422*	-0.431*	-0.429*	-0.403*	-0.360	-0.418*	-0.448**
	(0.223)	(0.223)	(0.223)	(0.222)	(0.223)	(0.224)	(0.223)	(0.225)
Entr. experience X N_Founders	-	-0.464***	-	-	-	-	-	-
	-	(0.176)	-	-	-	-	-	-
Management experience X N_Founders	-	-	-	-0.102	-	-	-	-
	-	-	-	(0.186)	-	-	-	-
Industry experience X N_Founders	-	-	-	-	-	0.428*	-	-
	-	-	-	-	-	(0.225)	-	-
Ed. level:2nd_Level X N_Founders	-	-	-	-	-	-	-	0.321*
	-	-	-	-	-	-	-	(0.183)

Table 11								
<i>(continued)</i>								
Variable	Model 1		Model 2		Model 3		Model 4	
Ed. level:Third_Level X	-	-	-	-	-	-	-	0.212
N_Founders	-	-	-	-	-	-	-	(0.274)
Industry sector fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year started fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	770	770	770	770	770	770	770	770
Model significance	0.6331	0.4381	0.153	0.3745	0.3033	0.7867	0.4082	0.7999
AIC	1315.78	1310.758	1323.231	1324.929	1329.695	1328.058	1328.648	1329.497
Pseudo R2	0.108	0.113	0.103	0.103	0.098	0.101	0.10	0.103
* p < 0.10. ** p < 0.05. *** p < 0.01.; Standard error in parentheses								

Examining the relationship between number of employees in the start-up—as a dependent variable—and several independent variables, an ordinal linear regression was performed while controlling for industry sector, gender diversity, and the year the company was founded. The independent variables that were tested were previous entrepreneurial experience, a dummy variable, presented in columns 1 and 2, previous senior management experience, a dummy variable, presented in columns 3 and 4, previous industry experience, a dummy variable, presented in columns 5 and 6, second and third level education as the highest educational levels, both dummy variables and both presented in columns 7 and 8, and the number of founders, continuous variable presented in columns 1 to 8.

The results presented in Table 11 show strong significance for previous entrepreneurial experience (coefficient = 0.571), which was found to have a 77% probability of increasing the number of employees in a start-up. The interaction of entrepreneurial experience and number of employees was found to be significant, meaning that the relative importance of entrepreneurial experience decreases with any increase in the number of founders.

Based on the results presented above, it can be concluded that Hypothesis 1 (the positive link between previous entrepreneurial experience and start-up success) is strongly supported by the findings. Hypothesis 2 (the link between previous managerial experience and success) and hypothesis 3 (the link between previous industry experience and success) are partially supported by the findings in Table 11. For hypothesis 4, no significant support was found for the link between highest education level and success. It can also be concluded that the findings in Table 11 strongly support hypothesis 5 (the positive link between number of founders and success).

## CHAPTER 5

### MULTIPLE CASE STUDY

The aim of this study was to explore early-stage new technology ventures and the factors that contribute to their success, focusing on the impact of the characteristics of the founders or of the entrepreneurial team. I performed an empirical analysis of the Israeli start-up ecosystem using several statistical models to test several hypotheses on the links between the entrepreneurs and company early-stage success, a complex area in what Klotz et al. (2014) called the black box between team inputs and firm performance.

New ventures or start-ups have a tremendous influence on the economy and culture of countries all over the world, and a small number of companies that are fast growing and achieving great business and financial success can be observed to stand out. Those companies not only generate financial added value for their founders, investors, and other stakeholders, but also create jobs and motivate others to emulate their success. It is therefore important to understand the factors that contribute to such outstanding success stories.

When discussing start-up companies that achieve outstanding success, the concept of ‘high-growth firms’ or ‘gazelles’ comes to mind. This subject generates a lot of interest because of the important role those companies play in the generation of jobs (Acs et al., 2008; Birch, 1981; Brüderl and Preisendorfer, 2000; Delmar et al., 2003). Birch (1981) found them to be the engine for job creation in the USA, being responsible for a disproportionate proportion of new jobs. Just the fastest growing 1% of these companies generates roughly 40% of new jobs, and the fastest growing 4% accounts for 70% of all new jobs created. Birch and Medoff (1994) found that a specific subset of fast-growing small firms, companies that can achieve high growth rates in a very short time, are the force behind job creation. Other than ‘gazelles’, terms used for the

same entities are 'high-impact firms' or 'high-growth firms'. Delmar et al. (2003) found that only a small percentage of firms are high-growth, and Acs et al., (2008) added that gazelles are overrepresented in young and growing industries. Birch (1981) also stated that fast growing entrepreneurial firms are critical for economic growth and job creation across the globe.

Much research has been conducted in the field of firm growth and its links to management. Penrose (1959) wrote that the growth of enterprises can be explained by their managers and managerial resources, which, paradoxically, can also be the main constraints on growth.

Delmar et al. (2003) emphasized the specific management challenges that are faced only by high growth firms, which were also found to be more likely to be founded and run by entrepreneurial teams with high levels of human capital (Cooper, Gimeno-Gascon, & Woo, 1994; McGee, Dowling, & Megginson, 1995). Colombo & Grilli (2005) stated that the human capital and access to equity funding of entrepreneurs are the two crucial factors for rapid growth in new technology-based sectors.

The study of high growth companies can be challenging, as they are difficult to sample and follow (Daunfeldt et al., 2014). Applying this concept to the entrepreneurship and start-ups area and conducting research is even more complex.

In order to examine this phenomenon, I conducted a multiple case study aimed at adding insights to the empirical analysis of the dataset. Qualitative methods are receiving great acceptance in the small business and entrepreneurship research community (Perren & Ram, 2004) and the use of more than one method is considered appropriate when a researcher decides that a certain study requires one method to clarify another (Wisdom et al., 2012). The use of a qualitative case study could be complementary, shedding light on how and why questions (Yin,

2003) and the application of the case study method to analyze and explain entrepreneurial issues has become increasingly employed and accepted in the literature (Perren and Ram, 2004)

One of the reasons for the recognition of case studies as a research method is that researchers were becoming increasingly concerned about the limitations of quantitative methods in providing holistic and in-depth explanations of the social and behavioral problems being examined. A case study can assist in explaining the complexities of real life situations, which may not be captured through experimental or survey research (Zainal 2007) as quantitative researchers conduct narrow investigations (Vohra, 2014). By applying a case study method, a researcher is able to go beyond the quantitative statistical results and understand the behavioral conditions through the actors' perspectives. "A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2017, p. 18). Yin (2003) defined how a descriptive case study is used to describe a particular phenomenon within its context and can be used to expand on a particular theme. Stake (1995) wrote that, in an instrumental case study, the researcher selects a small group of subjects in order to examine a certain pattern.

A multiple case study can help in providing evidence that is more compelling and robust (Yin, 2012), and can also enhance and support previous results, helping to increase the level of confidence in the robustness of the method (Zainal 2007). The multiple case-study method has been adopted to study entrepreneurs and their influence by many researchers, including Eisenhardt (1989), MacMillan et al. (1987), and Spiegel et al. (2006).

A multiple case approach is suitable here because the purpose of this study is to give new or alternative insights, not to test or verify any theory (Yin, 2017) and because it enables the

adaptation of real-life events that present a number of sources of evidence through replication, rather than sampling logic (Zainal, 2007).

The cases used in this study all originated from the sample that had been selected for the empirical research based on the Startup Nation Central (SNC) database of Israeli start-up companies. I selected six cases in which the subject of interest—the entrepreneurial team and the success of high growth start-ups—was “transparently observable” (Eisenhardt, 1989, p. 537).

The number of cases selected for a study or the size of the sample needs to be large enough to enable generalization, with Patton, (1990, pp. 244-245) stating that “Sample size depends on what you want to know, the purpose of the inquiry, what will be useful, what will have credibility, and what can be done with available time and resources.” Brown & Eisenhardt (1997) stated that the number of cases is usually between four and ten, which enables the researcher to balance the need to generate theory with the amount of data it requires. The selection criterion for a multi case study needs to yield a sample that is suitable to examine the relations among theoretical constructs (Eisenhardt, 1989).

For this research, I purposively selected a sample of cases based on theoretical categories (Eisenhardt and Graebner, 2007); i.e., a group that represents a non-probability sample. This selection technique, which involves the cases being selected deliberately by the researcher (Symon & Cassell, 2012), can be used to achieve new insights into a phenomenon (Neuman, 2014).

For this study, I selected companies that had achieved outstanding success during the observation period. The identification and selection of this sample of top performing companies was based on a set of defined success criteria or parameters that considered the amount of

funding raised by each company and, where applicable, the exit amount. This measurement of success is in line with the definitions of success used in the empirical study and in the literature. By purposely choosing only companies that had achieved outstanding success, I created a defined heterogenic sample, performing what Neuman (2014) called deviant or extreme case sampling. The goal of extreme case sampling is to locate a set of unusual cases, one that cannot be viewed as representing the whole population. In this instance, a researcher look for cases that diverge from the main patterns or that differ from the prevalent characteristics of other cases (Neuman, 2014), with deviant sampling aimed at exploring different or contrasting cases and at finding any patterns among such cases (Symon & Cassell, 2012), because “extreme cases often reveal more information” (Flyvbjerg, 2006, p.13). Patton (1990) claimed that a pattern found in an extreme sample could be of greater value to the scientific literature.

The data were collected from a variety of sources: the SNC database, available company records—such as financial reports and investor relations announcements—newspaper articles, publicly available interviews with the founders and other stakeholders, and other documentation and reports. The data used for this study can be categorized as being drawn from secondary sources. Frankfort, Nachmias, and Nachmias, (1992) defined secondary data as data that is collected by others, not specifically for the particular study and Cowton (1998) wrote that the essential point of secondary data is that the researcher did not collect the data. In their article on entrepreneurship research published on the Academy of Management Journal, Ireland et al. (2005, p. 560) found that “collecting secondary data was the most frequently used method in Academy of Management Journal entrepreneurship articles”, and that “the bulk of the studies using secondary data were published during the 2000.”

Secondary data is not only useful to solve research problems, but also to better explain them (Ghauri & Grønhaug, 2020), as secondary data drawn from multiple sources are accurate and unbiased and brings new sources to what can be an oversaturated set of sources that academics use for their studies (Cowton, 1998). Using publicly available sources and not conducting primary interviews is an approach that had been taken in entrepreneurship research (Rindova et al., 2009; Muegge & Reid, 2019) by taking first-hand accounts from entrepreneurs and triangulating them with the accounts of others and with other records and documents. Reddy and Agrawal (2012) built a framework—which they called type II case study—that relies solely on the use of secondary data in multiple case study research, stating that these types of case studies are suitable for management ideas and structures. Smith (2011) explained that the use of secondary data provide the researcher access to data that would otherwise be impossible to collect in the same scale and scope.

By using secondary data, the researched factors and their impact can be accounted for over a number of years, and therefore can be better explained. Another advantage of using secondary data is that exploring the same cases on a primary base would require access to the companies and founders, which may be impractical to achieve within the scope of a study. When collecting the data, to achieve a higher level of reliability, I built a sample with all the available documents and reviewed documentation. According to Yin (2009), a researcher also has to understand and identify the specific audience of a study, which, in this instance, is first and foremost made up of entrepreneurs and, I believe, of early-stage investors and academic researchers, who would find interest in the findings and the research methods.

## Description of the Cases.

The sample I selected consisted of six start-ups that had achieved outstanding success, as defined in the research design. Table 12 provides a general overview of the companies, their sectors, and the characteristics of their entrepreneurial teams. This study was focused on previous entrepreneurial experience, previous senior management experience, previous industry experience, highest education level, and number of founders.

Table 12								
<i>Summary of the Cases.</i>								
Company	Sector	Entr. Exp.	Manag. Exp.	Indus. Exp.	Edu. Level	N. Found.	Funding Amount	Number Emp.
Lemonade	Fintech & eCommerce	Yes	Yes	Yes	2	2	480,000,000	51-200
Armis	Security & Safety Tech.	No	No	Yes	1	3	112,000,000	51-200
Spot.io	Software Applications	No	No	Yes	1	3	52,600,000	51-200
Next Insurance	Fintech & eCommerce	Yes	Yes	Yes	1	3	381,000,000	11-50
Gong.io	Software Applications	Yes	Yes	Yes	2	2	133,000,000	51-200
Habana Labs	Software Applications	No	Yes	Yes	2	2	120,000,000	51-200

The following is a description of the six case studies, based on the information gathered.

### **1. Lemonade, Inc.**

Lemonade, founded in Israel in 2015 by Daniel Schreiber and Shai Wininger, is a company that offers insurance powered by artificial intelligence (AI) and behavioral economics. By replacing

brokers and bureaucracy with bots and machine learning, Lemonade seeks to eliminate paperwork and provide instant information.

The founders had first met the same year the company was founded. Both were veterans of the Israeli tech ecosystem and both shared an interest in developing disruptive technology in the insurance industry. The team believed in clear planning—high impact with low complications—with Wininger saying: “entrepreneurs complicate things too often, with the hope of sounding more sophisticated. In reality, this often accomplishes the opposite. Users, people like simplicity.” Wininger further explained that, in the first company he had founded, he had failed—and he believed he had failed as a CEO—and had since then given this position to someone else, and added that, after several failures and several successes, he believed that the main motivation of founders is a dream to change.

### **The Founders**

Daniel Schreiber – Co-Founder and Chief Executive Officer. Originally from the UK, a public attorney with extensive experience in senior management in technology companies small and large—his previous experience included President and Board member in PowerMat, Senior VP in SanDisk, LLB in Law, and post graduate in business and philosophy.

Shai Wininger – Co-founder and Chief Operating Officer. Vast experience in technology, as an entrepreneur and as a senior manager. His past experience included: co-founder and CTO of Fiverr (NYSE: FVRR) and senior management positions in several other companies. He did not have a high school degree. Being an autodidact, he had given himself an education in technology and design.

Shai's involvement in Fiverr had enabled him to see it scale up, go through an IPO and become a leading company in its field.

## **Funding**

Sequoia Capital had committed US\$13 million, one of the largest seed investments in the firm's history, in the Lemonade seed round. According to Haim Sadger, Partner at Sequoia Capital, "It is very unusual for a company to receive US\$13 million in an initial round of funding, but it is rarer still to find such accomplished founders tackling such a sizable industry."

Seed round, Dec 2015: US\$13 million

A Round, Aug 2016: US\$13 million

B Round, Dec 2016: US\$34 million

C Round, Dec 2017: US\$120 million

D Round, Apr 2019: US\$300 million

In April 2019, it had raised US\$300 million at a US\$2 billion valuation. Lemonade made an IPO in July 2020 (NYSE: LMND). On December 3, 2020, market cap of US\$7 billion.

## **2. Armis**

Armis had been founded in 2015 by Yevgeny Dibrov, Nadir Izrael, and Tomer Schwartz. Armis provided information security software for enterprise internet of things (IoT) systems. Using an agentless approach, Armis discovered, monitored, and provided visibility to all devices before they connected with the network.

The founders had first met during their military service and then again in university. A few years later, when Dibrov had left Adallom Inc. after it had been sold to Microsoft, they had decided to start Armis. In the middle of 2017, the company had changed the product after seeing limited progress. Following the change the company had found itself on better track and had built a sales machine.

The founders believed that a key component in the success of their company was the industry in which it operated, with Nadir Izrael saying that the cyber market is very dynamic, which he believed made it relatively easier to raise funds. He added that “The exponential growth of Armis to date illustrates just how critical securing unmanaged devices is for businesses.” Another key component in the success of Armis was its team, Izrael believed that, for founders to be key, they need to be capable, trust each other, and be fully committed. In the case of Armis, Dibrov had brought market knowledge and familiarity with customers from his previous positions, while Izrael had brought his familiarity with big data from Google.

### **The Founders:**

Yevgeny Dibrov – Co-Founder and Chief Executive Officer. Experience in software development, cyber security, and business development from previous jobs and from his military service. The first employee at Adallom, he had worked there until it had been sold to Microsoft for US\$320 million. Held a BSc. in computer engineering.

Nadir Izrael – Co-Founder and Chief Technology Officer. Experience in software development and cyber security from previous jobs and from his six years in the military. Had worked at Google. BSc. in computer engineering and in Physics.

Tomer Schwartz – Co-Founder. Experience in software development and cyber security from previous jobs and military service. BSc. Had left Armis in 2017, to work in Microsoft.

## **Funding**

The company had raised a total of US\$112 million, Gili Raanan from Sequoia, an early investor who knew Dibrov from previous investments, has been quoted saying: "We decided to gamble on this team"

A Round, Jan 2016: US\$17 million.

B Round, Apr 2018: US\$30 million.

C Round, Apr 2019: US\$65 million.

Armis had been sold to Insight for US\$1.1 billion after raising a total of US\$112 million.

In 2020, Armis had 240 Employees in Palo Alto, California, and Tel Aviv.

## **3. Spot.io**

Spot.io had been founded in 2015 by Amiram Shachar, Liran Polak, and Aharon Twizer.

Originally named Spotify, it was a SaaS optimization platform that aimed to help businesses reduce their cloud-related costs while maintaining high availability and performance, Spot.io knew how to predict the availability of computing resources in Amazon AWS, Microsoft Azure, and Google GCP.

The idea for the start-up, exploiting resources in the public cloud, had been based on Amiram Shachar's final project for his computer science degree in college. Shachar had been working during his studies and the project had provided a solution to a problem he had identified at work. Polak and Twizer had joined him to start the company.

The founders recounted that the first year or two had been very difficult. The company had struggled to raise money and to convince the customers of the viability of its model. They had had thoughts of closing the venture. However, once the customers and money had started coming in, things had changed and they had succeeded rapidly. Shachar had seen several key moments in the development of the company: 1) meeting with the Spot.io team in amazon AWS and validating the latter's commitment to the spot pricing model; 2) closing with the first paying customer; 3) raising money from VCs, adding that, in growing a company, the management needs to evolve in relation to managing more personnel, with a critical point at 150 employees—the size limit for a single group of people, above which there can no longer be a personal relationship.

Shachar saw the market of cloud computing as a world-changing technological revolution and, following Jeff Bezos, he believed that, “in business, unlike sports, there isn't one winner, many competitors can do well in a god market”, an attitude that had helped him to survive the concerns of competing and being dependent on a giant like Amazon AWS.

### **The Founders:**

Amiram Shachar – Co-Founder and CEO. Experience in software development and databases from previous jobs and from his seven years of military service. BSc. in computer science.

Liran Polak – Co-Founder and CTO. Experience in software development and DevOps from previous employment and military service. BSc. in computer science.

Aharon Twizer – Co-Founder. Experience in software development from previous employment and military service. BSc. in computer science. Had left the Spot.io in 2019 to work at Amazon.

## **Funding:**

Shachar recalled that, when looking for the initial funding, he had been turned down 100 times more than he had received a positive answer. He believed that, although Spot.io could have reached an exit without additional fundraising, “you do need money in the bank when recruiting employees and investing in new developments.”

Seed round, Feb 2015: US\$0.6 million

A Round, Mar 2016: US\$2 million

A Round, Jul 2017: US\$15 million

B Round, Aug 2018: US\$35 million

Spot.io had been sold to Netapp for US\$450 million. Total invested funds, US\$52.6 million.

As of 2020, the company had 200 employees, mostly in Israel.

## **4. Next Insurance**

Founded in 2016 by Guy Goldstein, Nissim Tapiro, and Alon Huri, Next Insurance developed insurance solutions for small businesses, offering simple, affordable coverage tailored to the needs of each class of business. Next provided coverage for entrepreneurs and small businesses, using artificial intelligence and machine learning technologies to tailor insurance policies for its customers. Next Insurance utilized AI and machine learning to simplify the purchasing process and drive down costs.

Goldstein, Huri, and Tapiro had previously worked together as the executive team at Check, a mobile payment company that Goldstein had co-founded and that had been acquired by Intuit Inc. for US\$360 million in 2014. When thinking of establishing a new company, the founders

had been looking for an industry in need of a shake-up. According to Guy Goldstein, they had been exploring based on the size of the market, team familiarity with the market, and complexity of the product, and had decided on supplying insurance to small businesses, a sector the team had found to be “the most archaic insurance niche”, with outdated processes and customer experience.

According to Goldstein, the key factor for success are the first investors and their support. Tapiro added that having learned from mistakes made in their previous company, the team’s emphasis, from day one, had been on a strong business model and on being able to sell as soon as possible.

### **The Founders**

Guy Goldstein – Co-Founder and Chief Executive Officer. Vast experience as an entrepreneur and in senior management, including co-founder and CEO of Check, business development at HP, and R&D director at Mercury. BA. in software engineering and BA. in Business.

Alon Huri – Co-Founder and Chief Technology Officer. Many years of experience in the industry and senior management, including CTO at Check and system architect at HP and Mercury. BSc. in software engineering.

Nissim Tapiro – Co-Founder. Many years of experience in the industry and senior management, including VP R&D at Check and product and R&D management at HP and Mercury. BSc. in computer science and mathematics.

## **Funding**

According to Alon Huri, the entrepreneurial team's reputation had helped them to raise large amounts of capital at an early stage.

Seed round, Mar 2016: US\$13 million

A Round, Jun 2017: US\$35 million

B Round, Jul 2018: US\$83 million

C Round, Oct 2019: US\$250 million

In October 2019, the company had raised US\$250 million (to a total of US\$381 million) at a company valuation of over US\$1 billion. In September 2020, it had raised an additional US\$250 million at a valuation of 2.2 billion.

As of October 2019, the company had 200 employees.

## **5. Gong.io**

Gong.io had been founded by Amit Bendov and Eilon Reshef. The company was applying artificial intelligence (AI), machine learning (ML), and natural language processing to the recognition of effective patterns from tens of thousands of hours of spoken sales conversations and was helping B2B sales teams win more deals. Gong.io analyzed conversations from audio sources and web-conferencing platforms, then linked the results to CRM systems.

Gong.io had been named a cool vendor in "Cool Vendors in CRM Sales, 2017" by the Gartner Research Group.

The idea at the heart of Gong.io had come when Amit Bendov had identified a problem: “most companies don’t understand why their sales teams aren’t meeting their targets.” While working at his previous job, he had joined co-founder Eilon Reshef and, together, they had begun by doing a market validation by asking a large number of potential buyers various questions; a process that had built on the founders’ previous experience in planning and analysis.

According to Amit Bendov, “we were aiming from the beginning to build a big and strong R&D team and big sales team.” He added, “I believe in careful planning, making detailed plans—not just for the investors, but also for the benefit of company.”

The investors had had the support of Carl Eschenbach, a partner at Sequoia Capital and a Gong.io board member, who said, “Gong has unlocked a world of potential with their AI-based approach to increasing revenue teams’ effectiveness,” and of Dror Nahumi, General Partner, Norwest Venture Partners, who added, “Gong.io aims to lead this new category using state-of-the-art multi-disciplinary technologies.”

## **The Founders**

Amit Bendov – Co-Founder and Chief Executive Officer. Experience in senior management, many years of experience in the industry and in developing companies, including CEO of SiSense and CMO in Panaya. BSc. in computer science.

Eilon Reshef – Co-Founder and Chief Product Officer (formerly CTO). Experience as an entrepreneur, in senior management, and as an investor. Many years of experience in the industry, including as co-founder and VP product in Webcollage. BSc. and MSc. in computer science.

## **Funding**

Raising the initial funding had been difficult, with many negative replies. Money had been raised based on the founders' record, with Amit Bendov saying, "A successful record helps in raising money." The company's philosophy in regard to raising funds is demonstrated by Amit Bendov, who said, "You raise funds not when you need to, but when you can."

Seed round, Jun 2016: US\$6 million

A Round, Jul 2017 US\$20: million

A Round, Apr 2018: US\$2 million

B Round, Feb 2019: US\$40 million

C Round, Dec 2019: US\$65 million

In August 2020, Gong.io had raised US\$200 million in a D round at a US\$2.2 billion company valuation. C round, in 2019, had been done at a US\$650M valuation.

Gong.io had 200 employees in 2019, rising to 350 in 2020.

## **6. Habana Labs**

Habana Labs had been founded in 2016 by David Dahan and Ran Halutz. The company provided artificial intelligence (AI) and deep-learning computing solutions, improving the processing performance of chips and lowering their costs. Habana's processors were aimed at the specific needs of training deep neural networks and were targeted at some of the most demanding applications, such as autonomous vehicles, industrial robotics, and data centers.

Both founders were former executives at PrimeSense, which had been acquired by Apple for US\$360 million in 2013.

## **Founders:**

David Dahan – Co-founder and Chief Executive Officer. Experience in senior management, over 20 years' experience in the industry, including COO of DSPG—a public company—and Primesense. BSc. in Electrical & Computer Engineering, and an MBA.

Ran Halutz – Co-founder and Vice President, R&D. Experience in hardware development and systems from previous employment, including group manager at Apple. B.Sc. in Electrical Engineering.

## **Funding**

Tech entrepreneur Avigdor Willenz, who had been one of the founders of Galileo Technologies, which had been sold in 2001 to Marvell for US\$2.7 billion, had been Habana Labs' first investor and chairman, leading the US\$9 million seed round.

Seed round, 2016: US\$9 million

A Round, Jan 2017: US\$45 million

B Round, Nov 2018: US\$75 million

Habana was acquired by Intel for US\$2 billion on December 16, 2019. The company had raised a total of US\$120 million to that date.

As of 2019, the company had 150 employees.

## Case analyses

The descriptions of those six cases enabled an examination and analysis of the findings in light of the five hypotheses described in chapter 2. In general, the cases can be said to demonstrate support for the assumption that the presence of relevant previous experience or greater human

capital within the entrepreneurial team helps start-ups in their early stages. Gili Raanan, from Sequoia, who had invested in Armis, is quoted saying: "We decided to gamble on this team." In the cases of Gong.io, Lemonade, Next Insurance, and Habana Labs, there were similar indications. The cases therefore show that the ability to identify and analyze markets, to plan well, and to have good access to funds are advantages linked to experience. In some accounts, it was difficult to differentiate whether a certain result could be attributed to a specific experience or to multiple ones—e.g., entrepreneurial experience and senior management experience. For example, Nissim Tapiro—one of the founders of Next Insurance—is quoted saying that, having learned from mistakes they had made in a previous company, the new company's entrepreneurial the team had emphasized, from the beginning, the need for a strong business model and to be able to sell as soon as possible. This can be viewed as being in line with Jovanovic (1982), who found that, when entrepreneurs draw from their past experiences, they have lower chances of failure. The Next Insurance team had entrepreneurial, senior management, and industry experiences, although it was unclear whether such account could be differentiated or was based on more than one or even all team members.

What is clear, however, is the importance of choosing the right partners. Shai Winger, Lemonade co-founder, said, "Choose partners well. Partners with diverse capabilities or talents." In some cases, the entrepreneurial team had been built based upon previous work relationships—as in the cases of Habana Labs and Next insurance—in others, it had been based on past relationships established at university or in the military—e.g., in the cases of Armis and Spot.io—in others still, it had been based on a shared specific goal or plan—as in the case of Lemonade, in which the founders had first met each other in the same year they had started the

company through an introduction by a mutual friend (who had then become an early investor and member of the Board) based on their shared interest in building a disruptive start-up in the insurance market. In two of the cases, one original member of each of the entrepreneurial teams—which had both started with three members—had left at the company. Amiram Shachar, co-founder of Spot.io, emphasized team support as critical to survive challenges that could otherwise destroy the company.

When examining the cases, I looked at the same entrepreneurial team characteristics that had been tested in the empirical part of the study.

In four of the six cases, the entrepreneurial team had included at least one member with previous entrepreneurial experience. In the early stages of the sample start-ups, a strong indication of the importance of such experience in terms of the ability to raise funds can be observed.

Previous experience in senior management positions was another factor that was shown to be relevant in some of the cases. In Gong.io, Lemonade, Habana Labs, and Next Insurance, both founders and investors had been building on the team's management capabilities in terms of choosing the market and setting up a plan and business model. In line with Colombo and Grilli (2005)—who concluded that founder managerial experience did not have any direct influence on a start-up's growth, but may facilitate the availability of equity funding—Amit Bendov, the Gong.io CEO, who had vast previous management experience, said that “A successful record helps in raising money,” when referring to the difficulties he and his team had met in raising initial funding and their eventual success in doing so. Previous senior management experience can also make founders aware of the areas in which they are weak, and thus help them avoid making mistakes that could result in a failure. Lemonade's Shai Wininger recalled that the first

company he had founded had failed, and he believed that he had failed as a CEO. Therefore, based on that experience, he had refrained from taking the CEO position at the companies he had subsequently founded. The entrepreneur age variable was not analyzed in this research; however, the experienced entrepreneurial teams found in the cases of Habana Labs, Next Insurance, Lemonade, and Gong.io lend support to Azoulay et al. (2020), who found successful entrepreneurs to have an average age of 45—thus not being very young.

Support for the use of funding as a measurement for success can be seen in the statement made by Gong.io CEO Amit Bendov: “You raise funds not when you need to, but when you can.”

Differences in the availability of initial funds were observed among the cases. Spot.io CEO Amiram Shachar, who had started the company with no entrepreneurial or management experience in the team, remembered the difficulties met in raising funds at the early stage.

Conversely, in the case of Lemonade, Next Insurance, and Gong.io—where the founders had been experienced—the sourcing of initial funding had been easier. A partner in Sequoia Capital, an early backer of Lemonade, said: “It is rare to find such accomplished founders tackling such a sizable industry.”

An interesting point that is not the subject of this study—but is worth mentioning as a potential basis for further research—is the importance of the human capital possessed by the entrepreneurial team in dealing with the difficult times leading up to turning point or a trigger point, defined by Brown and Mawson (2013, p. 285) as a “a systemic change to the structure and workings of a firm” that provides an opportunity to change a firm’s growth path. Vohora et al. (2004, p. 148) wrote that such points “characterize the transitions between different phases of development” and are challenges that a company has to face to achieve its next development

phase. Many factors—some external, like market opportunities, and others internal, like innovation—can set off a trigger point (Brown and Mawson, 2013). Bessant et al. (2005) indicated that a company's success is determined by the ways in which it responds to tipping points, not by the points themselves. Among the sample cases, in 2017, Armis had come to a point at which it needed to change its product and sales approach. Amiram Shachar, the CEO of Spot.io, described how the firm had at first struggled to secure customers and investors, saying that they had started thinking of closing down the start-up when, at a certain point, things had changed and the company had started to grow rapidly. Guy Goldstein, from Next Insurance, who led an entrepreneurial team with entrepreneurial, senior management, and industry experience, said that, when companies are faced with difficult problems, the key is, first, to admit that there is a problem and, second, to immediately look for a solution and implement it.

## CHAPTER 6

### DISCUSSION AND CONCLUSION

This research was focused on how the different characteristics of an entrepreneurial team relate to the success of a venture. Using both upper echelons theory and human capital theory, early-stage start-ups and their founders were empirically observed and the influence of the entrepreneurial teams on their ventures' success was analyzed. Previous entrepreneurship, senior management, and industry experiences and higher education levels were all expected to contribute positively to a start-up's chances of success. The entrepreneurial team's previous experience was found to significantly decrease the risk of failure while controlling for number of years of operation, sector, and gender diversity. The size of the entrepreneurial team was also found to have a significant and positive impact on the chances of success. The same patterns were found for previous entrepreneurial, senior management, and industry experience, with the impact of previous senior management experience being found to not be as significant as those of entrepreneurial and industry experience.

The first part of this study focused on the early stages of the life cycle of a start-up, as the most critical phase and the one during which the risk of failure is greater. Moreover, it is the stage at which the founders' characteristics have the greatest impact, as their ideas and human capital still constitute the start-up's main resource. In order to better understand the impact of the various factors on the probability of failure, four models were used—an OLS regression, a logistic regression using a binary outcome and—two time-to-event survival analysis models—a Cox hazards model and a Weibull model.

A Kaplan-Meier non-parametric analysis was performed to find and assess any significant differences using the log-rank test. The Cox and Weibull models enabled the measurement of the effect of each variable and to understand which influenced time-to-failure. In general, the proportion of failure risk was found to be surprisingly low, compared to what is reported in the literature.

The findings suggest that the presence of experience within the entrepreneurial team decreases the probability of failure for the start-up. The influence of different kinds of experience differs; previous industry and previous entrepreneurial experience were found to have a stronger association with success than previous senior management experience. The same pattern was found when looking at the amounts the start-ups had raised; companies with more previous experience in their entrepreneurial teams were more strongly associated with success.

Entrepreneurial team size was found to have a significant influence on outcomes. Start-ups with larger entrepreneurial teams were found to have a lower risk of failure and to have raised more funds. These findings are in line with the literature and demonstrate the advantages of a larger team—and of a team over a sole entrepreneur.

The second part of this research involved a multiple case study of high impact start-up cases. It took a different approach in order to gain another perspective and to perform a more in-depth analysis of the phenomenon of start-ups—especially high growth ones—using an extreme sampling technique to select six cases from the sample used for the first part, then describing and analyzing the cases and looking for correlation between those cases' entrepreneurial team characteristics and their success. The analysis yielded indications of a positive correlation between greater entrepreneurial team previous experience and a start-up's success and ability to

raise funds. Indications of such a correlation were found both in the accounts of the entrepreneurs and in statements made by the investors.

### Limitations and Gaps

This research has some limitations that could be addressed in future studies. The observation period was limited to a six year period (2014-2019). In the dynamic and rapidly changing new technology ecosystem, a focus on a recent and relatively short time period has its advantages, but also imposes limitations. Additionally, the data accounted only for companies that had successfully raised initial funds for their operations.

Further, the information available on the sample companies was incomplete and potentially unreliable—which would not have been the case for their listed counterparts—as early-stage start-ups are dynamic, lean, and, in many cases, unorganized, and are also shrouded by the level of confidentiality that often comes with innovation. The method used to build the sample required information that was self-reported by the founders and that, in significant parts, could not be verified by third party sources. However, such data were visible to the contacts of each founder and to people that knew them and their history and therefore could be taken with some level of confidence.

There were also limitations in regard to the measurement of the quality of the experience that was researched. Information was available on the existence of such experience and, in many cases, on its extent, but its quality could neither be determined nor measured. Additionally, this study did not account for the changes in the composition of an entrepreneurial team over time, or for any changes in specific characteristics of the entrepreneurial team and the start-up over time.

## Contributions

The contributions made by this research reflect several dimensions. First, it examined a very important yet complicated subject in which both data and insights are needed, given the different and even conflicting conclusions drawn from previous studies. Several different characteristics were analyzed by taking different models and approaches in order to conduct a comprehensive study of them. Entrepreneurs could look at this research to source ideas on team building as, once a company is established, changes in the team are much more difficult and complex to implement (Beckman & Burton, 2008) due to ownership and compensation issues and to obligations toward other stakeholders. Making the right choices before incorporation may be critical to long-term success. Given that investors in early-stage technology ventures always seek out additional insights into the process, this research could assist in avoiding mistakes and pointing to the high achievers.

Additionally, the sample for this study was partially selected by using publicly available information—mostly drawn from web based sources—that, until a few years ago would not have been available in such quantity and detail. I linked this collected data to an existing database and produced a comprehensive dataset of the Israeli start-up ecosystem. The same novel methods could be adopted by other researchers.

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