

**BUSINESS INCUBATORS AND
ENTREPRENEURIAL PERFORMANCE:**

**THE INFLUENCE OF NETWORK VALUE
AND ABSORPTIVE CAPACITY**

BY

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ABSTRACT

Small-scale businesses have assumed a critical role in industrialization and economic development, as small firms contribute significantly to value creation and to the development of the economy and society. The success of small firms depends on a number of different factors including the quality of management, human resource practices, networks, marketing, financing, aptitude for learning (absorptive capacity), and the innovativeness of the firm. While much research has focused on identifying critical success factors for start-ups, less is known about how different programs and means can facilitate successful development of resources known to be important success factors. This thesis focuses on the role of business incubators in facilitating entrepreneurial success, and the research question is whether incubators contribute to higher network value and absorptive capacity for start-ups.

Business incubators attempt to increase the odds of a new venture's survival and entrepreneurial performance by providing various forms of assistance, including management expertise, training, and reasonably priced shared facilities that provide access to essential resources and add legitimacy to a start-up venture. In their role as intermediaries, incubators link start-ups to important resources, including business advisors such as accountants and lawyers, investors, and, of course, other tenant firms. This research posits the thesis that strong network relationships and absorptive capacity are associated with better entrepreneurial performance at the earliest stage of a business's existence.

Despite the importance of the new firm's entrepreneurial performance, and the role of incubators in supporting performance, there is a scarcity of research that directly or indirectly compares the performance of firms that have resided in an incubator with those that have not done so. This study will help fill this gap in the literature. Thus, this study investigates the entrepreneurial performance of new small businesses that are either incubated or non-incubated, with a particular focus on network value and absorptive capacity. If incubated firms are found to perform better than non-incubated firms, the practical implications for policymakers seeking to help new firms are clear: support in the initial stage of the life cycle is beneficial to the development of new firms. If, however, non-incubated firms are found to perform equally well, or better, than incubated firms, funds currently spent on incubator operations might better be spent on other programs.

A survey including 4573 Norwegian start-ups shows that network value and absorptive capacity are significantly related to entrepreneurial performance. Furthermore, the analysis shows that incubated firms have higher network value and improved absorptive capacity than non-incubated firms. These two main findings indicate that incubated firms generate a higher

level of network value and absorptive capacity than non-incubated firms, and that this in turn contributes to higher levels of entrepreneurial performance. The results also show that incubated firms may improve their level of absorptive capacity through increased network value.

In sum, the present research identifies three main routes to entrepreneurial performance. The first is that incubators seem to increase entrepreneurial performance in start-ups by generating higher network value. The second is that incubators increase start-ups' entrepreneurial performance by improving their absorptive capacity. The third is that incubators that generate higher network value for start-ups also seem to improve their absorptive capacity, with the end result of increased entrepreneurial performance.

However, the results also indicate that there is no direct relationship between incubator status and entrepreneurial performance. Thus, the results of this study show that mechanisms other than the incubator alone, with a particular view to network value and absorptive capacity, are necessary to enable start-ups to achieve higher entrepreneurial performance.

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1. INTRODUCTION

The vast majority of businesses are either small- or medium-sized enterprises (OECD, 2003; Reijonen & Komppula, 2007; Small Business Administration, 2008). Most larger companies also started out as small businesses, sometimes with only a single entrepreneur (e.g., Olav Thon or Richard Branson). Most start-ups and small companies never become high performers, and many die. To survive and succeed, most, if not all, start-ups need to team up with partners to acquire complementary and in-demand resources to handle a continuous stream of new challenges as they develop. This is simply entrepreneurship, and new small companies need support to develop their businesses and survive.

The following questions are especially important for the entrepreneur: What services do you need to make your venture successful? Do you need business plan development support, legal and accounting advice, marketing, Internet access, or specialized manufacturing facilities? Is access to a particular market critical? Do you need to discuss your experiences with other entrepreneurs, to share start-up challenges? If the answer to any of these questions is yes, then a business should consider finding an incubator that specializes in its market. Business incubators may provide start-ups with a variety of resources and services intended to accelerate their development.

Business incubators can increase the chances of survival and success for start-ups, as they provide shared access to a variety of resources at a lower cost than firms could otherwise obtain (Aldrich, Reese, & Dubini, 1989; Bergek & Norrman, 2008; Boyd, 2006; Chen & Hambrick, 1995; Miller, Besser, & Riibe, 2006). In addition to tangible resources, incubators also provide intangible resources such as management advice, counseling, and mediation (networking) services that help tenants develop their absorptive capacity (Bergek & Norrman, 2008; Cohen & Levinthal, 1990; Gray, 2006; Jansen, Van den Bosch, & Volberda, 2005; Zahra & Covin, 1995).

Nonetheless, the extent to which start-up firms in incubators perform better than comparable start-ups that have not received such support, or that have received it from other sources, remains unclear. This study contributes to the underlying discussion by conducting an analysis of business performance of 4,573 start-ups in Norway.

The introduction provides a brief presentation of the background of this study, and outlines the research questions, which focus on the relationships between network value, absorptive capacity, entrepreneurial performance, and incubator connection.

1.1 BACKGROUND

Business growth and wealth creation are of primary concern to entire nations, as well as to individual entrepreneurs (Amit & Zott, 2001; Hitt & Ireland, 2000a). Cross-cultural studies have shown that much of the difference in economic growth rates is due to entrepreneurial activity (Birley, 1987; Global Entrepreneurship Monitor, 1999; Laukkanen, 2000; Schumpeter, 1934). The range of innovations created by entrepreneurs is virtually unlimited, extending from the development of new goods or services to new channels of distribution to the reorganization of entire industries (Birkinshaw, 2000; Schumpeter, 1934; Vesper, 1980). In this study, entrepreneurs are defined as people who have started new small independent firms, and who act in the industry/market to which they belong (Brockhaus, 1980; Carland, Hoy, Boulton, & Carland, 1984). The technical definitions can vary from country to country, but in this study, the terms "small business" and "SME" will be used interchangeably.

Network ties, that is, as used in this study, interpersonal ties that facilitate the sharing of information, are important to the effectiveness and overall value of a network for a new firm (Aldrich et al., 1987; Galunic & Moran, 1999; Granovetter, 1992; Gulati, 1998; Johannisson, 2000; Marsden & Campbell, 1984; Nahapiet et al., 1998; Rindfleisch & Moorman, 2001; Rothaermel, 2001; Uzzi, 1997). The size and structure of the network depends on the number of people included within the network and their relationships with each other (Aldrich et al., 1987; Galunic & Moran, 1999; Johannisson, 2000; Lechler, 2001; Rothaermel, 2001). Networks that include a greater number of people provide greater opportunities to share information. The value of networking depends on a number of factors, such as communication (Lechler, 2001), cooperation, impact (Miller et al., 2006/2007), tie strength, frequency of contact (Dollinger, 2003; Granovetter, 1973; Rindfleisch & Moorman, 2002) and trust (Cohen & Levinthal, 1990; Galunic & Moran, 1999; Sivadas & Dwyer, 2000; Tsai, 2001).

The capacity to innovate and to adapt to change is critical to business success in an age of global competition and rapid technological change, and knowledge-based assets and organizational learning capabilities are critical to a firm's innovative activities. The process of creating new knowledge seems to require absorptive capacity, which is defined as the firm's overall capacity for acquiring and assimilating information and utilizing it effectively to create sales and profits (Cohen & Levinthal, 1990; Gray, 2006; Jansen et al., 2005; Zahra & Covin, 1995).

A company that invests more financial resources when starting up is more likely to accumulate a larger stock of strategic assets than a firm that lacks similar financial resources when it is founded (Lee, Lee, & Pennings, 2001). Heirman, Clarysse, and Van Den Haute (2003) argue that organizational resources are not strictly relevant to the study of start-ups, because entrepreneurs build their firms over time. This study, therefore, concentrates on the entrepreneurs' resources, specifically on absorptive capacity and social capital created through networks.

Networks can be especially valuable for start-ups, as they provide the opportunity for entrepreneurs to learn new knowledge and develop absorptive capacity (Dussauge, Garrette, & Mitchell, 2000; Gray, 2006; Heeley, 1997; Hitt et al., 2000; Liao et al., 2003; Teece, Pisano, & Shuen, 1997; Wu, 2007; Zahra & George, 2002). The ability to learn is especially important to new firms because an organization needs prior knowledge in order to assimilate and use new knowledge for productive purposes. New firms with high absorptive capacity are likely to be successful in commercializing new products/services (Cohen & Levinthal, 1990).

Business incubators provide a supportive environment in which new firms can develop their networks and absorptive capacity while using low-cost buildings, equipment, and materials (Bergek & Norrman, 2008). Incubators work with new businesses from the initial start-up until they have "graduated," meaning they have obtained sufficient size and earnings stability to be able to survive without ongoing assistance, or, at the other end of the spectrum, they cease business operations. The overall goal is to accelerate business development and to increase the chances of survival and growth (Finer & Holberton, 2002). Networked incubators (Hansen, Chesbrough, Nohria, & Sull, 2000) are specifically designed to encourage the formation of partnerships between new firms and to facilitate the flow of knowledge and talent. With the help of incubators, new firms can network to obtain resources and build relationships quickly, allowing them to establish themselves in the marketplace ahead of their competitors (Sherman & Chappell, 1998).

For many entrepreneurs who start a new business, being part of something larger has helped them get their businesses established and grow more quickly and smoothly. Ultimately, an incubator can be the perfect bridge to make the big step from idea to execution. And what's the better path to success - be part of a group or go at it alone? On the other hand, is a business incubator a tool just for those who not are able to establish and run a new business, and are the business ideas bringing into a business incubator not the best ideas?

History shows a lot of great companies are born in garages, cramped spaces, kitchen tables, basements and dorm rooms, far away from incubator distractions that may include

wandering meetings, small talk generalities and people who have different agendas than a start-up success. A great moment for an entrepreneur is when he or she joins the business world of offices, shops and other people who have been successful.

Government seems to play an important role in kick-starting entrepreneurs. However, do they need to be intervening or picking which companies to incubate? Sometimes they can supercharge a naturally born start-up cluster like Silicon Valley with investments in vital infrastructure. Government can also help fund start-ups by simply being a customer for start-ups just like the Pentagon has been for Silicon Valley for years. This means that many policy instruments exist for start-ups. But which work?

However, some of the problems that start-ups face are associated with the "liability of newness" (Stinchcombe, 1965) and the "liability of smallness" (Baum, 1996; Carroll, 1983). Young organizations usually lack such internal processes as coordinating and defining roles, which develop trust and loyalty among employees. External problems include the acquisition of resources, the stabilization of supplier and customer relationships, and the development of a reputation in the business world (Stinchcombe, 1965; Witt, 2004). Likewise, small firms often lack the human and physical resources that are available to large firms. Incubators can help fledgling firms with these internal and external challenges, so that they can grow more quickly and overcome these issues.

The speed of development from the original conception of the idea to market introduction to profitability is an element of performance as it relates to survival and growth. Allen and Rahmans (1985) found in their study that 42% of incubated firms credited the incubator with allowing them to accelerate their plans and expand at a faster pace. One reason for this could be that incubators help tenants develop relationships that are critical in the early start-up and development stages of the firm (Lender, 2003). Without these connections, firms face a series of barriers to start-up, survival, and growth (Felsenstein, Fleischer, & Sidi, 1998; Parker, 2004).

It is expected that incubator tenants will be assisted in the earliest stages of their development, increasing their chances of survival and growth. There is, however, a gap in the literature on this point. Little research has directly compared firms that have and have not benefitted from incubator tenancy. This study attempts to fill this gap by examining the networks, absorptive capacity, and performance of Norwegian firms that have and have not had incubator residency.

1.2 POSITIONING OF THE STUDY

Few studies (Allen & Bazan, 1990; Sherman & Chappell, 1998) have directly compared and measured the performance of incubated versus non-incubated firms, using the firm as the unit of analysis (Hackett & Dilts, 2004; Belso-Martínez, Xavier Molina-Morales, & Mas-Verdu, 2011; Schwartz, 2013). Data on the success and failure of comparable non-incubator firms is rarely kept and have proven quite difficult to obtain (Bears, 1998). Wiley (1997), with the support of the U.S. Department of Commerce and Economic Development Administration, examined the impact of incubator investments and concluded that “Perhaps the most consistent criticism of past research is that no attempt was made to compare the treatment group (firms that were treated by the incubator) with firms that had never participated in an incubation program. Little empirical research has been done to attribute differences in business outcomes between the two groups to the effects of business incubation rather than other factors.” (p. B-2.)

Given the cost of incubating new firms, research should be conducted to determine if firms that have been incubated are more successful than those that have not, and determine the ways in which companies may benefit from incubator tenancy. This is surprising, considering that incubators have been in existence for more than half a century and that there are a great many incubators in operation worldwide. Cities and municipalities in particular show a high level of commitment to establishing these support facilities. This permits them to actively contribute to the improvement of location factors and the stimulation of endogenous growth processes and success factors.

1.3 PROBLEM STATEMENT AND AIM OF THE STUDY

Incubators assist new firms in the early stages of their development. By helping start-ups in the critical early stages, incubators intend to improve the success of the firms in their facilities and their chances of survival. It is expected that firms that have been in an incubator should have a greater chance of survival and financial success than firms that have not benefitted from incubator tenancy. However, little research has been conducted on the subject. This study directly compared the performance of 4,735 new firms that either have or have not experienced incubator residency, to analyze the extent to which business incubators contribute to the success of new firms. The unique structure of this dataset provides insight into the potential entrepreneurial performance for start-ups both inside and outside incubators. The study focused in particular on the development of networks and absorptive capacity, and the

ways in which these factors are associated with performance. It was expected that incubated firms would gain more value from their networks, more absorptive capacity, and overall greater performance than non-incubated firms.

The aim of this study is to develop a research model and to analyze the relationships between network value, absorptive capacity, and entrepreneurial performance in terms of performance for start-ups for both incubated and non-incubated start-ups. The study measured the effects of incubators, network value, and absorptive capacity (as a part of human and organizational capital resources) on entrepreneurial performance. This research will fill the gap in the literature related to network value and the influence of absorptive capacity on the entrepreneurial performance of both start-ups that have been in a business incubator and those that have not.

1.4 RESEARCH QUESTION

According to resource based view (RBV) theory, physical, human, and organizational capital resources are essential to the performance of start-ups (Barney, 1991; Heirman et al., 2003). Some characteristics of the entrepreneur, such as level of education and entrepreneurial orientation, can be considered part of the overall concept of absorptive capacity (Gray, 2006), which itself falls under the category of human resources. Network value may strengthen human (social) resources, but network ties can also improve access to other resources. Several other factors, including the size of a business, the industry, the age of the firm (Alowaihan, 2004; Brush, 1992; Butner & Moore, 1997; Dess & Beard, 1984; Fasci & Valdez, 1998; Glancey, 1998; Gray, 2006), and the owner's personal experience, education, motivation for entrepreneurship, and other similar organizational and personal characteristics (Hill, 2001; Loscocco, Robinson, Hall, & Allen, 1991; Reijonen & Komppula, 2007; Robinson & Watson, 2001; Rosa, Hamilton, Carter, & Burns, 1994; Walker & Brown, 2004), have been shown to be related to performance, but these factors do not adequately explain why or how business performance will increase.

The performance of new businesses that have and have not been incubated is itself worthy of study, given the resources invested in these support structures and the importance of small business to the economy and society in general. According to the incubator model developed by Bergek and Norrman (2008), business incubators provide infrastructure (physical resources and facilities), business support (management counseling) and mediation services (networking) for new firms. These coincide with the resources listed by Barney

(1991) and Heirman et al. (2003), following RBV theory. It was therefore expected, because of the way in which incubators help tenants at the earliest stages of life, that the three types of resources - physical, human, and organizational - together with absorptive capacity would be better developed for incubated firms than for non-incubated firms, and that incubated firms would have higher levels of performance.

Given these concepts regarding access to resources, networks, absorptive capacity, and the importance of incubators to the entrepreneurial performance of new small firms, the following research question was proposed:

The study's main research problem addresses the extent to which start-ups will experience performance benefits from incubator participation. More specifically, the study seeks to determine whether participation in business incubators provides start-ups with increased network value and improved absorptive capacity. If so, what are the direct and indirect performance implications of incubator participation?

Other personal and organizational factors, such as the entrepreneur's experience, educational level and the size of the business are also related to entrepreneurial performance. These factors must be taken into consideration and controlled in the analysis.

1.5 CONTRIBUTION

While a great deal of attention has been devoted to describing incubator facilities, less attention has been focused on incubated firms themselves and their outcomes. Considering the expense of operating incubators, it is important to determine whether incubated firms perform better, directly or indirectly, than non-incubated firms. If non-incubated firms perform as well as incubated firms, then incubators are a poor use of society's limited resources. On the other hand, if incubated firms are found to perform better, it is important to examine the reasons why.

This study focused on the relationship between entrepreneurial performance and access to resources, network value, and absorptive capacity so that incubator organizations can better assist current and future tenants. The degree to which network value and absorptive capacity are associated with entrepreneurial performance was empirically tested, thereby contributing to the literature on small business. Additionally, the specific links between

network value, absorptive capacity, and incubator tenancy were examined, helping to fill this gap in the literature.

Through the use of a national survey of business owners in Norway, this study constructed two samples, one involving incubated firms and one involving non-incubated firms. As part of the data collection process, a database was established that can be used to extend the analysis to other variables and facilitate new longitudinal studies.

1.6 OVERVIEW OF THE DISSERTATION

Chapter 1.4 outlines the research question and provides an introduction of some of the relevant literature. Chapter 2 presents two theoretical perspectives, namely a review of entrepreneurship (Section 2.1) and the function of business incubators (Section 2.2), and identifies important resources that are critical for start-ups (Section 2.3).

Chapter 3 begins by introducing the perspective of the resourced-based view and dynamic capabilities as approaches for the study of start-ups. This chapter continues by presenting the concepts of network value (Section 3.2) and absorptive capacity (Section 3.3) as important factors for new firms both inside and outside an incubator. Chapter 4 deals with variables, hypotheses, and the research model; outlines the dependent variable (entrepreneurial performance) and independent variables (incubator status, network value, and absorptive capacity); and combines these variables in the research model. Six hypotheses are outlined.

Chapter 5 presents the research methodology and starts with the research design and empirical setting (Section 5.1). Further, it includes the operationalization of the variables (Section 5.2), as well as the sample frame and data collection (Section 5.3).

Chapter 6 consists of data analysis and findings and includes data responses, adequacy, validity, and reliability considerations regarding the data, along with the construction of indexes (Sections 6.1 - 6.2). Descriptive statistics and data analysis are presented in Sections 6.3 and 6.4, testing the measurement model, and 6.5, testing the structural model. Chapter 7 starts with a summary of the results (7.1) and then presents a discussion of the findings (Section 7.2) and their theoretical, managerial and policy implications (Section 7.3) and limitations of the study (Section 7.4). Finally, areas for further research are suggested (Section 7.5) and the concluding remarks are presented (Section 7.6).

2. ENTREPRENEURSHIP, INCUBATORS AND RESOURCES FOR START-UPS

The purpose of this chapter is to identify what entrepreneurship is and what the success factors are for start-ups, and then to review incubators and how resources relate to entrepreneurship and start-ups. The chapter begins with a review of entrepreneurship, including business performance (Section 2.1); then reviews the function of incubators and the ways in which they attempt to assist start-ups in their development (Section 2.2); and finally identifies important resources for start-ups (Section 2.3). Success criteria for start-ups are identified, which are then used in Chapters 4 and 5 (i.e., the conceptual research model, hypotheses, and variables).

2.1 ENTREPRENEURSHIP, SUCCESS FACTORS AND PERFORMANCE OF START-UPS

The study of entrepreneurship has grown as an academic discipline in the past two decades, from a sub-discipline of management studies to a separate field with increasing complexities of its own (Wickham, 2004). Varying definitions of what constitutes an entrepreneur lead to profoundly different political and theoretical implications.

While some view entrepreneurship as an exclusive concept, limiting the title of "entrepreneur" to business owners who aggressively seek growth and profits through innovation, others embrace a broader definition that includes all small business owners regardless of their profit and growth goals, as well as "intrapreneurs," who are not self-employed, but who act entrepreneurially within larger corporations (Brockhaus, 1980; McQuaid, 2002; Carland et al., 1984; Dollinger, 2003; Drucker, 1985; Schollhammer, 1982; Shills, 1982; Thompson, 2002; Vesper, 1980).

In the most inclusive definition, all these groups of people are classified as entrepreneurs, as are owners of small and micro-enterprises that do not necessarily focus on profits or growth (Bhide, 2000).

2.1.1 Entrepreneurship research

Entrepreneurship has played, and continues to play, a large and increasing role in the future of national and individual wealth management. A precise definition of entrepreneurship is difficult to obtain as the construct is both difficult to distinguish and inaccurate. Nonetheless, Dollinger (2008) provides a short selection of definitions from entrepreneurial research, as can be seen in Table 1 below.

Table 1 - Overview of Entrepreneurial Research

Researcher/Source	Definitions of Entrepreneurship
Knight (1921)	Entrepreneurship is, in the context of start-ups, based on uncertainty and risk.
Schumpeter (1934)	Entrepreneurship focuses on a new firm's organization, products, services, methods of production, and markets.
Hoselitz (1952)	Entrepreneurs introduce innovations and provide both capital and the management of productive resources.
Cole (1959)	Entrepreneurship is an activity in which start-ups initiate and develop profit-oriented businesses.
McClelland (1961)	Entrepreneurship involves risk taking.
Casson (1982)	Entrepreneurs make decisions and judgments about the coordination of limited resources.
Gartner (1985)	Entrepreneurs create new organizations and ways of doing business.
Stevenson, Roberts, & Grousbeck (1989)	Entrepreneurs pursue opportunities without consideration of their limited current resources.
Hart, Stevenson, & Dial (1995)	Entrepreneurial opportunities are constrained by the founders' previous decisions and industry experience.
Shane & Venkataraman (2000)	Entrepreneurship is a field that seeks to understand how opportunities to create something new can be found.
Kuratko & Hodgetts (2004)	Entrepreneurship is a dynamic process of vision, change, and creation.
Allen (2006)	Entrepreneurship is a way of thinking that is opportunity-focused, innovative, and growth-oriented.

Common themes in the definitions above include creativity and innovation, resource acquisition, assimilation, and exploitation, as well as the opportunity to make financial gains in situations with considerable risk and uncertainty. Additionally, entrepreneurship is frequently defined as involving the development and deployment of resources to create an innovative organization for the purpose of growth under conditions of risk and uncertainty. This study focuses primarily on definitions from Allen (2006), Shane & Venkataraman (2000) and Casson (1982).

Barney (1991) has established three categories of resources: organizational capital, physical capital, and human capital. A review of research on start-ups and the entrepreneurship literature, including Barney's categories, shows that these resources have been found to be associated with performance. The review is shown in Appendix 9, Table 23.

In addition to debating the very meaning of the term "entrepreneur," much of the research in the field of entrepreneurship has focused on the personal characteristics of entrepreneurs. Studies that have investigated the cognitive and behavioral qualities that set entrepreneurs apart from others have concentrated on characteristics such as boldness, daring, imagination (Carland et al., 1984; Chandler et al., 1992; Chell, Haworth, & Brearley, 1991; Frank, Lueger, & Korunka, 2007), creativity, innovativeness, a high propensity for risk-taking, and a bias for action (Glancey & McQuaid, 2000; Lumpkin & Gess, 1996; Mitchell et al., 2002; Reynierse, Ackerman, Fink, & Harker, 2000). Lumpkin and Gess (1996) argue that the willingness to take risks is what separates entrepreneurs from hired employees, as there is considerable uncertainty in being self-employed. However, others contend that the overall ability to identify and innovatively exploit opportunities is the real heart of entrepreneurship (Baumol, 1993; Brown & Eisenhardt, 2000; Lumpkin & Gess, 1996; Shane & Venkataraman, 2000; Teece, 1998).

Personal characteristics and behaviors of individual entrepreneurs, as well as the attributes of the firm itself, are some of the most common explanations for differences in performance between companies. For example, the business owner's age (Gray, 2006), education (Aldrich & Weiss, 1981; Bruderl & Preisendorfer, 1998; Gray, 2006; Swinney, Runyan, & Huddleston, 2006), entrepreneurial orientation (Gray, 2006; Mostafa, Wheeler, & Jones, 2006), and work experiences (Bruderl & Preisendorfer, 1998) are all variable. Additionally, the following factors have been shown to be associated with firm performance, beyond the firm's industry itself (Losacco et al., 1991), size (Aldrich & Weiss, 1981; Alowaihan, 2004; Kalleberg & Leicht, 1991; Losacco et al., 1991), and access to financial resources (Wiklund & Shepherd, 2005).

2.1.2 Success factors

Factors in small business success are diverse in nature, and they include both personal (Aldrich & Weiss, 1981; Bruderl & Preisendorfer, 1998; Gray, 2006; Mostafa et al., 2006; Swinney et al., 2006) and organizational factors (Aldrich & Weiss, 1981; Alowaihan, 2004; Gray, 2006; Kalleberg & Leicht, 1991; Lechner, Dowling, & Welp, 2006; Loscocco et al., 1991; Wu, 2007) as well as physical and financial (including capital) factors (Wiklund & Shepherd, 2005). As discussed in the previous section, measuring the success of new firms is not a straightforward process because there is no single agreed-upon definition of success (Brush & Vanderwerf, 1992; Chandler & Hanks, 1998). Furthermore, a general problem of objective measures for the success of a start-up is that they depend on the founders' intentions

and aspirations. However, there are some common objective indicators. These include sales, total assets, profits, number of employees, and the absolute and relative growth rates of these variables, as well as overall survival (Ardishvili et al., 1998; McGee et al., 1995; Wiklund, 1998).

2.1.3 Business/entrepreneurial performance

Business performance in incubators is a widely discussed issue and has become one of the most controversial points among authors. The literature broadly agrees that there is no clear approach on what constitutes an appropriate measure of performance (Barbero et al., 2012). Most problems relate to that objective, and direct performance indicators are difficult to obtain. Schwartz (2011) stated that business performance studied in empirical analyses often refers to innovativeness of firms by using metrics such as R&D intensity, patent activity, R&D expenditures, cooperation propensity, or firm growth measured in terms of employment, sales, or profitability.

Business performance has been measured in different studies with a variety of indicators, the most common of which are sales, profits, assets, physical output, market share, and number of employees, as well as the growth rate in these indicators (Schwartz, 2011). There is a growing consensus that if only one indicator is used and the study has a cross-industry design, sales growth should be the preferred choice because it is the most general, and all commercial enterprises need sales to survive (Ardishvili, Cardozo, Harmon, & Vadakath, 1998; Wiklund, 1998). Small business owners are also likely to use this themselves as their primary measure of performance (Barkham, Gudgin, Hart, & Hanvey, 1996). Additionally, sales often precede the other indicators; it is the increase in sales that necessitates increases in assets and employees and that results in increased profits or market share (Flamholtz, 1986).

While sales may be the most universally applicable growth indicator, it is not always the best one. As Penrose (1959) wrote, "There is no way of measuring an amount of expansion, or even the size of a firm, that is not open to serious conceptual objections" (p. 199).

The majority of business start-ups are imitative of businesses in mature industries, which serve local markets (Aldrich, 1999; Samuelsson, 2004). As such they do not have much growth potential, but it is also important to realize that most business founders have modest growth aspirations for their firms (Human & Matthews, 2004). Using only first-year and end-year data for growth calculations has also been criticized because this practice models growth as one giant leap (Davidsson & Wiklund, 2000) which makes the calculation overly sensitive

to stochastic variation (Weinzimmer, Nystrom, & Freeman, 1998). Because no measure is likely to be perfect, Penrose (1959) has recommended that rather than use sales merely because others have proposed it, researchers would be well advised to think seriously about which growth indicators best match their theory, their research questions, and the type of firms included in their own sample.

The review, Appendix 9, of the factors related to performance shows that these factors bear a striking resemblance to the types of resources described by Barney (1991). As shown above, organizational and human resources, which Barney identified as two important types of resources, are associated with a firm's performance instead of financial capital resources. Barney lists physical resources as a third type of resource but points out that because these can be fairly easily purchased they do not lead to sustained competitive advantages. Financial capital is a generic resource that can be used to obtain other types of resources, especially physical resources (Dollinger, 1999; Wiklund & Shepherd, 2005). Obtaining and effectively using resources leads to improved chances of success in that the survival and performance of a new business depends on the capabilities and resources that it is able to exploit (Chandler & Hanks, 1998). For this purpose, the construct of entrepreneurial performance is used. This means that performance in this research is related to success for start-ups.

The entrepreneur is a major influence on his or her business, as the owner is central to every business decision (Hill, 2001; Reijonen & Komppula, 2007). Therefore, to examine the performance of a small business, it is necessary to investigate the relationship between the entrepreneur's personal (human) qualities and attributes and the firm's performance. It is also important to look at the characteristics of the organization itself, because some personal characteristics (e.g., entrepreneurial orientation, ability to acquire financing) translate into organizational factors, such as strategic orientation and access to physical capital.

Previous research on business performance of start-ups have been done, as measured primarily by sales and sales growth. The review follows Barney's (1991) categorization where the variables related to success are divided into human capital and organizational capital resources.

Figure 1 provides a graphical representation of the interrelationships between the variables from the review of entrepreneurship in Appendix 9, Table 23. As can be seen below, most factors are directly associated with entrepreneurial performance, but they can also indirectly influence success.

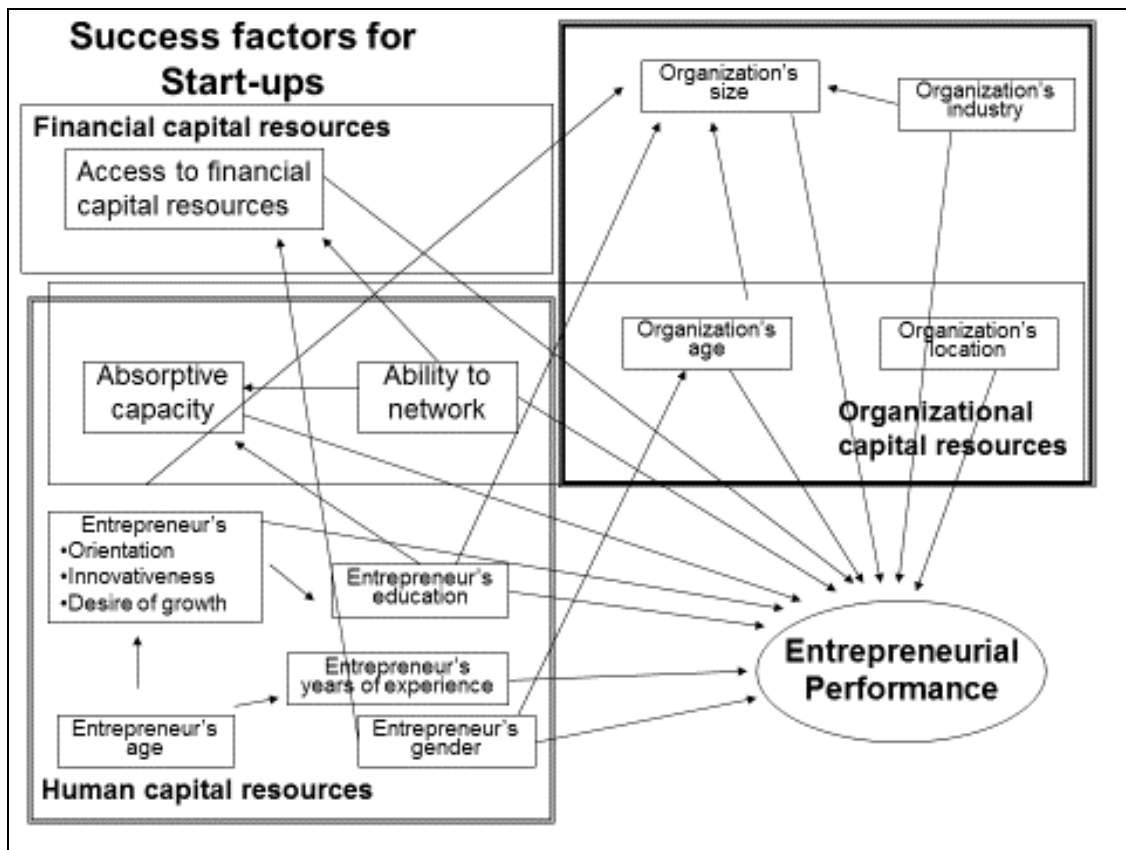


Figure 1 - Success factors for start-ups.

Section 2.3 and 3.1 explain the resource based view and dynamic capabilities for start-ups in greater detail and provide further insight into the importance of financial, organizational, and human capital resources for new small business (start-ups) success. This means that start-ups need tools for develop their resources so they may handle their challenges in their start-up period and develop needed resources.

2.2 BUSINESS INCUBATORS

Entrepreneurs build organizations that allow them to take advantage of market opportunities (Larson & Starr, 1993). However, in competing with established companies, start-ups face at least two disadvantages: their small size in the early stages of the development process (liability of smallness) and their lack of reputation and corporate history (liability of newness). New firms struggle to survive in their formative years (Stinchcombe, 1965), and earlier studies have shown that the survival rates of new firms are poor (Audretsch, 1995; Dollinger, 1999; Hoegel, 1998). Empirical studies of the failure rates of firms within various industries have also consistently shown that new firms have a much greater likelihood of failure than established firms (Fichman & Levinthal, 1991; Utterback & Suárez, 1993). Between 20% and 30% of new start-ups close during their first year of

existence, and the failure rate is 80% within six years of inception (Dollinger, 2003). Thus, individuals who choose to become entrepreneurs face long odds for both survival and success.

2.2.1 Background

Business incubators provide a nurturing environment, hands-on assistance, and a variety of services for start-up companies and entrepreneurs during these challenging first years of development. Incubators have been given this term because they nurture the development of entrepreneurial companies, helping them to survive the start-up period and to grow more quickly into successful companies (Finer & Holberton, 2002).

In the past, nine out of ten business failures were attributed to a lack of experience or to poor management skills (Humphreys & McClung, 1981; Schwartz, 2013). Expert advice and business support provided by incubators can, however, substitute for direct experience and help business owners acquire the tacit knowledge shared by other managers in the industry, thus helping incubated firms overcome their deficiencies (Aldrich et al., 1989; Miller, Besser, & Riibe, 2006). While the primary purpose of an incubator is to help create and accelerate the successful development of new businesses in a community (Finer & Holberton, 2002; Sherman & Chappell, 1998), incubators and their tenants can also create jobs and spread new technology, creating wealth and tax revenue while simultaneously revitalizing neighborhoods and empowering women, minorities, and individuals on a low income (Boyd, 2006, p. 3).

The principal arguments for business incubators all center on the assistance they provide in helping entrepreneurs develop their resources. From the RBV, business incubators provide a link to important resources that the incubated firm may be unable or unwilling to acquire on its own (Wernerfelt, 1984; Barney, 1991). Shared services, access to technology, administrative services, and reduced-cost consulting services may help enable firms with limited capital or ability to survive past their early stages. The social capital perspective (Granovetter, 1973) suggests that business incubators may allow tenants to form networks they would be unable to access otherwise. By enabling firms to form more and better networks than they could alone, incubators can provide more extensive and higher quality resources for their tenants. Finally, legitimacy theory (Aldrich & Fiol, 1994) indicates that by indoctrinating firms in standard business practices, such as business planning, financing, and administration, business incubators enable tenant firms to comply with the established norms of the larger social, political, and business communities. By conforming to these best practices, tenant firms and graduates legitimate themselves in the eyes of the communities of which they seek to become a part.

The success of incubated firms can be examined through both hard data, such as sales turnover, profitability, growth, and graduation from the incubator, and through subjective (soft) measures, including increased professionalism, improved business skills, increased networks, increased knowledge, and decreased costs (Voisey et al., 2006). Soft measures are more difficult to ascertain and measure, but they are particularly relevant in the development of personal skills and business knowledge which might be applied to future entrepreneurial activities (Hackett & Dilts, 2004). Because soft skills such as networking and developing absorptive capacity can lead to improved performance in sales, growth, and the like, incubators attempt to develop tenants' skills in these areas as will be described in greater detail in the following section.

2.2.2 Development of the business incubator context

The incubator concept can be traced back to Batavia, New York, in 1959, yet there were still only 12 incubators in the United States by 1980. As a result, research in the early 1980s was still focused on the basic task of identifying the common features of incubators. Boyd (2006) states that because "business incubation is still an emerging industry" (p. 6), new discoveries in how to manage incubators and assist community development continue to be made every day. Table 2, which is based on work by Hackett and Dilts (2004), presents an overview of existing research on incubators, dividing incubator research into three main categories: development studies, configuration studies, and incubation impact studies.

Table 2 - Overview of Incubator Research

Kind of Research	Research Question	Topics
<u>Development Studies:</u> 1984–1988	What are incubators? How are they planned and developed? What are the processes of new venture development? What is the role of planning? What role is taken by the business incubator management?	Definitions Taxonomies Policy prescriptions New venture development Impact on planning of development
<u>Configuration Studies:</u> 1987–1990	What are the critical success factors for incubators? How does the incubator concept work in practice?	Conceptual frameworks Incubator selection
<u>Incubation Impact Studies:</u> 1990–2000	How can incubation program outcomes be evaluated? What constitutes a model for a virtual incubator? What are the economic and fiscal impacts of an incubator? What are the critical connection factors to success?	Levels and units of analysis Outcomes and measures of success Explicit and implicit use of formal theories (TCE, network, entrepreneurship, economic development)

Studies (Allen, 1985; Campbell, 1987; Smilor & Gill, 1986) examining incubators from the perspectives of the facilities, the tenants, and the graduates have shown that success rates are generally favorable. Campbell found that only about 14% of the companies that were admitted to an incubator discontinued operations. However, a study conducted by Allen (1985) found that for every two tenants that graduate, one discontinued operations while still a tenant. Regardless, there is still the question of whether incubators achieve significant results beyond simply extending the suffering for new firms that would otherwise fail quickly (Brisette, 2001).

In a study of incubated and non-incubated firms in Pennsylvania, U.S.A, Allen and Bazan (1990) concluded that incubated firms were more likely to survive longer and to perform better than other firms in terms of sales and employment growth. However, after graduation, performance differences were no longer evident. These findings were criticized by the Pennsylvania Incubator Association, however, due to time lags, possible biases, and the lack of comparability between the two groups of companies (Lewis, 2001).

Sherman and Chappell (1998) found that incubated firms had significant performance gains in gross sales and annual payroll between the time they joined the incubator and the time of the study. The largest average gains were seen in companies associated with technology incubators. Approximately two-thirds of the incubated firms in the study agreed that the incubator experience was important to their success, while the remaining third rated it as either somewhat important or not at all important. No significant correlation was found between this rating and either financial performance or success in creating jobs. Regardless, Sherman and Chappell (1998) concluded that, from a macro perspective, incubation is an effective business development tool that only requires a modest investment but provides an outstanding return in the regional economy. For example, despite low employment numbers for tenant firms (Allen, 1985, placed the median number of employees at 2.3, while Campbell, 1987, found the median size of graduate firms to be 9 employees), local retention of graduates is generally high - over 85% of graduates either expected to relocate or had relocated in the local area (Smilor & Gill, 1986).

Peña (2004) came to a conflicted conclusion. In his study of business incubators and new firm growth in the Basque region, he found that firm growth is mostly the result of the entrepreneurs' own skills and organizational factors related to the start-up period of the firm. According to his findings, new firms should be able to develop themselves without any assistance from a business incubator, as the only significant association he found was between firm success and training/assistance services. Lotti et al. (2001) agree with Peña, also

suggesting that incubators can create negative externalities and biases against incumbent firms and entrepreneurs. Likewise, Brissett (2001) contends that although incubators are fast becoming a popular tool for local economic development, their long-term impact is less obvious.

One major challenge in researching the effect of incubators on the performance of new firms is the difficulty of creating a control group of non-incubated firms with similar developmental outcomes to incubated firms (Sherman & Chappell, 1998). Few, if any, studies have demonstrated an ability to clarify variation in incubation outcomes (Hackett & Dilts, 2004). Incubators themselves are difficult to compare because there are many types of incubators with goals that vary based on their individual missions, which often relate to those of their sponsors. The next section discusses this in further detail.

2.2.3 Types of incubators and resources

The National Business Incubator Association, the largest such organization in the world, classifies incubator programs by industry, using technology, manufacturing, services, mixed-use and "other" as categories (Boyd, 2006, p. 12). While 37% of incubators in the United States assist technology start-ups, the plurality (47%) are in the mixed-use category because they include a variety of businesses. Manufacturing (7%) and service (6%) incubators are in the minority. The "other" category includes those incubators that focus on niche markets or community development, which are often called empowerment incubators. Academic institutions are the most frequent (25%) sponsor of incubators in North America, followed by government bodies (16%) and economic development organizations (15%), while 10% are run by for-profit organizations that seek to capitalize on the development of new ventures, especially in the technology sector (Boyd, 2006, p. 11). However, 19% have neither a sponsor nor a host organization.

Incubator facilities are quite diverse, have various objectives and organizational arrangements. The kinds of opportunities and resources offered by incubators usually relate to their purpose, goals, and resulting management policies (Hannon, 2005). The purpose of some incubators is to provide an "artificial" environment for new ventures, especially those operated by specific target groups or those that will provide jobs and economic development to the local area. Others primarily seek to accelerate the commercial application of knowledge research or technology, often at a profit to the sponsors (Allen & Bazan, 1990; Hansson, 1993). Universities and vocational/technical schools are often primarily interested in providing training opportunities for students and commercial outlets for faculty research.

Although objectives and management policies may differ, there are some common elements which include the universal goal of increasing the chances of the survival of firms in their formative years (Allen & Rahman, 1985).

2.2.4 Incubator components and business services

Despite their varied goals and financial resources, incubators also have many similarities. Bergek and Norrman (2008) have identified five common components of most incubation models: selection, infrastructure, mediation, business support, and graduation. The selection and graduation procedures pertain mostly to the entry into and exit from an incubator, while the remaining components describe the types of resources and services provided by the incubator and its managers to tenant firms which is the focus of this research. The infrastructure consists of the physical location, office facilities, and general administrative services, whereas business support includes management assistance, which can lead to the increased absorptive capacity of tenants. Incubators also provide mediation services as they connect tenants to each other and to the outside world, thus assisting in networking. The following sections describe these components in greater detail, focusing primarily on mediation, business support, and general infrastructure.

Selection criteria can vary depending on the objectives and philosophies of a particular incubator (Bergek & Norrman, 2008; Smilor, 1987). Facilities sponsored by the public are more likely than others to consider job creation potential and local ownership when admitting tenants, whereas privately funded incubators are often more concerned with obtaining full occupancy than with selecting a particular type of tenant. While some incubator managers focus on the assets (including personal characteristics and experience) of the individual entrepreneur when admitting applicants, others place more emphasis on the foundational idea of the business (Hackett & Dilts, 2004; Lumpkin & Ireland, 1988). Some incubators will take on a greater number of tenants and let the market determine which ones survive and thrive, whereas others attempt to choose only those with the best chances of success (Bergek & Norrman, 2008).

Entrepreneurs who are admitted to an incubator will find that most incubators provide the same basic infrastructure of shared administrative services, physical facilities, and office equipment as they seek to provide an environment conducive to development (Bergek & Norrman, 2008; Bøllingtoft & Ulhøi, 2005; Boyd, 2006; Chan & Lau, 2005; Colombo & Delmastro, 2002; Hackett & Dilts, 2004; Rice et al., 2004). While such basic items as photocopiers, postage machines, and other office equipment are useful and often necessary,

these present high overhead costs to a single small venture first starting out. Loading docks and forklifts, as well as specialized devices such as autoclaves and water purifiers, would be out of reach for most new businesses, but incubators can provide these through their organizational cost-sharing model (Boyd, 2006). An additional intangible benefit is that they lend an air of legitimacy to these new firms (Lee et al., 2001).

Incubators provide a variety of services to their tenants. Smilor and Gill (1986) grouped these into four categories: secretarial, administrative, consulting services, and physical facilities and their related services. After studying incubators in Pennsylvania, Allen (1985) grouped services into seven similar categories: financial consulting, management assistance, general business services, professional services, and physical services, among others. The different types of services incubators commonly provide are shown in Table 3.

Table 3 - Different Types of Incubator Services

Incubator Services:
Financial Consulting <ul style="list-style-type: none">• Risk management and insurance• Grant application assistance and loan packaging• Introduction to venture capitalists• Government contract preparation• Export development
Management Assistance <ul style="list-style-type: none">• Business plan preparation• Employee relations• Marketing• Research and development
General Business Services <ul style="list-style-type: none">• Word processing• Shipping and receiving; mail service• Telephone, fax, receptionist, and copying
Professional Services <ul style="list-style-type: none">• Legal counseling• Patent assistance• Accounting• Computer and information technology services
Physical Services <ul style="list-style-type: none">• Conference rooms• Cafeteria• Audiovisual equipment• Building security

These services and resources, conveniently provided in one location, are a great help to new businesses just starting. Hansen et al. (2000) found that during the first six to nine months of operations, managers of new ventures frequently spend up to half their time just establishing the basic infrastructure they need to run their businesses (p. 76). They quoted an incubator tenant extolling the virtues of his incubators, expressing his satisfaction with the fact that managers do not have to deal with "back-office stuff like "Why doesn't the fax

machine work today?' . . . Here in the [named] incubator, we can focus entirely on the business issues as hand. I've made three years' worth of decisions in three months" (Hansen et al., 2000, p. 77). However, they also point out that infrastructure alone is not enough, and assert that the network ties derived from tenancy in an incubator are the most vital element in accelerating a new firm's successful development.

The overall goal of incubation is, of course, graduation. It is important for incubated firms to stand on their own rather than need the continued support of an incubator. That also allows new ventures to benefit from the limited slots available within incubators (Hackett & Dilts, 2004). Graduation policies are considerably less variable in nature than selection methods, as most incubators expect tenants to move out after three to five years (Bergek & Norrman, 2008; CSES, 2002). These policies also help to ensure that the resources of the economy as a whole are not wasted on firms that cannot survive long-term without incubator assistance.

2.2.5 Incubators and success factors for incubatees

The results of a survey of new incubated firms (Allen & Rahmans, 1985) showed that more than half the firms changed their business strategy because of improvements stemming from their incubator experience. Of these, 42% said the incubator allowed the firm to accelerate plans and expand at a faster pace. Other benefits were new business contacts (15%) and lowered costs (12%). Regardless of these benefits, the same survey found that a majority of the entrepreneurs (87%) said that they would have started their business without the incubator.

Following Voisey et al. (2006), Figure 2 displays the positive impacts that business incubators have on start-ups and categorizes their outcomes into hard and soft measures.

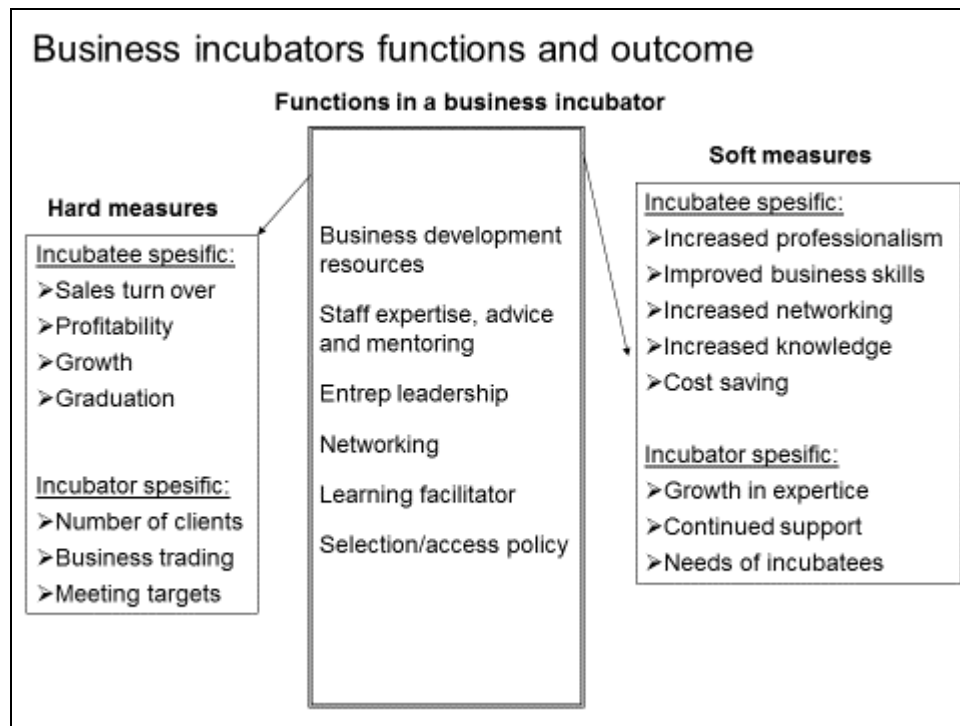


Figure 2 - Functions of business incubators.

According to the research of Voisey et al. (2006), it is apparent that business incubators create other outputs in addition to profits and costs (hard measures) which can be classified as soft measures. Soft measures include benefits such as increased business knowledge, skills, and awareness, and increased client networking. These are subjective measures and as such are more difficult to ascertain and measure, but they exist nonetheless. The soft measures listed by Voisey et al. (2006) are particularly relevant in the development of personal skills and business knowledge that can be applied to future entrepreneurial activities (Hackett & Dilits, 2004). Thus, it follows that business incubators provide clear advantages for facilitating firms' progress and performance.

Conceptualizing business performance in new small firms turns out to be a difficult task. The conventional measures of performance for large companies, like profits, revenues, and sales, do not always apply, and financial information about private firms is closely held. In investigating business performance, it is essential to recognize the multidimensional nature of performance as well. Entrepreneurial activities may lead to favorable outcomes in one performance dimension and unfavorable outcomes in another. Research that only considers a single dimension or a narrow range of business performance may result in inaccurate descriptions and theory building. New firms are often formed because key players prefer to work for themselves rather than take direction from an organizational superior. A privately owned start-up firm may regard its continued existence as a satisfactory indicator of high

performance. It also may make the conscious decision not to grow beyond a certain size, in order to maintain control of the business. Factors such as overall satisfaction and nonfinancial goals of the owners may need to be more heavily weighted in evaluating business performance, especially with regard to start-ups. Other non-financial considerations may also be important. These include such factors as reputation, public image, goodwill, and the commitment and satisfaction of employees. Researchers who investigate the effectiveness and efficiency of an entrepreneurial orientation need to be sensitive to these performance criteria.

Incubators may serve as a knowledge base, a networking tool and a "safe" environment while incentivizing both the immediate and future development of new enterprises. They should also be a significant tool to increase performance. To examine this, attention will be turned in the following sections to the development of networking and knowledge (absorptive capacity) as important elements for new firms to run their new businesses.

2.3 IMPORTANT RESOURCES FOR ENTREPRENEURSHIP/START-UPS

Timmons (1994) contends that there are three essential driving forces of entrepreneurship: the founders/entrepreneurs themselves, their ability to recognize opportunities, and the resources needed to establish the firm. Only when all three components fit together can successful entrepreneurship take place. The RBV approach suggests that the efficient and effective use of the resources a firm possesses determine its performance. This includes all firm-controlled assets, capabilities, organizational processes, firm attributes, information, knowledge, and the like, which enable the firm to conceive of and to implement strategies that improve its efficiency and effectiveness (Barney, 1991).

Sustainable competitive advantages are based on access to resources that are rare, hard to copy, not imitable or substitutable, and more valuable than those held by competitors (Barney, 1991, 1996, 2002; Dyer & Singh, 1998; Dollinger, 1999; Hoskisson, Hitt, Wan, & Yiu, 1999; Mitchell et al., 2002). Many scholars have attempted to investigate the mechanism of sustainable competitive advantage of new firms through the RBV using such concepts as core competencies (Hamel & Praharad, 1994), dynamic capabilities (Teece et al., 1997), and the development of routines and skills (Nelson & Winter, 1982).

Barney (1991) categorizes resources into organizational capital, physical capital, and human capital (p. 101). Although all these types of resources are useful, they are not necessarily all equally important in the development of small firms (Heirman et al., 2003).

The following sections describe these three types of resources in greater detail and provide the background for this study's analysis of the relationship between human capital resources and entrepreneurial performance.

2.3.1 Organizational and financial capital resources

Some descriptive factors of organizations, such as the size and age of a business, as well as the industry in which it operates and the geographic area in which it is located, have been found to be associated with performance. For example, the service and retail industries are both very competitive which makes it relatively difficult for business owners in these industries to achieve high performance and growth (Alowaihan, 2004; Loscocco et al., 1991; Swinney et al., 2006). Industries and regions that are more dynamic are often home to rapidly growing firms (Carroll & Hannan, 2000; Davidsson, 2004). Zahra and Covin (1995) argue that entrepreneurial opportunities are more likely to arise in heterogeneous markets, as developments in one market create demand for a firm's products in related markets. On the other hand, heterogeneity may also indicate that the market is fragmented into small niches and that individual firms would find it difficult to expand across these niches.

The size of a business, which is based on employment, is associated with better performance as larger businesses have higher absolute sales and profits (Aldrich & Weiss, 1981; Alowaihan, 2004; Kalleberg & Leicht, 1991; Loscocco et al., 1991) as well as a higher growth of assets (Glancey, 1998). The fact that size is positively correlated with success has led researchers to conclude that start-ups may suffer from the "liability of smallness." In other words, the very fact that a firm is small can be a hindrance to its success. Some firms apparently overcome this liability as Thomson and Gray (1999) found. For new firms, the owner's strategic orientation towards growth is a much stronger determinant of performance than the size of the firm.

Similar to the liability of smallness, the "liability of newness" refers to the fact that younger businesses are also more likely to have lower levels of performance (Alowaihan, 2004; Stinchcombe, 1965), although the literature presents some mixed results. For example, Alowaihan (2004) found that the age of a business was positively correlated with its gross earnings as newer businesses had lower earnings. In contrast, newer firms (less than five years old) have also been found to have higher investment levels, as well as higher sales and growth rates (Dobson & Gerrard, 1989; Glancey, 1998; Gray, 2006). Audretsch (1995) determined that, for those who survive the first few difficult years, both survival and growth are higher in subsequent years. One reason for this may be the age of a business, as well as the amount and

depth of personal business experience of its owner; both are related to the development of absorptive capacity which is dependent upon previous knowledge (Gray, 2006).

The liabilities of smallness and newness are likely interrelated, as it often takes time for an organization to grow to a significant size and develop a significant resource base. Size is often measured in terms of the number of employees, but it can also refer to an organization's amount of physical capital which includes a firm's plant, equipment, technology, and access to raw materials. Although these are certainly resources that are important to success, and can influence overall firm strategy (Hellmann & Puri, 2000; Lee et al., 2001), Barney contends that because physical technology can be purchased by competitors and is therefore imitable, it is not necessarily a contributor to sustained competitive advantage.

Organizational capital is based on the ability of the firm to coordinate, plan, and control its activities. Because organizational resources are built up over time, they are not usually in place at the time of founding and are therefore not as important to the study of start-ups as are other types of resources (Heirman et al., 2003). Given that physical capital resources do not always lead to sustained competitive advantages (Barney, 1991), and that organizational capital resources are not wholly relevant to start-ups (Heirman et al., 2003), this study will therefore focus on human capital resources, which are described in the following section.

2.3.2 Human capital resources

In most start-ups, the entrepreneur is the primary, and often the only, person in the firm. Therefore, the founder's personal characteristics, skills, and goals are closely intertwined with those of the firm (Van de Ven, Hudson, & Schroder, 1984). Jenkins et al. (1997) present compelling evidence that the owner-manager's growth motivation, communicated vision, and goals have direct effects on the firm's growth (Baum & Locke, 2004).

Entrepreneurial orientation, which is associated with innovation, proactivity, and high risk-taking propensity, "can be a way to see how management discovers and exploits opportunities" (Madsen, 2007, p. 186; Miller, 1983). Entrepreneurial orientation has been shown to have a relationship with improved firm performance, including sales growth (Brown, 1996; Junehed & Davidsson, 1998; Mostafa et al., 2006; Wiklund, 1999; Zahra & Covin, 1995), and it enhances the positive relationship between knowledge-based resources and performance (Madsen, 2007; Wiklund & Shepherd, 2005). Akgun, Keskin, Byrne, and Aren (2007) identified a correlation between performance and innovativeness, which was associated with learning capabilities and thus showed a link to absorptive capacity. Gray's (2006) study of British start-ups confirmed that non-innovative firms were more likely to be

struggling or weak (p. 356). However, too much entrepreneurial orientation can be detrimental, especially if it causes the organization to take too many risks or to act in a way that is not in accord with the organization's environment (Madsen, 2007; Miller, 1983; Slevin & Covin, 1990).

One important factor, which complicates the identification of characteristics and behaviors necessary for success, is that not every business owner pursues profit maximization and growth (Carland et al., 1984; Gray, 2006; Walker & Brown, 2004). Some people are primarily motivated by the lifestyle associated with being independent and are not motivated to expand their firms, although they still need to earn sufficient profit in order to earn a living (Brush, 1992; Butner & Moore, 1997; Fasci & Valdez, 1998; Glancey, 1998; Gray, 2006; National Foundation for Women Business Owners, 1994; Reijonen & Komppula, 2007; Robinson & Watson, 2001; Rosa et al., 1994; Walker & Brown, 2004). Likewise, performance is related to the entrepreneur's intentions, and some business owners do not want to grow so large that they must delegate key functions or employ non-family members (Chell et al., 1991; Gray, 2006). In a study conducted in Finland, Reijonen and Komppula (2007) found that most business owners were growth-oriented but in a limited fashion. They wanted to grow in terms of turnover, but not in the number of employees, as this would significantly increase costs. Similarly, an empirical study of 400 small business owners in Sweden showed a significant relationship between expected outcomes and the desire for growth (Davidsson, 2004). In 40% of those firms, the owners did not intend to grow at all due to fears of reduced employee well-being and of a loss of supervisory control. Gray (2002) even argues that only a minority of small business owners are primarily concerned with traditional financial goals. Start-ups managed by people with non-business goals are likely to have different strategies than businesses established by entrepreneurs who are focused on financial performance and growth.

Demographic characteristics relating to the entrepreneur as a person, such as age, education level, and sex, also directly or indirectly correlate with performance. However, these relationships are not always linear, and they may vary based on other factors. For example, Reijonen and Komppula (2007) found that age interacted with growth intentions as older business owners did not want to increase the size of their firms. Likewise, Gray (2006) found that older micro-business owners were less growth-oriented, although the owners of larger small firms remained entrepreneurial. The number of years of experience, which can be (though is not necessarily) related to the age of the entrepreneur has been demonstrated to have a relationship with gross revenue (Alowaihan, 2004).

Absorptive capacity, entrepreneurship growth, and internal development practices have also been found to vary depending on educational level (Storey, 1994; Gray, 1998, 2006; Harding, 2003), although Gray (2006) found those business owners with technical and vocational education to be the most growth-oriented. Educational level can also affect access to capital (U.S. Department of Labor, 2005), which may, in turn, be related to the tendency for firms founded by highly educated people to survive longer (Bates, 1997). One reason for this may be that education indicates intellectual and critical thinking ability, as well as a greater tolerance for ambiguity (Dollinger, 1985). Gray (2006) used education level, experience, and propensity to innovate as variables in examining absorptive capacity. However, in comparing the performance of female- and male-owned firms in the service and retail industries, Swinney et al. (2006) found that while education was positively related to performance among the women business owners, no such association was found among the men in the sample.

Indeed, the effects of gender upon entrepreneurial performance are still debatable despite a large amount of research on the topic. Many studies (Chell & Baines, 1998; Cuba, DeCenzo, & Anish, 1983; Fasci & Valdez, 1998; Hisrich & Bruschi, 1985) have found that female-owned businesses tend to have lower levels of performance and growth due to such factors as women's lower risk-taking propensity (Sexton & Bowman-Upton, 1990; Swinney et al., 2006). However, other studies (Loscocco et al., 1991) have determined that differences initially attributed to sex are better explained by structural factors, such as industry and organizational size. In a study of female-owned start-ups in Australia, Robinson and Watson (2003) found that women had significantly lower profits, but also less variability in profits. They therefore concluded that women's businesses may actually achieve better performance and could be considered a better investment if risk is taken into consideration.

Human capital resources can be further subdivided into human capital and social capital (Coleman, 1988; 1990; Honig, 1998). Individuals' skills, knowledge, training, experience, judgment, and insight, which ultimately determine absorptive capacity, are categorized as human capital. Social capital includes the relationships between people (network ties).

In the RBV context, the ability to network is one of the most important entrepreneurial skills (i.e., resources) for success (Aldrich & Zimmer, 1987; Barney, 1991; Birley, 1985; Johannisson et al., 1994; Voisey, Gotnall, Jones, & Thomas, 2006; Wernerfelt, 1984), because business owners with strong networks not only maintain a greater awareness of the latest technological or industrial developments, but are also more likely to gain access to

resources that would otherwise be inaccessible, or that would at least be more costly, thus creating a competitive advantage (Chesbrough, 2003; Dubini & Aldrich, 1991; George, Wood, & Khan, 2001; Granstrand et al., 1996; Hagedoorn, 1993; Jarillo, 1989; Teece, 1986; Vanhaverbeke, 2006). This in turn can lead to improved chances of survival, growth, and overall success (Johannisson, Alexanderson, Nowicki, & Senneseth, 1994; Madsen, 2007; Malecki, 1997). For example, network ties may lead to small firms obtaining board members with significant management expertise, or to orders from large corporations that would not otherwise deal with a new small firm (Hippel, 1994). Miller and Besser (2005) found that business performance metrics, including gross sales, were significantly higher for businesses that were identified as being networked, which Miller and Besser defined as being members of a given business association, than for those that were not network members. Access to information and advice is a "key benefit" of networks (p. 169) as it provides chances for new ideas, problem solving, and opportunity recognition.

The network research perspective focuses on relationships among actors that are categorized as individuals, work units, or organizations. These actors are embedded within networks of relationships that provide both opportunities for, and constraints on, behavior. This means that the focus is on relationships rather than on particular attributes, on structured patterns of interaction rather than on isolated individual actors. Following Brass, Greve, and Galaskiewicz (2004), a network is defined in this study as a set of nodes and the set of ties representing a relationship, or the lack thereof, between the nodes. The nodes are each different actors (individuals, work units, or organizations). Networking, as well as education and training, therefore contributes to absorptive capacity (Ahuja, 2000; Deeds & Rothaermel, 2003; Eisenhardt & Schoonhoven, 1996; Grandstrand et al., 1997; Gray, 2006; Hagedoorn, 2002).

The effective allocation of resources in an entrepreneurial firm has a significant influence on how that firm develops and utilizes its resources, strategic assets, and network ties (Neck, Meyer, Coben, & Corbett, 2004; Subramani & Venkatraman, 2003). RBV theory views new firms as entering into transactional relationships with others because they cannot generate all of their required resources internally (Barney, 1991).

A firm's performance depends on its ability to structure both the direction and rate of growth of its knowledge (Penrose, 1959). Just as entrepreneurs have heterogeneous networking abilities, their abilities to derive benefits from networks by increasing their learning and knowledge (absorptive capacity) are similarly heterogeneous (Cohen & Levinthal, 1990). Consequently, a given business owner's personal and social networks are

one of "the most important strategic resources of entrepreneurs for the start-up firm" (Lechner et al., 2006, p. 517). The more networking activities in which an entrepreneur engages, the larger the personal network and the more central the position in which that entrepreneur's firm should be. However, some founders have no aspirations to be successful by the measures of those who are growth-oriented, so they may deliberately restrict their network size (Chell & Baines, 2000). As will be discussed in greater detail in Chapters 4 and 5, the effective development and use of such resources as network ties and absorptive capacity can be the key to success. New small businesses often lack these vital resources, however. Business incubators, which are described in detail in Chapter 3, attempt to help entrepreneurs with the development of these crucial resources, particularly through the use of networking.

2.4 SUMMARY AND DIRECTIONS FOR THE RESEARCH MODEL

The focus of this chapter has been to identify the construct of entrepreneurship and business incubators, as well as the success factors for start-ups. The literature review demonstrates that the success of a start-up depends on a variety of organizational capital, human capital, and physical capital resources. For start-ups, the skills and capacity of the entrepreneur are often essential.

An entrepreneur's personal characteristics, such as education and years of experience, are associated with success, as are organizational attributes such as size and choice of industry. As has been demonstrated, these factors are clearly important to the success of start-ups. Figure 3 shows the resource framework for start-ups as well as the main factors that will be examined in further detail in this study.

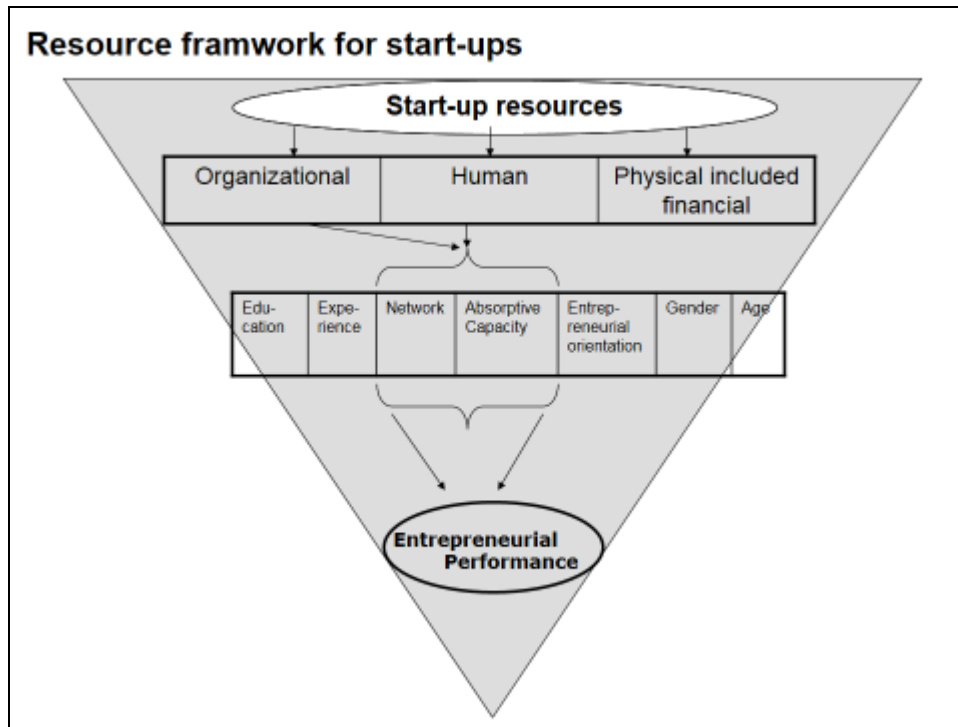


Figure 3 - Start-up and resources related to entrepreneurial performance.

The role of business incubators is to help start-ups grow into successful firms. Thus, one of their functions is to assist tenants in the development of their networks and absorptive capacity, tools which can be used to help businesses grow. This means that human capital resources and organizational capital resources from Figure 3 are the main resources further examined in this research together with the role of business incubators.

Section 2.2 has identified the major role that business incubators can play in the success of start-ups. The literature review also establishes that three primary ways incubators assist tenants by providing physical infrastructure, mediation services, and business consulting (Bergek & Norrman, 2008). In other words, incubators support new firms by providing physical infrastructure for a business (e.g., office space, office equipment), as well as by helping them develop human and social resources through networking and deploying the value of networking. The ability to network also relates to the acquisition and exploitation of additional knowledge, and the concept of human resources development is closely related. In the next section the concepts of network value and absorptive capacity will be outlined.

3. NETWORK VALUE AND ABSORPTIVE CAPACITY

This chapter first introduces the perspective of RBV and dynamic capabilities (3.1) as important approaches for human and organizational resources, and then deals with how network value (3.2), and absorptive capacity (3.3) are related to the development of start-ups and their deployment. Section 3.4 gives directions for the research model.

3.1 BACKGROUND: THE PERSPECTIVE OF RBV AND DYNAMIC CAPABILITIES

Given that entrepreneurs build their businesses from the resources (both tangible and intangible) and capabilities that they acquire or develop (Dollinger, 1999; Wernerfelt, 1984), the RBV is useful for modeling entrepreneurial processes. In fact, Dollinger (2003) states that the RBV is "the most appropriate to understand new venture creation because it best describes how entrepreneurs themselves build their businesses from the resources and capabilities they currently possess or can realistically acquire" (p. 10). Chandler and Hanks (1994) found that small business performance was related to both higher levels and broader varieties of resource-based capabilities. A new firm's performance is therefore directly related to its ability to access a predictable supply of critical resources.

Following RBV-theory, the ability to network is one of the most important entrepreneurial skills (i.e., resources) for success (Aldrich & Zimmer, 1987; Barney, 1991; Birley, 1985; Johannisson et. al., 1994; Voisey, Gotnall, Jones, & Thomas, 2006; Wernerfelt, 1984), because business owners with strong networks are more likely to gain access to resources that would otherwise be inaccessible, or that would at least be more costly, thus creating a competitive advantage (Chesbrough, 2003; Dubini & Aldrich, 1991; George, Wood, & Khan, 2001; Granstrand et al., 1996; Hagedoorn, 1993; Jarillo, 1989; Teece, 1986; Vanhaverbeke, 2006). Access to information and advice is a "key benefit" of networks (p. 169) as it provides chances for new ideas, problem solving, and opportunity recognition.

However, in a rapidly growing market, the straightforward application of the RBV in predicting firm success can be too simplistic, because without dynamic capabilities, firms can rapidly deplete their endowments and be eliminated (Eisenhardt & Martin, 2000; Wu, 2007). Thus, the RBV highlights the role of these dynamic capabilities, which integrate, build, and reconfigure internal and external competencies and resources to address rapidly changing environments (Eisenhardt & Martin, 2000; Schoonhoven & Romanelli, 2001; Teece et al., 1997).

For start-ups it is important to clarify what kind of resources the entrepreneur or start-up has, and what kind of capabilities exist to run and develop the business. Capabilities for a new firm are a composite amount of knowledge which makes the firm capable to utilize their resources. Many start-ups have not developed sufficient dynamic capabilities, because they have to stabilize ordinary capabilities, i.e. those capabilities through which a firm “makes its living” in the short term. Zahra and George (2002) define absorptive capacity as a dynamic capability. This means those capabilities that are used to extend, modify, change, and/or create ordinary capabilities. Further networking or co-creation together with absorptive capacity will be important to develop resources.

It also emphasizes the importance of knowledge resources for developing a sustainable competitive advantage (Kogut & Zander, 1996). Zollo and Winter (2002) argue that dynamic capabilities are rooted in organizational routines that promote learning, in that they are learned patterns of activity through which the organization systematically modifies its operating routines in the pursuit of improved effectiveness. Dynamic capabilities are thus built up through the accumulation of experience and subsequent knowledge and become embedded within the culture of an organization (McGrath, Tsai, Venkataraman, & MacMillan, 1996; Zollo & Winter, 2002).

A sustainable competitive position may not be attained without developing a distinctive internal knowledge base (Prahalad & Hamel, 1990; Petts, 1997). However, simply possessing knowledge is not enough to create a competitive advantage, and moreover, "knowledge fades if it is not used" (Prahalad & Hamel, 1990, p. 82). The ability to consolidate and integrate available human, organizational, and physical resources into competencies, empowering it to adapt and exploit changing opportunities is vitally important to the success of a firm (Prahalad & Hamel, 1990). To be innovative over time, the firm must continuously develop and enrich its core competencies and capabilities through continuous learning, by extending absorptive capacity, at both the individual and organizational levels and in addition the value of networking will be an important instrument for the learning process.

3.2 DEVELOPING NETWORK VALUE

Despite the importance of incubator-provided physical resources, social relationships and networking are important as incubators provide a bridge between incubated firms and the environment (Merrifield, 1987) which helps to compensate for incubated firms' lack of

established entrepreneurial networks (Bøllingtoft & Ulhoi, 2005; Grimald & Grandi, 2005; Lee et al., 1999; Peters et al., 2004; Smilor, 1987; Von Zedwitz, 2003). Such relationships increase the probability of survival as well as improved overall performance (Hansen et al., 2000). Peters et al. (2004) claim that the success of incubators relates mostly to the presence or absence of coaching and access to networks. However, because this is a personal social process, a firm's network development ultimately influences the personality, traits, and attitudes of the entrepreneur (Johannisson, 1986, 1987). Researchers have used different concepts of feelings about relationships, communication, and cooperation to measure the value of network ties (Lechler, 2001; Johannisson, 2000; Miller et al., 2006/2007; Rindfleisch & Moorman, 2001).

Networks are an important factor in performance in that they provide access to external resources (Granovetter, 1973; Hoang, 2003; Jarillo, 1989; Pettersen et al., 2016). Business incubators are in themselves a special kind of network as they connect tenants with useful resources and advisors. Therefore, it is expected that incubated companies will enjoy greater success than those that have not benefitted from this type of network. This use of external resources in turn facilitates the development of such internal resources as absorptive capacity.

The role of incubators in developing network ties, particularly between the incubated firms and other external parties, has been shown to "serve as a network node point for relationships with important external consultants such as tax accountants, patent and other lawyers, business consultants, marketing and public relation firms" (Lender, 2003, p. 6). In this way, incubators provide access to critical resources such as knowledge, technology, and financial capital, as well as both human and market resources on both a frequent informal basis and a more formal schedule which facilitates faster and better decision-making (Bergek & Norrman, 2008, p. 24; Hansen at al., 2000). Lender (2003) states that incubators help start-up companies establish themselves in networks much more quickly than they would otherwise, which then allows new ventures to further develop their own sets of relationships. With the provision of basic facilities and assistance in developing vital networks, entrepreneurs can concentrate on the growth of their businesses.

Because there is also the built-in potential for interaction between incubated firms, the incubator environment increases the development of social networks that act to support entrepreneurs of new firms (Aernoudt, 2004; Bøllingtoft & Ulhoi, 2005; Brooks, 1986; Collinson & Gregson, 2003; McAdam & McAdam, 2006; Von Zedwitz, 2003). Research by Neck et al. (2004) indicates that businesses within the same incubator relate uniquely and

interact to form a system conducive to dense entrepreneurial activity. Shahidi (as cited in Lewis, 2001) found that tenants of technology incubators had more networking opportunities than did similar non-incubated firms (p. 15). These network ties relate to improved performance and the greater likelihood of obtaining equity capital, grants, and seed money. Likewise, Lichenstein (as cited in Lewis, 2001) found that the networks and relationships tenants in an incubator established between one another lead to increase sales, lower costs, enhanced capabilities, and overall reduced risk (p. 14). Additionally, the moral and psychological support that incubated firms received was their most frequently named benefit. Incubatees considered the relationships with other tenants, with the incubator manager, and with others associated with the incubator to be valuable benefits.

Networking can stimulate performance as entrepreneurs build formal and informal networks for sharing management strategy information, especially in incubators where the possibilities to learn from each other are better than they would be were a firm "to stay alone" (Miller & Besser, 2005). Sherman and Chappell (1998) found that almost one-fourth of the incubated firms in their study had developed a subcontract or other arrangement with a fellow tenant, and one-sixth had collaborated with another company in the incubator. These relationships facilitate the transfer of knowledge and expertise between small start-ups, thereby stimulating fruitful relationships (Hansen et al., 2000). Information and resources exchanged between network members influence the firms' business strategy and actions, strengthening or enhancing the firm's effectiveness (Butler & Hansen, 1991). In fact, most of the small businesses that responded to one survey (Competition, 2003) indicated that they initially patterned themselves after other businesses. Incubator tenants in particular watch each other and adopt successful strategies that they observe (Sevon, 1996). Network ties, therefore, seem to play a key role in facilitating the design and implementation of firm growth strategies and entrepreneurial performance (McAdam & McAdam, 2006).

Alliances between incubators and their tenants, with other successful small businesses, government agencies, foundations, and educational institutions help firms to develop resources, gain market power, move into new markets, and create options for future investments, while also providing a wealth of varied skills (Hagedoorn, 1993; Hamel, Doz, & Prahalad, 1989; Kogut, 1991; Smilor, 1987). Such relationships also enhance the legitimacy of incubated firms and provide opportunities for the development of new competencies (Baum & Oliver, 1991; Hamel et al., 1989). By reaching out to these partners and sponsors, new ventures can obtain advice from outside experts and assemble advisory boards of higher caliber than they would ordinarily obtain (Bøllingtoft & Ulhøi, 2005; Hansen et al., 2000).

Assistance in recruiting highly talented employees can be as valuable as networking with expert advisors. As one entrepreneur quoted in Hansen et al. (2000) stated, "Before joining [this incubator], I started two companies . . . but [the] lack of talented people starved them both" (p. 78).

An important element of any alliance or relationship is trust, as mutual trust theoretically protects both parties from opportunistic behavior by the other side. As Dollinger (2003) stated, "Trust enables the entrepreneur to forgo all of the activities and legal formalities that guard against opportunism . . . It means that the entrepreneur has the flexibility to call on resources and people very quickly . . . when resources and information are needed" (p. 345). It is especially difficult for new firms to show their trustworthiness when their credibility has yet to be established. Although new ventures have an insufficient resource balance (Saxton, 1997), acceptance into an incubator signals that the business has future potential and that the incubator thereby acts as a proxy for credibility, thus facilitating trust among potential partners. In their research on incubators in Ireland, Macadam and Marlow (2007) found that entrepreneurs who had been in business longer were more inclined to share problems, but there was still greater trust in those networks established prior to entering the incubator.

The potential benefits of networking are clear, but these are not automatically guaranteed by simply being located in an incubator (Johannisson, 1986, 1987). Just as there are different types of incubators with their own unique missions, the type of networking that occurs in incubators may vary. In fact, Hansen et al. (2000) state that without a focus on networking, an incubator is "little more than a place to set up shop" (p. 75). Entrepreneurs may possess the attitude that they are in the incubator to run their own business, and that they are too busy working to socialize with other tenants. This can sometimes relate to the layout and operation of certain incubators that encourage entrepreneurs to hide in their offices, rather than promote networking. Research by Johannisson (1986, 1987) showed that in some incubators, tenants can be slow to share ideas, and that there are often no mechanisms to encourage interaction. If the incubator itself does not promote networking, incubated firms themselves must take a proactive stance toward it, as all entrepreneurs are busy and time is a crucial resource for everyone.

In a study of one incubator (Johannisson, 1986, 1987), entrepreneurs complained that they did not know many of the other tenants in their incubator, yet social interaction appeared to be the critical factor in knowing whom they could trust and share ideas with. Complicating the situation, there appeared to be a latent fear in some of the interviewees of giving too much

away during the discussions that did occur. Although the firms in this incubator were often operating in different sectors, they were all competing for funding, grants, and to a certain extent, a spot in the local limelight. Consequently, this hostility and competitiveness had a negative influence on the interactions between the entrepreneurs in the incubator.

Given the potential but not necessarily realized, benefits of being in an incubator, Hansen et al. (2000) state that residence in an incubator is not the right choice for everyone (p. 81). Entrepreneurs who already have "strong personal connections to the right industry players" or who do not need to move quickly may not need the services of a networked incubator. For many new ventures, however, an incubator, particularly one with strong networks, can help develop absorptive capacities through strong business support services.

A cross-European study conducted by Open University Business School concluded that the primary reasons for networking include the exchange of knowledge in addition to social interaction (Gray, 2006). Furthermore, networks enhance a firm's ability to recognize and evaluate pertinent knowledge (Lane & Lubatkin, 1998). These relationships, and the knowledge that can be derived from them, are an integral part of this learning process (Baron & Markman, 2000; Birley, 1985; Blundel & Smith, 2001; Collinson & Shaw, 2001; Devins et al., 2002; Harding, 2004; Nohria & Eccles, 1992; Shaw & Conway, 2000). In fact, social capital theory regards learning as taking place within the relationships or network in which a person is engaged (Holman et al., 1996). Granovetter's (1992) assertion that "economic action is embedded in networks of personal relations" (p. 27) resonates with the social and conversational model of experiential learning and supports the argument that absorptive capacity is influenced by network. Empirical studies suggest that networks have a significant impact on successful innovation (Cooper, 1992; Hoegl, 1998). Aldrich and Zimmer (1986) therefore recommend establishing business networks at the inception of a new business, because individuals who have trusting relationships will share resources, which builds value and provides advantages to their businesses (Jarillo, 1988; Wollebaek & Selle, 2002).

3.2.1 Network for start-ups

Networks are becoming increasingly important as they provide firms with access to markets, information, technology, and other resources (Gulati, Nohria, & Zaheer, 2000). Through networks, new firms are able to establish relationships of trust, reciprocity, and cooperation, as well as create opportunities for the acquisition and exploitation of knowledge (Dyer & Singh, 1998; Etzioni, 1988; Lane & Lubatkin, 1998; Powell, 1990). Additionally, networks can provide the opportunity to develop new capabilities (Dussauge et al., 2000; Hitt

et al., 2000), enabling firms to compete in markets without first owning all of the resources necessary to do so. This is particularly important to new firms as they frequently have limited resources (Dubini & Aldrich, 1991; Cooper, 2001). Successfully accessing and integrating trans-organizational resources thus creates value for the firm (Achrol, 1997). In fact, research suggests that start-ups can enhance their chances of survival and eventual success by establishing alliances and developing them into an effective network (Baum et al., 2000).

The entrepreneurial aspect of networks is rooted in the social network perspective (Granovetter, 1985). An entrepreneur who can identify and exploit synergistic opportunities with partners that control complementary resources and capabilities may enjoy an advantage over those who are unable or unwilling to do so. Founders with dense and varied networks of contacts can obtain information to help them surmount business development problems, shaping their own survival and growth (Low & MacMillan, 1988). Advice and information from locally-based research institutions and higher education institutions can also encourage growth, and as a result firms that utilize these may develop a competitive advantage over their direct competitors. The benefits of networking are therefore important to small firm performance (Aldrich, Rosen, & Woodward, 1987; Aldrich & Zimmer, 1986; BarNir & Smith, 2002; Birley, 1985; Donckels & Lambrecht, 1997).

Entrepreneurs are to some extent dependent on their network of personal relationships when making decisions and solving problems (Taylor & Thorpe, 2004). Dollinger (2003) states that, "networks themselves can be sources of sustainable competitive advantage as well as a means of procuring other resources that can be a source of sustainable competitive advantage" (p. 342). According to Butler and Hansen (1991), new firms are more likely to achieve business performance when they are able to identify and attain resources through exchange relationships within their networks. This may also be explained by the fact that networked firms place greater importance on employee, customer, and community strategies than do non-networked firms (Miller & Besser, 2005). Thorelli (1986) likewise claimed that networking generates a greater focus on personnel, which would then generate increased entrepreneurial performance.

Just as growth orientation has been demonstrated to positively relate to performance, a 1995 study by the Open University Business School showed that growth-oriented entrepreneurs were more likely to network (Gray, 2006). In a study of small businesses in the United States, Miller and Besser (2005) found that higher performance in terms of gross sales was derived from employee-centered strategies (internal environment), whereas higher performance in terms of satisfaction with work was derived from customer-centered strategies

(external environment). These findings support work by Jaworski and Kohli (1993), which shows that business owners in a formal business network achieved a significantly higher rate of success in reaching their business goals than non-networked businesses.

Researchers examining the nature of networks have used a variety of terms to discuss networks, although most tend to describe range, frequency, or breadth, meaning the variety and frequency of contact among people within a network, as well as the value or depth of network ties. The following sections describe these attributes and the ways in which various studies have examined them.

3.2.2 Network range

The range of a network refers to the content and pattern of activity in a given network, which has also been called structural embeddedness (Aldrich et al., 1987; Galunic & Moran, 1999; Hoang & Antoncic, 2003; Johannisson, 2000; Lechner et al., 2006; Rothaermel, 2001). The content of a network refers to the people and organizations with whom a business owner has relationships, and the support, knowledge, and other resources that are derived from these relationships. Zhao and Aram (1995) used the more direct terms of breadth and range for this concept. Others describe the content and structure of a network as network activity (Aldrich et al., 1987; Galunic & Moran, 1999; Johannisson, 2000; Lechler, 2001; Rothaermel, 2001).

Aldrich et al. (1989) measured network activity through the size of the network, defined as the number of people with whom business or entrepreneurship issues were discussed during a given week. Similarly, Zhao and Aram (1995) measured "the total number of contacts that provide the firm with different resources" (p. 358). Therefore, they counted a single network actor repeatedly if more than one resource was obtained, such as product development advice and technical service.

Lechner et al. (2006) state that there are different types of networks that serve various ends. Networks can have a strictly economic function, but may also include people who provide value in other ways, such as friends and relatives in social networks. In contrast, reputational networks are comprised of people and firms that help the entrepreneur gain legitimacy and credibility (Deeds et al., 1997; Stuart et al., 1999), and marketing information networks are comprised of individuals and firms that provide a flow of information. For example, customers, suppliers, and competitors can provide important information (Dollinger, 1985; Malecki & Poehing, 1999). Littunen (2000) and Watson (2007) categorized contacts as being either informal (family and friends, local businesses, others in the industry) or formal (banks, business consultants, external accountants, industry associations, Small Business

Development Corporation, solicitors/lawyers, tax office), which also correspond roughly to those groups often found to be included under strong ties (informal) or weak ties (formal). Network partners can also fulfill more than one role, such as is the case with business incubators, which provide tenants with legitimacy, information, and other network contacts (Witt, 2004).

Research (Burt, 1992; Uzzi, 1997) has shown that strong and weak ties each offer different advantages in different contexts. Weak ties may generally be regarded as performance-improving tools. Loosely defined relationships provide the freedom to exploit new opportunities by bridging disconnected contacts. Furthermore, entrepreneurs with structural autonomy are likely to gain the most, as they are not bound by social expectations or obligations (Burt, 1992). Alternatively, strong ties with customers, suppliers, and other entrepreneurs may facilitate revenue growth and exchange of shared systems because these ties are more motivated to interact, and typically are more readily available for instrumental cooperation (Granovetter, 1982). Strong ties are described as enhancing firm performance directly through trust-building, information transfer, and joint problem-solving arrangements (Uzzi, 1997).

The range of networks also includes the pattern of relationships between network partners (Hoang & Antoncic, 2003). In fact, the identity of the network partners "is secondary to their position in the network structure" (p. 170) because of their access to others in the network, which is also related to their degree of centrality. This is especially true for those who fill holes in the network's structure and therefore receive more information from a greater number of sources. The overall size and diversity of a network are also important as they determine the potential number of partners with whom a firm communicates.

Empirical research conducted on the effects of network range on performance has produced mixed results. Aldrich et al. (1987) found that network accessibility positively influenced business founding, and that network density was associated with the profitability of new ventures. Rothaermel (2001) observed a positive relationship between network size and firm performance, confirming the findings of Baum et al. (2000) that a start-up's initial performance increased depending on the size of its network. In a study of sales managers, Galunic and Moran (1999) found that network size had a positive influence on revenue. It is proposed that making network ties that provide access to more diverse information and resource capabilities generally gives stronger performance. Therefore, personal networks may increase the likelihood of entrepreneurs locating clients and suppliers who are socially related. This may in turn facilitate sales stabilization and eventual growth, as the embeddedness

provides room for negotiations that may then allow entrepreneurs to utilize their social bonds to create revenue growth and other benefits. In contrast, Reese et al. (1995) found no evidence to suggest that the size of an entrepreneur's network affects venture survival, while Deeds and Hill (1996) found a curvilinear relationship between network size and performance when studying technology partnering. Similarly, Watson (2007) determined that networking was beneficial, but that "accessing more than six networks during a year is likely to be counter-productive," as would "accessing any individual network on more than three occasions during a year" (p. 870).

In this study, the concept "network range" concerns the array of people in the network and it is used to express various types of network partners the entrepreneur stays in contact with regarding business discussions (Zhao and Aram, 1995). Other researchers use "network diversity" to express the same.

3.2.3 Network frequency of contact

The frequency with which two or more network partners interact is considered to be an element of network value, as discussed in the following section. Granovetter (1973) called the quality and intensity of a given network relationship the strength of the tie, and categorized these relationships as weak ties or strong ties depending upon the frequency of contact, friendship (emotional intensity and intimacy), and reciprocal services involved (p. 1361). These factors are actually interrelated in that frequent contact is associated with reciprocity, and friendship and contact frequency have been used to measure these other two concepts (Granovetter, 1973; Nelson, 1989). Because friends and family have more frequent contact and are closer emotionally their relationships were considered strong ties, whereas weak ties were deemed to be those involving business contacts as these typically had lower levels of intensity and less frequent contact. Similarly, Watson (2007) categorized contacts as either formal or informal, corresponding to Granovetter's weak and strong ties. Watson's study was based on the Australian Bureau of Statistics' Business Register survey, which asked participants questions regarding the frequency of contact (never, 0–3 times, more than 3 times) that they had over the past year with three informal sources (family and friends, local businesses, others in the industry) and with seven formal sources (banks, business consultants, external accountants, industry associations, the Small Business Development Corporation, solicitors/lawyers, the tax office). Zhao and Aram (1995) also measured tie strength by asking people about the frequency of weekly contact, categorizing it as low (0–1 time per week), moderate (2–3 times per week), and high (4 or more times per week). Additionally, they

asked whether the "amount of resources obtained" through the contact was small, modest, or large. They then combined these two component measures to yield a single composite measure of tie strength.

In this study, the construct Network frequency is used, meaning network frequency of contact. It is also common to just use frequency of contact. In other studies, Network frequency is used (Zhao and Aram, 1995; Watson, 2007) as an expression for how often entrepreneurs use his/her network contacts to discuss business issues.

3.2.4 Network value

The value related to the business of the relationships in a network has been termed relational embeddedness (Gulati, 1998; Rindfleisch & Moorman, 2001, p. 3; Uzzi, 1997) or depth/intensity (Zhao & Aram, 1995). More specifically, relational embeddedness refers to the "degree of reciprocity and closeness" (Rindfleisch & Moorman, 2001, p. 3) in interpersonal network relationships developed during a specific period (Granovetter, 1992; Nahapiet et al., 1998), with closeness reflecting the intensity of a relationship (Marsden & Campbell, 1984). The overall concept of relational embeddedness or quality of network ties shows the extent to which economic actions, competitive advantages, and overall business performance are affected by the quality of actors' personal relationships (Dyer, 1998; Granovetter, 1985; Tsai & Sumantra, 1998). Important elements of the concept include communication (Lechler, 2001), cooperation, impact, tie strength (Dollinger, 2003; Granovetter, 1973; Rindfleisch & Moorman, 2002), and trust (Cohen & Levinthal, 1990; Galunic & Moran, 1999; Sivadas & Dwyer, 2000; Tsai, 2001).

Rather than using frequency and type of contact, other researchers have used concepts involving feelings about relationships, communication, and cooperation to measure the value of network ties (Lechler, 2001; Johannisson, 2000; Miller et al., 2006/2007; Rindfleisch & Moorman, 2001). Rindfleisch and Moorman (2001) measured tie strength by asking participants to indicate the degree to which they felt indebted to their collaborators and shared close social relationships, expected that they would be working together far into the future, and defined their relationships as mutually gratifying.

Using concepts pertaining to communication, cooperation, and the impact of these communications to measure the quality of networks, Lechler (2001) found that social interaction between a new venture's team members, including both the frequency of communication and degree of cooperation, had a positive effect on firm performance. A 1995 survey of 2,500 SME owners determined that growth-oriented owners were more likely to be

communicative and participative in their management styles and were also more likely to establish networks (Gray, 1998). According to Johannisson (2000), communication, network size, and firm performance are interrelated. Inter-firm networks may provide access to complementary resources that can be used to develop, produce, and market products and services (Deeds & Hill, 1996). However, entering into inter-firm relationships also presents costs and risks as well as benefits. Costs include both financial resources and time, and risks include the loss of both time and money (Watson, 2007; Zhao & Aram, 1995).

Miller et al. (2006/2007) concluded that communication, as well as cooperation and the impact of relationships in networks, are useful measures for explaining the performance and behavior of young firms. They measured the degree of communication by asking how frequently, frankly, and intensely participants communicated with other new firms and how constructive and beneficial these discussions were perceived to be. They measured cooperation by asking how often participants had referred customers to network members, exchanged or shared employees, worked together to influence legislation, shared information about new techniques/suppliers/customers/technology, worked together for marketing or promotion, or developed a new product or service with another business. The impact of relationships between network members was measured by asking about the improvement in market knowledge, management skill, product quality, and marketing that were derived from the relationship as well as the degree to which the relationship provided opportunities for personal socializing.

Another important aspect of the value of a network is trust between actors, which "plays a major role in influencing resource exchange and costs compared to market coordination or integration of activities" (Lechner et al., 2006, p. 516), and is a key factor in the development of relationships and networks (Bøllingtoft & Ulhøi, 2005; Hoang & Antoncic, 2003; Granovetter, 1982; Jarillo, 1988; Thorelli, 1986). The presence of trust allows those within a trusting relationship to assume that each will take actions that are predictable, mutually acceptable, and shared (Powell, 1990; Uzzi, 1997). In addition to reducing costs, trust increases the flow of information by encouraging partners to share deeper and richer knowledge (Hoang & Antoncic, 2003; Uzzi, 1997). It is, however, not easy to define or identify trust (Stiglitz, 2000), and knowing how much to trust someone is often difficult (Krishna, 2000).

The development of trust for start-ups takes both time and effort but is often strengthened by shared interests and common backgrounds (Hite, 2003; Lorenzoni & Lipparini, 1999). The level of trust between new firms in a network can vary. As an element

of social capital, trust and the accompanying reciprocity allow greater access to resources and a willingness to work things out through mutual problem solving (Miller et al., 2006/2007). The belief that an exchange partner will not act in self-interest at another's expense is important in alliances and joint ventures, as no contract can cover all the variations and conditions that can occur (Dollinger, 2003; Uzzi, 1997). Trust therefore signifies a commitment by the network members not to take advantage of another member's weakness, and it represents both an ongoing social control mechanism and a risk reduction device (Dollinger, 2003). It influences both the extent of knowledge and resources exchanged in the network of new firms and the efficiency with which these are exchanged, which leads to a shared understanding between the members of the network (Lane & Lubatkin, 1998).

Sivadas and Dwyer (2000) found that cooperative competency, which they defined as a combination of trust, communication, and coordination, was a significant contributor to the success of new product development in an alliance between firms (p. 42). They asked participants about the degree to which they felt their network partners had the ability to contribute to cooperative projects, whether their network partners' motives were questionable, and the extent of their trust that network partners would act in the participant's best interest.

The value provided by networks of new small businesses increases the young firms' knowledge, which is acquired through the network relationship as network interactions intensify (Dollinger, 2003; Birley, 1985).

3.3 DEVELOPING ABSORPTIVE CAPACITY

One of the most valuable benefits of being associated with an incubator is the availability of on-going, in-depth business counseling (Smilor, 1987). Social capital derived from the networks facilitated by an incubator increases a firm's capability for knowledge transformation and exploitation, or its realized absorptive capacity (Zahra & George, 2002). While a considerable amount of counseling deals with operations and with overall strategy, incubators also can advise prospective entrepreneurs not to proceed until they have a better business plan. The opportunity for immediate feedback and assistance leaves the firm with more time for productive work, reduces the number of costly mistakes, and increases its general knowledge of what to do (or not do) to succeed in business.

When incubator tenants and managers share problems, those with the relevant information, knowledge, and expertise can share solutions. Lichenstein (as cited in Lewis, 2001) found that the opportunity to acquire skills and generate new ideas by observing and

talking to incubator managers and other tenants is important to the success of incubated firms (p. 14). The exploitation of knowledge then manifests in a firm's ability to innovatively create new goods and services (Rumelt, 1987; Spender, 1996). A certain amount of relevant knowledge is necessary before a firm can increase its knowledge base (Gray, 2006). By gathering in mutually beneficial groups and by sharing knowledge, incubator tenants not only provide each other with knowledge but also help each other learn. For small firms such as those that populate incubators, the entire firm's absorptive capacity is reflective of the individual entrepreneur. However, there is also the management expertise provided by the incubator managers and other professionals that forms the basis of an incubator's business support (Bergek & Norrman, 2008; Smilor, 1987).

Although it takes time to establish knowledge acquisition routines, participation in an incubator may assist entrepreneurs in their efforts, thus increasing the speed of a firm's absorptive capacity development (Brissett, 2001). Additionally, the variety of areas of expertise that are available to incubator tenants can influence the paths that the entrepreneur follows in acquiring knowledge. This presence can offer incubated firms greater flexibility in assembling necessary resources and can increase the degree to which they assimilate knowledge. Overall, this can lower the cost of capability development over time (Teece et al., 1997; Zott, 2003).

Incubators offer information, knowledge, and expertise that are essential for the survival and entrepreneurial performance of new ventures. They may also reduce the uncertainty that incubated firms experience (Collinson & Gregson, 2003; Smilor, 1987). Hackett and Dilts (2004) suggest that incubators provide formalized business training, especially with regard to business plan writing, to help entrepreneurs develop their intangible knowledge resources. The chances of success increase when firms have relationships with educational institutions or appropriate professional organizations that offer regularly scheduled training courses. The integration of business plan development into training courses also seems to make a positive contribution.

Few new ventures achieve high entrepreneurial performance during their early years due to a variety of problems that include poor management and under-capitalization (Allen & Rahmans, 1985). Although entrepreneurs may have specialized knowledge about a product, they frequently lack a full complement of business skills. In these cases, the incubator facility can play a critical role, as it helps fill these knowledge gaps, helps reduce early-stage operational costs, and helps embed entrepreneurs in a local enterprise support network. As firms develop both their absorptive capacities and networks through their participation in

incubators, they are more likely to improve their entrepreneurial performance. There is a lack of current research dealing specifically with how incubated firms develop within incubators, despite the great deal of research on new business development (Hackett & Dilts, 2004). This study addresses this important gap in the literature.

3.3.1 The concept of absorptive capacity

Absorptive capacity deals with knowledge; an entrepreneur's educational level is an important variable to examine. Both education levels and firm size have been found to be positively linked to levels of entrepreneurship growth and internal development practices (Storey, 1994; Gray, 1998; Harding, 2003). In a study of British start-ups, Gray (2006) measured absorptive capacity according to level of education, experience, propensity to innovate, and growth strategy, all of which have been shown to relate to overall performance. The level and relevance of formal training and experience was related to the degree of functional knowledge, which was found to correlate to educational level, source of knowledge acquisition, and experience. He also found that larger, growth-oriented start-ups were not only more likely to offer more training, but also to engage in more informational and learning activities, which facilitate the development of absorptive capacity. In contrast, small business owners with less formal education were more growth averse than the other respondents. This was especially true with organizations that were planning to make significant investments in the following year. Start-ups with approximately 15 employees (as opposed to smaller firms) demonstrated a greater capacity to absorb and use new knowledge, especially those in which the entrepreneurs had higher educational levels and clear growth objectives.

Absorptive capacity is often defined as having three basic components, which include the acquisition of new knowledge, integrating it into the firm, and then exploiting it for the company's benefit (Cohen & Levinthal, 1990; Gray, 2006; Heeley, 1997; Liao et al., 2003). However, Zahra & George (2002) reconceptualized absorptive capacity as having four components. They considered acquisition and assimilation to be processes that are related to potential absorptive capacity, whereas realized absorptive capacity included transformation and exploitation of knowledge. Potential absorptive capacity is separate from realized absorptive capacity in that acquiring knowledge is not the same as utilizing it. These processes build on each other to influence a firm's other organizational capabilities, such as production, marketing and distribution (Teece et al., 1997). According to Eisenhardt & Martin (2000), these processes are characteristic of the specific ways that firms pursue, develop, and employ resources to achieve different competitive advantages and improve entrepreneurial

performance. In the following sections, the different aspects of absorptive capacity and its influence on performance are described in greater detail.

3.3.2 Acquisition

Acquisition refers to a firm's ability to identify and obtain outside knowledge that is critical to its operations. This kind of knowledge will typically be acquired from the networks. Knowledge acquisition has three attributes that can influence absorptive capacity: intensity, speed, and direction (Cohen & Levinthal, 1990). The intensity and speed of a firm's efforts to identify and gather knowledge can determine the quality of that firm's acquisition capabilities. Obviously, there are limits to a firm's ability to increase its speed because learning cycles cannot be shortened easily, and some of the resources necessary for the development of absorptive capacity are not quickly assembled (Clark & Fujimoto, 1991). The direction knowledge accumulation takes can influence the paths that the firm follows in obtaining external knowledge. These activities vary in their richness and complexity, and having different areas of expertise within a firm improves its ability to process and retain external knowledge.

Jantunen (2005) measured knowledge acquisition by asking business owners about the frequency with which they and their employees actively observed the best practices in their industry, communicated with customers and third party consultants (accountants, business consultants, tax advisors), and collected industry information (through such informal means such as lunch with industry friends and talks with trade partners). These items were therefore related to the process of taking in new information without regard to what was done with that information.

3.3.3 Transformation

Having acquired new knowledge a firm must assimilate, transform, and integrate this knowledge into its routines and processes. To do so it must first analyze, process, interpret, and understand the information that it obtained from external sources (Szulanski, 1996). This is necessary because external knowledge is often context specific which can prevent outsiders from understanding or replicating this knowledge (Szulanski, 1996). Comprehension is especially difficult when the value of knowledge depends on the existence of complementary assets that may not be available to the recipient firm (Teece, 1981). However, as comprehension promotes knowledge assimilation, establishing comprehension allows firms to process and internalize similar externally generated knowledge.

Transformation refers to an organization's ability to change and to develop routines for combining recently acquired and assimilated knowledge with existing knowledge (Zahra & George, 2002). This may mean adding further knowledge, interpreting current knowledge differently, or even deleting existing knowledge. This transformation leads to action as the firm "alters the way the firm sees itself and its competitive landscape" (Zahra & George, 2002, p. 190) and recognizes new opportunities in its environment (Smith & DeGregorio as cited in Zahra & George, 2002). As a firm transforms based on its new knowledge, it may develop new competencies and strategies.

Firms with well-developed capabilities of acquisition and assimilation are likely to be more adept at continually revamping their stores of knowledge. There are two dimensions to being adept: timing and cost. First, a well-developed absorptive capacity helps a firm track changes in its industry more effectively, thereby facilitating the deployment of changes to essential functions, such as production and technological competencies, in a timely manner. Second, given that capabilities are captured in a firm's routines, the costs associated with capability development decrease over time as the firm gains experience and more effectively manages its routines. Thus, a highly developed absorptive capacity reduces sunken investments in external resources and operational routines. The costs of change are likely to be lower when firms have accumulated adequate knowledge and prior experience to comprehend the new knowledge or skill base (Teece et al., 1997; Zander & Kogut, 1995; Zott, 2001). Further, the more flexible a firm is in configuring its resource base, the more capable it is of integrating the knowledge so that it can be exploited for entrepreneurial performance.

3.3.4 Exploitation

Exploitation is based on the routines that allow firms to refine, extend, and leverage existing competencies or create new ones by incorporating acquired and transformed knowledge into their operations. The presence of such routines provides structural, systemic, and procedural mechanisms that allow firms to sustain the exploitation of knowledge over extended periods of time. Exploitation reflects a firm's ability to harvest and incorporate knowledge into its operations (Van den Bosch et al., 1999). The outcomes of systematic exploitation routines include the persistent creation of new goods, systems, processes, knowledge, and new organizational forms (Spender, 1996). Exploitation is evident, for example, in new ventures that capture knowledge from their market, competition, and customers, and then use that knowledge to develop new competencies. Similarly, successful,

established companies are likely to establish routines that target and deploy their knowledge to enhance existing initiatives or encourage new initiatives within a firm (Rumelt, 1987) to be innovative and focus on new products, services, and markets.

Jansen et al. (2005) examined the exploitation of new external knowledge of marketing by asking entrepreneurs how well the person or people in the firm knew how marketing activities should be performed, whether they knew who to turn to in order to obtain information about customers or marketing, and whether they had considered how to better exploit knowledge, listened to and changed practices because of customer complaints, responded to competitors' actions, and easily implemented new products and services.

Although Zahra and George (2002) include transformation as one of the elements of absorptive capacity, this concept is contained within the ideas of assimilation and exploitation, in how that information is communicated and used. Cohen and Levinthal (1990) used three original constructs of knowledge acquisition, transformation, and exploitation. Firms must have the ability to identify and take in valuable new knowledge, share it with the necessary employees, and then make actual use of it so that knowledge is transformed and can then be exploited in new and practical ways. Furthermore, because this is a path-dependent process, the ability to identify and use new knowledge is to some degree based upon the firm's pre-existing knowledge base.

3.4 SUMMARY AND DIRECTIONS FOR THE RESEARCH MODEL

The above review of the literature on success in small business showed that some characteristics of entrepreneurs, such as age, experience, and level of formal education, fall outside the mission of business incubators. For example, incubators strive to teach tenants practical knowledge and assist in their learning, but they are not schools. Similarly, incubators do not seek to change an organization's industry, but work with that organization's owner to improve performance within a given industry.

Following Bergek and Norrman (2008), it is clear that business incubators focus on the development of network value, and absorptive capacity, which are then used as tools for business growth. This study therefore examined the concepts of network value and absorptive capacity and sought to analyze the degree to which incubators help tenants by increasing entrepreneurial performance, as well as the value of networking and of absorptive capacity. These two independent variables together with the dependent variable, entrepreneurial performance, will be key elements for the research model.

4. RESEARCH MODEL AND HYPOTHESES

The following sections present the research model, hypotheses, and the conceptual model. The connection between the literature review and the research model is presented in Section 4.1. Hypotheses about incubators and entrepreneurial performance are presented in Section 4.2. Network value is outlined in Section 4.3, and hypotheses for network value in new firms are presented. This is followed by hypotheses regarding absorptive capacity in Sections 4.4 and 4.5, while Section 4.6 describes the conceptual research model.

4.1 FROM THEORY REVIEW TO RESEARCH MODEL

The literature presented previously has argued that network value and absorptive capacity are two important areas for entrepreneurs when starting a new business. In order to succeed, new firms therefore need to develop their networks (specifically the value of the networks) and develop their knowledge about the businesses, markets, industry, and environment in which they compete, which in this study is to increase their absorptive capacity.

In the literature, incubators are assumed to provide new businesses with a better chance of survival and with improved entrepreneurial performance (Wiley, 1997). The assumption is that a business incubator provides start-ups with a higher level of both network value and absorptive capacity, which in turn leads to a higher level of performance than they would otherwise be capable of.

The importance of network value is to provide access to external resources, business ideas to run the firm and information of value for business development (Granovetter, 1973; Hoang, 2003; Jarillo, 1989). It is further expected that incubated companies will enjoy greater network value than those that have not benefitted from this type of network offered from an incubator. Between new firms it is normal to think about competition. When some individuals who have trusting relationships share resources, this builds value and provides advantages to their businesses (Jarillo, 1988; Wollebaek & Selle, 2002). This use of external resources in turn facilitates the development of absorptive capacity.

Networking leads to a greater base of information and knowledge through help from external partners to develop competence (Gray, 2006) and then stimulate the absorptive capacity (Cohen & Levinthal, 1990; Teece et al., 1997; Zahra & George, 2002; Wu, 2007). For small firms such as those that populate incubators, the entire firm's absorptive capacity is reflective of the individual entrepreneur.

The literature review in Chapter 3 has shown that networking and learning are important mechanisms for a new firm to act successfully and affect entrepreneurial performance. The research model then is based on the independent variables incubator, network value, absorptive capacity and the dependent variable entrepreneurial performance.

To examine the importance of incubator connections for new firms, and the extent to which network value and absorptive capacity are related to entrepreneurial performance, the following research model is proposed in Figure 4 below:

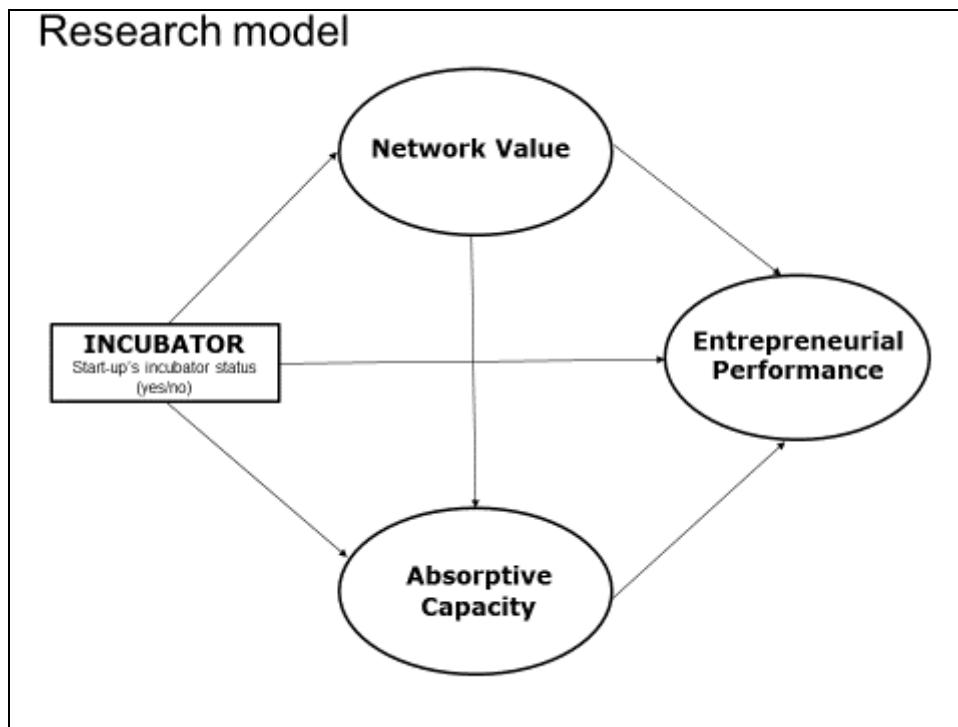


Figure 4 - Research model

In the model, the unit of examination is start-ups, new small firms, with and without incubator connection. The research model assumes that being in an incubator strengthens entrepreneurial performance, and also that incubator connection strengthens both network value and absorptive capacity for start-ups. In addition, network value is presumed to be positively related to absorptive capacity, as networks provide knowledge for new firms. Further, the model shows a positive relationship between network value and entrepreneurial performance, and between absorptive capacity and entrepreneurial performance. New small firms both inside and outside incubators will be studied in order to determine the degree to which business incubators directly affect entrepreneurial performance or whether this is indirect and entrepreneurial performance is affected through improved network value and increased absorptive capacity.

Hypotheses will subsequently be proposed regarding the influence of incubators, network value, and absorptive capacity on entrepreneurial performance.

4.2 INCUBATORS AND ENTREPRENEURIAL PERFORMANCE

Incubators aim to accelerate the conception, launch, and early growth phases of a new venture (Hannon, 2003). As detailed in Section 2.2, there are three major roles that business incubators play for start-ups. As mentioned above, the literature review shows that these are by providing physical infrastructure, mediation services, and business consulting (Bergek & Norrman, 2008). That is, incubators support new firms with physical infrastructure for a business (i.e., office space, office equipment) as well as by helping them to develop human and social resources through network and consulting. Additionally, incubators attempt to provide tenants with useful services and help them utilize them, encouraging improvements to business performance.

In their study of incubated firms, Allen and Rahman (1985) found that slightly over half of the firms changed their business strategies due to incubator influence. Of these, 42% believed that the incubator enabled them to accelerate their plans and expand at a faster pace.

Because they flow from the other people involved in the venture as well as from the entrepreneur, dynamic capabilities (Wu, 2007) and networks (Lechner et al., 2006) are considered both personal and organizational factors. Access to financial capital, which can then be converted into other types of resources, is also a significant factor (Cooper et al., 1994; Wiklund & Shepherd, 2005). According to the RBV of the firm (Penrose, 1959; Wernerfelt, 1984; Barney, 1991; Kogut & Zander, 1992; Conner & Prahalad, 1996), organizations are built up by incorporating these unique resources and capabilities, which Barney (1991) has classified as organizational, physical, and capital resources. Capital resources can be further broken down into the categories of human capital, meaning the skills and knowledge of people in the organization, and social capital, which refers to the relationships between people (Coleman, 1988; 1990; Honig, 1998).

For this purpose, the construct of entrepreneurial performance is used.

Incubators should therefore increase the possibility of better entrepreneurial performance for start-ups in an incubator than non-incubated firms, leading to the following hypothesis:

H₁: Incubated firms will have better entrepreneurial performance than non-incubated firms.

Even in the early part of the last century, new firms were confronted with a highly dynamic environment (Schumpeter, 1936). This situation has intensified today, as the rate of environmental change has increased exponentially, meaning that entrepreneurs must therefore be able to innovate, perceive profit opportunities, and implement new resource combinations (Kotkin, 2000; Naisbitt, 2006). In the current era, one of the most important resources in entrepreneurship is knowledge, meaning that the development of absorptive capacity is vital to performance. Networking with other people, from suppliers to customers to other business owners, provides an effective means for obtaining new knowledge. Additionally, many new opportunities arise from alliances and networks. The following sections describe the various attributes of networks and absorptive capacity, showing how they relate to performance for start-ups.

4.3 NETWORK VALUE FROM BUSINESS INCUBATORS

The resources and services provided by incubators are important to the success of incubated firms (Bergek & Norrman, 2008; Bøllingtoft & Ulhoi, 2005; Boyd, 2006; Chan & Lau, 2005; Colombo & Delmastro, 2002; Hackett & Dilts, 2004; Rice, 2002). The mediation function of incubators not only connects tenants with external help and resources, but also provides tenants with the opportunity to develop new networks with incubator management and with other incubated firms.

In contrast to resources and services provided within the incubator, some resources are obtained from external sources. For example, incubator management may not provide legal and accounting services directly, but may provide them indirectly by linking tenants with external advisors. This provides a double benefit as incubated firms not only receive needed support, but also establish broader and richer networks than they could on their own.

A network's structure pertains to the people in the network (Aldrich et al., 1987; Galunic & Moran, 1999; Hoang & Antoncic, 2003; Johannisson, 2000; Lechner et al., 2006; Rothaermel, 2001), while relational embeddedness is indicated by the quality, intensity, or strength of a relationship (Dyer & Singh, 1998; Granovetter, 1992; Gulati, 1998; Marsden & Campbell, 1984; Nahapiet et al., 1998; Rindfleisch & Moorman, 2001, p. 3; Tsai & Sumantra, 1998; Uzzi, 1997; Zhao & Aram 1995). Granovetter (1973) based the strength of a tie (weak

or strong) on the frequency of contact, determining that contact frequency is also an indicator of friendship and reciprocity. Studies by Dyer & Singh (1998), Granovetter (1992), Nahapiet et al. (1998), Rindfleisch & Moorman (2001), Tsai & Sumantra (1998), Uzzi (1997), and Zhao & Aram (1995) all show that frequency of contact has often been used as a measure of network strength. This is because relationships are developed by frequent contact and, as a corollary, people tend to meet more often and for longer periods of time with people with whom they have stronger relationships. Frequent communication is essential to the development of relational embeddedness, which is itself important because "higher levels of relational embeddedness facilitate the utilization of information" (Rindfleisch & Moorman, 2001, p. 5). In this system, relationships with friends and family are deemed to be strong ties because of frequent contact and emotional closeness, whereas weak ties are most seen as more common for business associates, consultants, and other such contacts.

Others (Frenzen & Nakamoto, 1993, p. 369; Zhao and Aram, 1995) contend that frequency of contact is an insufficient measure of tie strength because there is no guarantee that information is exchanged; there is only the opportunity for exchange. The quality of relationships between businesses, customers, suppliers, creditors, and other parties will vary depending not only on the frequency of contact, but also on the reciprocity of the exchange (Aldrich & Zimmer, 1986). Zhao and Aram (1995) examined the "amount of resources obtained" as part of their measure of relational "intensity." For example, a strong tie with a friend with whom one interacts frequently is not necessarily of great value in a business setting, whereas a weak tie with a business consultant would be expected to yield a higher quantity of resources obtained. This study equates network quality with intensity, which is based on both the range of contacts (number of different types of people in a network) and the value of the resources obtained from those contacts.

Granovetter (1973) also argued that "the strength of weak ties" was related to network diversity in that "individuals with few weak ties will be deprived of information from distant parts of the social system and will be confined to the provincial news and views of their close friends" (p. 106). Thus, it follows that business founders with larger and more diverse networks of contacts are more likely to obtain information that will help them surmount business development problems, thus improving their prospects for survival and growth (Aldrich, 1989; Burt, 1982; Low & MacMillan, 1988; Zhao & Aram, 1995). One of the primary goals of business incubators is to increase tenants' access to different business contacts that will be useful to them (Bergek & Norrman, 2008).

In fact, business incubators are in themselves a special kind of network in that they link incubated firms with each other. This connection with both internal and external companies can help incubated firms increase their range of contacts. It is therefore expected that the networks of entrepreneurs who are in incubators will have a greater range (diversity) than those that have not benefited from this type of support.

Most entrepreneurs do not possess all the knowledge they need to start a new business, and therefore discuss their plans for business development with other people. The set of people with whom the entrepreneur discusses business is called a business discussion network (Greve & Salaff, 2003). Both the size of the discussion network (a larger number of sources is likely to provide more and better information) and the entrepreneur's position within the network (a shorter path to a knowledgeable person is likely to provide better and faster access to information) are important characteristics of the network (Burt, 1982; Granovetter, 1973; Greve & Salaff, 2003). Additionally, diversity of contacts in the network can also be important, as it increases the variety of information that can be obtained (Greve, 1995).

Given that incubated firms can benefit from the business discussion networks developed by the incubator manager, the owners of incubated firms can be expected to have larger and more diverse business discussion networks, which provide greater value than do the networks of owners of non-incubated firms. Additionally, because the firms are located in the incubator, where the entrepreneurs are likely to have more systematic daily contact with other people (especially the incubator manager), the value of the network should be higher for entrepreneurs whose firms are located in incubators as compared to those that are not benefitting from this service, leading to this hypothesis:

H₂: Incubated firms have higher levels of network value compared to non-incubated firms.

Larger networks, which logically present a greater opportunity for diverse network size and value, have been found to positively influence start-ups' network diversity and ultimately entrepreneurial performance (Aldrich et al., 1989; Baum, Locke, & Smith, 2001; Galunic & Moran, 1999; Rothaermel, 2001). By examining the roles of structural and relational embeddedness in network density and strength, Rowley, Behrens, & Krackhardt (2000) found that network density (associated with replication of information) had a negative relationship to firm performance. In Watson's (2007) study, formal and informal networks were associated with survival, but only formal networks were also associated with growth. In

his investigation of diversity in network ties, Uzzi (1996) found that a firm is more likely to survive if it has a diverse set of network ties to a variety of network partners.

In their study, Zhao & Aram (1995) found that high-growth firms put more emphasis on the intensity of their network ties, while low-growth firms tended to have lower levels of networking intensity, and that intensity, in turn, corresponded with higher value. Thus, network value leads to better entrepreneurial performance. This leads to the third hypothesis:

H₃: Network value has a positive effect on entrepreneurial performance.

Yli-Renko, Autio, and Sapienza (2001) argue that the amount of external knowledge a young firm will acquire from the key customer depends on aspects of social capital in the relationship and, in particular, on the level of network ties and value. Further, they also expect that knowledge acquisition will enhance knowledge exploitation processes, thereby enhancing performance. It may then be pointed out that the higher the level of customer network value provided by the key customer, the greater the new firm's knowledge acquisition, possibilities of knowledge exploitation, and entrepreneurial performance will be.

Overall, these hypotheses are based on the assumption that by building large, diverse networks, business founders can acquire information, thus increasing absorptive capacity. Because learning organizations can more easily benefit from using networks and clusters to use and create new knowledge (Gray, 2006), networks and clusters have been suggested as an effective method for start-ups to overcome their skills and knowledge gaps (U.K. National Skills Task Force, 2000). Gray (2006) also claims that the propensity to network is a prerequisite to "the effective knowledge management that underpins the construction of entrepreneurial absorptive capacity" (p. 349). The following section further describes the nature and importance of absorptive capacity to new small firms, including the relationship between networks and learning capabilities.

4.4 THE RELATIONSHIP BETWEEN NETWORK VALUE AND ABSORPTIVE CAPACITY

Establishing networks can be an effective method for start-ups that seek to overcome their skills and knowledge gaps by gaining access to external resources (Gray, 2006; Watson, 2007; Wu, 2007). Absorptive capacity is essential to the creation of entrepreneurial performance as it pertains to a firm's overall ability to learn, to integrate and disseminate new knowledge internally, and then exploit this knowledge to enhance performance (Teece et al.,

1997; Wu, 2007; Zahra & George, 2002). Because an organization needs prior knowledge in order to assimilate and use new knowledge, absorptive capacity is a function of the organization's existing resources, tacit and explicit knowledge, internal routines, management competencies, and culture. Therefore, in the early stages of new venture development, it is the identification and acquisition of resources rather than deployment or allocation activities which are most critical for a firm's future performance (Stevenson & Jarillo, 1985). Research and development activities build up an SME's internal knowledge at the same time that they contribute to a firm's absorptive capacity (Gray, 2006; Griffith et al., 2003). Such innovation is also an indication of proactive entrepreneurialism, which has also been shown to be related to performance. According to Gray (2006), networking is a pre-requisite to "the effective knowledge management that underpins the construction of entrepreneurial absorptive capacity" (p. 349). Firms build absorptive capacity by investing in strategic networks. High network value then extends their knowledge base and allows them to acquire and exploit external sources of knowledge that can subsequently be applied to commercial ends (Zahra & George, 2002), thus leading to the following hypothesis:

H₄: Network value has a positive effect on absorptive capacity.

As a new firm's knowledge base increases, its performance is likely to improve as it profits from the new knowledge it has absorbed. The ability to apply this new knowledge to commercial ends can translate into improved entrepreneurial performance because new firms with high absorptive capacity are likely to successfully commercialize new products/services (Cohen & Levinthal, 1990). Gray (2006) contends that some of the major challenges start-ups face are exactly these knowledge-based issues, such as the maintaining of firm capabilities and management competencies, acquiring and interpreting new knowledge, and innovatively creating new knowledge (p. 348–349).

4.5 ABSORPTIVE CAPACITY FROM BUSINESS INCUBATORS

As discussed in Chapter 3, absorptive capacity refers to the ability to acquire, transform, and exploit knowledge. It is commonly argued (Zahra & George, 2002; Iammarino, 2005) that greater absorptive capacity results in higher levels of knowledge development. Both potential and realized absorptive capacity are important in assessing the overall degree of the absorptive capacity of firms. Potential absorptive capacity involves the

acquisition of knowledge (Zahra & George, 2002). The acquisition of knowledge is dependent on the availability of relevant knowledge sources and the type of networks to which the firm has access. Realized absorptive capacity is based on the firm's ability to use newly acquired abilities.

Knowledge acquisition refers to a firm's capability to identify and acquire externally generated knowledge that is critical to its operations (Zahra & George, 2002). The more knowledge that can be collected over a given period, the better the acquisition capability works. Exploitation emphasizes change, flexibility, and innovation, leading to the creation and implementation of new organizational goals, forms, and practices (Zahra & George, 2002). Thus, a firm's absorptive capacity depends not only on its direct interaction with the external environment, but also on its internal knowledge. In the research model, it is hypothesized that network ties and value influence a firm's absorptive capacity and ultimate success as these relationships help the company acquire knowledge.

While the acquisition of knowledge involves potential absorptive capacity, the transformation and exploitation of knowledge represent realized absorptive capacity (Zahra & George, 2002). The variety of areas of expertise that are available to incubator tenants can influence the paths that the entrepreneur follows in acquiring knowledge. This can offer incubated firms greater flexibility in assembling needed resources, thereby increasing the degree to which they can transform and exploit knowledge. This can ultimately lower the cost of capability development over time (Teece et al., 1997; Zott, 2003).

Cohen and Levinthal (1990) examined how absorptive capacity is needed for acquiring external knowledge in general. A certain amount of relevant knowledge is necessary before a firm can further increase its knowledge base in a given area (Gray, 2006). For small businesses, firm absorptive capacity is largely reflective of the absorptive capacity of the individual entrepreneur.

Lichenstein (as cited in Lewis, 2001) found that, for incubator tenants, the opportunity to acquire skills and generate new ideas by observing and talking to incubator managers and other tenants is important to their success (p. 14). Participation in an incubator may assist entrepreneurs in their efforts and thus increase the speed of their development of absorptive capacity (Brissett, 2001). In addition to the business support (management expertise) provided by the incubator managers (and other professionals that tenants come into contact with via the incubator), incubated firms can also help each other to learn as they gather in mutually beneficial groups and share knowledge (Bergek & Norrman, 2008; Smilor, 1987). It is

therefore expected that incubators will support start-ups in their knowledge acquisition process.

Further, as incubators assist tenants in acquiring knowledge, their ability to exploit the knowledge they acquire will increase, and will exceed that of non-incubated firms. For example, approximately half of the participants in a study of incubated firms altered their business strategies because of what the owners had learned from their incubator experience (Allen & Rahman, 1985). The above arguments lead to this hypothesis:

H₅: Incubated firms have higher levels of absorptive capacity compared to non-incubated firms.

Absorptive capacity is essential to the creation of entrepreneurial performance as it pertains to a firm's overall ability to learn, integrate, and transform new knowledge internally, and then exploit this knowledge to strengthen the firm (Cohen & Levinthal, 1990; Gray, 2006; Teece et al., 1997; Wu & Young, 2007; Zahra & George, 2002).

The acquisition, transformation, and exploitation of knowledge enhances a firm's ability to innovatively create new goods and services (Rumelt, 1987; Spender, 1996). Zahra and Hayton (2008) found that absorptive capacity leads to higher firm performance, as it facilitates the flow of knowledge necessary for new product development. It can therefore be hypothesized that:

H₆: Absorptive capacity has a positive effect on entrepreneurial performance.

As incubators help tenants acquire, transform, and exploit knowledge, these organizations promote their tenants' success. Indeed, the purpose of incubators is to provide necessary infrastructure, business support, and mediation to increase the chances of the survival and growth of incubated firms (Bergek & Norrman, 2008; Bøllingtoft & Ulhøi, 2005; Boyd, 2006; Chan & Lau, 2005; Colombo & Delmastro, 2002; Hackett & Dilts, 2004; Rice, 2002).

In 1997, Heely wrote that absorptive capacity is an appealing yet illusive construct. A decade later, Vega-Jurado, Gutierrez-Garcia, and Fernandez-de-Lucio (2008) stated that "there is no widely accepted measure of absorptive capacity" (p. 398–9). Neither Cohen and Levinthal's (1990) model nor Zahra and George's (2002) extension has been commonly used to measure absorptive capacity directly. Instead, research and development spending/intensity (Cohen & Levinthal, 1990; Stock, Greise, & Fischer, 2001; Vega-Jurado et al., 2008; Zahra &

Hayton, 2008), existence of a formal research and development department (Vega-Jurado et al., 2008), number of patents held by the company (Nicholls-Nixon, 1993), and other proxy variables have often been used to determine absorptive capacity level. Heely (1997), however, contends that although research spending may be related to absorptive capacity, it is really more of a reflection of a firm's technical knowledge and expertise.

According to Cohen and Levinthal (1990), in their seminal work on absorptive capacity, an organization's absorptive capacity is based on the transference of knowledge within the company (p. 131 - 2). Therefore, "communication between the external environment and the organization, as well as among the subunits of the organization, and also on the character and distribution of expertise within the organization" is vital to the understanding of the source of a firm's absorptive capacity. This emphasis on communication, not just within the firm, but also with external sources, is also closely related to network value.

4.6 THE CONCEPTUAL RESEARCH MODEL

The conceptual research model (see Figure 5 below) is based on the literature regarding business incubators (Bergek & Norrman, 2008; Bøllingtoft & Ulhoi, 2005; Boyd, 2006; Chan & Lau, 2005; Hackett & Dilts, 2004; Neck et al., 2004; Schwartz, 2013), RBV (Wernerfelt, 1984; Barney, 1991; Teece et al., 1997), networks (Watson, 2007; Lechner et al., 2006; Lerner, 1997; Donckels et al., 1995; Aldrich et al., 1985; Granovetter, 1973), absorptive capacity (Gray, 2006; Wu, 2007; Zahra & Hayton, 2008; Szulanski, 1996; Cohen & Levinthal, 1990), and business performance (Wiklund & Shepherd, 2005; Porter, 1985; Rumelt, 1987; Cooper, Gimeno-Gascon, & Woo, 1991; Pelham et al., 1996).

The relationship between business incubators and entrepreneurial performance (described in Section 4.2), network value, and absorptive capacity (Sections 4.3 - 4.5) are then useful in explaining entrepreneurial performance in new firms, as shown in the conceptual research model in Figure 5. It is proposed that incubator support strengthens both network value and absorptive capacity for incubated firms. In addition, network value is positively assumed to be related to absorptive capacity, as network value provides knowledge for new firms.

Further, there is a positive relationship between network value and entrepreneurial performance, and between absorptive capacity and entrepreneurial performance. The relationship between the model and the hypotheses is shown in Figure 5:

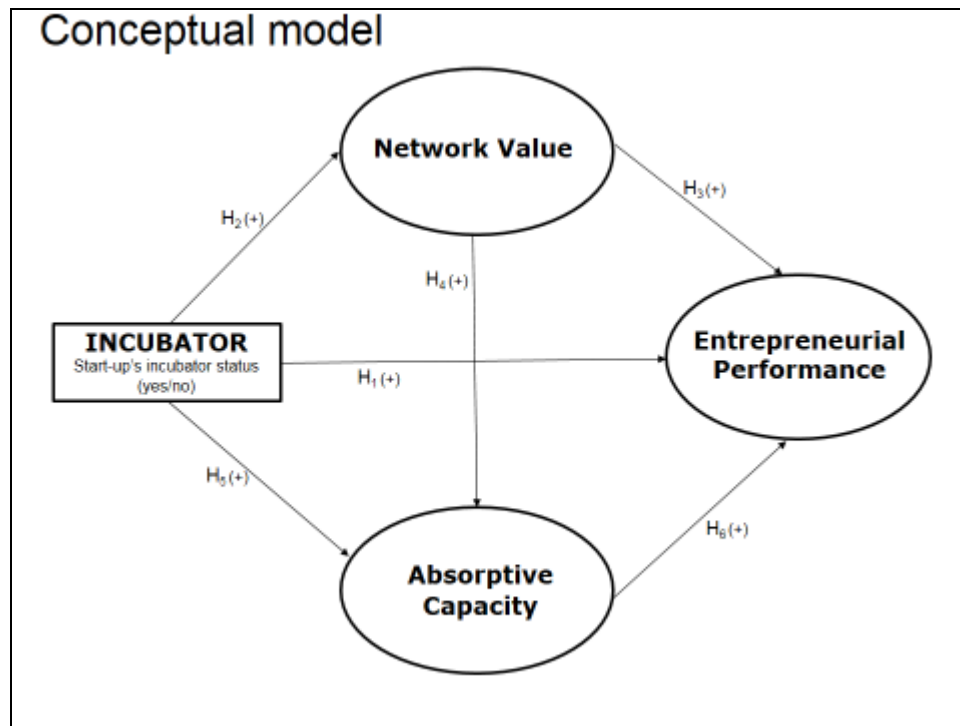


Figure 5 - Conceptual model of the relationship between the variables and hypotheses

4.7 SUMMARY OF VARIABLES AND HYPOTHESES

This chapter presented the conceptual research model and hypotheses that is the object for investigation in this research. A summary of these hypotheses is presented in Table 4.

Table 4 - Summary of Research Hypotheses

#	Statement of Hypotheses with Underlined Variables
1	Incubated firms will have better entrepreneurial performance than non-incubated firms.
2	Incubated firms have higher levels of network value compared to non-incubated firms.
3	Network value has a positive effect on entrepreneurial performance.
4	Network value has a positive effect on absorptive capacity.
5	Incubated firms have higher levels of absorptive capacity compared to non-incubated firms.
6	Absorptive capacity has a positive effect on entrepreneurial performance.

In Chapter 5, the research design, empirical setting, approach to measurement, and item definitions are outlined, along with the sample frame and the method used for data collection.

5. RESEARCH METHODOLOGY

The conceptual research model outlined in the previous chapter was tested through the use of a quantitative study examining the hypothesized relationships between the variables in the model. This chapter provides a description of the operationalization of the variables, the research design, and the data collection procedures for an empirical test of the research model. This methodology chapter begins with an explanation of the research model that incorporates the variables and concepts derived from the current literature in Chapters 2 and 3, Sections 4.1 - 4.5, and the outlined conceptual model in Section 4.6. Furthermore, this chapter describes the research design and empirical setting (Section 5.1), followed by descriptions of the measurement and operationalization of variables (Section 5.2), and the sample frame and data collection used (Section 5.3) to collect and analyze data for this study.

5.1 RESEARCH DESIGN AND EMPIRICAL SETTING

The objective of this study was to develop and test the relationships outlined in the conceptual model presented in Section 4.6. There are three potential research designs available for this approach. These include the classical experiment, the quasi-experiment, and the non-experimental field study. All of them, except for the non-experimental field study, have features for conducting tests of causal relationships. Thus, experiments and quasi-experiments were the most appropriate designs for the study (Cook & Campbell, 1979). With such a design, it is possible to change or manipulate one variable in a model and examine the resulting effects on other variables, thereby determining cause-and-effect relationships. To control the analysis, manipulate the treatment, and make comparisons between treatment conditions, the classical experiment was the most appropriate for establishing the requirements for isolation and directionality (Calder, Phillips, & Tybout, 1981). Since the research model has several predictor variables, conducting an experiment is difficult due to the need to establish many different experimental groups (Cook & Campbell, 1979). The variables used in the research model are complex and are assumed to develop slowly over time. The manipulation of variables, such as network quality and absorptive capacity, seems to be impossible within a short time frame. This manipulation is difficult when entrepreneurs lack a sufficient level of analytical ability (McGrath, 1982). This leads to situations in which experimental testing of the model would be insufficient and must be excluded as a possible option.

The quasi-experiment, in which causality is studied in natural settings (Cook & Campbell, 1979), was not seen as a possible design option either. In such a design, subjects confronted with the independent variable are compared with subjects not confronted with it. The division of subject into experimental versus control groups should ideally be randomized as well. Regarding non-experimental designs, the best alternative for testing the direction of influence is through a panel design (Menard, 1991). In utilizing this design method, observations from at least two different periods are necessary to get the appropriate information. However, the resources available do not allow for the timeframe or costs associated with a study that has two different periods of data collection. Consequently, this alternative was not possible either.

Based on the preceding discussion, the most reasonable design in this case would be a correlation design. This design has some limitations when testing causal models. Mitchell (1985) argues that Cook and Campbell's (1979) list of threats to internal validity is of marginal help when using correlation designs. In these studies, the effort must be clearly connected to the identification of third variables through systematic thinking (setting characteristics) and the review of theory. Consequently, the isolation of other intervening influences may be met by a homogenous population and by the use of control variables (Mitchell, 1985).

There were two important items to consider when establishing associations within the chosen design: sufficient variance and stability. Sufficient variance is necessary to achieve co-variations within the constructs (Calder, Phillips, & Tybout, 1981, 1982). Sufficient variance in network quality and absorptive capacity will be obtained in most entrepreneurial activities.

The connection between these independent constructs and the dependent construct is complex. Usually, system equilibrium is assumed in correlation design. The reasonable solution is to measure the effect when a system has achieved equilibrium or stability in not changing further (Hoyle, 1995). This should not, however, be performed without prior knowledge regarding the distance in time between a change in the cause and the expected effect. As argued in the theoretical discussion, a change in any of the independent variables of network quality and absorptive capacity will influence the dependent variable through a set of mechanisms that couples the cause to the effect. This implies that the amount of time since the relationship was established should be sufficient for the mechanisms, by which the causal influences are transmitted to the effect, which is then stabilized.

Data are then deductively analyzed, and the stated hypotheses are accepted or rejected as the researcher takes an objective and detached approach. Associations between variables

can be examined, with conclusions generalized to a larger population, rather than being restricted to a given context (Marczyk, DeMatteo, & Festinger, 2005). In this study, the hypotheses outlined from the research model were framed as correlations. Through the use of a cross-sectional design, it is possible to test the hypotheses by establishing associations between the variables and controlling for spurious effects. This can be achieved through statistical techniques combined with the use of control variables.

In a study such as this one, internal validity, meaning the extent to which a relationship found in a study is objectively true, will be weaker than it is in experimental or quasi-experimental studies that are based on controlled manipulations. However, the "realism of context" is high, and the intent is not to manipulate the subjects or make them sensitive. Both of these elements are usually considered to enhance the external validity, which is the degree to which the study's conclusions can be generalized to other people, groups, or situations (Cook & Campbell, 1979; Marczyk et al., 2005; Trochim, 2006). Regardless, it is always possible that the responses of randomly chosen participants do not reflect the population, which would lead to sampling error and lower validity (Alreck & Settle, 1985). Generally speaking, however, sampling error decreases as the sample size increases. Sampling error also decreases and reliability increases when there is less variance among the members of a population.

Reliability refers to the consistency or dependability of the method of measurement and the absence of random error (Alreck & Settle, 1985; Marczyk et al., 2005). In practice, the reliability of a measurement deals with the correlation between independently obtained sets of results, and it is therefore normally expressed as a correlation coefficient, preferably .80 or higher (Marczyk et al., 2005, p. 103). Quantitative studies normally have higher coefficients than those in qualitative studies due to the nature of the data and the methods used to collect the data. For example, reliability in a study that uses unstructured interviews to collect qualitative data would be lower than in a study such as this one, which used survey questionnaires that were e-mailed to participants.

This study can be classified as a theory test. As such, internal validity should have priority over external validity (e.g., Cook & Campbell, 1979). By investigating new firms, it is also possible to account for the potential impact of industry effects, and thus internal validity can be improved. However, the choice of more industries may increase the amount of error variance, and statistical power will be improved. As a general theory of entrepreneurship and incubators, the study's theory should hold for firms in general. Any theory claimed to be

general, however, can be rejected if it is falsified for any subgroup of firms (Calder, Phillips, & Tybout, 1981).

For this study, new small firms¹ were analyzed, and the unit of analysis was the entrepreneur or the owner of the new firm. Adopting the entrepreneur as the unit of analysis, the study examined some attributes of the critical factors for entrepreneurial performance, as defined in Chapters 3 and 4.

The empirical setting of the study is of great importance for testing the theoretical model. It is homogenous and is assumed to secure variation in the independent constructs.

5.2 MEASUREMENT AND OPERATIONALIZATION OF VARIABLES

This chapter describes the measurement and operationalization of variables. Following Bollen (1989), there are four important steps in this process: (1) working out the meaning of the concept, (2) identifying the dimensions and variables to represent it, (3) obtaining the measurements, and (4) identifying the relationships between the measurements and the variables. This study follows Churchill's (1979) recommendation to adopt or adapt measurements used and validated in other studies. Accordingly, the challenge is to find such measurements in the literature, to adapt them to the empirical context, and to enable subsequent construct validity assessment. The following sections describe the variables in this study and how they are operationalized.

One way to increase the validity of a survey instrument is to integrate the input of experts on the subject. A draft of the survey was therefore reviewed by three experts. Their suggestions were used to modify and improve the final questionnaire. This expert panel included experts from business incubators. In addition, a pilot study with five participants was conducted with both Norwegian participants (entrepreneurs outside business incubators) and American participants (a manager of an incubator and three participants, all from Hazelton, Pennsylvania). The experts and participants of the pilot study gave in addition comments on the questionnaire which resulted in a modified version of the original questionnaire.

Because the study was to be distributed in both Norwegian and English, the final questionnaire was translated into Norwegian by a native speaker of the language to make it easier for the entrepreneur to understand the terminology.

The variables were measured by using questions based on Zahra and George (2002). The MARKOR model (Armario et al., 2008; Darroch & McNaughton, 2002; Jaworski &

¹ Defined as new firms established in Norway in the period 2007-2010 and mostly have less than 50 employees.

Kohli, 1993; Kohli & Jaworski, 1990; Liao et al., 2003) formed the basis of the questionnaire, with additional questions included from studies (Jansen et al., 2002) that had been used to measure absorptive capacity. This approach is outlined from the concept of market orientation with perspectives including decision-making, market intelligence, the culturally based behavioral perspective, the strategic perspective and customer orientation (Kohli and Jaworski, 1990).

Kohli and Jaworski (1990) defined market orientation as *"the organization-wide generation of market intelligence, dissemination of the intelligence across departments and organization-wide responsiveness to it"*. The marketing concept is a business philosophy, and the term market orientation refers to the actual implementation of the marketing concept. Narver and Slater (1990) defined market orientation as *"the organization culture that most effectively and efficiently creates the necessary behaviours for the creation of superior value for buyers and, thus, continuous superior performance for the business"*. The organization development and use of market knowledge is central to the conceptualization of market orientation. Market knowledge is then the basis for the organization-wide generation of product ideas and the decisions to use those ideas to develop strong market positions with customers and to take advantage of market development opportunities. In sum, the concept of the MARKOR model has transfer value to both network value and absorptive capacity.

Following theory regarding incubators (Bergek & Norrman, 2008; Hackett & Dilts, 2004; Lumpkin & Ireland, 1988), networks (Granovetter, 1973; Zhao & Aram, 1995) and absorptive capacity as determinants of entrepreneurial performance (Narver and Slater, 1993, 1994; Zahra & George, 2002; Schmidt, 2005), the analysis in this study considers one indicator of incubator connections and one of the network value, three indicators of absorptive capacity (acquisition, transformation, and exploitation), and five indicators of entrepreneurial performance (sales (income), profit, number of employees, speed of entrepreneurship, and intentions for the future), as indicators that might affect the entrepreneurial performance of start-ups depending on whether or not they have been in an incubator. The variables of incubator connection, network value, absorptive capacity, and entrepreneurial performance are operationalized below. The code book in Appendix 8 gives more details from the operationalization.

5.2.1 Incubator connection

The aim of an incubator is to help new firms establish themselves and growth. The measurement of incubator connection identifies whether or not a firm has been in a business

incubator. Prior or current incubator participation, as well as science park and business park tenancy were determined through direct questions:

- Has your firm ever been located in a business incubator?
- Has your firm ever been located in a science park?
- Has your firm ever been located in a business park (Norwegian: *næringshage*)?

Responses were coded using:

Never

Less than 1 year

1–2 years

More than two years

Those who have been in an incubator were also asked to indicate the type of incubator (Boyd, 2006):

- Technology incubator
- Manufacturing incubator
- Services incubator
- Mixed-use incubator
- Other incubator

5.2.2 Network value

Network value concerns the value of the information received from various actors in the network. To determine the sources of important information, the respondents were asked to indicate the sources that they have used to obtain this information. The formal and informal sources used by Watson (2007) formed the basis of the list of respondents, sources one to eleven. Given this study's focus on incubators, this source was also included (source twelve). Customers/clients and suppliers (sources thirteen and fourteen) were also added to the list based on the MARKOR model (Jaworski & Kohli, 1993; Jansen et al., 2002). Given this study's focus on incubators, this source was also included, for a total of 14 listed sources:

1. Family
2. Friends
3. Professional acquaintances
4. Local businesses
5. Others in the industry
6. Banks

7. Business consultants
8. External accountants
9. Industry associations
10. Small business development organizations
11. Solicitors/lawyers
12. Incubator
13. Customers/clients
14. Suppliers

The respondents were asked to rate their value, from the network partners, with the contribution to the firm's development for each of the fourteen sources on a seven-point Likert type scale ranging from "very dissatisfied" (1) to "very satisfied" (7). This was done by rate in the list for each of the partners as shown below:

- For source 1 rate a number (1-7)
- For source 2 rate a number (1-7)
- For source x rate a number (1-7)
- For source 14 rate a number (1-7)

5.2.3 Absorptive capacity

According to Darroch and McNaughton (2003), a knowledge-management orientation and a marketing orientation are very similar in that both involve knowledge acquisition, transformation, and exploitation, although a marketing orientation focuses on knowledge pertaining to customers and competitors (Kohli & Jaworski, 1990; Narver & Slater, 1990).

Carrying this idea a step further, various studies (Fosfuri & Tribo, 2008; Murovec & Prodan, 2009; Soo, Devinney & Midgley, 2007; Vega-Jurado et al., 2008) have included access to various sources of information as part of knowledge acquisition when measuring absorptive capacity.

There is no measure that has been repeatedly used to determine absorptive capacity as understood within the entrepreneurial context. As mentioned in Chapters 2 and 4, many studies do not attempt to gather data on the processes of knowledge acquisition, transformation and exploitation, but instead use R&D spending as a short-hand proxy measure. This method is inadequate for a study that intends to analyze separate variables regarding absorptive capacity for start-ups. The MARKOR model (Jaworski & Kohli, 1993), however, does offer a series of items that have been developed over time and that have been

widely used. The marketing perspective is concerned with the acquisition and transformation of knowledge, and the measurements in this model contain validity statistics from various studies, and it is therefore appropriate to use for gathering data on absorptive capacity.

Acquisition and transformation of knowledge were measured using 18 items based on Jaworski and Kohli (1993).

The sources of the items are constructed in English based on the sources mentioned above. The items in the questionnaire were translated into Norwegian from the original English by a native speaker of Norwegian to make it easier for the entrepreneur to understand the terminology in a Norwegian context.

Respondents were asked to indicate on a 7-point Likert scale (1 = to a small extent, 7 = to a great extent) the frequency with which they engaged in the following actions:

Acquisition

- We often have meetings with our customers to survey products or services they will need in the future.
- We cooperate with customers directly to comply with their needs even better.
- We often survey our customers to control the quality of our products and services.
- We collect sector information by informal means e.g., lunch with colleagues, talks with business partners, etc.
- We collect information about our competitors.
- We regularly review the likely effect that changes in our business conditions, such as regulations and technology, will have on our customers.
- We are slow to detect fundamental shifts in our customers' request for products or services.
- We are slow in detecting fundamental shifts and trends in our industry sector such as new competitors, new technology, and changes in framework conditions.

Transformation

- Many informal talks within the company unit deal with our competitors' tactics or strategies.
- We often have internal meetings to discuss trends and development in the market.
- We often use time to discuss the future needs of our clients.
- We frequently circulate documents (for example, reports and newsletters) that provide information about our customers.

- When something of importance happens in our most important markets, the whole company is informed about this within a short time.
- The results from satisfactory surveys are always conveyed to the employees.
- There is minimal internal communication in our company regarding market development.
- When an employee discovers something important about competitors, he/she is slow to notify other employees.
- The company pays more attention to acquire and process new knowledge on markets and regulations than other recently established businesses.

Exploitation

Zahra and George (2002) state that firms cannot exploit external knowledge that they have not previously acquired, but the acquisition of knowledge does not necessarily imply its exploitation. The MARKOR model items related to the exploitation of knowledge are less relevant to this study, because this study does not specifically deal with marketing. Therefore, two items (#1 and #2) to measure knowledge exploitation were taken from Jansen et al. (2005), and one other item (#3) was taken from Jaworski and Kohli (1993). These items, together with six items (#4 to #9) from Soo et al. (2007), were found to be appropriate and build on Tsai's (2001) study, which suggests connections to knowledge sources through network value. Respondents were asked to indicate their level of agreement on a 7-point Likert scale (1 = to a little extent, 7 = to a great extent).

- We are constantly appraising how new knowledge can be used to further develop the business.
- Compared to other recently established firms, our company is good at assimilating new knowledge.
- New, acquired knowledge has led us to take efficient measurements compared to our competitors.
- Feedback from customers has often contributed to changed practice.
- New knowledge acquired by us in the last year has resulted in new ways of performing tasks.
- New knowledge acquired in the last year has improved company results.
- New knowledge acquired in the last year has resulted in new projects or product ideas.

- New knowledge acquired in the last year has increased our capability to solve different types of problems.

The items previously described provided a measure of absorptive capacity. In the following sections, the measurements regarding entrepreneurial performance are described.

5.2.4 Entrepreneurial performance

Objective data on business performance are not easy to obtain in a survey with voluntary participation because entrepreneurs tend not to willingly reveal their businesses' financial data (Naman & Slevin, 1993). In an attempt to overcome this problem, this study used broad sales categories in addition to subjective measures.

Although objective figures are difficult to obtain, managers' subjective perceptions of performance have been found to be highly consistent with actual firm performance (Dess & Robinson, 1984; Pearce, Robbins, & Robinson, 1987; Wall et al., 2004). Entrepreneurial performance itself can be a subjective goal because different entrepreneurs have different concepts of success (Robinson & Watson, 2001), and whether a firm fulfills the goals of its owner is in itself an important performance consideration, one that can only be determined through subjective measures. For example, a given sales volume may be considered more than satisfactory to one person while a bitter disappointment to another. By asking about expectations, it is possible to see how the business is performing compared to the entrepreneur's goal. Additionally, some small business owners focus more on non-financial goals, such as freedom, flexibility, and a particular lifestyle, in which case lower sales and profits may be acceptable. Therefore, an entrepreneur's intentions are a relevant concept in the study of entrepreneurial performance. Subjective measures of performance commonly used in research include the entrepreneur's assessment of the firm's profit and sales.

The measurement of entrepreneurial performance is thus a combination of objective and subjective measures. Five measures of entrepreneurial performance were used: sales (income), profit, number of employees, intentions for the future, and speed of entrepreneurship.

1. Sales (income)

- My firm's total sales at the end of 2009 and 2010
- My firm's total sales at the end of a given year, depending on the year of starting
- My firm's expected sales in 2011

2. Profit

- My firm's profit at the end of 2009 and 2010

- My firm's profit at the end of a given year, depending on the year of starting
- My firm's expected profit in 2011

3. Number of employees

- My firm's number of full time employees one year after starting
- My firm's number of full time employees two years after starting
- My firm's expected number of full time employees in 2012
- My firm's number of part time employees one year after starting
- My firm's number of part time employees two years after starting
- My firm's expected number of part time employees in 2012

4. Intentions for the future

Intentions regarding future growth were also measured for the following items based on those in a Eurostat (2009) survey conducted in 2005–2006. In that study, participants were asked to report on their plans for firm development in the areas below. Measurement was based on expected development of business activity and measured with a 7-point scale ranging from very low probability (1) to very high probability (7):

- Increased sales (income)
- Increased number of employees
- Increased variety of goods/services for sale
- Increased profitability

5. Speed of entrepreneurship

Another aspect of performance, speed of entrepreneurship, was measured as the time in months/years between important business-related events (0–3 months, 4–6 months, 7–9 months, 10–12 months, between 1–2 years, between 2–3 years, more than 3 years, and not yet). This set of events was comprised of:

- Time from idea conception to the decision to start a business
- Time from business decision to business establishment
- Time from business establishment to product launch
- Time from product launch to profitability

5.2.5 Additional network indicators

The purpose of the study related to network was to examine the value obtained from participation in networks, cf. Chapter 5.2.2 for measurement of network value. According to Greve (1995), network size/range "may be one of the most important variables explaining the

successful establishment of new businesses" (p. 5). The more contacts that an entrepreneur has, the more diverse the entrepreneur's network is likely to be, thereby increasing the chances that he or she will be able to access needed information and advice. Likewise, the more time an entrepreneur spends on developing and maintaining contacts, the more likely he or she is to obtain valuable information (Brown & Duguid, 1991).

A network with a large range would likely include both informal and formal sources. Informal sources include family, friends, professional acquaintances, and business contacts, whereas formal sources include banks, business consultants, accountants, lawyers, chambers of commerce, small business development centers, customers/clients, suppliers, etc. (Birley, 1985; Cooper, Woo, Dunkelber, & William, 1989; Littunen, 2000; Watson, 2007). New firms may often have stronger ties with informal sources, and may have weaker ties with formal sources, because the frequency of contact is usually lower with formal sources. These networks and sources of knowledge are important to businesses because the development of absorptive capacity begins with knowledge acquisition (Cohen & Levinthal, 1990; Gray, 2006). If an entrepreneur's network is limited to a group of people who cannot provide valuable information about the business, the performance of his or her firm is likely to suffer in comparison to that of a company whose owner is able to take advantage of a diverse network. Founders with more widely varied networks of contacts are in a better position to gain information that will enable them to surmount business development problems, thus shaping their own survival and growth (Aldrich, 1989; Burt, 1982; Low & MacMillan, 1988; Zhao & Aram, 1995).

Operationalization of additional network indicators are done particularly to analyze whether network frequency and network range, in addition to network value, are of special interest when explaining the relationship between networks and entrepreneurial performance. Further, whether these two indicators should have been a part of the research and structural model or not in explanation of entrepreneurial performance

Following Greve (1995) and Greve and Salaff (2003), the following questions were asked to help determine the size of entrepreneurs' networks and the time they spent developing and maintaining these networks:

- Over the course of the last year, with how many people would you estimate you have discussed aspects of starting or running your own business?
- Over the course of the last year, how many hours per week on average did you spend developing/maintaining contacts with persons with whom you can discuss business matters (either starting a new business or operating your current one)?

However, time spent with network contacts does not automatically assure that useful information will come from any given person. Frequency of contact is therefore not sufficient as the sole measure of network value, because the exchange of useful information is not guaranteed - there is only the opportunity for exchange (Frenzen & Nakamoto, 1993, p. 369; Zhao & Aram, 1995). Additionally, some people are more likely to provide useful information for a given problem. This study therefore also asked participants to indicate the average frequency of contact, cf the list of contacts in 5.2.2, (never; 1–3 times every three months; 4–10 times every three months; and more than 10 times every three months) with each of the listed sources (Watson, 2007). Further details are shown in the code book, Appendix 8.

5.2.6 Control variables

Control variables represent external factors that have the potential to influence the outcome of a study seeking to investigate other variables. These variables are included in the empirical model because of their recognized influence on performance, but are not included in the theoretical model, because they are not hypothesized to moderate the form or strength of the independent variable - entrepreneurial performance relationship. As described in Chapter 2 and Section 5.2.1, personal characteristics of the entrepreneur, such as age and education, as well as organizational aspects (e.g., industry) have been associated with business performance. This study focuses on incubator connection or not, absorptive capacity, network value, and entrepreneurial performance. In order to better isolate and study the associations between these variables, several control variables were used. According to Lane and Lubatkin (1998), the industrial sector of a firm can influence its knowledge acquisition, exchange processes and relationship outcomes, and the age of an organization could have an influence on its ability to learn from network contacts and utilize this knowledge. However, because previous studies (Alowaihan, 2004; Losacco et al., 1991) have shown organizational age (entrepreneur's age) and industry to be correlated with performance, they are included here as control variables. Control variables to include are entrepreneur age (Gray, 2006), education' experience, and started a business before (Swinney et al., 2006; Gray, 2006; Aldrich & Weiss, 1981; Bruderl & Preisendorfer, 1998; Saffu et al., 2008), experience (Bruderl & Preisendorfer, 1998; Losacco et al., 1991; Alowaihan, 2004; Saffu et al., 2008; Lerner et al., 1991), and gender (Cooper, Gimeno-Gascon, & Woo, 1994; Kalleberg & Leicht, 1991; Loscocco & Leicht, 1993; Losacco et al., 1991; Watson & Robinson, 2003), as well as the

type of incubator and organization's industry (Losacco et al., 1991; Alowaihan, 2004). This means that the following control variables are included in the study:

- Age of the entrepreneur
- The entrepreneur's education (highest level of schooling completed: primary school, high school, college, graduate school)
- Started a business before, experience (never, once, twice, more times)
- The entrepreneur's experience (years of industry experience)
- The entrepreneur's gender (female, male)
- Type of incubator; business park²
- Type of industry of the firm:
 - Manufacturing
 - Constructing
 - Wholesale
 - Retail trade
 - Finance
 - IT
 - Professional and other services
 - Other

In order to identify factors that may affect the main research variables, some demographic, background characteristic and incubator specific variables that have been suggested as determinants of entrepreneurial performance are included in this study. For instance, is it reasonable to argue that education and experience with starting a business before may explain entrepreneurial performance positively.

Because the research methodology was not a controlled experiment with manipulated treatments or randomization, the study relied on statistical controls used in analyzing regression models. Regression analyses hold some variables constant while the regression coefficients are calculated (Hair et al., 1998; Lewis-Beck, 1980), thus identifying the contributions of individual variables. The candidates for such variables are (1) variables likely to be correlated with both the independent and dependent variables, and (2) variables that are other likely causes of the dependent variable but that are not correlated with the independent variables. Thus the control variables mentioned above are regarded as having a potential to influence both the independent variables and dependent variables, so this will be taken into account.

² In Norwegian "Næringsshage".

5.2.7 Summary of measurement of variables

Below, Table 5 displays how all the variables, used in the structural model, are measured. The table is sorted by the name of the variable from the research model, the measurements used in this study and how the variables were measured in other studies.

Table 5 - Measurement of Variables

Variable	Measurements Used in This Study	Reference to Earlier Studies
<u>Incubator:</u> Status	Yes/no (inside or outside an incubator), and perhaps an indication of how long	Bergek and Norrman (2008), Boyd (2006), Hackett et al. (2004)
<u>Network Value:</u>	Value of information or advice obtained from the network over the course of the past year and number and diversity of sources of information and advice	Burt (1982), Zhao & Aram (1985), Lechner et al. (2006), Watson (2007)
<u>Absorptive Capacity:</u> Acquisition Transformation Exploitation	Information seeking and human resources development Transformation of acquired knowledge Use of new knowledge for business and product/services development	Vega-Jurado et al. (2008), Zahra & Hayton (2008), Jantunen (2005), Eriksson et. al. (2007), Soo et. al. (2007), Jansen et. al. (2002) and Szulanski (1996), Jantunen (2005), Eriksson et. al. (2007), Soo et. al. (2007), Jansen et. al. (2002) and Szulanski (1996)
<u>Entrepreneurial Performance:</u> Sales/Income, Profit, Employees and Intentions Speed of entrepreneurship	Sales growth, profits, profits growth, sales ratio, number of employees (for all: also below or above intentions) Time to start and establish the firm, initial product launch, and time to profitability	Naman & Slevin (1993), Wall et al. (2004), Robinson & Watson (2001), Narver and Slatter (1993, 1994)
<u>Additional network indicators</u>	Frequency and range of contact	Greve (1995), Greve and Salaff (2003), (Frenzen & Nakamoto, 1993), (Zhao & Aram, 1995)
<u>Control variables</u>	Started a business before, age, education, experience, gender, type of incubator, type of industry	Lane and Lubatkin (1998), (Alowaihan, 2004; Losacco et al., 1991), (Gray, 2006), (Bruderl & Preisendorfer, 1998; Losacco et al., 1991; Alowaihan, 2004; Saffu et al., 2008; Lerner et al., 1991)

A broader review of different variables, measurements, and findings is described in Chapter 2, Figure 1 and Appendix 9.

5.3 SAMPLE FRAME AND DATA COLLECTION

The aim of this study is to advance a research model with entrepreneurial performance as the primary dependent variable, and with network value, absorptive capacity, and incubator/non-incubator status as independent variables.

As shown in previous sections, the survey items for this study included numerical items, checklists, and Likert scales, which are a form of rating scales that allow researchers to gauge participants' attitudes and opinions (Sproull, 1995). The most important aspect of this type of scale is that it allows ordinal data to be collected, as it measures the relative intensity of different items (Babbie, 1995).

In the design of experiments and data analysis, control variables are those variables that are not changed throughout the trials in an experiment, because the researcher is not interested in the effect of that variable being changed for that particular experiment. Thus, control variables are extraneous factors that could potentially affect the experiment, but which are kept constant so as to minimize their effects on the outcome. Because the number of employees and the number of years a business has been in existence could be related to entrepreneurial performance, these variables were controlled through sample selection.

Sampling is the "the process of selecting a subset of cases in order to draw conclusions about the entire set" (Singleton & Straits, 1999, p. 170). Self-selection or other forms of sampling bias can decrease validity so that findings may not truly represent the population—those who voluntarily choose to participate in a study may be different from those who chose not to participate (Alreck & Settle, 1985). A random sample in which every member of the population has an equal chance of being chosen for the study is assumed to provide an unbiased look at the population from which it is drawn. Thus, conclusions drawn from analysis of the data provided by participants in the sample can, to some extent, be generalized to the relevant population.

The Industrial Development Corporation of Norway (SIVA) is the governmental corporation charged with developing regional and local industrial clusters through ownership in infrastructure, investment and knowledge networks, and business incubators. SIVA has developed business incubator models that are adapted to Norwegian business conditions, and, through its 22 incubators (2010), aims to provide entrepreneurs with resources in the form of expertise, business experience, consultants, and capital. Networks of cooperation have been established to make incubation services available to entrepreneurs in more remote areas of the country. The sample frame of this study included Norwegian businesses that had been tenants in a SIVA incubator, and other businesses in the same geographical areas within Norway that had not been incubator tenants. This project attempted to obtain responses from all SIVA-incubated businesses that were established in 2007. To obtain data from non-incubated businesses that were established in the same years, 1,000 firms were randomly selected. Only businesses located in the same areas as SIVA incubators were included in the non-incubated

group, to control for geographic variation. Names and contact information for potential participants were obtained from the SIVA incubators and business directories.

There is usually a tradeoff between the size of the sample and the size of the questionnaire (Alreck & Settle, 1985). If the goal of the study is to come up with a close estimate to a parameter, with a high confidence level, a large sample is needed, which means that the amount of information that can be obtained from each participant is limited. Furthermore, when attempting to examine relationships between responses to survey questions so that patterns can be identified, a large amount of data is needed from each participant, which effectively limits the size of the sample. Because the purpose of this study is to determine the relationships between incubator status, entrepreneurial performance, network value, and absorptive capacity, a fairly large amount of data was required. The size of the sample had to be somewhat limited because of the volume of individual data required, but it still needed to be sufficiently large for data analysis. Alreck and Settle state that, under normal conditions, the maximum practical sample size is 1,000, while the minimum is 100. Within these guidelines, a sample seldom needs to be larger than 10% of the population being studied.

5.3.1 Mailed surveys

Self-administered surveys that are sent to the participant and returned to the researcher through the postal service have long been one of the most common methods of conducting surveys. This method of data collection has many advantages for both the participant and the researcher. In contrast to interviews, mailed surveys can be completed at the convenience of the participant, providing the participant as much time as desired to complete the survey form (Rea & Parker, 2005). In fact, the participant can start and stop as desired and can take the time to find pertinent information by consulting records if necessary. For this reason, survey questionnaires can be longer and ask more complex questions than phone interviews.

At the same time, participants who mail back a form in a business reply envelope without identifiers can also be assured of anonymity. Because each participant has been asked the exact same questions in the exact same way, bias is reduced, although this form of one-way communication also prevents participants from receiving clarification if questions are unclear.

In order to create a large volume of professional-looking questionnaires, envelopes, and cover letters, Alreck and Settle (1985) recommend using commercial printing vendors as they produce quality products.

5.3.2 Telephone surveys

Telephone surveys, in contrast to other survey methods, require synchronous communication, and respondents must normally complete the survey during one phone call. This method is useful for reducing the number of non-respondents but may be less effective when sensitive issues are involved (Frankfort-Nachmias & Nachmias, 1992, p. 234). However, since the questionnaire developed for this study contains concrete and non-sensitive questions, this problem is not expected to be of serious concern. To control the interview situation, computer-assisted telephone interviewing can be applied, although the issue of one-way communication still exists.

5.3.3 Using the Internet for research

In the age of the Internet, research is increasingly conducted through the use of e-mail or web pages. In fact, e-mail was first used as a substitute for mailed survey forms almost immediately after its introduction (Bachmann, Elfrink, & Vazzana, 1996). Using this method, researchers e-mail questionnaires to participants, who then complete their surveys and e-mail them back to the researcher. In contrast, web-based surveys include a link that directs participants to an interactive form on a website, usually allowing questions to be answered by checking the desired responses or selecting them from a drop-down box (Ye, 2007). Web-based surveys are considered to be both more convenient for participants and more standardized because of their closed questions. As with mailed questionnaires, participants can use as much time as they wish to complete the survey (Rea & Parker, 2005). Although self-selection sampling bias was a serious problem with web-based or e-mailed surveys when the Internet was first popularized, Internet users now tend to reflect the general population (rather than being a distinct but homogeneous group) in terms of demographic characteristics (Ye, 2007). Regardless, a secure server needs to be used to maintain the confidentiality of the data received from participants (Rea & Parker, 2005).

If a survey is open to anyone who wishes to participate, it is impossible to determine a response rate; this problem is solved if the survey is only available to invited participants (Ye, 2007). Pre-notifications that include a deadline for response and good survey design can also improve response rates. It has been suggested that surveys ask for no more than 25 responses and take no longer than 15 minutes to complete as the length of the questionnaire is negatively related to completion rates (Graf, 2002; Lang, 2007). Response rates of less than 20% have become common, just as with postal mail, which often averages around 10%

(Lang, 2007; Ye, 2007). Follow-up reminders can increase response rates, although the effectiveness of these devices decreases with each additional message (Zhang, 1999).

Lang (2007) conducted a study in which participants were mailed a traditional survey form, a self-addressed stamped envelope, and a letter that provided a link so that participants could complete the survey online if desired. This combination of response methods provided a 52% response rate (45% of which was usable). Lang attributes this high response rate to a number of factors, including an accurate sampling frame, follow-up procedures, personalized correspondence, material rewards (a copy of the study's results and a ticket for a raffle), clear questions, a well-designed form (for both web and paper), appropriate questionnaire length, endorsement by a university, technical competence (web server availability), ease of return (self-addressed stamped envelopes included with paper questionnaire), a cut-off date, and the promise of confidentiality. It should be noted that due to the offer of a reward and the assurance of confidentiality, 91% of participants gave their names and contact information so that they could be eligible for the raffle and/or to receive a report of the study's results.

Although web-based surveys hold the promise of a very inexpensive method of quickly collecting data from a large group of people, these benefits have come at a price. The use of "spam" by both honest and unscrupulous persons and organizations has made people rightfully suspicious of unsolicited e-mail and links to websites. Not only does this lead to low response rates, but both the European Union and the United States have introduced legislation to protect Internet users' privacy, although these laws are difficult to enforce (Lang, 2007). Nonetheless, web-based surveys may still be effective if combined with mailed questionnaires, as shown by the results of Lang's study, in which 50% of the questionnaires were collected by one method or another, with the participants choosing their preferred method.

5.3.4 Choice and combination of methods and accomplishment of survey

For the purposes of this study, it was important to obtain a representative sample of both incubated and non-incubated firms. The names and contact information for incubated firms were obtained from SIVA incubators, while the names and contact information for non-incubated firms were obtained from The Brønnøysund Register Centre³.

The starting point for data collection was the merging of the Brønnøysundregistrene Excel files from 2008, 2009, and 2010. These included firm names, e-mail addresses, phone

³ In Norwegian Brønnøysundregisterne.

numbers, starting year, and other details. This merged file was checked for repeated company names, e-mail addresses, and phone numbers, and all duplicates were deleted so that each entry was unique. The study focused on new small Norwegian start-ups established in the period 2008 - 2010, which employed twenty or fewer employees. Out of a total of 38,289 start-ups in the Excel files, 7,854 duplicate names, 853 duplicate e-mail addresses, and 2,570 duplicate phone numbers were deleted. The final step in the process entailed deleting the 163 companies that would be called by telephone because they were SIVA-registered firms. The final sample frame of firms not in a SIVA incubator included 29,419 start-ups. Surveys were e-mailed to each of these firms and data were collected in two ways based on the type of firm:

1. E-mails were sent to the 29,419 firms not registered with SIVA. The e-mail included a link to the survey (cf. Appendices 7). A total of 1,315 start-ups responded to the survey after the first e-mail. A second e-mail was sent to those that had not responded, resulting in a total of 4,480 (response rate 15.1%) firms that answered the survey either in whole or in part.
2. The 163 SIVA-incubated start-ups were called and asked to answer the survey over the telephone. Of these, 93 (response rate 57.1%) participated in the study.

The procedure for the survey and a codebook based on the survey form was developed to assist with the analysis of the data (Appendices 7 and 8). Following this codebook, data from the survey were entered into MIPRO software, a tool for data collection. Data from firms not registered with SIVA were entered directly into MIPRO as the responses were entered online. The telephone interviewers entered the data they collected into MIPRO as they conducted the surveys. This process allowed for the generation of data files that could be used for statistical analysis in SPSS and PLSPM with XIStat.

The results of the survey are presented in the following section, and are analyzed in accordance with the theoretical research model outlined and operationalized in this chapter and Chapter 4. Specifically, levels of entrepreneurial performance, network value, and absorptive capacity are statistically analyzed to determine whether or not firms that were raised in incubators have experienced higher levels of entrepreneurial performance. Based on this relationship (if found), the role of network value and absorptive capacity are examined, especially with regard to their effect on entrepreneurial performance. Additionally, the role of incubators in strengthening network value and absorptive capacity was investigated.

6. DATA ANALYSIS AND FINDINGS

The conceptual model developed in Chapter 4 includes two incubator qualities (network value and absorptive capacity) that drive entrepreneurial performance. This model, with a set of proposed relationships between the constructs, formed the basis for the development of the hypotheses that were presented in Chapter 4. The purpose of the present chapter is to test the hypotheses, the measurement model and the structural model.

Thus, this chapter deals with the data analysis, starting with an evaluation of the data quality in Section 6.1. Section 6.2 addresses validity and reliability considerations and with the construction of indices. The descriptive statistics and correlation matrix are presented in Section 6.3. The data are analyzed and respecified to meet the requirements of a satisfactory measurement model and in Section 6.4 the measurement model is tested. The data analysis, hypothesized model, and hypothesis tests are presented in Section 6.5, together with the structural model results from XIStat PLSPM.

6.1 DATA QUALITY

The proposed model, with its associated hypotheses (H_1 to H_6), as outlined in Section 4.2 - 4.6, is tested using data from a sample of Norwegian start-ups. The results will be discussed tentatively, as the study has several limitations. However, the main objective of the empirical test is to evaluate the initial validity of the start-up challenges developed in this study.

6.1.1 Data collection and respondents

The survey consisted of 165 total items, 109 of which were included in this study. The survey was conducted in December 2011 and January 2012. During this time, 29,586 potential survey participants were contacted, all of which were newly established businesses in Norway. The 163 potential respondents from SIVA incubators were surveyed by telephone, while the remaining 29,419 received an e-mail survey. There were 2,734 participants that completed the survey initially, but another 1,839 responded after a reminder. This resulted in 4,480 participants completing the online survey and 93 completing the telephone survey, for a total of 4,573 responses. This equals an overall response rate of approximately 14.5% ($(4480+93 / (29419 + 93))$), cf Chapter 5.3.4.

6.1.2 Non-response bias

Differences in data collection methods and response time may influence actual responses. This non-response bias can be assessed in surveys by comparing responses from early and late respondents (Armstrong et al., 1977). Early and late respondents were compared, as were responses gathered online and by phone. No significant differences were found between early and late respondents with regard to performance measures, sales, or intentions (F-value 1,232, ns). Likewise, there were no significant differences in responses obtained using different collection methods. Therefore, it is assumed that non-response bias is not a significant issue in this research.

6.1.3 Characteristics of respondents and missing values

Given the high number of potential participants (29,586) and the relatively high number of responses (4,573) in the present study, it came as no surprise that some of the respondents skipped some of the items. Some participants may have found it too time consuming to answer all 109 relevant questions and therefore skipped some items, or they simply submitted the survey incomplete. A total of 2,799 out of 4,573 questionnaires were less than 70% complete and were therefore discarded from the sample. Since missing data is a part of almost all research, the important question is whether data were "missed by random" or "missed not by random" (Rubin, 1976). As the respondents represented a sample of busy new business owners, there is good reason to believe that the relatively high number of survey questions was the primary reason for incomplete responses. Some of the participants may have chosen to omit data on actual performance because this would have consumed more of their valuable time. Others might have been interrupted while completing the survey or decided that it was too time consuming to complete. Thus, if data were missing for one of these reasons, the data in question would presumably be missing at random.

Management of missing data; the choice between listwise and pairwise deletion

There is no clear guideline for an acceptable level of missing data. While a larger sample size will generally increase the statistical power, listwise deletion could affect the p -values. Generally, listwise deletion is recommended when the sample size is quite large because it excludes data from respondents who have aborted their completion of the survey. Pairwise deletion is recommended for analyses with small sample sizes because all available data is included, despite the risk of including data from respondents who may not be

representative for the population. Pairwise deletion only excludes the specific missing values in any pair of variables included in the multivariate test. Thus, all available data is included, and the different estimated correlation coefficients may not be based on the same number of cases. As the complete sample size for this survey was large, listwise deletion was therefore used.

As indicated above, 36 missing items, or 30% of the survey, was set to be acceptable, with the purpose of retaining as much data as could be reasonably retained. This meant that at least 73 questions out of 109 were answered in each questionnaire. With a cut-off value of 36 missing items, 1,774 (38.5 %) out of a total of 4,573 respondents were included. With listwise deletion, those respondents with missing data will automatically be eliminated from the data analysis. The justification for their elimination is that those responses with high levels of missing data may create noise, as they might have given less serious answers. While the survey consisted of 165 questions, not all of them were used in this study. Some were part of a larger study. Only the 109 items related to the analysis are operationalized in Chapter 6.

Managing a high number of missing data on entrepreneurial performance

The measure of entrepreneurial performance is operationalized as development in income, profit, speed of entrepreneurship and number of employees from the first to the second year of a firm's operation, and performance intentions as a part of entrepreneurial performance. The dataset consists of this information from 2007 to 2010. Only those firms that were established between 2006 and 2008 are included. The survey showed a higher amount of missing data on performance measurement than for the rest of the variables. It was therefore decided to collect supplementary performance data from the Brønnøysund Business Registers. The analyzed file was supplemented with these more objective performance measures, and the dataset was strengthened as shown in Table 6 below. All 4573 respondents participating in the survey are included, with 487 answering to the perceptual performance measures and data collected for 888 firms that were registered with sales in 2008.

Table 6 - Entrepreneurial Performance Observations

	Entrepreneurial Performance (Perceptual Survey Data)	Entrepreneurial Performance (Data from Brønnøysund Business Registers)
2008	487	888
2009	777	1425
2010	1157	2172

The strict demand maintained on the number of missing responses is possible since the number of respondents is high, both before and after the elimination of respondents. The basis

for a valid data analysis, which provides the possibility of drawing valid scientific conclusions, should therefore be within range.

After omitting questionnaires that were missing more than 30% of the responses on performance, 651 firms were retained for further analysis.

Conclusion: Management of missing data resulted in two analyzable datasets

The process resulted in two datasets. One included all variables in the dataset with less than 30% missing - a total of 1,774 observations (missing 10% gives $N = 1,212$), and the other included 651 firms with valid observations on performance measures.

Of the 1,774 observations of the entire dataset (i.e., after removing the responses with > 30% missing entries) the following number of respondents were in an incubator, research park, and/or business park (*næringshage*):

- 106 in an incubator (a missing 10% gives 80)
- 128 in a research park (a missing 10% gives 93)
- 88 in a business park (*næringshage*) (a missing 10% gives 64)

Of the 651 usable performance observations, the following are in an incubator, research park, and/or business park (*næringshage*):

- 48 in an incubator
- 53 in a research park
- 33 in a business park (*næringshage*)

Entrepreneurial performance was operationalized by income, profit, employees, intentions, and speed of entrepreneurship. Reports on performance measurements differ between the items (see Table 7).

Table 7 - Descriptive Data for Performance Measurement

	N	Minimum	Maximum	Mean	Std. Deviation
Performance: Income	296	-1.23	6.69	0.38	1.03
Performance: Profit	337	-11.89	18.10	-0.13	3.36
Performance: Employees	221	-1.00	2.00	0.08	0.44
Performance: Intentions	651	1.00	7.00	4.03	1.76
Performance: Speed of Entrepreneurship	651	1.00	4.00	3.42	0.86

6.1.4 Non-response bias

Before conducting multivariate analyses, the adequacy of the items and variables need to be assessed by inspecting their distributional characteristics and the amount of missing data (Bagozzi & Yi, 1988). Univariate normal distribution is a key assumption of multivariate analyses and is assessed by evaluating the skewness and kurtosis of each item. Missing data

can be problematic when the amount missing is considerable (e.g., > 10%), and alternative methods of dealing with missing data should be evaluated. Normally distributed data appears as a bell-shaped density curve with a single peak around the mean. Skewness refers to the symmetry of the distribution and to what extent it leans to either side. Kurtosis refers to how peaked the curve is.

When data have a perfect normal distribution, the density curve is completely symmetrical, meaning that the data are distributed equally on both sides of the mean, and the curve is neither too narrowly nor too broadly peaked. For such data, both skewness and kurtosis are 0. It is, however, extremely rare for data collected in studies such as this one to be perfectly normally distributed.

If the skewness and kurtosis values are high, the normality assumption is violated, which may lead to biased parameter estimates and unreliable model fit (Bagozzi & Yi, 1988). According to Kaplan (1990), skewness and kurtosis values that exceed 1 in terms of absolute value should be treated with caution, while Kline (2011) characterizes skewness values exceeding 3 and kurtosis values exceeding 8 as extreme. The distribution characteristics of the collected data are assessed by an inspection of the skewness and kurtosis for each variable. These values for the independent variables of network value and absorptive capacity, as well as for the two self-reported performance concepts of speed of entrepreneurship and expected future performance, appear in Appendix 1 and Appendix 2. Except for high kurtosis values on two network value items (cf. AnettvBN7 and AnettvBN12), all remaining items satisfy the criteria for normality.

Appendix 2 shows descriptive statistics and distribution characteristics for development in income, profit, and employees. Both income and profit had extremely high values of kurtosis and skewness. The values for development in income from first to second year of operation varied from +239% to -1%, and the values for development in profit varied from +73% to -111%. Outliers were removed from the dataset, resulting in a reduction of the performance dataset from 651 to 631. Of these, 88 firms had been in an incubator, research park, or business park (*næringshage*). The outliers that were removed were firms with extremely high values for income; i.e., these businesses could not be considered small firms. To maintain a common definition of small firms, all firms with less than 100' in income and more than 10" in income are defined as outliers. Additionally, firms with negative income were also removed from the data set. The descriptive statistics and distribution characteristics after removal of outliers appear in Appendix 1 and Appendix 2.

6.2 VALIDITY AND RELIABILITY CONSIDERATIONS AND CONSTRUCTION OF INDEXES

The operationalization of variables is related to establishing sufficient construct validity. Construct validity has four components (Reve, 1985):

- Face validity (Do the empirical indicators "seem right"?),
- Convergent validity (Do the indicators of a construct, that theoretically should be related, in fact relate?),
- Divergent validity (Are the variables and/or indicators, that theoretically are supposed to be unrelated, in fact unrelated?), and
- Nomological validity (Do the variables behave as expected; i.e., do they explain and/or are they explained as expected within a theoretical model?).

The latter three measures of construct validity are based on empirical assessment, and are therefore not further considered here. The main purpose of the preceding section is to evaluate the face validity of the indicators, i.e., the establishment of the logical basis for the operationalization of the variables.

These measures can be distinguished as those that are either influenced by (reflective) or that influence (formative) latent variables (Bollen et al., 1991). When researchers do not pay attention to the directional relationship between measures and the construct, the measurement model can be incorrectly specified (Chin, 1998). Table 8 shows the classification of the core concepts as either reflective or formative. The classification is consistent with the decision rules provided by Jarvis, MacKenzie, and Podsakoff (2003).

Table 8 - Classification in Agreement with Decision Rules Provided by Jarvis et al. (2003)

Construct	Interchangeability of the Indicators	Covariation Among the Indicators	Nomological Net of the Construct Indicators	Nature of Measuring Instrument
Performance	Indicators are not necessarily interchangeable	Not necessary for indicators to covary with each other	Nomological net may differ for different indicators	Formative
Network Value	Indicators are not necessarily interchangeable	Not necessary for indicators to covary with each other	Nomological net may differ for different indicators	Formative
Absorptive Capacity	Indicators are interchangeable	Indicators are expected to covary with each other	Nomological net for the indicators does not differ	Reflective

Indicators that are influenced by latent variables are called effects indicators. The measurement models that validate these indicators and their latent variables are known as reflective models. These models possess a common latent factor structure with reflective indicators and show that changes in the underlying latent construct are reflected by changes in

the indicators. Additionally, the indicators are subject to errors of measurement in the reflective model.

Indicators that influence latent variables (or so called composite variables) are called causal indicators. The measurement models that validate these indicators and their composite variables are known as formative models. Internal consistency and reliability are unimportant in formative measurement models because the indicators are examining different facets of the construct. Error of measurement should therefore be assessed at the construct level rather than at the item level.

6.2.1 Validation of reflective measures

Reflective measures represent the underlying construct in a reflective model and are therefore expected to be correlated. Due to the high correlations between the indicators, the indicators can be considered interchangeable, and dropping an indicator should not alter the conceptual meaning of the construct (Jarvis et al., 2003).

In this study, the measurement of absorptive capacity is reflective and will be validated by performing confirmatory factor analysis in PLSPM with XIStat. For the measurement models, reliability can be measured by calculating composite reliability coefficients for the latent variables (Diamantopoulos & Siguaw, 2000). This coefficient is an indication of how much of the variation in the observations is explained by the underlying latent variable, and is calculated with the following formula:

$$\rho_c = \frac{(\sum \lambda)^2}{[(\sum \lambda)^2 + \sum (\theta)]},$$

where ρ_c = composite reliability,

λ = indicator loadings, and

θ = indicator error variances.

Composite reliability should be greater than 0.6 for each latent variable (Bagozzi & Yi, 1988).

An additional measure of reliability is item reliability, which is given by the square of the standardized factor loadings in PLSPM with XIStat. Item reliability should exceed 0.5 (Bagozzi & Yi, 1988).

Reliability is a necessary condition for validity, but it is not sufficient for validity by itself. Validity can be assessed in different ways, and in this study, emphasis has been placed on the four types outlined in Cronbach and Meehl's (1955) classic article: (1) predictive validity, (2) concurrent validity, (3) content validity, and (4) construct validity. The first two

types are considered as criteria-oriented validation procedures, and they are concerned with the degree to which test scores from one test correlate with scores from another test when the tests have been designed to measure the same construct. In this study, only one test is available, taken during one period of time. However, if the analysis of this one-time test indicates reliability, this will be considered to support its criterion-related validity (virtually identical with predictive validity and concurrent validity).

Content validity is concerned with the extent to which the items used to measure a construct are representative of the universe of items belonging to the construct. This type of validity must be assessed deductively, and in this study, items from Jansen et al. (2005), Jaworski and Kohli (1993), and Soo et al. (2007) are utilized for their measurement of absorptive capacity. For construct performance, items from Jaworski and Kohli (1993) and Narver and Slater (1993, 1994) are used. Finally, construct validity refers to the degree to which a measure captures the concept it is intended to measure (Cook & Campbell, 1979; Cronbach & Meehl, 1955). Construct validation takes place by setting forth specific testable hypotheses about what should be expected if variations in scores on the measurement instrument reflect true variations in the concept they are supposed to measure.

Convergent validity is an important part of construct validation. Convergent validity is the degree to which a measure captures the concept it is supposed to measure. Through confirmatory factor analysis, construct validity is present if the model fits the data reasonably well and if factor loadings are significant (Anderson & Gerbing, 1988; cf. Appendices 4–6). Further, the average variance extracted directly shows "the amount of variance that is captured by the construct in relation to the amount of variance due to measurement error" (Fornell & Larcker, 1981, p. 45). Average variance extracted is calculated by using the following formula (Diamantopoulos & Siguaw, 2000):

$$\rho_v = \left(\sum \lambda^2 \right) / \left[\left(\sum \lambda^2 \right) + \sum (\theta) \right],$$

where ρ_v = average variance extracted,

λ = indicator loadings, and

θ = indicator error variances.

A variance extracted of less than 0.5 indicates that measurement error accounts for the greatest amount of variance in the indicator, and doubts can be raised about the soundness of the indicator and/or the latent construct itself (Diamantopoulos & Siguaw, 2000).

6.2.2 Validation of formative measures

The formative measurement is one in which the indicators influence the construct. These are often called causal indicators, and the construct is often referred to as either a combination variable (MacCallum et al., 1993) or composite variable (MacKenzie, Podsakoff, & Jarvis, 2005). This means that the measures cause the construct and that the construct is fully derived by its measurement. Measurement errors take place at the construct level, which indicate that part of the construct is not explained by the measures. Due to the direction of causality with formative models, a high correlation between indicators is not expected, required, or a cause for concern. However, to drop an indicator would be similar to dropping a part of the construct (Bollen et al., 1991), and this should not be done once an indicator has been verified as part of a construct.

The literature suggests that formative constructs (e.g., the constructs Performance and Network Value) can be investigated for validity by evaluating three different conditions. First, Jarvis et al. (2003) argued that formative constructs require a census of all of the indicators that form the entire construct. Second, both measures and dimensions should be tested for measurement quality by assessing the multicollinearity and path weights (Götz & Liehr-Gobbers, 2004). Third, Bollen and Lennox (1991) stated that "to assess validity we need to examine other variables that are effects of the latent construct" (p. 312). Adhering to the first and third conditions means paying attention to (1) a census of the included items and (2) nomological and/or criterion-related validity (Jarvis et al., 2003). The second condition is analyzed in the next section.

The census criterion was addressed in the identification of adequate measurement instruments based on a literature review and use of existing measurement scales. Based on this identification process, the items in our instruments were found to adequately cover their conceptual domain. Criterion-related validity is addressed in the structural equation modeling (SEM) analysis when the explanatory power of the formative constructs within the proposed research model is tested.

6.3 DESCRIPTIVE STATISTICS - FORMATIVE MEASURES

The network variables, the performance measures "speed of entrepreneurship" and "performance intentions," and the indexes constructed (indexes were constructed by averaging the items in the scale) from the survey were tested for normality in SPSS before hypothesis testing. The descriptive statistics, as well as measures of kurtosis and skewness, are presented

in Table 9 for a sample of variables. A complete table of descriptive statistics is enclosed in Appendix 1.

Table 9 - Descriptive Statistics for a Sample of Variables

	<i>N</i>	Mean	Std. Deviation	Skewness	Kurtosis
Network Range	651	7.48	3.01	-.27	-.11
Network Frequency Contacts	651	1.64	.82	-.17	-.87
Network Frequency Organizations	651	.189	.41	2.87	9.83
Network Value Contacts	651	4.03	1.92	-.44	-.42
Network Value Organizations	651	.53	1.25	2.57	6.24
Network Value Finance	651	2.46	1.92	.31	-.83
Performance Intentions	651	3.91	1.78	-.08	-1.02
Speed of entrepreneurship	651	3.37	.85	-1.28	.71

6.4 TESTING THE MEASUREMENT MODEL

Before the structural model was tested, the measurement models for each construct were evaluated for fit of each model to the data. This means that the psychometric properties, i.e., the validity and reliability, of each measurement instrument were tested (Section 6.2). A valid and reliable measurement model ensures the absence of non-random measurement errors and multicollinearity, which are both important in regression assumption. Both formative and reflective measurement instruments were applied, and different methods of testing the validity and reliability were conducted for the two different types of measurement models.

As mentioned above, data were collected in MI-PRO and were then transferred into SPSS. Data was subsequently coded in SPSS, and the program was used to calculate descriptive statistics. The purpose of this section is to analyze the research model by employing variance-based SEM as the analysis approach. The data analysis tool PLSPM with XIStat was utilized to perform the analysis. Thus, PLSPM with XIStat was utilized to test both the measurement model and the structural model.

The SEM approach was chosen since it is a second generation regression method that combines confirmatory factor analysis with linear regression (Appendices 4 - 6). This particular quality of SEM makes it possible to run a measurement model and a structural model simultaneously. In general, SEM has qualities that make it appropriate for the study, including its ability to enable more accurate parameter estimation, i.e., a "more realistic" analysis (Bollen, 1989, p. 19) than traditional regression (Goodhue, Lewis, & Thompson, 2006). Using PLSPM with XIStat makes it possible to test a model composed of formative

(e.g., network value) and reflective (e.g., performance intention) measurement models as well as a hierarchical construct (e.g., absorptive capacity).

The conceptual model (cf. Figure 5) was analyzed through a three-step test strategy. First, a model with incubator as an independent variable and entrepreneurial performance as the dependent variable was analyzed. This model is labeled as Model 1. Next was introduction of two intermediate variables, i.e. network value and absorptive capacity, into Model 1. This model is labeled as Model 2. The third test was to introduce a set of control variables into Model 2, to test the robustness of the findings. This model is labeled as Model 3. Table 10 summarizes the chosen analysis strategy.

Table 10 - Test strategy for test analysis

Models	Independent variable	Intermediate variables	Dependent variable	Purpose
Model 1	Incubator	-	Entrepreneurial Performance	Test whether being in an incubator produces an effect on performance.
Model 2	Incubator	- Network Value - Absorptive Capacity	Entrepreneurial Performance	Test whether network value and absorptive capacity are substantial mechanisms explaining the value of participating in an incubator program.
Model 3	Incubator	Main Variables: - Network Value - Absorptive Capacity Control Variables: - Started a business before - Entrepreneur experience (years of industry experience) - Location in a science park related to a university - Location in a business park (<i>næringsshage</i>) - The entrepreneur's education - Age of entrepreneur - Gender	Entrepreneurial Performance	Testing the robustness of the findings in Model 2.

6.4.1 Measurement model results

The proposed research model consists of five summated rated scales (network value, acquisition, transformation, exploitation, and entrepreneurial performance) and one single rated scale (the incubator). Three out of five of the summated rated scales represent reflective variables, and two represent formative variables (network value and entrepreneurial performance).

The literature suggests that formative constructs can be investigated for validity by evaluating three different conditions. First, according to Jarvis et al. (2003), formative constructs require a census of all of the indicators that form the entire construct. Second, both measures and dimensions should be tested for measurement quality by assessing their multicollinearity and path weights (Götz & Liehr-Gobbers, 2004). Third, Bollen and Lennox (1991) stated that "to assess validity we need to examine other variables that are effects of the latent construct" (p. 312). The second condition is analyzed in the next section, while adhering to the first and third conditions means paying attention to (1) a census of the included items and (2) nomological or criterion-related validity (Jarvis et al., 2003). The census criterion was addressed in the pre-test procedures for the survey; experts on the topic were invited to evaluate the two formative instruments and asked to suggest other relevant issues that could enhance or inhibit the level of network value and performance. It turned out that the items in these two instruments appear to cover actual indicators. Criterion-related validity is addressed in the SEM analysis when testing the explanatory power of network value and absorptive capacity within the proposed research model.

The adequacy of the reflective variables, e.g., acquisition, transformation, and exploitation, can be determined by looking at: (1) individual item reliabilities, (2) the convergent validities of measures associated with individual variables, and (3) discriminant validity between variables and items (Hulland, 1999).

Recently, a global fit measure for PLSPM has been suggested (Tenenhaus et al., 2005) called Goodness of Fit ($0 < \text{GoF} < 1$), which is defined as the geometric mean of the average communality and average R^2 (for endogenous constructs). Based on Cohen's (1988) recommendation for evaluation of effect sizes, Wetzels et al. (2009) recommend the following evaluation criteria for GoF values: small ≤ 0.1 , medium ≤ 0.25 , and large ≤ 0.36 . These may serve as baseline values for validating the PLSPM model globally. For the initial model, a GoF value of 0.42 was obtained, which exceeds the cut-off value of 0.36 for large effect sizes of R^2 , thus demonstrating that the model performs adequately compared to the baseline values defined above.

Table 11 shows factor loadings and t -values for the constructs in the proposed research model. For each construct, the assessment of convergent validity or internal consistency is also included in the composite reliability coefficient (Fornell & Larcker, 1981). As can be seen in Table 12, all the constructs have internal consistency values that exceed the threshold value of 0.70 recommended by Nunnally (1978).

Table 11 - Composite Reliability, Loadings/Weights, and *t*-values

Variable	Mean	Std. deviation	Indicator coefficient	<i>t</i> -value
Network Value (formative indicators),				
Value of information contact:			Weight	
Friends	3,79	2,22	0.15	1.15
Family	4,54	1,98	0.09	0.68
Business contacts	4,21	1,90	0.29	2.28
Local businesses	2,05	1,94	0.06	0.52
Industry	3,47	2,05	0.08	0.61
Bank	2,11	2,26	0.00	0.02
Consultant	0.63	1,49	0.07	0.45
Accountant	3,41	2,20	0.06	0.52
Industry associations	0.58	1,46	0.07	0.68
Small Business Development Organizations	0.35	1,21	0.01	0.06
Solicitors/Lawyers	1,52	2,38	0.26	2.16
Incubator	0.77	1,81	0.55	3.93
Customers/Clients	3,88	2,33	0.24	2.04
Suppliers	3,18	2,38	0.20	1.45
Acquisition (reflective indicators) Composite reliability = 0.84)			Loading	
<i>How does the company collect information and knowledge?</i>				
We often have meetings with our customers to survey products or services they will need in the future.	3.81	2.06	0.77	19,15
We cooperate with customers directly to comply with their needs even better.	5.39	1.87	0.55	7,08
We often survey our customers to control the quality of our products and services.	3.60	1.95	0.80	30.77
We often share results from surveys with others, for example, distributors.	2.46	1.75	0.54	8.92
We collect sector information by informal means e.g., lunch with colleagues, talks with business partners, etc.	4.18	1.95	0.53	6.97
We collect information about our competitors.	3.49	1.91	0.71	16.93
We regularly review the likely effect that changes in our business conditions, such as regulations and technology, will have on our customers.	3.40	1.90	0.70	12.06
We are slow to detect fundamental shifts in our customers' request for products or services	2.38	1.44	0.03*	0.23
We are slow in detecting fundamental shifts and trends in our industry sector such as new competitors, new technology, and changes in framework conditions.	2.41	1.50	0.07*	0.59
Transformation (reflective indicators) (Composite reliability = 0.88)			Loading	
<i>How does the company collect information and knowledge?</i>				
Many informal talks within the company unit deal with our competitors' tactics or strategies.	3.12	1.92	0.73	19.98
We often have internal meetings to discuss trends and development in the market.	3.63	2.10	0.80	25.84
We often use time to discuss the future needs of our clients.	4.29	2.00	0.80	23.46
We frequently circulate documents (for example, reports and newsletters) that provide information about our customers.	2.94	1.99	0.71	15.95

Variable	Mean	Std. deviation	Indicator coefficient	t-value
When something of importance happens in our most important markets, the whole company is informed about this within a short time.	5.07	2.00	0.63	8.72
The results from satisfactory surveys are always conveyed to the employees.	2.91	2.18	0.62	10.82
There is minimal internal communication in our company regarding market development.	2.57	1.75	0.09*	0.85
When an employee discovers something important about competitors, he/she is slow to notify other employees.	2.37	1.81	0.14*	1.28
The company pays more attention to acquire and process new knowledge on markets and regulations than other recently established businesses.	3.64	1.80	0.74	18.58
Exploitation (reflective indicators) (Composite reliability = 0.94)			Loading	
<i>How does the company exploit acquired information and knowledge?</i>				
We are constantly appraising how new knowledge can be used to further develop the business	4.83	1.82	0.86	20.89
Compared to other recently established firms, our company is good at assimilating new knowledge.	4.46	1.71	0.79	22.41
New, acquired knowledge has led us to take efficient measurements compared to our competitors.	4.00	1.93	0.87	42.91
Feedback from customers has often contributed to changed practice.	4.30	1.82	0.69	12.86
New knowledge acquired by us in the last year has resulted in new ways of performing tasks.	4.61	1.86	0.87	23.99
New knowledge acquired in the last year has improved company results .	4.36	1.90	0.80	16.95
New knowledge acquired in the last year has resulted in new projects or product ideas.	4.53	1.99	0.81	25.16
New knowledge acquired in the last year has increased our capability to solve different types of problems.	4.73	1.82	0.82	19.58
Performance intention (reflective indicators) Composite reliability = 0.90)			Loading	
<i>What are your intentions with regard to development in 2012?</i>				
Increase sales	4.52	2.19	0.86	90.44
Increase number of employees	2.77	2.19	0.77	55.97
New competitive products	3.73	2.15	0.83	71.67
Improved results	4.65	2.08	0.83	64.33
Entrepreneurial Performance (formative indicators)			Weight	
Income	0.61	2.14	0.33	3.51
Profit	2.93	37.12	0.03	0.29
Employee	0.14	0.55	0.11	0.77
Performance intention (i.e., index based on reflective items)	4.03	1.76	0.82	12.49
Pspeed	3.42	0.86	0.21	1.61

*Removed due to low factor loading

For 10 out of the 31 items on the summated rating scales, the factor loadings were below 0.7. In practice, it is common to find several measurement items in an estimated model that have factor loadings below the 0.7 threshold. Especially when new items are employed, a

more suitable lower cut-off value is considered sufficient in SEM analyses (Hulland, 1999). Thus, a cut-off value of approximately 0.50 was applied to the factor loadings to retain items. The result was that a total of four items that were well below 0.55 had to be dropped from two of the variables (cf. factor loadings marked with asterisks in Table 11). All retained items had loadings above 0.50. In addition, all of the reflective measures had significant loadings (t -values > 1.96).

Following Bollen (2011) and Jarvis et al. (2003, p. 202): “dropping a causal indicator may omit a unique part of the composite latent construct and change the meaning of the variable.” Thus, the approach is to not remove formative items from the latent variable. Four out of fourteen formative network value items had substantial and significant weights. They are “Business contacts”, “Solicitors/Lawyers”, “Incubator” and “Customers/Clients”, see Table 11. This indicates that a specific set of network ties contributes substantially to network value. The network ties that contributed with the main amount of variance in network value were, as mentioned above, Business contacts, Solicitors/Lawyers, Incubator and Customers/Clients. A similar pattern was also identified for the formative variable of entrepreneurial performance. Two out of five formative indicators, “Income” and “Performance intention” had substantial and significant weights, see Table 11. This indicates that income and intentions constitute the core of the explained variance in the latent variable entrepreneurial performance.

Performance intentions consist of four reflective indicators, which are computed to an index; i.e. the scorings on the four reflective indicators is added together and divided by four. This computation of performance intention results in one variable which is intended to be included as an indicator in the latent variable entrepreneurial performance. Entrepreneurial performance consists of income, profit, employees, speed of entrepreneurship and performance intention. Each of these five indicators of entrepreneurial performance is not expected to be associated with each other, and hence, they are defined as formative indicators. As already pointed out, performance intention consists basically of four reflective indicators, but when an index is computed out of these four and added as one out of five entrepreneurial performance indicators, this index becomes an element in a set of formative indicators.

The discriminant validity of the reflective indicators and variables was examined using both factor (Table 12) and correlation (Table 13) analyses:

Table 12 - Factor Loadings and Cross-Loadings

	ACQ	TRA	EXP
ACQ1	0.77	0.47	0.48
ACQ2	0.54	0.42	0.37
ACQ3	0.80	0.56	0.60
ACQ4	0.54	0.43	0.32
ACQ5	0.53	0.38	0.44
ACQ6	0.71	0.53	0.47
ACQ7	0.70	0.58	0.48
TRA1	0.56	0.73	0.51
TRA2	0.55	0.80	0.59
TRA3	0.66	0.80	0.67
TRA4	0.47	0.71	0.49
TRA5	0.38	0.63	0.41
TRA6	0.41	0.62	0.38
TRA9	0.57	0.74	0.65
EXP1	0.56	0.68	0.83
EXP2	0.52	0.56	0.79
EXP3	0.67	0.67	0.87
EXP4	0.54	0.49	0.69
EXP5	0.56	0.62	0.87
EXP6	0.54	0.60	0.80
EXP7	0.59	0.61	0.81
EXP8	0.51	0.62	0.82

The coefficients in Table 13 show that no items have higher cross-loadings than factor loadings on their respectively assigned latent variables. Additionally, all items have cross-loadings that are at least 0.10 lower than the factor loading for their respectively assigned latent variables, which suggests that discriminant validity at the item level is met for all three reflective first order constructs.

Table 13 - Discriminant Validity (Squared Correlations < AVE)

	Acqui	Transf	Exploi
Acquisition	0.44	0.53	0.48
Transformation	0.53	0.52	0.56
Exploitation	0.48	0.56	0.66

The inspection of discriminant validity among variables is based on the squared correlation between the variables and their respective average variance extracted. As Table 13 shows, the average variance extracted value for the variables is consistently larger than the off-diagonal squared correlations for exploitation, which suggests satisfactory discriminant validity. However, the squared correlations between the acquisition and transformation

variables are slightly higher than their respective values for average variance extracted, which indicates a potential problem with discriminant validity between these two sub-dimensions of absorptive capacity. Since the item level test (see Table 12) does not indicate any problems, and the difference between the squared correlations and the respective average variance extracted is relatively marginal (e.g., 0.08 and 0.002), the decision was made to retain both acquisition and transformation.

Table 14 illustrates a test of three alternative and competing measurement models for absorptive capacity. The purpose with the test of these alternative models is to evaluate whether the construct absorptive capacity is:

1. A one-factor construct based on all items from all the three dimensions, i.e., without distinguishing between these potential dimensions. This is the baseline model.
2. A three-factor construct in which each of the three dimensions is a unique variable in the structural model. Thus, absorptive capacity is not a uniform construct in this model.
3. A second-order model in which the three dimensions make up the absorptive capacity construct. This can also be characterized as a hierarchical construct model.

Table 14 - Measurement for Absorptive Capacity

Model of Absorptive Capacity	Relation with Performance	Goodness of Fit Index
One-factor construct (i.e., all items in one dimension)	0.24 (3.24)	0.29
Three unique constructs:		
- Acquisition	-0.09 (-0.79)	0.31
- Transformation	0.07 (0.72)	
- Exploitation	0.28 (2.67)	
Second-order-construct	0.23 (3.14)	0.47

Each of these three alternative measurement models was tested as a part of the structural model (see Figure 5). The indicator pool was equal in each test; only the modeling of the measurement model for absorptive capacity was changed. Based on the calculations in the table, the goodness of fit index indicates that the second-order model has the best fit and should therefore be used in the analysis of the final test of the structural model. Accordingly, fitting the final measurement models to the sample data resulted in a goodness of fit ($0 < \text{GoF} < 1$) value of .47, which exceeds the cut-off value of 0.36 for large effect sizes of R^2 , thereby showing that the model performs well compared to the defined baseline value.

Consequently, the fit value was within the acceptable range. The conclusion is therefore that the measurement model shows a sufficiently adequate fit to continue with an evaluation of the structural model.

In summary, the analysis was done using the following variables and items:

- Incubator connection (yes/no).
- Network value is modeled as a formative variable with all the items from Table 11, even though they have different weights. Network frequency and range are not included in the model, cf Chapter 5.2.6, but are given special attention to see how they may influence the results, cf Chapter 6.5.2.
- Absorptive capacity is modeled as a reflective second order construct with use of the items in Table 11, except for four items due to too low loadings.
- Entrepreneurial performance is modeled as a formative variable based on Income, Profit, Employee, Pspeed and Performance intention as indicators. Performance intention is an index based on the four reflective items in Table 11.

6.5 TESTING THE STRUCTURAL MODEL

In agreement with the test strategy described in the introduction to Section 6.4, three different models were tested in the present section to construct the structural model. The first model (i.e. Model 1) was tested with incubator as an independent variable and entrepreneurial performance as the dependent variable. The purpose of Model 1 was to test whether just being in an incubator produce an effect on performance. After that, a test of a model (i.e. Model 2) with two intermediate variables, i.e. network value and absorptive capacity was done. The purpose was to test whether network value and absorptive capacity are substantial mechanisms explaining the value of participating in an incubator program. The final test was to introduce a set of control variables (i.e. Model 3), with the purpose of testing the robustness of the findings.

6.5.1 Test of the hypotheses

Test of Model 1; Figure 6 shows the results from the test of Model 1, where incubator was hypothesized to directly influence entrepreneurial performance. The standardized regression coefficient is shown for the path between incubator and entrepreneurial performance, together with the corresponding *t*-value (in parenthesis).

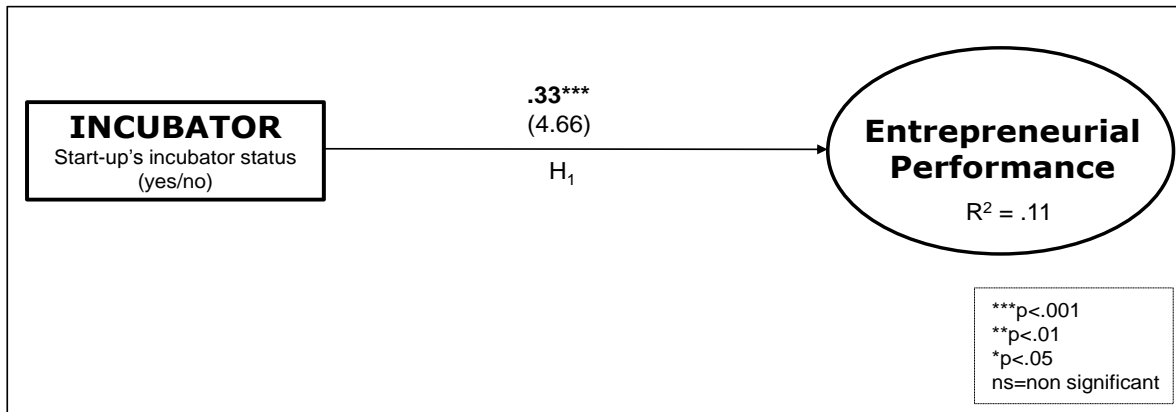


Figure 6 - Test of Model 1 with results from PLSPM with XIStat

As can be seen from Figure 6, incubators have a significant association with entrepreneurial performance, and thus, the hypothesized positive effect that incubated firms generate higher entrepreneurial performance than non-incubated firms (H_1) is supported ($\gamma = 0.33, p < .001$).

Test of Model 2; Figure 7 presents the results from the test of Model 2, where the effects of incubators on entrepreneurial performance are mediated by two variables which are proposed to capture how incubators add value to entrepreneurs.

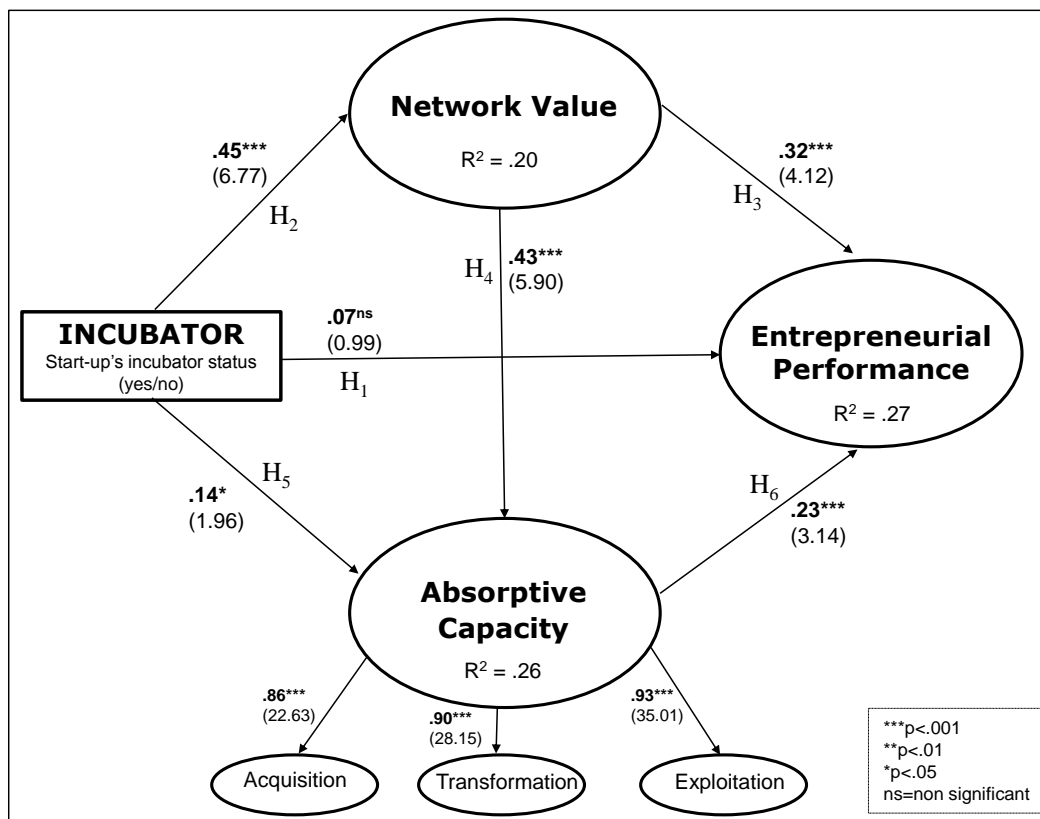


Figure 7 - Test of Model 2 with results from PLSPM with XIStat

When run together with the two mediator variables, the direct effect of incubator affiliation on entrepreneurial performance becomes suppressed ($\gamma = .07$, ns), and thus H₁ is not significant. Incubator has a direct effect on network value ($\gamma = .45$, $p < .001$) and absorptive capacity ($\gamma = .14$, $p < .05$), and thus H₂ and H₅ is supported. Network value has an effect on absorptive capacity ($\beta = .43$, $p < .001$) and thus H₄ is supported. Both network value and absorptive capacity have an effect on entrepreneurial performance (i.e. $\beta = .32$, $p < .001$ and $\beta = .23$, $p < .001$), and thus H₃ and H₆ is supported. Table 15 presents the results from the test of Model 2, and summarizes the results of analysis.

Table 15 - Results of hypotheses testing

	Dependent variables (values are standardized coefficients)		
	Network Value	Absorptive Capacity	Entrepreneurial Performance
Incubator	.45** (H ₂ supported)	.14* (H ₅ supported)	.07 ^{ns} (H ₁ not supported)
Network Value		.43** (H ₄ supported)	.32** (H ₃ supported)
Absorptive Capacity			.23** (H ₆ supported)
R ²	.20	.26	.27

** $p < 0.001$; * $p < 0.05$; ns=non-significant

In addition to testing the formal hypotheses, Sobel's test of mediation was utilized to test the mediation effects of incubators on entrepreneurial performance through network value and absorptive capacity. Both of the effects turned out to be significant; i.e., the mediation effect of network value was 0.14 ($p < 0.01$), and the mediation effect of absorptive capacity was 0.03 ($p < 0.05$). This indicates that incubated firms generate a higher level of network value and absorptive capacity than non-incubated firms do, and that this in turn contributes to a higher level of entrepreneurial performance.

The mediation effects of incubator - network value on absorptive capacity and entrepreneurial performance were also tested. The mediation effect of incubator network - value on absorptive capacity was 0.19 ($p < 0.001$), and the mediation effect of incubator - network value on absorptive capacity and its effect on performance was 0.10 ($p < 0.05$). The mediation test, mediation coefficient and significance levels are shown in Table 16 below.

Table 16 - Sobel's Test of Mediation

Mediation Test	Mediation Coefficient	Significance Level
Incubator - network value; effect on entrepreneurial performance	0.14	$p < .01$
Incubator - absorptive capacity; effect on entrepreneurial performance	0.03	$p < .05$
Incubator - network value; effect on absorptive capacity	0.19	$p < .001$
Incubator - network value on absorptive capacity and its effect on performance	0.10	$p < .05$

The results from Table 16 indicate that incubated firms generate a higher level of network value as well as a higher level of absorptive capacity, and this in turn contributes to a higher level of entrepreneurial performance. In sum, there seem to be three paths to entrepreneurial performance within the established structural model. In the first, incubators increase new firm's entrepreneurial performance by increasing network value (incubator → network value → entrepreneurial performance). In the second, incubators increase start-ups' entrepreneurial performance by increasing absorptive capacity (incubator → absorptive capacity → entrepreneurial performance). In the third, incubators increase new firms' entrepreneurial performance by increasing network value, which in turn increases new firms' absorptive capacity and then entrepreneurial performance (incubator → network value → absorptive capacity → entrepreneurial performance).

Test of Model 3; Including a set of control variables in a structural model is important to meet the requirement of isolation, i.e., to test the robustness of the findings. The literature on incubators does not provide much help with the identification of possible control variables. However, it may be difficult to detect the effects of the independent and mediating variables on entrepreneurial performance without controlling the effects of as many factors as possible outside of the included research variables. Demographic and background characteristic variables may have the potential to influence the mediating and dependent variables, and these are therefore included in the structural model. This procedure for including variables is well suited to identifying spurious and suppressed coefficients in the structural model.

The following variables were included as control variables: started a business before; entrepreneur experience (years of industry experience); location in a science park related to a university; location in a business park (*næringsshage*); the entrepreneur's education; age of entrepreneur; and gender. Table 17 shows how the control variables influence the core variables in the research model (cf. Model 2).

Table 17 - The effects of control variables

Control variables	Variables		
	Network value	Absorptive capacity	Entrepreneurial performance
Started a business before	.06 ^{ns} (.94)	.07 ^{ns} (.97)	-.09 ^{ns} (1.31)
Entrepreneur experience (years of industry experience)	-.14* (1.98)	-.04 ^{ns} (-.56)	-.08 ^{ns} (.99)
Location in a science park related to a university	.16 ^{ns} (1.51)	.00 ^{ns} (.03)	.07 ^{ns} (.68)
Location in a business park (<i>næringsshage</i>)	.13 ^{ns} (1.65)	.01 ^{ns} (.13)	.02 ^{ns} (.20)
The entrepreneur's education	.03 ^{ns} (.51)	.10 ^{ns} (1.41)	-.13 ^{ns} (1.94)
Age of entrepreneur	-.13 ^{ns} (1.73)	.03 ^{ns} (.37)	-.07 ^{ns} (.90)
Gender	-.06 ^{ns} (.87)	.10 ^{ns} (1.43)	-.01 ^{ns} (.20)
R ²	.20	.26	.27

**p<0.001; *p<0.05; ns=non-significant

Table 18, i.e. summarizes the results from test of Model 3, cf. the heading “*After introducing control variables*”, where seven control variables are introduced simultaneously to the model. Standardized regression coefficients are shown in connection with each relationship, and *t*-values appear in parentheses following the regression coefficient.

Table 18 - Control Variables; results before and after introduction

Before introducing control variables			
	Network Value	Absorptive Capacity	Entrepreneurial Performance
Incubator	.45** (6.77)	.14* (1.96)	.07 ^{ns} (.99)
Network Value		.43** (5.90)	.32** (4.12)
Absorptive Capacity			.23** (3.14)
R ²	.20	.26	.27
After introducing control variables			
	Network Value	Absorptive Capacity	Entrepreneurial Performance
Incubator	.30** (2.52)	.15 ^{ns} (1.14)	.04 ^{ns} (.31)
Network Value		.34** (4.02)	.22** (2.61)
Absorptive Capacity			.31** (4.21)
R ²	.20	.26	.27

**p<0.001; *p<0.05; ns=non-significant

The findings in table 18 show that there are some changes in the standardized regression coefficients when a set of control variables is controlled for (cf. Chapter 5.2.6). The path from incubator to absorptive capacity becomes insignificant ($\gamma = .15$, ns), and thus H₅ is not supported after the introduction of control variables. The effect of incubator affiliation on entrepreneurial performance still becomes suppressed ($\gamma = .04$, ns), and thus H₁ is not significant. Incubator has a somewhat lower, but still a significant effect on network

value ($\gamma = .30$, $p < .001$) and thus H_2 is supported. Network value has a somewhat lower, but still a significant effect on absorptive capacity ($\beta = .34$, $p < .001$) and thus H_4 is supported. Network value has a somewhat lower, but still a significant effect on entrepreneurial performance ($\beta = .22$, $p < .001$), and thus H_3 is supported. Absorptive capacity has a somewhat stronger and still a significant effect on entrepreneurial performance ($\beta = .31$, $p < .001$), and thus H_6 is supported. In general, the test of control variables thus supports the assumption that the findings in Model 2 are robust, and hence, that suppressed or spurious relationships do not exist. The expectation from this is the relationship between incubator and absorptive capacity, where the initial path coefficient changes from a significant ($\gamma = .14$, $p < .05$) to a non-significant coefficient ($\gamma = .15$, ns).

6.5.2 Additional analyses and results

Network range and frequency are important variables for explaining the successful establishment of new businesses (Watson, 2007; Greve, 1995). Other researchers have used concepts regarding feelings about relationships, communication, and cooperation to measure the value of network ties (Lechler, 2001; Johannisson, 2000; Miller et al., 2006/2007; Rindfleisch & Moorman, 2001). The more diverse the network is and the more frequent the contact is, the more likely the chances are that the entrepreneur will be able to access necessary information and advice. Likewise, the more time an entrepreneur spends on developing and maintaining contacts, the more likely it is that he or she will obtain valuable information (Brown & Duguid, 1991). Table 19 shows results from the present study regarding the respondents' activity in connection with how many people they have discussed aspects of starting or running their own businesses, and the frequency with which the entrepreneurs had contact with persons with whom they discussed business matters.

Table 19 - Alternative analysis of Network as Independent Variable

Network Item	Incubator (Independent Variable)	Performance (Dependent Variable)
Network Value (the structural model)	0.45 (<i>t</i> -value 6.77, <i>p</i> = 0.05)	0.32 (<i>t</i> -value 4.12, <i>p</i> = 0.05)
Network range ; How many people would you estimate that you have discussed aspects of starting or running your own business?	0.17 (2.31)	0.26 (3.75)
Network frequency ; How many hours per week in average did you spend developing/maintaining contacts with persons with whom you can discuss business matters?	0.02 (0.29)	0.43 (7.16)

Network value is a formative variable. Thus, it is useful to examine how each of the indicators or network contacts contributes to explaining the results from the model. Weights

in the table correspond to the weights that each of the elements has in the model. Weights are related to effect size (from Cohen, 1988). The bullets below show measurement of effect size:

- 0.10, small
- 0.30, moderate
- 0.50, large

The results show that start-ups in an incubator discuss aspects of starting and running a new business with more people than those that are not in an incubator. The results are significant, but the standardized regression coefficient (0.17) is closer to a small effect size than a moderate size. Moreover, the more people the entrepreneur has discussed business matters with, the higher the entrepreneurial performance. The effect size for this finding is closer to moderate (0.26) than significant. The findings are also shown for hours per week used to discuss business aspects with relevant people. The effect size for these is moderate for performance (0.43). The coefficient between incubator and hours per week is small (0.02), however, and not significant.

The mediated effects that an incubator has involving "how many people the entrepreneur has discussed aspects of starting or running the business with" on entrepreneurial performance is 0.04 (i.e., $0.17 * 0.26$) and represents a small effect size. The equivalent effect of an incubator on "how many hours per week on average the entrepreneur spent developing/maintaining contacts with persons with whom he or she can discuss business matters as a liaison" and on entrepreneurial performance is 0.009 (i.e., $0.02 * 0.43$) and therefore insignificant. For network value, this mediated relationship has the effect size of 0.14 (i.e., $0.45 * 0.32$). The results presented here, which were generated from three different network variables, are relatively consistent and support the initial findings, where network value is used as a mediating variable between incubator and entrepreneurial performance.

Table 20 below shows the 14 categories of network contacts used in the present study. The weights and the *t*-values (see Columns 3 and 4) in the table demonstrated the relative importance of each of them in their constitution of network value.

Table 20 - Categories of Network Contacts

	Network Contacts for Business Matters	The importance of the Items	
		Weights	t-value
1	Friends	0.15	1.15
2	Family	0.09	0.68
3	Professional acquaintances	0.29	2.28
4	Local businesses	0.06	0.52
5	Others in the industry	0.08	0.61
6	Bank	0.00	0.02
7	Business Consultants	0.07	0.45
8	External Accountants	0.06	0.52
9	Industry Associations	0.07	0.68
10	Small Business Development Organizations	0.01	0.06
11	Solicitors/Lawyers	0.26	2.16
12	Incubator	0.55	3.93
13	Customers/Clients	0.24	2.04
14	Suppliers	0.20	1.45

There are four network contacts with significant weights (i.e., a Beta value): professional acquaintances, solicitors/lawyers, incubators, and customers/clients. The effect of the incubator is large, and the effects of the three others range from moderate to small. This indicates that these four groups are the most important with regard to strengthening the network value of start-ups, leading to better entrepreneurial performance.

The results also show, and are supported by Tortoriello (2015) and Cohen and Levinthal (1990), that the ability to recombine successfully diverse sources of knowledge acquired outside the start-up depends on the position maintained by individuals in the internal knowledge-sharing network, which is important to strengthen absorptive capacity.

To further substantiate the results from the structural model in Figure 7, additional analyses were completed. The table above shows the results from measuring network value and the effect of how many people with whom the entrepreneur has discussed aspects of starting business as well as how many hours he or she spent on such discussions each week over a period of three months. This shows that the results are consistent and independent of measurement. Only network value was used for hypothesis testing in the measurement model.

Network was operationalized for value and network frequency and range in Chapter 5.2.2 and 5.2.6 and asked for in the questionnaire. Against this background, an alternative structural model was also constructed, cf Appendix 10 to examine whether or not including

network frequency and range as indicators for the independent variable network (in addition to network value) will affect the hypothesis testing. The alternative structural model in Appendix 10 shows that including those two indicators did not affect the result of the hypothesis testing.

Next, the dependent variable entrepreneurial performance consists of different indicators. The results of the analysis for each are shown in Table 21. *T*-values equal to or higher than 1.96 demonstrate that the indicator contribute with significant variation in a latent variable. The weights are shown as correlations and may turn out weak (close to 0) or strong (close to 1.0). The value of the correlation in this study, defined as higher than .20 and contemporary, are significant, and they show that the indicator contributes to the latent variable. Since the measurement model is formative, the indicators which do not contribute are not deleted. If the measurement model was reflective, they were deleted.

Table 21 - Analysis of Entrepreneurial Performance

Entrepreneurial Performance (Formative)	Mean	Std. deviation	Weights	<i>t</i>-value
Income	0.61	2.14	0.33	3.51
Profit	2.93	37.12	0.03	0.29
Employee	0.14	0.55	0.11	0.77
Performance intention (i.e., index based on reflective items)	4.03	1.76	0.82	12.49
Speed	3.42	0.86	0.21	1.61

In the table, weights for income (.33) and performance intention (.82) contribute to what network value and absorptive capacity effect in entrepreneurial performance. This then is a result of the process of estimation to figure out the best solution from the given variation in the dataset.

In the structural model, one overall expression for the dependent variable is used. PLS-PM has its own procedure of estimation for latent variables. This procedure optimizes the explanation of independent variables. When the procedure can estimate the relation between network value and entrepreneurial performance, then the correlation between these two variables will have been optimized.

In Table 22, the structural model is tested against different dimensions of entrepreneurial performance and not just one common expression, as was the case in the structural model.

Table 22 - Test of Each of the Dimensions in Entrepreneurial Performance

Performance Variable	Incubator	Network	Absorptive Capacity
Income	-0.11 (1.60)	0.14 (1.81)	0.04 (0.57)
Profit	-0.05 (0.82)	0.08 (1.18)	0.13 (2.10)
Employee	-0.05 (0.75)	0.09 (1.34)	0.01 (0.13)
Performance intention (i.e., index based on reflective items)	-0.02 (0.82)	0.19 (7.46)	0.45 (18.65)
Speed	-0.09 (3.07)	-0.09 (3.07)	-0.01 (0.44)

Results from the analysis of all five different performance indicators shows relatively weak positive relationships between each of them. However, performance intention is satisfied with two good results. These results, then, provide sufficient reason to conduct a test with the latent variable of entrepreneurial performance and its relationship with all five of the indicators in the table.

7. DISCUSSION AND IMPLICATIONS

The aim of this research was to examine relationships between business incubator status, network value, absorptive capacity, and entrepreneurial performance for start-ups. Based on a review of incubator models developed by Bergek and Norrman (2008), business incubators provide infrastructure (physical resources and facilities), business support (management counseling) and mediation services (networking) for new firms. These coincide with the resources listed by Barney (1991) and Heirman et al. (2003). It was expected that levels of absorptive capacity, as well as value from networking, would be better developed for incubated firms than for non-incubated firms, leading to higher levels of entrepreneurial performance.

This chapter discusses the study and the results. Section 7.1 summarizes the results from the data analysis. Section 7.2 then examines the theoretical implications; Section 7.3, managerial and policy implications and Section 7.4, the limitations of the study. Section 7.5 points out directions for further research, and Section 7.6 provides some concluding remarks.

7.1 SUMMARY OF THE RESULTS

The research model developed for this study suggests that firms that develop their network value and absorptive capacity will improve their entrepreneurial performance more than firms that do not do so. Firms that participate in an incubation program will be able to develop their networks and absorptive capacity in a more purposeful way than those who do not participate in such a program. Ultimately, this will lead to higher entrepreneurial performance for firms that participate in an incubation program. Six hypotheses were developed from the theoretical approach and empirically tested with data collected from start-up Norwegian firms that either have or have participated in incubator programs. The data analysis shows that incubated firms tend to have higher network values and greater absorptive capacity than non-incubated firms. Furthermore, firms' network value and absorptive capacities seem to influence their levels of entrepreneurial performance. However, the results do not demonstrate a direct link between participation in an incubator program and entrepreneurial performance, and hence, the results do not support Hypothesis 1 (i.e., Beta **.07** and *t*-value 0.99), cf. the test of Model 2, Figure 7. The latter finding supports the main hypotheses, namely that network value and absorptive capacity serve as intermediaries between incubator status and entrepreneurial performance. Network value and absorptive

capacity seem to be sufficient mediators of the contribution of start-ups' entrepreneurial performance. Thus, the main value of incubator membership is found in these factors.

As indicated above, the empirical findings support Hypothesis 2, namely that incubated firms in general generate higher levels of network value than non-incubated firms. The findings also support Hypothesis 5, that incubated firms in general produce higher levels of absorptive capacity than non-incubated firms. Likewise, there was support for Hypothesis 3, that firms' network values are positively related to performance, as well as for Hypothesis 6, that firms' level of absorptive capacity is positively related to entrepreneurial performance.

7.2 THEORETICAL IMPLICATIONS

Measuring outcomes of business incubators for start-ups has long been one of the greatest challenges of research on performance of incubatees (Sherman & Chappell, 1998). The data analysis performed for this research shows that the effect of business incubators on start-ups can be measured using a resource-based view of the firm, network value and dynamic capabilities (absorptive capacity). The resource-based view postulates that firms gain competitive advantages when they acquire and retain resources that are valuable, rare, inimitable and non-substitutable (Barney, 1991, 2001). Business incubators support start-ups from inception and accelerate their learning curve and resource development, thereby contributing to superior entrepreneurial performance. Accordingly, start-ups in a business incubator would profit from the incubator's goals of helping companies to survive their hardest years and assisting them in overcoming the disadvantages of their inexperience.

The findings demonstrate that start-ups inside an incubator report better business development from network value and absorptive capacity to a greater extent than those outside an incubator. This in turn indicates that start-ups inside a business incubator will establish better resources and be provided with increased capabilities to enable them to develop their businesses compared with those outside an incubator. Thus, both network value and absorptive capacity may be characterized as important for the development of performance-generating resources and capabilities for start-ups. In other words, the findings demonstrate the importance of network value and absorptive capacity, showing them to be essential resources and capabilities for start-ups, as they both appear to boost entrepreneurial performance. Based on this, the most important question is: Why do start-ups inside an incubator have a higher probability of developing network value and absorptive capacity than those outside an incubator?

With regard to network value, one explanation may be the unique possibility that start-ups in an incubator have for establishing network with the incubator management, other firms, and other sources of new resources relevant to the business. To establish a network like this will stimulate a firm's absorptive capacity, and hence, possibilities for organizational learning. This is supported by Hansen et al. (2000) and Scillitoe and Chakrabarti (2010), who stress the importance of start-ups' networking activities.

From the resource based point of view liability of newness may cause a lack of resources for new firms, mediocrity of resources for start-ups and resources as a static phenomenon (Newbert, 2007). This in turn indicates that start-ups may lack sufficient dynamic capabilities to do what they need to run the business in a proper way to perform well. The results from the analysis show that just to be in an incubator is not enough to succeed as an entrepreneur. On the basis of the RBV-theory (Barney, 1991) and dynamic capabilities (Teece et. al., 1997) and the result that H1 is not supported in the structural model (model 2), it is sufficient to argue that there is not a direct effect between incubator connection and entrepreneurial performance. Thus critical variables for entrepreneurial performance in analysis model 2, Figure 7, are shown to be network value and absorptive capacity.

For a new firm capabilities as a composite quantity of resources and knowledge making the firm capable to exploit their resources. Given the results from this study, ordinary capabilities, those capabilities through which a firm 'makes its living' in the short term, may be developed to more dynamic capabilities. These capabilities are used to extend, modify, change, and/or create ordinary capabilities through the new firm's development of network value and absorptive capacity, cf Figure 4. This in turn should in addition develop heterogeneous capabilities, unique and company-specific, and more homogenous capabilities, common for the industry in which the new firm competes (Scilke, 2014; Drnevich et. al, 2011). Different types of capabilities identified in the literature (Scilke, 2014; Drnevich et. al, 2011) influence performance in different ways, but from this research it is unclear how. In addition, heterogeneous capabilities are not tested on business performance in the literature.

Totterman and Sten (2005) found that it is important to link entrepreneurs to the most appropriate networks available through the incubator. They stated that for incubators, offering space and equipment is not the most important way to support tenants. Although these are important aspects of what an incubator should offer tenants, the focus should be primarily on the development of business networks. These findings are consistent with the findings in this study, namely that networks are an important resource for start-ups. Additionally, network value seems also to be important for building start-ups' absorptive capacity. Network value

and absorptive capacity seem to be interconnected and are basic building blocks in the improvement of entrepreneurial performance.

Schwartz (2011) states in his study of long-term firm growth for incubated firms, *"Firm performance during incubation is positive, yet it is unclear that incubation itself affects firm growth positively. More data are needed about incubator-specific support components and what actually happens during the stay in the incubator"* (p. 510).

As mentioned in Section 7.1, a direct path between incubation and entrepreneurial performance was not supported (H_1) in the model 2 analysis. An incubator's role is to help new firms establish themselves and growth. The measurement of incubator connection identifies whether or not a firm has been in a business incubator. The results show no directly and significant support that incubated starts-ups perform better than non-incubated. One aspect of this is that well performing firms and entrepreneurs with the best ideas do not need an incubator. They have both products and services selling well without support from services in incubators.

Another aspect is related to the organization of incubators, in the forms of managed and non-managed incubators or science parks, may also affect the success for start-ups, especially if there is a significant difference between managed and non-managed science parks, e.g., when a managed science park has a full-time on-site manager. In this research, the organization of incubators has not been controlled. Westhead and Batstone (1999) noted that the failure rate is higher for non-managed parks in comparison with managed parks; a parallel in this context would concern tenants in managed parks performing better than those in non-managed parks. This suggests the positive impact of having a professional incubator management team (Westhead et. al. 1999). European business incubators were examined in a study by Aerts, Matthyssens, & Vandembemt (2007). They explored the link between specific screening practices of the incubators and other incubator-specific criteria on the one hand, and tenant failure rates on the other hand. The results found that medium-sized incubators account for the highest tenant failure rates. One limitation of that study was that incubator design is not taken into account. In general, contrivance of incubators may explain more of tenant's entrepreneurial performance than this research counts for.

Since H_1 was rejected in model 2, this indicates that some mechanisms need to be established to achieve an increase in entrepreneurial performance (see H_2 – H_5). The findings from the present study show that network value and absorptive capacity have the potential to constitute such mechanisms. This means that the present study has contributed to the knowledge of the role of the incubator and the critical factors behind its success in supporting

start-ups. It demonstrates that there may be a complex set of mechanisms that are important for the entrepreneurial performance of start-ups.

The statement that network value is a central part for start-ups and entrepreneurial development, cf Figure 5, is supported by Bøllingtoft and Ulhøi (2005), who argue for a bottom-up business incubator approach as they found that incubatees in a bottom-up business incubator mostly learned and developed via interaction with the network within the business incubator and thereby did not use formal business development sessions, which are considered an essential part of business incubators that are based on a top-down management approach. These findings definitely challenge the traditional business incubation program approach. However, this research does not argue for a radical redefinition of the current business incubation program approach, even though the arguments and findings presented by Bøllingtoft and Ulhøi (2005) are supported and acknowledged by the findings of this research, as it is highlighted that the element of the business incubation element perceived as most influential is that of network with other entrepreneurs, which is rated significantly higher than the other support elements.

Watson (2007) stated that both network range and frequency are important for network value. Network value was measured to determine the value or effects from development of the entrepreneur's network. Following Watson (2007), network range, frequency of contact, and networking value were determined, and the participants indicated the average frequency of contact and the average value of the information obtained from the given contact. The analysis showed that network value is of significant meaning to entrepreneurial performance and that the most valuable network partners are Professional acquaintances, Solicitors/Lawyers, Incubator and Customers/Clients, means that network partners outside the incubator are very valuable, they may however be introduced through the incubator or by the management of the incubator.

Neither range of network nor time spent with network contacts (frequency) automatically assures that useful information will come from any given person. Frequency of each contact is therefore not sufficient as the sole measure of network value, because the exchange of useful information is not guaranteed - there is only the opportunity for exchange (Frenzen & Nakamoto, 1993; Zhao & Aram, 1995). This means that it is important for the entrepreneur to spend time on the right network partners.

The results in Chapter 6 suggest that absorptive capacity of information gathered in the environment positively influences entrepreneurial performance of start-ups. The importance of knowledge for performance has long been acknowledged in the

entrepreneurship research (Zahra & George, 2002; Iammarino, 2005). In the context of entrepreneurship, contradictory results have emerged. For example, research has not produced significant results showing that a focus on market orientation has led to improved entrepreneurial performance regarding new products and service novelty (Im and Workman, 2004).

In this research small firms are used and they are established on business ideas representing moderate levels of novelty rather than highly innovative new products. While breakthrough innovations are important to move the world forward, incremental improvements often lead the way to success for small firms (Gourville, 2006). In this study, absorptive capacity had a significant influence on entrepreneurial performance, suggesting that by building capabilities to assemble, transform, and exploit information from important sources in the environment, entrepreneurs are likely to develop higher impact of entrepreneurial performance.

Small, newly established firms often consist of only a few people and therefore are less likely to have large internal sources of information to draw on when developing their business. This structure makes them vulnerable because their access to important information is scarcer than that for larger organizations with established networks. The importance of network value then is even more important for small start-ups. Incubators offer access to such networks and therefore represent an opportunity for entrepreneurs to develop their business in a supportive environment. This research shows that firms in incubators score higher on absorptive capacity than firms that do not use incubators. Moreover, incubator tenancy has a direct effect on the novelty dimension of the business, suggesting that the networks and information sources available through incubators support the development of novel business ideas.

The implications from the analysis and results to entrepreneurs lie in the importance of external contacts and information resources and the ability to transform and exploit those resources for increased entrepreneurial performance. Because creative business ideas are better able to serve market needs, emphasizing facilitation of information exploitation is likely to have positive consequences for newly established firms' future opportunities and performance. Furthermore, incubator tenancy facilitates such absorptive capacity and should be considered an important opportunity for entrepreneurs.

Further, network value has a positive influence on absorptive capacity, meaning that H₄ is supported in the analysis. Start-ups build absorptive capacity by investing in strategic networks. High network value then extends their knowledge base and allows them to acquire

knowledge from their networks and exploit external sources of knowledge that can subsequently be applied to commercial ends (Zahra & George, 2002) and strengthen entrepreneurial performance. Absorptive capacity is essential to the creation of entrepreneurial performance H_6 , and contributes to integrating and disseminating new knowledge internally, and then exploiting this knowledge to enhance performance (Teece et al., 1997; Wu, 2007; Zahra & George, 2002). Because an organization needs prior knowledge in order to assimilate and use new knowledge, absorptive capacity is a function of the organization's existing resources, tacit and explicit knowledge, internal routines, management competences, and culture. In the early stages of new venture development, it is the identification and acquisition of resources, coming from the value of networking which is the most critical for a firm's future performance (Stevenson & Jarillo, 1985). The analysis shows that networking, with focus on the right networking partners, build up a start-up's internal knowledge at the same time that they contribute to a firm's absorptive capacity (Gray, 2006; Griffith et al., 2003).

From the literature review, it emerged that objective figures are difficult to obtain when measuring entrepreneurial performance. Start-ups in an incubator may especially be reluctant to reporting performance figures because, in some cases, they expect that the incubator management will report positive performance figures.

It is then easier to report positive intentions or expectations for the future. However, managers' subjective perceptions of performance have been found to be highly consistent with actual firm performance (Dess & Robinson, 1984; Pearce, Robbins, & Robinson, 1987; Wall et al., 2004). Entrepreneurial performance itself can be a subjective goal because different entrepreneurs have different concepts of success (Robinson & Watson, 2001), and whether a firm fulfills the goals of its owner is in itself an important performance consideration, one that can only be determined through subjective measures. Besides, measuring performance is difficult with regard to sufficient validity and reliability.

By asking about expectations, it is possible to see how the business is performing compared to the entrepreneur's goal. But, what's the real goal? Some small business owners focus more on non-financial goals, such as freedom, flexibility, and a particular lifestyle, in which case lower sales and profits may be acceptable.

7.3 MANAGERIAL AND POLICY IMPLICATIONS

This study indicates that incubation improves entrepreneurial performance, at least indirectly. However, exactly how incubation itself affects performance positively remains unclear. In order to investigate what actually happens during the stay in the incubator, more data regarding specific support components in a number of incubators is needed. For instance, one limitation of this study is that it did not include an in-depth analysis of the degree and type of specific managerial support or networking activities of incubated firms. Currently, only a limited number of studies have tried to capture the effects of specific incubator support components on firm growth (Peña, 2004).

The present study also includes firms that have been subject to a market exit during the observation period. Official data sources do not provide information on firms that have failed. Existing studies that investigate the performance differences between firms located inside and outside incubators show that incubated firms have higher growth rates in terms of employment and sales (Löfsten & Lindelöf, 2002) than comparable outside firms.

Regional development policies perceive business incubation as an effective measure to promote regional growth through the support of new start-ups. The common assumption is that incubation promotes firm growth, and that they still should be run after they have graduated from their incubator organizations. Thus, this study may facilitate further development of the concept of incubators, focusing on activities that increase network value and absorptive capacity, as this study shows that network value and absorptive capacity both are essential resources and capabilities for start-ups. The implications for incubators, then, will be the development of incubator support to handle those two important elements.

Because it may be difficult for a start-up to establish a good connection with a well-known organization, the management of business incubators has to strengthen the availability of personal network connections with other organizations active in their business (Vanderstraeten et al., 2012), in which personal introductions are often necessary. This may include access to:

- High quality partners such as venture capitalists, bookkeepers, lawyers, and other tenants
- Potential partners with similar operational activities
- Potential partners in the same sector or field, both inside and outside the incubator
- Internal networking and resource utilization among tenants, which generally requires regular contact between incubator personnel and tenants

To achieve such access, the incubator management needs to be friendly, with good interaction skills and trustworthiness. Tenants stressed that without trust they would be afraid that their core business activities might be exposed to others if they shared their needs and problems with the incubator management. Incubator management also has to stress the importance of interacting. To offer viable interaction possibilities with external organizations, the incubator management needs to establish strong, active network partners in the relevant sector and establish close partners that can offer operational advice.

The analysis in this study contradicts the view that network value is more effective if the networking is focused. Prior literature claims that to help tenants locate the right contacts in a complex network, the incubator must organize its network connections (Rice, 2002), which should seemingly be easier with a clear focus on the network value aspect (Bruneel et al., 2012).

Accordingly, this research argues that incubatees are to be understood as a diverse group of individuals with different needs and challenges. This means that business incubators and their business incubation programs should be able to accommodate this flexibility and furthermore embrace the value of the knowledge that can occur from the bottom up in the business incubator; for instance, the interaction between novice and experienced entrepreneurs can create a dynamic learning environment that is beneficial for both parties and their entrepreneurial development. This understanding is aligned with Chan and Lau (2005), who called for a more flexible business incubation program, based on the argument that the start-up phase might differ for different types of start-up firms.

However, it might be of greater importance for novice entrepreneurs who have not been through an entrepreneurial process before and have therefore not experienced the challenges and distress that comes with entrepreneurial activity and furthermore have a limited entrepreneurial network. In general, all types of entrepreneurs need to have a high level of confidence in themselves and their entrepreneurial endeavors in order to ensure progress in the environment of uncertainty that characterizes entrepreneurship. Therefore, entrepreneurial self-belief and self-efficacy are crucial fundamental elements in relation to entrepreneurial behavior and performance, as stated by Rae (2007).

7.4 LIMITATIONS OF THE STUDY

A major strength of this research is the inclusion of data from a broad spectrum and different sources of entrepreneur, thereby avoiding a potential common method bias that can

arise from single-source data. Nonetheless, this research also has several limitations that should be addressed in future research.

First, the study design is correlational, and thus future researchers should be careful when drawing conclusions from this study about causality. A diverse variety of factors are implicated in the analysis of absorptive capacity and incubator tenancy, and this research was unable to identify the particular mechanisms underlying the findings. For example, does incubator tenancy really lead to increased absorptive capacity, or are these factors just two manifestations of an entrepreneur's tendency to rely on external sources? Similarly, does increased absorptive capacity lead to increased entrepreneurial performance or do both just happen to covary in this study? Although the study argues theoretically that greater absorptive capacity enables improved entrepreneurial performance, the study design is not suited to judge causality. To do so, a longitudinal study should be conducted to follow the development of absorptive capacity and performance in different forms (e.g., new products, new distribution forms, new marketing campaigns) over time.

Second, the subsample used to test the hypotheses, including the start-ups inside incubators, was relatively small ($n = 134$), which may have led to errors due to small samples. Moreover, results concerning the assessment of entrepreneurial performance was obtained from relatively few of the incubated firms in the sample; therefore, the results regarding the effects of incubator tenancy on performance must be treated with caution. In theory, it could have been possible to increase the number of incubated firms regarding the assessment of entrepreneurial performance. However, the consideration of a larger sample was balanced against a need for reliable assessment of performance. Increasing the number of start-ups inside an incubator would have reduced reliability of the assessments, because it would have been difficult to take the whole sample into account when assessing performance. In the future, more studies should be undertaken to test whether the results can be replicated in other samples.

Third, the survey was very long and untaught that respondents did not answer all of the questions. Especially questions regarding performance were difficult to answer, both because the respondents were not able to remember figures and that they were reluctant to talk about objective performance measures. It is, however, easier to talk about expectations for the future. Consequently, there are several limitations in the data regarding performance. In addition, speed of entrepreneurship is not an established measurement in the entrepreneurship literature.

Incomplete data is a challenge for validity and reliability. In this research entrepreneurial performance lacked more data than the rest of the variables. After omitting questionnaires that lacked more than 30% of the responses on performance. The strength of the survey is the relatively high number of respondents, while the weakness is the large amount of missing data regarding the reporting of performance measurement. However, the basis for a valid data analysis, which provides the possibility of drawing valid scientific conclusions, should be within range. Further intentions items (expectations for the future), as a part of the entrepreneurial performance measurement, have the highest response rate, that is subjective measures and challenges the reliability in the study.

7.5 FURTHER RESEARCH

This study did not include an assessment of the impact of specific services provided by business incubators upon the evolution of business start-ups. To better understand the different effects of business incubators, studies with the incubator as the unit of analysis may show which types of services have more influence on start-ups. Such studies may also reveal how the institutional environment of business incubators affects their role as information brokers. This type of design would change the focus from the entrepreneur to the incubator's staff team and how they manage the potentials and dynamics of social capital.

Accordingly, while this study does indicate that network and absorptive capacity are important components of the services provided by incubators, further research is needed on this important issue.

The present research has not investigated whether incubators supported by the public enhance the performance of the incubated firms. It will then be necessary to do a follow-up study in which the long-term performance of incubated firms (after their graduation) is contrasted with the results of the long-term performance of a control group of comparable non-incubated firms.

More information is also needed about non-incubator growth patterns of similar industries and similar sized firms. The long-term effect of incubated firms has to be further analyzed and compared to non-incubated firms to get enough data to generalize the effects of incubator programs. To date, the existing results (particularly regarding growth patterns post-graduation) have been quite ambiguous and far from satisfactory with regard to concluding (Hackett & Dilts, 2008) and to generalizing the results from this study.

A critical task in selecting candidates to join an incubator is identifying those that will benefit from the experience and show promise for success (Colombo & Delmastro, 2002; Hackett & Dilts, 2004; Lumpkin & Ireland, 1988; Peters, Rice, & Sundararajan, 2004; Smilor, 1987). Some potential incubated firms may achieve an equal level of performance on their own. In contrast, others are not likely to succeed even with incubator support. Determining which applicants to admit to an incubator is of great importance for incubator managers, who must make the most efficient use of the limited resources (Hackett & Dilts, 2004; Lumpkin & Ireland, 1988). Such an approach will also be of interest to further explain more success factors for incubators.

7.6 CONCLUSION

The primary objective of this study has been to develop a conceptual and structural research model and to investigate the potential influence of business incubators, network value, and absorptive capacity on entrepreneurial performance for both incubated and non-incubated start-ups in Norway.

Accordingly, this study devised a hypothetical structural model to explore the links among contextual variables. In the structural model, incubator, network value, and entrepreneurial performance were conceptualized as formative constructs, and absorptive capacity was conceptualized as being comprised of three complementary dimensions: acquisition, transformation, and exploitation. To clarify the relationships among these variables, the study used SEM to examine the hypothetical model's fit and the hypotheses. Using data from a study of 4,735 small and medium-sized Norwegian start-ups enterprises, the SEM results clearly demonstrate the important role of network value and absorptive capacity for start-ups. In addition, the study determined that network value is positively related to absorptive capacity.

Business incubators, therefore, provide incubated start-ups a higher level of both network value and absorptive capacity, as compared to non-incubated start-ups.

This study further contributes to the literature by comparing the entrepreneurial performance of incubated and non-incubated businesses and demonstrating that network value and absorptive capacity influence entrepreneurial performance, and that this influence is stronger for incubated firms than for non-incubated firms.

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APPENDICES

Appendix 1 - Descriptive Statistics⁴

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AforventnutvN1	1602	1	7	4.51	2.194	-.378	.061	-1.262	.122
AforventnutvN2	1602	1	7	2.77	2.188	.815	.061	-.863	.122
AforventnutvN3	1602	1	7	3.73	2.150	.075	.061	-1.361	.122
AforventnutvN4	1601	1	7	4.64	2.085	-.480	.061	-1.057	.122
AtidforideN1	1598	1	4	1.82	1.086	.964	.061	-.541	.122
AtidforetablN1	1596	1	4	1.44	.842	1.891	.061	2.508	.122
AtidforprodN1	1594	1	4	1.33	.783	2.395	.061	4.647	.123
AtidfortjenN1	1592	1	4	1.99	1.169	.693	.061	-1.091	.123
Asamlkunnsk1N1	3067	1	7	3.65	2.034	.131	.044	-1.254	.088
Asamlkunnsk1N2	3070	1	7	5.30	1.895	-1.058	.044	.020	.088
Asamlkunnsk1N3	3070	1	7	3.50	1.952	.222	.044	-1.131	.088
Asamlkunnsk1N4	3067	1	7	2.37	1.706	1.073	.044	.080	.088
Asamlkunnsk1N5	3068	1	7	4.06	1.957	-.174	.044	-1.125	.088
Asamlkunnsk1N6	3067	1	7	3.38	1.891	.253	.044	-1.101	.088
Asamlkunnsk1N7	3069	1	7	3.35	1.898	.298	.044	-1.027	.088
Asamlkunnsk1N8	3069	1	7	2.38	1.450	1.082	.044	.642	.088
Asamlkunnsk1N9	3068	1	7	2.41	1.512	1.103	.044	.598	.088
Asamlkunnsk2N1	2698	1	7	3.03	1.876	.477	.047	-.924	.094
Asamlkunnsk2N2	2700	1	7	3.53	2.093	.190	.047	-1.269	.094
Asamlkunnsk2N3	2701	1	7	4.19	2.018	-.288	.047	-1.133	.094
Asamlkunnsk2N4	2698	1	7	2.87	1.963	.661	.047	-.830	.094
Asamlkunnsk2N5	2697	1	7	4.95	2.053	-.745	.047	-.705	.094

⁴ Descriptive statistics for performance variables collected from Brønnøysund (development income, profits, and number of employees) are presented in Appendix 2(B).

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Asamlkunnsk2N6	2696	1	7	2.82	2.159	.781	.047	-.840	.094
Asamlkunnsk2N7	2697	1	7	2.62	1.771	.995	.047	.065	.094
Asamlkunnsk2N8	2694	1	7	2.37	1.787	1.215	.047	.388	.094
Asamlkunnsk2N9	2699	1	7	3.53	1.813	.116	.047	-.909	.094
AbrukkunnskN1	2351	1	7	4.79	1.827	-.637	.050	-.519	.101
AbrukkunnskN2	2351	1	7	4.41	1.718	-.366	.050	-.524	.101
AbrukkunnskN3	2353	1	7	3.96	1.935	-.137	.050	-1.070	.101
AbrukkunnskN4	2352	1	7	4.24	1.833	-.282	.050	-.879	.101
AbrukkunnskN5	2353	1	7	4.54	1.869	-.512	.050	-.716	.101
AbrukkunnskN6	2353	1	7	4.31	1.888	-.329	.050	-.887	.101
AbrukkunnskN7	2351	1	7	4.46	1.986	-.419	.050	-.996	.101
AbrukkunnskN8	2353	1	7	4.65	1.829	-.586	.050	-.573	.101
AnettvBN1	1762	0	3	1.70	1.070	-.177	.058	-1.250	.117
AnettvBN2	1762	0	3	1.97	1.051	-.550	.058	-1.001	.117
AnettvBN3	1762	0	3	1.74	1.024	-.261	.058	-1.082	.117
AnettvBN4	1761	0	3	.89	.947	.762	.058	-.461	.117
AnettvBN5	1762	0	3	1.35	1.034	.208	.058	-1.11	.117
AnettvBN6	1762	0	3	.68	.797	1.007	.058	.407	.117
AnettvBN7	1762	0	3	.28	.635	2.496	.058	5.951	.117
AnettvBN8	1761	0	3	1.17	.967	.323	.058	-.923	.117
AnettvBN9	1762	0	3	.17	.502	3.330	.058	#####	.117
AnettvBN10	1762	0	3	.17	.488	3.278	.058	#####	.117
AnettvBN11	1762	0	3	.42	.728	1.809	.058	2.753	.117
AnettvBN12	1762	0	3	.23	.632	3.070	.058	9.136	.117
AnettvBN13	1762	0	3	1.59	1.094	-.102	.058	-1.297	.117
AnettvBN14	1762	0	3	1.32	1.098	.210	.058	-1.282	.117
AnettvTN1	1453	1	7	4.56	1.523	-.052	.064	-.631	.128
AnettvTN2	1530	1	7	4.81	1.614	-.200	.063	-.811	.125
AnettvTN3	1480	1	7	4.63	1.493	-.259	.064	-.389	.127
AnettvTN4	976	1	7	3.57	1.530	.185	.078	-.397	.156
AnettvTN5	1302	1	7	4.28	1.579	-.099	.068	-.583	.136

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AnettvTN6	871	1	7	3.80	1.588	.158	.083	-.565	.166
AnettvTN7	327	1	7	3.54	1.633	.121	.135	-.683	.269
AnettvTN8	1221	1	7	4.30	1.619	-.171	.070	-.630	.140
AnettvTN9	208	1	7	3.61	1.578	.163	.169	-.463	.336
AnettvTN10	218	1	7	3.84	1.651	-.008	.165	-.648	.328
AnettvTN11	517	1	7	4.42	1.544	-.068	.107	-.742	.214
AnettvTN12	250	1	7	4.08	1.674	-.054	.154	-.704	.307
AnettvTN13	1369	1	7	4.84	1.501	-.338	.066	-.473	.132
AnettvTN14	1204	1	7	4.56	1.522	-.202	.071	-.589	.141

Appendix 2 - Descriptive Statistics for Performance Variables

A: Before removing outliers

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pincome	312.00	-1.23	239.43	1.65	14.09	15.73	0.14	263.50	0.28
Pprofit	371.00	-110.59	72.53	-0.14	10.11	-4.18	0.13	64.06	0.25
Employees	228.00	-1.00	2.00	0.09	0.46	1.45	0.16	5.10	0.32

B: After removing outliers

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pincome	296	-1.23	6.69	0.38	1.03	2.45	0.14	9.30	0.28
Pprofit	337	-11.89	18.10	-0.13	3.36	2.06	0.13	10.44	0.26
Employees	221	-1.00	2.00	0.08	0.44	1.35	0.16	5.36	0.33

Appendix 3 - Overview of Performance Measures and Validation

Variables	Operationalization	Validation	Result of validation and variable names
Performance Income	Percentage change in income from year 1 – year 2	Single indicator	Pincome

Variables	Operationalization	Validation	Result of validation and variable names
Performance Profit	Percentage change in profit from year 1 – year 2	Single indicator	PProfit
Performance Employees	Percentage change in number of employees from year 1 – year 2	Single indicator	PEmployees
Performance Speed of entrepreneurship	Time <ol style="list-style-type: none"> 1. From idea to decision 2. From decision to start-up 3. From start-up to sales 4. From start-up to profitability 	Convergent validity: Exploratory factor analysis – PCA with direct oblimin Cronbach’s alpha	PCA suggested 2 factors Speedstartup <ul style="list-style-type: none"> - From idea to decision - From decision to start-up (alpha = .683) Speedprofit <ul style="list-style-type: none"> - From start-up to sales - From start-up to profit (alpha = .524), not reliable Drop speedprofit, use speedstartup as measure of speed of entrepreneurship. Name: PSpeed
Performance Intentions	Scale 1–7: Expected increase in <ol style="list-style-type: none"> 1. Higher sales 2. No. of employees 3. More products 4. Higher profitability 	Convergent validity: PCA with direct oblimin. Cronbach’s alpha	PCA suggested one factor: Pintentions (alpha = .842)

Appendix 4 - Results from Factor Analysis, Speed of Entrepreneurship

Structure Matrix

	Component	
	1	2
AtidforideN1	.867	.240
AtidforetablN1	.875	.201
AtidforprodN1	.342	.801
AtidforfortjenN1	.107	.861

Extraction Method: Principal Component

Analysis.

Rotation Method: Oblimin with Kaiser

Normalization.

Appendix 5 - Results from Factor Analysis, Intentions

Component Matrix^a

	Component
	1
AforventnutvN1	.894
AforventnutvN2	.719
AforventnutvN3	.811
AforventnutvN4	.871

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Appendix 6 - Results from Factor Analysis, Network Value

Structure Matrix: Initial solution

	Component		
	1	2	3
value1	.775	.158	-.014
value2	.719	.116	-.031
value3	.710	.250	-.499
value4	.510	.487	-.513
value5	.590	.204	-.461
value6	.205	.249	-.694
value7	.175	.764	-.283
value8	.260	.195	-.731
value9	.145	.573	-.310
value10	.175	.769	-.148
value11	.130	.346	-.625
value12	.140	.764	-.173
value13	.692	.218	-.408
value14	.596	.229	-.530

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Structure Matrix: Final solution

	Component		
	1	2	3
value1	.882	.136	-.131
value2	.877	.094	-.223
value6	.135	.178	-.841
value8	.200	.154	-.834
value10	.139	.840	-.178
value12	.082	.848	-.157

Extraction Method: Principal Component
Analysis.

Rotation Method: Oblimin with Kaiser
Normalization.

Appendix 7 - Introduction to the Survey



NASJONALT FORSKNINGSPROSJEKT OM NORSKE BEDRIFTSETABLERINGER 2007-2010

Dette forskningsprosjektet gjennomføres som et doktorgradsarbeid ved Norges Handelshøyskole. Formålet er å identifisere egenskaper ved nystartede bedrifter for å styrke innsikten rundt bedriftsetableringer og relevante utfordringer. De som deltar er også med i konkurransen om ett reise-gavekort på kr 10.000. De som svarer på spørreundersøkelsen vil også motta en kortfattet versjon av resultatene og praktiske implikasjoner fra undersøkelsen.

Alle opplysningene som blir gitt i denne spørreundersøkelsen vil bli behandlet strengt konfidensielt. Det er kun totalresultatene som vil bli offentliggjort.

De fleste av spørsmålene er formulert som utsagn med en svarskala fra 1 til 7. Tenk på 7 som "mye mer enn andre bedrifter" du kjenner til og 1 som "mye mindre enn andre bedrifter". Midtverdien 4 representerer det som er "vanlig" blant andre bedrifter. Noen spørsmål kan virke like og har til formål å øke presisjonsnivået. Din umiddelbare reaksjon er sannsynligvis den riktige og du oppfordres til å besvare spørsmålene i et raskt og jevnt tempo.

Når det gjelder spørsmål der du bes om tallstørrelser eller angivelser av svar er det tilstrekkelig med omtrentlige verdier. Det er ikke nødvendig å lete fram opplysninger for å besvare spørsmålene.

Vennligst klikk på linken nedenfor for å starte undersøkelsen!

<http://dc.mipro.net/dcwebengine/startsurvey.aspx?qif=f65ad4b8-67ba-42cf-abd1-5df48adbc1dd&altid=23092&rspid=386ba2dd-7254-45cc-a517-6b3fc01f991c&s=ef6f6e0dd8f214a585e385321e21e3d0>

Med vennlig hilsen
Hans Anton Stubberud
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Appendix 8 - Survey codebook included for analysis purpose

KODEBOK

Variabelnavn i rødt

Verdier ift registrering i grønt

Respondent nr

Vi ønsker først en kort beskrivelse av den nystartede bedriften

1. Når ble din bedrift etablert (skriv årstall, fire sifre): **Etableringsaar**

Skriv årstall Hvilket år ble din bedrift etablert

2. **Selskapsform** **Selskapsform:**

- 1 Aksjeselskap
2 Eneierforetak
3 Delt ansvar

Her kan 2 og 3 vurderes og slås sammen

Vennligst oppgi antall ansatte (ikke inkludert deg selv). **Totans**

3.1 Heltidsansatte **Anshel**

- Skriv antall Etter 1 år fra etablering
Skriv antall Etter 2 år fra etablering
Skriv antall Forventet antall heltidsansatte i 2012

3.2 Deltidsansatte **Ansdel**

- Skriv antall Etter 1 år fra etablering
Skriv antall Etter 2 år fra etablering
Skriv antall Forventet antall deltidansatte i 2012

Totans = sum anshel + sum ansdel * 0,5, gir er samlet uttrykk for antall ansatte

4. Har din bedrift noen gang vært tilknyttet en inkubator? **Inktilknytning**

- 1 Nei
2 Ja, mindre enn 1 år
3 Ja, 1-2 år

4 Ja, mer enn 2 år

Hvis du svarte **nei** på spørsmål 4, gå til spørsmål 6.

5. Vennligst angi hvilken type inkubator. **Inktype**

- 1 Teknologi
 2 Produksjonsbedrift
 3 Tjenesteyting
 4 Blandet/generell
 5 Distribuert
 6 Annet

6. Er eller har din bedrift vært tilknyttet en forsknings-/kunnskapspark relatert til høyskole/universitet? **Forskkunsktilknytning**

- 1 Aldri
 2 Mindre enn 1 år
 3 1-2 år
 4 Mer enn 2 år

7. Er eller har din bedrift vært tilknyttet en næringshage? **Naertilknytning**

- 1 Aldri
 2 Mindre enn 1 år
 3 1-2 år
 4 Mer enn 2 år

De følgende spørsmålene omhandler på hvilke måter bedriften samler inn og bruker informasjon/kunnskap.

Gi alle navnet samlkunnsk etterfulgt av nr på spm, for eksempel samlkunnsk1 – 18.

Valideres og indekseres i etterkant.

Angi verdiene 1-7

	I svært liten grad					I svært stor grad	
	1	2	3	4	5	6	7
1) Vi har ofte møte med kundene for å kartlegge hvilke produkter eller tjenester de vil trenge i framtiden.	Gi verdiene 1-7 for alle						
2) Vi samarbeider direkte med kundene for å kunne imøtekomme deres behov enda bedre.							
3) Vi kartlegger ofte sluttbrukere for å kunne kontrollere kvaliteten på våre produkter og tjenester.							

4)	Vi deler ofte resultater fra våre undersøkelser med andre f eks distributører.						
5)	Vi skaffer oss bransjeinformasjon på en uformell måte f eks gjennom lunsj med kollegaer, samtaler med forretningspartnere el l.						
6)	Vi utarbeider informasjon om våre konkurrenter.						
7)	Vi går jevnlig gjennom den sannsynlige effekten endringer i våre betingelser, som forskrifter og teknologi, vil ha for våre kunder.						
8)	Vi er sene til å oppdage endringer i kundenes ønsker om produkter eller tjenester.						
9)	Vi oppdager sent grunnleggende endringer og trender i vår bransje, slik som ny konkurranse, teknologi og rammebetingelser.						
10)	Mange uformelle samtaler internt i bedriften dreier seg om våre konkurrenters taktikk eller strategier.						
11)	Vi har ofte felles møter internt i bedriften for å diskutere trender og utvikling i markedet.						
12)	Vi bruker ofte tid på å diskutere kundenes framtidige behov.						
13)	Vi sirkulerer jevnlig dokumenter (for eksempel rapporter og nyhetsbrev) som gir informasjon om våre kunder.						
14)	Når det skjer noe viktig i våre viktigste markeder vet hele bedriften om dette i løpet av kort tid.						
15)	Resultater fra tilfredshetsundersøkelser sendes alltid ut til alle ansatte.						
16)	Det er minimal intern kommunikasjon angående markedsutvikling.						
17)	Når en ansatt finner ut noe viktig om konkurrenter, er han/hun sene med å varsle de andre ansatte.						
18)	Bedriften har mer fokus på å tilegne og bearbeide ny innsikt om markeder og rammebetingelser enn andre nystartede bedrifter.						

Hva er karakteristisk for bruk av ny kunnskap i din bedrift?

Gi alle navnet brukkunnsk etterfulgt av nr på spm, for eksempel brukkunnsk1 osv.

Valideres og indekseres i etterkant

Gi verdiene 1-7

	I svært liten grad					I svært stor grad	
	1	2	3	4	5	6	7
1)	Vi vurderer kontinuerlig hvordan ny kunnskap kan brukes i bedriftens utvikling.						
2)	Sammenlignet med andre nystartede bedrifter du kjenner godt til er din bedrift god til å bruke ny kunnskap.						
3)	Ny kunnskap vi har tilegnet oss har ført til at vi har satt i verk effektive grep i forhold til våre konkurrenter.						
4)	Tilbakemeldinger fra kunder ofte ført til at vi har endret praksis.						

5) De tilegnede kunnskapene siste år har resultert i nye måter å utføre oppgaver på.							
6) De tilegnede kunnskapene siste år har gitt bedriften bedre resultater.							
7) De tilegnede kunnskapene siste år har resultert i nye prosjekter eller produktideer.							
8) De tilegnede kunnskapene siste år har resultert i økt evne til å løse andre problemer.							

Hvor ofte har bedriften benyttet følgende tjenester de siste tre månedene fra eksterne leverandører inkl inkubator, næringshage og forskningspark?

Gi alle navnet brukte tjenester etterfulgt av nr på spm, for eksempel brukte tjenester1 osv til 5
Et annet alternativ er å gi "ikke benyttet" verdien 0 slik at dette blir den laveste verdien

	Svært sjelden		3	4	5	Svært ofte		Ikke benyttet
	1	2				6	7	
1) Fysiske tjenester (f eks konferanselokaler, kantine, audiovisuelt utstyr, vaktsselskap).	Gi verdiene 1-7 for alle							Gi verdien "missing"
2) Generelle tjenester (f eks grafisk utforming, post- og varehåndtering, resepsjon, kopiering).								
3) Økonomisk rådgivning (f eks budsjett og regnskap, tilskudd og lån, investorbåndtering, kontraktsutforming, eksport).								
4) Forretningsutvikling (f eks forretningsplaner, personalhåndtering, markedsføring, forskning og utvikling).								
5) Andre spesialisttjenester (juridiske tjenester, patentering, revisor, IT).								

Hvordan vil du vurdere kvaliteten på de benyttede eksterne tjenestene?

Gi alle navnet kvalltjenester etterfulgt av nr på spm, for eksempel kvalltjenester1 osv til 5
Et annet alternativ er å gi "ikke benyttet" verdien 0 slik at dette blir den laveste verdien

	Meget dårlig		3	4	5	Meget god		Ikke benyttet
	1	2				6	7	
1) Fysiske tjenester (f eks konferanselokaler, kantine, audiovisuelt utstyr, vaktsselskap).	Gi verdiene 1-7 for alle							Gi verdien "missing"
2) Generelle tjenester (f eks grafisk utforming, post- og varehåndtering, resepsjon, kopiering).								
3) Økonomisk rådgivning (f eks budsjett og regnskap, tilskudd og lån, investorbåndtering, kontraktsutforming, eksport).								
4) Forretningsutvikling (f eks forretningsplaner, personalhåndtering, markedsføring, forskning og utvikling).								
5) Andre spesialisttjenester (juridiske								

tjenester, patentering, revisor, IT).

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Gi alle navnet kvalscore etterfulgt av nr på spm, for eksempel kvalscore1 osv til 5

Vennligst fordel 100% score mellom hver av leverandørene (framgår i de to kolonnene lengst til høyere i tabellen) av de ulike tjenestene (sett 0 dersom tjenesten ikke er benyttet):

	Direkte fra en inkubator, forsknings-/kunningspark eller næringshage	Fra andre steder (ikke relatert til alternativene i kolonnen til venstre)
1) Fysiske tjenester (f eks konferanselokaler, kantine, audiovisuelt utstyr, vaktsselskap).	Angi prosenttall	Angi prosenttall
2) Generelle tjenester (f eks grafisk utforming, post- og varehåndtering, resepsjon, kopiering).		
3) Økonomisk rådgivning (f eks budsjett og regnskap, tilskudd og lån, investorbåndtering, kontraktsutforming, eksport).	Angi prosenttall	Angi prosenttall
4) Forretningsutvikling (f eks forretningsplaner, personalhåndtering, markedsføring, forskning og utvikling).	Angi prosenttall	Angi prosenttall
5) Andre spesialisttjenester (juridiske tjenester, patentering, revisor, IT).	Angi prosenttall	Angi prosenttall

Her beregnes gjennomsnittelig % fordelt på de to alternativene?

Gi alle navnet fornøyd etterfulgt av nr på spm, for eksempel fornøyd1 osv til 3

Hvor fornøyd er du med bedriftens utbytte generelt av tjenestene og servicefunksjonene som er benyttet? Valideres og slås sammen?

	I svært liten grad					I svært stor grad	
	1	2	3	4	5	6	7
1 Er du generelt fornøyd med de tjenestene bedriften har benyttet seg av?	Gi verdiene 1-7 for alle						
2 Har leverandørene av tjenester generelt svart til forventningene du hadde?							
3 Bidrar tjenestene til å utvikle bedriften?							

De følgende spørsmålene omhandler nettverkskontakt bedriften har benyttet.

Nettverkskontakt1

skriv tall

Hvor mange forskjellige personer antar du at du i løpet av de siste tre månedene har diskutert aspekter om drift og utvikling av ditt firma?

Nettverkskontakt2

skriv tall

Hvor mange timer i uken (gjennomsnittelig) i løpet av de siste tre månedene har du diskutert med noen i ditt nettverk aspekter om drift og utvikling av ditt firma?

Vennligst kryss av for hvor hyppig i løpet av det siste året du har mottatt assistanse eller diskutert din bedrift med dine nettverkspartnere. Angi også for hver av dem hvor tilfreds du generelt er med nettverkspartnerens bidrag til utviklingen av bedriften på en skala fra 1-7 hvor 7 er svært fornøyd.

Lag to variabler for hver kontakt, en som angir bruk (sett en B bak variabelnavn) og en som angir tilfredshet (Sett en T bak variabelnavn).

Summerer alle B'ene som en variabel og alle T'ene som en annen. En multiplikativ indeks (B*T) beregnes deretter.

Aktuelle nettverkskontakter til forretningsformål	Hyppighet av nettverkskontakt for din bedrift				Hvor fornøyd er du med nettverkspartnerens bidrag til bedriftens utvikling? 1= svært misfornøyd og 7=svært fornøyd
	Aldri	1-3 ganger	4-10 ganger	Flere enn 10 ganger	
Verdier	0	1	2	3	Skriv verdien 1-7
Venner NettvennerB/T					
Familie NettvfamilieB/T					
Forretningskontakter nettvoorretnB/T					
Lokalt næringsliv nettvlaknærB/T					
Andre innen samme bransje nettvransjeB/T					
Bank nettvransjeB/T					
Næringskonsulenter nettvkonsulentB/T					
Eksterne revisorer/regnskapsbedrifter nettvrevisorB/T					
Industriforeninger nettforeningerB/T					
Utviklingsorganisasjoner for små bedrifter nettvtvorgB/T					
Advokater/juridiske rådgivere nettvkjurB/T					
Inkubator, forsknings-/kunnskapspark, næringshage nettvink					
Kunder nettvkunderB/T					
Leverandører nettvlvB/T					

De følgende spørsmålene omhandler noen sider ved bedriftens økonomi og antall ansatte.

Vennligst gi et anslag i hele tusen kroner:

- | | |
|---|------------------------------|
| 1) Hva var bedriftens omsetning første fulle regnskapsår (spørsmålet stilles ikke til de som startet i 2010) | Oms1aar
Skriv tall |
| 2) Hva var bedriftens omsetning andre regnskapsår (spørsmålet stilles ikke til de som startet i 2009 og 2010) | Oms2aar
Skriv tall |
| 3) Hva var bedriftens | Oms2010 |

omsetning i 2010 (spørsmålet stilles kun til de som startet i 2007 eller 2008)	Skriv tall
4) Hva er dine forventninger til omsetning for 2011	Omsforventn2011 Skriv tall
5) Hva var bedriftens resultat første fulle regnskapsår (spørsmålet stilles ikke til de som startet i 2010)	Res1aar Skriv tall
6) Hva var bedriftens resultat andre fulle regnskapsår (spørsmålet stilles ikke til de som startet i 2009 og 2010)	Res2aar Skriv tall
7) Hva var bedriftens resultat i 2010 (spørsmålet stilles kun til de som startet i 2007 eller 2008)	Res2010 Skriv tall
8) Hva er dine forventninger til resultat for 2011	Resforventn2011 Skriv tall

Hvilke forventninger har du til utvikling i 2012.

Gi alle navnet Forventnutv etterfulgt av nr på spm, forforventnutv1 osv til 4

Bruker de som alternative enkeltvariabler

I hvilken grad forventer du:

- 1) Økt omsetning
- 2) Økt antall ansatte
- 3) Nye konkurransedyktige produkter
- 4) Forbedret resultat

I svært liten grad						I svært stor grad	
1	2	3	4	5	6	7	
Skriv Verdi 1-7 for alle							

Hvor lang tid tok det fra forretningsideen ble unnfanget første gang til beslutningen om å starte bedriften ble tatt? Tidforide

- 1 0-6 måneder
- 2 7-12 måneder
- 3 Mellom 1 og 2 år
- 4 Mer enn 2 år

Hvor lang tid tok det fra du bestemte deg for å starte en bedrift til du etablerte bedriften?

Tidforetabl

- 1 0-6 måneder
 2 7-12 måneder
 3 Mellom 1 og 2 år
 4 Mer enn 2 år

Hvor lang tid tok det fra du etablerte bedriften til du lanserte første produkt eller tjeneste.

Tidforprod

- 1 0-6 måneder
 2 7-12 måneder
 3 Mellom 1 og 2 år
 4 Mer enn 2 år

Hvor lang tid gikk det fra du lanserte det første produktet til du hadde fortjeneste på dette?

Tidforfortjen

- 1 0-6 måneder
 2 7-12 måneder
 3 Mellom 1 og 2 år
 4 Mer enn 2 år

Gi en kort beskrivelse av den forretningsideen som var utgangspunktet for etableringen av bedriften:

Legges inn som tekstfelt i datafilen sammen med respondentnummer

Teksten skal behandles av 3 eksperter som kategoriserer den iht teoretisk tilnærming om kreativitet, jf f eks Engseth (2010) og Amabile (1982), eller begge. Creativity researchers commonly use subjective assessment techniques to determine each response's degree of creativity. According to Amabile (1982), a product or response is creative if appropriate observers agree it is creative. Thus, creativity is the quality of products or responses judge to be creative.

Utsagnene under omhandler hvordan du vil beskrive deg selv

Nedenfor er det listet 30 adjektiver. Sett et kryss ved alle de adjektivene du mener beskriver deg selv.

Lag 30 variabler og gi alle navn lik adjektivet som er listet.

Denne delen av undersøkelsen er eksplorativ

Verdier: 1= har krysset av, 0=har ikke krysset av

Dyktig		Oppfinnsom		Konservativ	
--------	--	------------	--	-------------	--

Smart		Original		Konvensjonell	
Trygg		Reflekterende		Misfornøyd	
Selvopptatt		Ressurssterk		Ærlig	
Humoristisk sans		Selvtillit		Ensidige interesser	
Uformell		Sexy		Høflig	
Individualist		Snobbete		Oppriktig	
Innsiktsfull		Ukonvensjonell		Underdanig	
Intelligent		Forsiktig		Mistenksom	
Varierte interesser		Hverdagslig		Falsk	

Hvor gammel er du? **Alder**

- 1 under 25
 2 25-34
 3 35-44
 4 45-54
 5 55-64
 6 65 eller eldre

Hva er din høyeste formelle utdanning? **Utdanning**

- 1 Inntil 10-årig grunnskole
 2 Videregående skole, fullført
 3 Universitet/høyskole, 1-2 års varighet
 4 Universitet/høyskole, bachelor-/cand mag
 5 Universitet/høyskole, mastergrad eller høyere

Hva slags kategori utdanning har du ut fra listen under? **Utdanomraade**

- 1 Ingen spesiell kategori ut fra listen under
 2 Teknologi/ingeniøruddanning
 3 Økonomi, administrasjon og ledelse
 4 Informasjonsteknologi (IKT)
 5 Landbruk
 6 Lærerutdanning/pedagogisk utdanning
 7 Reiseliv
 8 Mediefag
 9 Helsefag
 10 Samfunnsfag eller språk
 11 Jus
 12 Estetiske fag (kunst, design, håndverk, musikk)

Hvor mange bedrifter har du startet eller vært med på å starte? Vennligst angi et tall.

Antbedstart

Skriv tall

Har du erfaring fra samme type næringsområde som din bedrift tilhører? Sett ett kryss.

Erfaringbransj

- 1 Ingeren erfaring
- 2 1-4 år
- 3 5-9 år
- 4 10-14 år
- 5 15-19 år
- 6 20 år eller mer

Vennligst kryss av: **Kjoenn**

- 1 Kvinne
- 2 Mann

Hvor er din bedrift plassert? **Geo**

- 1 By (flere enn 30000 innbyggere)
- 2 By (færre enn 30000 innbyggere)
- 3 Øvrig

Hvilken type næringsvirksomhet tilhører din bedrift? **Bransje**

- 1 Bygg- og anleggsbransje
- 2 Transport, lager, kommunikasjon
- 3 Engros- og agenturhandel
- 4 Hotell, restaurant og turisme
- 5 Jord- og skogbruk
- 6 Finansformidling
- 7 IKT og design + annen teknisk konsulentvirksomhet
- 8 Eiendom, utleie og forretningaktivitet
- 9 Helsetjenester- og innovasjon
- 10 Undervisningstjenester
- 11 Varehandel
- 12 Forretningsmessig tjenesteyting
- 13 Annet

Appendix 9 - Overview of Research on Start-Ups

Table 23 - Overview of Research on Start-Ups

Variable	Author(s)	Operationalization of Variables	Findings	Sample and Comments
HUMAN CAPITAL RESOURCES				
<u>Age of Entrepreneur:</u> Gray (2006)		Age Groups: <40, 40–49, 50–59, 60+	Older business owners were less likely to be growth oriented, and were more likely to be growth averse, which was negatively related to performance.	808 SME owner-managers
<u>Education:</u> Swinney, Runyan, & Huddleston (2006)		Education Levels: high school, some college, university graduate, graduate school	Education was positively associated with performance in female-owned businesses but not in male-owned businesses.	57 men and 57 women in the service and retail industries
Gray (2006)		Education Levels: degree, professional, technical/vocational, school, none, all	Education was positively associated with organizational size (employees) and with the availability of employee training, both of which were linked to higher levels of absorptive capacity and growth orientation, which were associated with performance.	739 SME owner-managers
Aldrich & Weiss (1981)		Years of schooling	Education was positively associated with income.	430 business owners
Bruderl & Preisendorfer (1998)		Years of schooling	Years of schooling was positively associated with sales.	1710 Chamber of Commerce firms in southern Germany
Saffu et al. (2008)		Years of schooling	Years of schooling was positively associated with sales and profitability.	247 small business owners in the tourism industry in Ghana
<u>Entrepreneur's Experience:</u> Bruderl & Preisendorfer (1998)		Years of work experience	Years of work experience was positively associated with sales.	1710 Chamber of Commerce firms in southern Germany
Losacco et al. (1991)		Years of industry experience	Years of experience was related to sales and income	442 members of the Small Business Association of New England
Alowaihan (2004)		Years of industry experience	Years of experience was positively correlated with gross earnings.	357 men and 203 women business owners in Kuwait
Saffu et al. (2008)		Years of industry experience	Years of experience was positively associated with profitability and income.	247 small business owners in the tourism industry in Ghana
Lerner et al. (1997)		Previous experience in their economic sector – Yes or no	Previous experience was positively correlated with revenue.	220 women entrepreneurs in Israel
<u>Entrepreneurial (Growth) Orientation:</u> Gray (2006)		Growth intentions are categorized as growth-oriented, growth-averse, or exit/sell	Growth intentions were related to performance.	808 SME owner-managers

Variable	Author(s)	Operationalization of Variables	Findings	Sample and Comments
Mostafa et al. (2006)		Entrepreneurial orientation constructed of 3 items regarding innovativeness, 3 items regarding proactiveness, and 3 items regarding risk-taking	High entrepreneurial orientation was associated with higher sales growth in exports.	158 SME manufacturing exporters
Wiklund & Shepherd (2005)		7-point scales between 2 opposing statements following Miller (1990)	Entrepreneurial orientation was positively associated with firm performance, firm size, and firm age.	413 independent incorporated Swedish firms with fewer than 50 employees
<u>Entrepreneur's Gender:</u> Cooper, Gimeno-Gascon, & Woo (1994)		Men or women	Gender (men) was associated with employment growth over 50%.	1053 firms (385 that failed and 668 that survived over the course of 3 years)
Kalleberg & Leicht (1991)		Men or women	Businesses headed by men had higher gross earnings than those headed by women, although growth in earnings were not significantly different; companies headed by men were larger than those headed by women.	411 small business owner-managers
Losacco et al. (1991)		Men or women	Men had older, larger businesses (in terms of more employees), and higher levels of human capital (education and experience) than women. Men's personal earnings and business revenues were higher than women's.	310 small business owners
Losacco et al. (1991)		Men or women	Men's businesses were larger and older, with higher sales than women's businesses.	442 members of the Small Business Association of New England
Watson & Robinson (2001)		Men or women	Average annual profit (and the log of annual profit) was higher for businesses controlled by men than those controlled by women.	2367 start-ups that participated in the Australian Bureau of Statistics Business Growth and Performance Surveys
ORGANIZATIONAL CAPITAL RESOURCES				
<u>Size:</u> Losacco et al. (1991)		Number of full-time employees, including owner	Size was positively related to sales and income.	442 members of the Small Business Association of New England
Aldrich & Weiss (1981)		Number of people employed by the business, including relatives	Size was positively related to income.	430 business owners
Kalleberg & Leicht (1991)		Number of employees	Size was positively related to earnings and growth; companies headed by women were smaller than those headed by men.	411 small business owner-managers
Alowaihan, 2004		Number of full-time employees	Size was positively correlated with gross earnings.	357 men and 203 women business owners in Kuwait
Zahra & Hayton (2008)		Number of firm employees (logged)	Size was positively correlated with ROE (logged).	217 global manufacturing companies

Variable	Author(s)	Operationalization of Variables	Findings	Sample and Comments
<u>Industry:</u> Losacco et al. (1991)		Industry Categories: wholesale trade, retail trade, finance/insurance/real estate, business services, other services	The type of industry was related to sales and income.	442 members of the Small Business Association of New England
<u>Age of Business:</u> Alowaihan, 2004		Age categories: 0–2 years, 3–7 years, 8–10 years, and over 10 years	Age of business is positively correlated with gross earnings.	357 men and 203 women business owners in Kuwait
HUMAN AND ORGANIZATIONAL CAPITAL RESOURCES				
<u>Absorptive Capacity/ Dynamic Capabilities:</u> Wu (2007)		Resource integration and reconfiguration capacity, learning ability, ability to adapt to a changing environment	Dynamic capabilities were positively associated with return on investment in the first 2 years. Dynamic capabilities were a mediating variable between entrepreneurial resources and performance.	200 high-tech Taiwanese firms
Zahra & Hayton (2008)		Dollars spent on research and development	Absorptive capacity was positively correlated with ROE (logged) and revenue growth.	
<u>Networks:</u> Lechner et al. (2006)		Network size – total number of relationships with other firms/outside individuals regarded as important for business Relationships with: Social networks – based on personal relationships Reputational networks – highly regarded firms or individuals, market leaders Marketing information networks – firms or individuals that allow for the flow of market information	Social networks were the most common and plentiful but were negatively related to sales. Reputational networks were significantly related to reduced time-to-break-even, while technology networks were associated with increased time-to-break-even.	60 venture-capital financed start-ups
Watson (2007)		Networking content: 7 formal sources (banks, business consultants, external accountants, industry associations such as the Small Business Development Corporation, solicitors/lawyers, tax office) and 3 informal sources (family and friends, local businesses, others in the industry). Frequency and content were counted together to form a single average networking score.	Networking and business survival and growth exhibited a U-shaped relationship, such that greater networking was advantageous to a moderate extent, but disadvantageous if taken to a greater level.	5014 start-ups that participated in the Australian Bureau of Statistics Business Growth and Performance Surveys
Lerner et al. (1997)		Membership in women's business associations, number of networks	Association membership was related to profitability and revenue. The number of networks was negatively correlated with revenue.	220 women entrepreneurs in Israel

Variable	Author(s)	Operationalization of Variables	Findings	Sample and Comments
Donckels & Lambrecht (1995)		Participation in trade fairs, consultation with external consultants, attendance at seminars, discussion with relatives	Entrepreneurs who participated in trade fairs and seminars were more likely to report business growth.	900 entrepreneurs in Flemish Belgium
Yli-Renko et.al. (2001)		Social capital as a factor of external knowledge acquisition in key customer relationships, which mediate the relationship between social capital and knowledge exploitation for competitive advantage	Social interaction and network ties are associated with greater knowledge acquisition, which is positively associated with knowledge exploitation for competitive advantage and sales cost efficiency.	180 entrepreneurial high-technology ventures based in the United Kingdom
FINANCIAL CAPITAL RESOURCES				
Wiklund & Shepherd (2005)		Access to financial capital: A 7-point scale based on perceived sufficiency of available capital using opposite statements: "insufficient and a great impediment for our development" and "fully satisfactory for the firm's development"	Access to financial resources was associated with increased performance (multidimensional measure including perceived level of profitability relative to competitors, sales, sales growth).	413 independent incorporated Swedish firms with fewer than 50 employees
Cooper, Gimeno-Gascon, & Woo (1991)		Total amount of capital invested (hundreds of thousands of dollars) by the time of the first sale	The level of capitalization was associated with marginal survival and growth (as measured by employment).	1053 firms (385 that failed and 668 that survived over the course of 3 years)

Appendix 10 - Alternative structure model

