

# Are Business Incubators helping? The role of BIs in facilitating tenants' development

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**Abstract.** Business incubators (BI) are among a variety of initiatives to stimulate economic growth by promoting the creation and development of new companies. The rapid growth of BIs in recent years confirms their importance in the economic fabric. In this study, we conceptualize BIs using insights from knowledge based theory of the firm, resource-based view thinking and capabilities literature. BIs will be seen as service providers geared towards helping their tenants in solving developmental problems. The more problems the BI helps to solve the bigger the incubation value for tenants; further, as tenant firms solve problems they develop important capabilities which will yield increase their chances of survival once they graduate. Results show that tenants unequivocally seek support after experiencing problems. Solving those problems is a function of BI support and other external sources part of each tenant firm's network of contacts. Age and human capital of tenant firms have a negative impact in the total number of the problems solved, suggesting BIs' deficiencies in helping more experienced and older tenants. Our main contribution is to shed light on the processes of delivering support to young firms within BIs. Importantly, we assess the value of the BIs' intervention by measuring the amount of developmental problems they help tenants to overcome. Finally, we discuss the implication of our finding to BI managers, prospective tenants and policy makers.

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## 1 Introduction

Business incubators (BI) position themselves at the core of business support initiatives. BIs set out to nurture nascent companies, providing them with the needed support to maximize their chances of survival. Since the first BI in United States in the late 1950s (Adkins, 2002), the concept of incubation evolved. The evolution of BIs in the past decades shows that infrastructure is no longer the most important. BIs have become collaborative service providers (Lalkaka and Bishop, 1996). Yet research has been unable to uncover acceptably the impact of BI in creating job and wealth (Massey et al., 1992; Quintas et al., 1992), facilitating university-industry interaction (Rothaermel and Thursby, 2005a, , 2005b), increasing innovation activity (Colombo and Delmastro, 2002), or promoting firm performance. Several reasons might be behind this. First, the plethora of models, different stakeholders and a variety of management practices existent in the universe of BIs, all taken together, provide an extra difficulty to investigate the nature of their performance (Phan et al., 2005). Second, the lack of an appropriate theoretical background does not allow researchers to adequately analyze the BI's intervention (Hackett and Dilts, 2004).

We build on insights from the knowledge based theory of the firm (Grant, 1996; Hsieh et al., 2007; Nickerson and Zenger, 2004) to provide a theoretical ground to BIs. Nickerson and Zenger (2004) conceptualize solving problems as the basic mechanism to create capabilities within a firm. Managers, when facing a problem, choose from three difference governance modes to find solutions for problems: market, authority-based hierarchy consensus-based hierarchy (Nickerson and Zenger, 2004, p. 623). The market where solutions can be acquired refers to any source of solution external to the boundary of the firm. BIs can be such source of expertise. Both authority-based and consensus-based hierarchies refer to solution developed internally. In this case, BIs can also be a source of expertise as facilitators or problem co-solvers. Any governance mode tenant firms' managers eventually choose will yield the creation of important capabilities within the firm (Nickerson and Zenger, 2004). The BIs intervention can be assessed in the amount of problems they participated in finding solutions to. In other words, BIs intervention can be measured in the amount of problems solved with their support.

We investigate to what extent BIs help their tenants in their development process. The underlying assumption is that BI's tenants experience problems and look for support to solve them. The support delivered leads to solved problems which will in turn contribute to enlarge the firm's knowledge base and further increase their capabilities (Nickerson and Zenger, 2004). We also consider other sources of support such as fellow tenants and the personal network of each tenant firm. Capabilities are the source of firms' competitive advantage (Eisenhardt and Martin, 2000). If BIs contribute actively to problem solving and the consequent firm capabilities building, then they are facilitating tenants' development and have a positive impact in tenants' growth and long term survival. We compiled a list of developmental problems in four key areas inspired by social systems theory (Parsons, 1964) and its recent developments applied to entrepreneurship (Groen et al., 2008). Furthermore, entrepreneurship and strategic management literature were used to derive specific problems.

Our empirical setting are 12 BIs located across six Northwestern European countries and their respective tenants. We surveyed more than 350 tenants about the mechanisms of support provision. Tenants were asked which problems they experienced since the beginning of the incubation period. Of those, we enquired on whether support was sought and where (incubator, fellow tenants or outside). This allowed us to calculate the total number of problems experienced, the total amount of support of several sources and the total amount of problems solved. We will examine how these aggregated measures are related, using a process approach to problem solving.

Our contribution is manifold. We provide a novel framework to measure incubation based on the theoretical insights of knowledge based theory of the firm (e.g. Nickerson and Zenger, 2004) and capabilities thinking (e.g. Dosi et al., 2000). We also shed light on the incubation process by examining which factors determine seeking support and solving problems within firms undergoing an incubation experience. Finally, we contribute to a better understanding of capabilities building through the problem solving process within firms.

This paper is structured as follows. We start by identifying the nature of BI, discussion definitions and exploring conceptualizations. Next, we develop models and craft hypothesis under which we can assess the BI's intervention. The problem solution framework is present subsequently. In the Methodology section, we describe our

empirical setting and how variables were operationalized. After presenting the results, we discuss our findings and suggest future directions to research. We conclude by summarizing our contribution and implication to both research and practice.

## **2 The nature of business incubators: theory and hypotheses**

Both researchers and practitioners have proposed definitions for business incubation. Yet interestingly no rationale for their existence or their activities has been thoroughly discussed. In this section, we discuss the operational definitions of BIs. Further, we advance literature by suggesting that in any way practitioners and researchers define BIs, the rationale for their existence lies in economic theory of growth and entrepreneurship. Similarly, we will show that the rationale for BIs' activities can be found in strategic management literature. Finally, we also address the gap of most incubation studies being atheoretical (Hackett and Dilts, 2004) by proposing an empirical framework to analyze business incubation impact.

### **2.1 What is a business incubator?**

Several attempts to define BIs have been put forth by both researchers and practitioners (Aernoudt, 2004; Barrow, 2001; Bergek and Norrman, 2008; EC, 2002; Hackett and Dilts, 2004; NBIA, 2007; Rice, 2002; Smilor and Gill, 1986; UKBI, 2007). Using their industry definitions, BIs are mostly property-based organizations with the mission of business development using knowledge agglomeration and resource sharing (NBIA, 2007; Phan et al., 2005; UKBI, 2007). They set out to create firms as well as to support them during their first years of existence (Hackett and Dilts, 2004). Practitioners frequently tout the benefits of BIs to be manifold and on several levels: regional development, job and wealth creation, and entrepreneurship promotion are among those.

The potential effect that BIs might have on the creation of job and wealth finds its reason in economic theory of growth and entrepreneurship literature. In the 1950s, Robert Solow was the modern pioneer in modelling economic growth by putting technical progress central in the creation of wealth in advanced economies (Solow, 1956). Today, the notion that technology change is responsible for economic growth is widespread (Aghion and Howitt, 1997; Romer, 1990). According to this view, growth is driven by technological change created endogenously and intentionally by purposed investments in the creation of knowledge. More recently, Audretsch (2007) suggested

the mechanism through which new knowledge is brought to the market, creating new products and services, is entrepreneurship. This definition is in accordance with previous work since it considers the creation of new firms as essential (e.g. Low and MacMillan, 1988) as well as the exploitation of new market opportunities (Shane and Venkataraman, 2000). BIs position themselves as tools to help bridging the gap between knowledge creation and markets.

As their name celebrates, BIs are safeguarded environments where new firms can establish and develop sheltered from the rougher market competition. The new firm will be thus protected during its first years of existence and guided till it achieves the necessary maturity to eventually graduate. The underlying rationale to protect firms during its first years can be found in the resource based view of the firm (RBV). According to this stream of literature, nascent firms lack the necessary resource base to maximize their chances of survival. Furthermore, assembling a stable resource base is a challenge to any entrepreneurial team (Brush et al., 2001). Resources which are valuable, rare, inimitable and non-substitutable (Barney, 1991), are at the core each firm's competitive advantage. Shortage of resources might keep new firms from striving for competitive advantage since they must divert their limited resource base to the necessary operational routines to survive. The combination of these effect creates a liability of newness (Carroll, 1983); this phenomena tends to favor older firms given their reliability, accountability and broader customer base (Freeman et al., 1983; Hannan and Freeman, 1984). BIs counter this effect providing their tenants with resources.

BIs are designed to provide their tenants with three main types of resources: infrastructure, business support and access to networks (Barrow, 2001; EC, 2002; Smilor and Gill, 1986). Infrastructure is the basic resource provided by BIs (Allen and McCluskey, 1990). Typically, this is a key in hand office space located in a building where more incubated companies are housed. Office space is often bundled with complementary services such as parking, meeting rooms, receptionist and telecommunications (Aerts et al., 2007; EC, 2002). Some BIs also provide specialized premises such as laboratories or technical equipment (Grimaldi and Grandi, 2005). Business support is the direct source of knowledge made available to the nascent firm. Services such training, coaching or mentoring are normally provided (Bergek and Norrman, 2008; Carayannis and von Zedtwitz, 2005; Peters et al., 2004). Finally,

having the possibility to access the BI's network of contacts completes the resource pool tenants can profit from (Bøllingtoft and Ulhøi, 2005; Nowak and Grantham, 2000).

An extension to the RBV thinking suggests that resources are not enough to confer sustained competitive advantage to firms. The success of firm is influenced by their capabilities (Eisenhardt and Martin, 2000) defined as a collection of routines (Winter, 2003) aimed at solving problems and achieving a certain outcome (Zahra et al., 2006). Capabilities are the result combination of non-automatic routines embodying managerial deliberation, action, planning and expertise (Dosi et al., 2000). Using RBV and capabilities insights, we can say that BI should provide resources to their tenants but also show them how to combine resources in order to build organizational capabilities. Graduation from the BI should occur when tenants firms have developed the necessary capabilities to survive when put freely in the market.

In summary, BIs become important agents for economic growth and job creation when conducting incubation processes through which new firms have enough resources available to cope with their intrinsic liability of newness. At the same time, BIs maximize their tenants' chances of survival if ensuring that incubated firms develop an important level of capabilities. We now turn our attention to discuss how BIs can help their tenants to create such capabilities.

## **2.2 Business incubators as problem (co-)solvers**

One of the ways BIs have to engage actively in their tenants' process of building organizational capabilities is through participating in their systematic problem solving. Every firm experiences developmental problems according to its stage of development (Kazanjian, 1988). BIs function is to help nascent and young companies to solve these problems; this kind of support would accelerate the learning curve of the new firm and, at the same time, contributes directly to firm's capabilities creation (Zollo and Winter, 2002). The premise that problem solving is central in the creation of capabilities provides the base for the knowledge based theory of the firm (Hsieh et al., 2007; Nickerson and Zenger, 2004). According to this view, managers choose to solve each problem they encounter by balancing the cost of finding one solution and the expected value of the solution's use (Nickerson and Zenger, 2004). There are three fundamental governance modes that the firm can use to solve its problems: market, authority-based

hierarchy and consensus-based hierarchy (Hsieh et al., 2007; Nickerson and Zenger, 2004). Solutions found in the market are arguably the easiest way to solve problems. In this case, managers choose to acquire the necessary knowledge externally to the firm. In both authority-based and consensus-based hierarchies, solutions are developed internally. Managers choose each mode according to the cost of the solution and the value of the expected solution. In this study, we are not examining the details of *how* the firm solves its problems but rather looking at *where* the firm seeks support for solving its problems. Therefore, in the BIs context, the underlying assumption is that managers, when facing a developmental problem, will choose from different sources of help to solve it (or not seek help at all). For BIs' tenants, looking for solutions in the market or using BIs as problem co-solvers is the easiest and most affordable way for two reasons. First, BIs have the resources and capabilities needed for business development. Second, the incubated firm has access to incubation services that are most likely more economical than similar services available elsewhere.

BIs are important partners in building capabilities if having an important role in solving tenants' developmental problems. This function is independent from providing resources. While resources such as infrastructure, business support and access to networks are important and valuable for young firms, they are not necessarily helping tenants to solve their problems. This bundle of resources is probably more helpful to establish a firm but not for preparing it for the post incubation stage. Consider the example of business support, more specifically, the often offered service of training. Training sessions and dissemination of certain information are a valuable and potentially an important source of knowledge. Yet it is unlikely that this resource alone contributes to solve developmental problems beyond the expected and predictable ones. If a firm faces a difficult challenge, such as putting new products in the market, a short lecture in marketing is not enough. The solution for such a problem is complex and costly to the firm. We now use these insights to derive hypotheses and submitted them to empirical testing.

### **2.3 Crafting models and building hypotheses**

The process of solving problems is modelled as shown in Figure 1. We analyse separately what determines seeking support and solving problems. The left part of the figure – Model 1 – allows us to show what determines seeking support. The right part of

the figure – Model 2 – explores which characteristics of both the BI and the firm explain solving problems.

++ PUT FIGURE 1 ABOUT HERE ++

*Model 1.* Our first model seeks to investigate what firms' characteristics determine seeking support. Empirical research on BIs suggests that tenant firms might value the incubator's bundle of available resources differently in each stage of their development (McAdam and McAdam, 2008). This effect is more pronounced the more rigid a certain service is delivered. For instance, infrastructure provision is unlikely to change during the incubation period of a given firm. Being located within a BI might be extremely important when the firm is starting, providing an economical bundle of services as well as an external signal of acceptance as a promising company. This contributes to reduce the liability of newness firms face at this point of their development (Singh et al., 1986). Yet towards the end of the incubation period and as the firm matures, being located within this same environment, sharing office and resources with younger firms can be perceived as negative by tenant firms (McAdam and McAdam, 2008). Similar reasoning can be applied to business support services and access to networks. As the firm grows older, business support services progressively become less meaningful and needed for the tenants firm. Services such coaching might be crucial in earlier stages of a venture but become progressively less important as the knowledge gap between firm and coaches narrows. Young ventures also make different use of a professional network of contacts. We hypothesize therefore that age is negatively correlated to support seeking.

H1a: Tenant firms' age has a negative effect on seeking support.

The same line of reasoning applies to human capital. Founders' human capital has been shown to have a positive impact on new firms' growth (Colombo and Grilli, 2005; Cooper et al., 1994; Feeser and Willard, 1990). New business opportunities are most likely to be successful if pursued by teams who are capable of integrating different kinds of context-specific knowledge (cf. Grant, 1996). This means that teams containing individuals with higher levels of school attainment and specific experience are more likely to, not only identify entrepreneurial opportunities, but also to seize them. Also, these teams are better qualified to make better strategic decisions for the firm's development (Colombo and Grilli, 2009). In terms of seeking support, we can

hypothesise that tenant firms with greater human capital will seek less support. For instance, more experienced teams have more experience in dealing with situations of shortage of resources, typical of the earlier stages of each venture. Also, such entrepreneurs have already developed firm capabilities previously and therefore will not necessarily look for support to do so.

H1b: Tenant firms' human capital has a negative effect on seeking support.

While being incubated, firms will grow in absolute and relative terms. Firms located within BIs cannot grow steeply during their incubation period mainly due to the BIs' space constraints. Yet size of firms strengthens its capabilities (Zahra et al., 2006) which suggests that entrepreneurs will look for less support as the firm grows.

H1c: Tenant firms' size has a negative effect on seeking support.

*Model 2.* Our second model illustrates which characteristics of both the BI and the firm explain solving problems. Finding solutions with the aim of solving specific problems is at the core of the knowledge based theory of the firm and it is the chief mechanism by which the firm builds its capabilities (Grant, 1996; Nickerson and Zenger, 2004). Two main governance modes are typically adopted by managers to search for solution: internal and external to the firm. In an incubation environment, it is most likely that tenant firms seek support externally to the firm. The positive role of external support in small firm performance already received empirical confirmation (Robson and Bennett, 2000) We thus hypothesise as follows.

H2a: Support has a positive effect on solving problems.

H2a refers to any kind of support sought. Yet the value of support can depend on its source. BIs are specialized sources of support and typically geared towards solving developmental problems of early stage ventures. Furthermore, from the tenants' perspective, if a venture is located within a BI, it is easier for managers to look for support within that same environment. Due to this match between knowing how to help early stage ventures and tenants more prone to look for support next to the incubator team. This is what we dub the incubation hypothesis. If confirmed, the incubation hypothesis contributes to a better understanding of the role of BIs in developing their tenants. H2b follows.

H2b: Support by the incubator's team has a positive effect on solving problems.

There are more sources of support for a venture located within a BI. For instance, literature has been touting the fact that companies sharing a common infrastructure might develop important networks with the aim of sharing knowledge and mutual help (Barrow, 2001; Totterman and Sten, 2005). H2c is what we dub as interaction hypothesis. The results concerning this hypothesis will throw light on the question of whether housing nascent firms under the same roof can create meaningful synergies between them.

H2c: Support by fellow tenants has a positive effect on solving problems.

There is yet another source of support for BI tenants. Tenant firms can also make use of their personal network of contact. This means that when facing a problem, tenants firms would go directly outside to look for a solution, not making use of any of the BIs' services or the BIs' network. H2d follows.

H2d: Support directly outside has a positive effect on solving problems.

Note that the support sought has a positive effect in solving problems, regardless of its origin. The fundamental difference between this set of hypotheses is related to what they try to explain in terms of BIs' characteristics. H2b posits the value of the BI's services to tenants firms. If solving problems is explained by enjoying support from the incubator, then the services provided are of undeniable value, *ceteris paribus*. H2c suggests the value of the networks created by tenants located within the same building. Finally, H2d hints on the possible value of each firm independence in relation to the BI, looking for help within its own network.

Tenants' characteristics will also impact the way problems are solved. Incubation programs do not usually graduate classes of companies. This means that the tenants firms' age is not the same across all tenants. Despite the short incubation period – maximum of five years (EC, 2002) – it is expected that these firms change during this period. For instance, it is during the first years of activity that firms find a valuable strategy (Feesser and Willard, 1990), shape their target markets (Santos and Eisenhardt, 2009) or start developing their routines and capabilities (Zahra et al., 2006). It is thus reasonable to assume that firms towards the end of the incubation period are more

capable of solving their problems. Also, firms housed longer within the BI will have already solved some problems either with or without help. This experience also contributes to build their capabilities. H3a follows.

H3a: Tenant firms' age has a positive effect on solving problems.

Tenants' human capital also impacts the outcome of problem solving. Although tenants look for support to solve problems, this does not rule out their own action. During the incubation period, tenant firms have access to the incubator's pool of resources. Take the example of a resource such as access to networks. Tenants accessing the specialized BI networks develop contacts with venture capitalists, among other. These actors are important sources of knowledge and are known to develop young firms in terms of human capital and creation of routines (Hellmann and Puri, 2002) accelerating their learning curve and contributing to their professionalization. Learning is responsible for the creation of capabilities (Zollo and Winter, 2002) as well as the emergence of routines (Salvato, 2003). Hence, we hypothesize that the firm's human capital will impact positively solving problems.

H3b: Tenant firms' human capital has a positive effect on solving problems.

During the incubation period firm will still grow in absolute and relative terms. Size of firms also contributes to strengthen its capabilities (Zahra et al., 2006). H3c follows.

H3c: Tenant firms' size has a positive effect on solving problems.

Tenants' age, human capital and size all impact positively problem solving after they looked for support. In other words, our model suggests that age, human capital and size impact negatively looking for support while the same characteristics will enable the firm to better solve their problem after looking for that same support. Yet this is not paradoxical. More mature, experienced and bigger firms will be less likely to look for support; when they do, they more likely to solve their problems cooperating with the support given by whichever source.

### **3 The problem solution framework**

We set out to research what the role of BIs is in terms of helping their tenants to solve developmental problems. Our theoretical framework suggests that when BIs help their

tenants to solve problem, they are not only making use of the available resources but also facilitating and accelerating the creation of capabilities within the new venture. Our operationalization accounts for 20 problems which, if solved, have the potential to contribute to the creation of firm routines and capabilities. We build on previous work on determinants for venture growth and start-up firms' needs to identify the most common developmental problems faced by nascent firms. We organize the problems in four main areas: strategy, economic, managerial and networks (Groen et al., 2008; cf. Parsons, 1964) (Table 1).

### *Strategy problems*

Strategic decision is of crucial importance for any firm. Strategy involves the choice of how a firm will create value for its customers, satisfying their needs better than its competitors (Porter, 1996). The main problem in this area is *gaining advantage over competitors*. Firms which achieve competitive advantage will show superior performance. This happens as a result of superior rents stemming from either lower production costs or provision of greater value to customers for comparable costs (Porter, 1996). For incubated firms, this is most likely to happen in two ways: either by putting new products or services in the markets; or by generating whole new business ideas. Therefore, we included *introducing new products* in the market as a developmental problem for start-ups together with *generating new business ideas*. Arguably, for a nascent firm the question would not involve new business ideas or new products but rather *the product* or *the idea*. Yet nascent entrepreneurs continuously evaluate the set of opportunities they pursue and valuable opportunities can emerge from the continuous development and modification of ideas (Dimov, 2007). This is the case during early planning but can also happen during the first stages of each venture (Dimov, 2009). Further, improvisation is an important way to develop dynamic capabilities in young firms (Zahra et al., 2006).

*Time to market products and services* can also be a critical strategy problem, particularly in highly dynamic environments. Equally important in terms of strategic problems is *writing and presenting a business plan*. BI do not typically include a written business plan as part of their selection criteria (cf. Aerts et al., 2007; J. R. Lumpkin and Ireland, 1988). However, nascent ventures frequently need a formal business plan to access external financing, for example from venture capitalists (Honig and Karlsson,

2004). The positive effect of early planning on firm performance and survival has received empirical support (Delmar and Shane, 2003; Schwenk and Shrader, 1993) although this relationship is contingent to the external environment (Gruber, 2007) and purpose of planning (Burke et al., 2009). Finally, lack of *credibility* might be part of the liability of newness of nascent firms (Singh et al., 1986) and a hurdle to achieve a sustainable financial situation (Vohora et al., 2004).

### *Financial problems*

Imperfections in the capital markets have long been identified as a constraint to firm's financing (Hubbard, 1998; Stiglitz and Weiss, 1981). The situation is even more acute for nascent firms, particular for the high-tech (Carpenter and Petersen, 2002). The reason is that nascent firms typically lack a track record to base their negotiation with investors. Further, uncertainties in the entrepreneurial process (cf. Davidsson, 2004) make it harder to distinguish the high-potential entrepreneurs from the low-potential ones. Nascent also frequently lack collateral (or have low value ones) and therefore mostly rely on personal capital (see, for instance, Berger and Udell, 1998). We captured this in the *obtaining finance*. In our view, the BI can help tenants to access finance in several ways: direct subsidies, contacts with venture capitalists or business angels are examples of those. Problems such as *improve cash flow*, *saving on labor* and *equipment costs* are also problems which, if solved, develop important routines and capabilities within the nascent firm.

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### *Managerial problems*

Since Penrose's seminal contribution to the theory of the firm (Penrose, 1959) that the lack of management skills is seen as a major constraint to growth. This is known as the Penrose effect (Thompson and Wright, 2005) and it has enjoyed empirical support since (Richardson, 1964; Shen, 1970). We choose to capture this effect in the problem *professionalize management*. A more specific type of skills beneficial for entrepreneurs are the so-called *entrepreneurial skills*. These include autonomy, risk taking and proactiveness, among others (Brockhaus, 1980; Gartner, 1985; G. T. Lumpkin and Dess, 1996). Yet firms do need only to professionalize their own management skills but also to *hire personnel*. As the firms matures, enlarging personnel is crucial to build and

strengthen firm's capabilities (Zahra et al., 2006). Nascent firms are often faced with an array of new activities that go beyond their core business idea. Regulatory and legal procedures such as accounting or lawyers are an example of this. Such contractors can also be important source of advice (Bennett and Robson, 1999; Gooderham et al., 2004). We formulated this in the problem *compliance with administrative and legal regulations*. An additional problem BIs can help their tenants to solve is to *develop a new technology*. This is however highly contingent to the type of incubated companies and the resources available within the BI. We also included *find office or production space* to capture help immediately before graduation. Incubated companies sometimes need additional production space to manufacture prototypes and small production series without necessarily being ready for graduation (see individual case studies in OECD, 1997; OECD, 1999; Ratinho, 2007 for insightful examples). Finally, we also formulated a problem to capture the broker function of BIs (cf. Nowak and Grantham, 2000). It is difficult for a BI to have in-house all the necessary expertise to help tenants solving their problems. For instance, services such as venture capital (Hackett and Dilts, 2004) or specialized knowledge (Becker and Gassmann, 2006). We included *getting additional external advice* as a problem on the management group.

### *Network problems*

The value of networks for nascent and young firms has long been confirmed empirically (Birley, 1985; Hoang and Antoncic, 2003; Parker, 2008). The rationale behind the value of networks for firm development can be found in social capital (e.g. Portes, 1998); its impact on firm performance has also received broad empirical support (e.g. Davidsson and Honig, 2003; Yli-Renko et al., 2001). Social capital exists in the relationships between people and allows its bearer to access different resources when using it (Coleman, 1988). The main assumption here is that nascent firms need not only to assemble the right resources to establish themselves but also a proper network of contacts to develop successfully. Since the idea shaping phase (Dimov, 2007) till more mature firm stages, entrepreneurs rely on networks to gain to access important information and advice (Hoang and Antoncic, 2003). The interactions within the network range from the entrepreneur's personal contacts – family, friends or colleagues – to the more professional ones – business partners, investors, contractors, suppliers and employees (Greve and Salaff, 2003). We formulated problems in this area using this insight. *Build and expand market base* and *establish suppliers contacts* are therefore

problems of the network group. *Establishing alliances* with other companies has a potential value for firm (e.g. Gulati, 1998). Particularly for nascent companies, alliances with key partners have an important impact in their performance and long-term survival (Gomes- Casseres, 1997).

## **4 Methodology**

### **4.1 Research design and context**

Our population of BIs the 12 BIs part of Nensi – North European Network of Service Incubators. Nensi is a network of 12 service incubators located in six Northwestern European countries. The project enjoyed EU funding and ran from 2005 till 2008. During this period, data on both BIs and their respective tenants were collected. The goal was to monitor tenants during the project period and therefore we developed two questionnaires (initial and follow-up). The initial questionnaire was more focused on tenants' characteristics such as size, age or founders' human capital. The follow-up questionnaire updated these figures (if applicable) and enquired on usage of services and problem solving in the period between the initial and the follow-up questionnaires. On average, the lag between the two questionnaires was about one year. In this paper, we only use data coming from the initial questionnaire and the first follow-up (for a detailed description of both questionnaires and the monitoring tool see Jenniskens, 2006). From the initial call to 354 companies, 101 returned two valid questionnaires (29%). Of these, 73 could be used on our analysis (21%).

### **4.2 Measuring experienced problems, support sought and problems solved: dependent and explanatory variables**

We captured tenants' problems using dichotomous variables and asking managers whether they had experienced that specific problem. We subsequently enquire on whether support was sought and where it was sought. Three options were given to respondents: incubator team, fellow tenants and directly outside. "Incubator team" capture any kind of support given directly by the incubator manager or anyone part of the incubator. For instance, it is typical that BIs assign coaches to their tenants (Barrow, 2001; Smilor and Gill, 1986). "Fellow tenants" investigates one among the benefits often claimed by practitioners, i.e., the benefits arising from the creation of synergies

among BI's tenants. Finally, "directly outside" investigates whether tenants seek support directly outside, making use of their personal network of contacts.

Measuring experienced problems, support sought and problems solved allows us to analyze the whole process of solving problems (Figure 1). In this contribution, we utilize aggregated measures to investigate what determines support seeking and subsequent problem solving. Our dependent variables are Total Amount of Problems for which Support was Sought (Model 1) and Total Amount of Problems Solved (Model 2). Total Amount of Problems Experienced is used as an explanatory variable in Model 1. The aggregated measures of the sources of support (Total Amount of Support given by the BI, Total Amount of Support given by Fellow Tenants and Total Amount of Support given Directly Outside) are used as explanatory variables in Model 2 (Figure 1).

We used age, human capital and size also as explanatory variables. Age was measured in years and size in full time equivalent employees. Human capital was captured by two variables: average work experience prior to the firm foundation (in years) and prior experience in starting businesses. In case of entrepreneurial teams, we computed the average years of experience. Prior experience in starting a business is coded 1 when at least one member of the entrepreneurial teams has such experience. Our operationalization of human capital follows previous studies on entrepreneurship and dynamics of small firm growth (Davidsson and Honig, 2003; Johnson et al., 1999).

## **5 Results**

The results section is organized as follows. Table 2 provides the descriptive statistics and bivariate correlation between all variables. Table 3 presents the ordinary least squares (OLS) estimators for Models 1 and 2. The results presented in the latter are central to our hypotheses.

Table 2 shows that tenants firms experience far more problems than the ones they seek support for. The total number of problems for which support sought is roughly half of the total number of problems experienced. Of those, the majority of support is seemingly sought directly outside. Support next to fellow tenants is the smallest source of support. We note that the independent variables show low bivariate correlations (Table 2). The values are generally well below 0.70 suggesting discriminate validity between the variables (Cohen et al., 2003). For example, considering solely the several

sources of support, the bivariate correlation is below 0.30. The only correlation pair above 0.70 is between the total amount of support sought and the total amount of support sought directly outside (formatted bold). Yet these variables are not present in the same regression models. Therefore, multicollinearity did not affect our estimation results.

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The results from the regression models are presented in Table 3. Model 1 estimates the determinants of looking of support. We expected that age, human capital and size would determine the tenant firms' support seeking patterns. Yet results show that support is sought by every tenant who experienced problems. We can thus reject H1a, H1b and H1c. This means that the only determinant variable in seeking support when located within a BI is experiencing problems. In other words, when housed inside a BI, firms seek support regardless of their age, human capital or size.

Models 2 estimate what determines problem solving among tenant firms. The number of cases is, in these models, smaller since we only considered companies which experienced at least one problem. Model 2a estimates that, in the aggregated level, tenants solve their problems benefiting from support regardless of the source, therefore confirming H2a. Model 2b confirm the hypotheses concerning support given by the incubator and directly outside (H2b and H2d) while providing no support for the interaction hypothesis (H2c). This means that tenants are in fact receiving useful support from the BI but not from their fellow tenants. In both models, we observed that age and human capital have a negative effect in solving problems while the number of employees contributes positively to solving problems. This confirms H3b while providing no support for H3a and H3c. Tenants are therefore solving fewer problems when they are older and more experienced but profiting from growing in terms of solving their developmental problems.

## **6 Discussion**

Prior research on BIs has focused on descriptive studies in which the incubator's service portfolio and the overall incubator's impact are described as positive to their

performance and survival (EC, 2002; Knopp, 2007; Smilor and Gill, 1986). Yet the tenants are seldom enquired on their perception about the BI's availability of services or the impact of the BI's intervention in the firm. We addressed directly this gap by developing a framework that makes possible to measure the overall BIs intervention using data collected next to tenants.

Our conceptualization of BIs' redefines them as collaborative partners in helping nascent firms to solve their development problems. We divided our conceptual framework in two distinct models: first, we analysed what determines seeking support; and second, we investigated what explains problem solving, focusing on the different sources of support. The results of the first model show that tenants seek support when they experience a problem. This is independent from age, human capital levels and size of the firms, as initially hypothesized. We also tested the robustness of these results using as dependent variable the several sources of support (incubator, fellow tenants and directly outside) and the results hold. According to the knowledge based theory of the firm, managers choose between two basic mechanisms to build their capabilities by solving their problems: find solutions in the market or develop solutions within the firm (Nickerson and Zenger, 2004, p. 619). Further, the most valuable problems are the ones which, after solved, yield the most desirable capability to the firm. Therefore, solving a problem is a balance between a) the value of a solution and b) the costs of finding one. For managers located within a BI, the obvious decision on where to look for solutions for developmental problem is inside the incubator. This is arguably the cheapest, easiest and geographically closest to the firm option to initiate the quest for a solution to whichever problem. In fact, the reason behind looking for solutions also next to fellow tenants follows the same reasoning. Looking for support directly outside the incubator is also a low cost option to start searching for solutions for problems, assuming that tenants are using in this case their personal network of contacts.

The results of our second model show that companies which seek support within the incubator and directly outside are more likely to solve their problems. This confirms the incubation hypothesis showing that BIs help their tenants to solve their developmental problems. This finding provides evidence of the positive effect of the BI's intervention. This is an extremely important results because it confirms the value BI have in helping nascent firms in their first stages of existence. It also sheds light on the potential value of business support BIs can provide to their tenants. In theory, BIs can only help solving

tenants' problems if they possess the capabilities needed to perform an effective incubation process. Our results suggest that this is true within the BIs in our sample. The BIs' service portfolio was not part of our research. Yet we can posit that such services are effective to the extent that it is through the provision of those that tenants get the assistance needed to solve their problems. Previous work already discussed the need for a match between tenants' needs and BI's services (Lee and Osteryoung, 2004). This finding suggests that the service portfolio is customized to tenants' needs given the contribution of the BIs in solving tenants' problems.

At the same time, we did not find support for the interaction hypothesis, i.e., tenant firms do not interact with each other in a meaningful manner. Arguably, tenants may still have frequent and close contacts but not to the extent that such relationships yield significant contributions in terms of solving developmental problems. In essence, this finding counters the stylized fact that tenants interaction is frequent and useful for tenants (e.g. Sherman and Chappell, 1998). Further, it adds to the finding that tenant interaction is not sophisticated but rather informal and supportive (Totterman and Sten, 2005, p. 503). In addition, our evidence confirms that such relationships are not contributing to help tenants building each others capabilities by solving developmental problems.

We also found support for the hypothesis that support sought directly outside has a positive effect in tenants' development. The coefficient is somehow smaller suggesting that while this source of support is important, it does not outperform the incubator support. The importance of the entrepreneurs' personal networks of contacts in the early stages of a venture has already been researched (e.g. Birley, 1985) and its positive impact in young firms empirically confirmed (Zhao and Aram, 1995). The fact that tenants firms seek support for certain problems directly outside can be interpreted as a result of the value perceived within their personal network. Yet despite the emphasis literature has put in learning through partnerships (Yli-Renko et al., 2001) and building capabilities through interorganizational relationships (Grant and Baden-Fuller, 2004), our results suggest that the problem solving process taking place within the BI has a bigger effect. This translates into a bigger contribution of BIs than that of networking and partnering.

The hypotheses concerning age and human capital were not confirmed. While we theorized that age and human capital would impact positively the total amount of problems solved, data show that the opposite happens. Older companies solve fewer problems, that is, the total amount of problems solved decreases with age. This finding is counterintuitive and not in accordance with the capabilities perspective used to derive our theoretical framework. Age and capabilities correlate positively (Zahra et al., 2006; Zollo and Winter, 2002) and therefore, it is expected that companies towards the end of their incubation process would solve more problems, even without any external support. Yet it can also be argued that as companies develop, they experience different kinds of problems (Kazanjian, 1988), their complexity increases as well as the value of the solutions. This may render BI support as less effective or even incapable of helping. Consider for instance managerial problems, one of the groups of problems we investigated. BIs are capable of helping nascent firms to solve their managerial problems. However, as the venture grows, the firm's managerial needs change and so does the intensity each problem in this area. As problems become more complex and require different approaches to find solutions (cf. Nickerson and Zenger, 2004), the BI decreases its ability to provide capable help. BIs are specialized in solving nascent and young firms' problems. Hence, the reason behind age being negatively related to the total amount of problems solved might be the complexity of those problems together with the limited and finite BI capabilities.

Similar reasoning can be applied to human capital. Both prior experience in starting business and average work experience have negative coefficients due to the propensity of more experienced entrepreneurs identifying more specific and complex problems. The entrepreneurs' human capital has been identified as determinant for business longevity (Bates, 1990), start-up size (Colombo et al., 2004) and identification of opportunities (Shane, 2000). Also, industry specific knowledge (Colombo and Grilli, 2005) and prior business ownership (Mosey and Wright, 2007) also play a role in growth and survival. We suggest that these positive effects are related to faster problem identification and subsequent solving. It follows that only the more complex problems are the ones for which support is actually sought. Consider the example of a team of experienced engineers starting their third company aiming to commercialize a new product in an existing market. This entrepreneurial team will not likely seek support during the initial steps because it has experience in setting up businesses; furthermore,

they most certainly starting a company based on a business idea previously gestated in their previous ventures. The moment they will ask for support is when their knowledge is not enough to solve a new, complex and serious problem. As suggested above, the BI might not have the ability to help tenants solve this kind of problems.

We found support for size of companies having a positive impact in solving problems. This confirms previous work on capabilities development (Zahra et al., 2006) suggesting that size of companies is determinant to use problem solving as a way to develop and build capabilities.

### **6.1 Limitations and further research**

This study is not without limitations. Our study only surveyed companies within their incubation period. Therefore, we are not capable of providing evidence of two further groups of companies: failed businesses and graduates. Business failure can be attributed to a myriad of factors such as finance (Everett and Watson, 1998), marketing (Sharma and Mahajan, 1980), or lack of managerial skills (Penrose, 1959; Thompson and Wright, 2005). Arguably, our results are biased towards the positive BI intervention only if BI did not help enough or were partly responsible for some tenant forms failure. However, this source of bias is limited as this effect is extremely unlikely to happen. BIs often boast higher rates of success among their graduates (e.g. EC, 2002). Given the supportive environment most BIs provide, it is reasonable to assume that if a firm fails during the incubation period, the critical factors will be other than the direct BI intervention. Furthermore, our research design meant to capture tenant firm level problem solving processes during a limited time of their incubation period. Alternative designs to ameliorate this possible bias would have to include retrospective data which could; in turn, raise further issues. Second, we did not enquired on the complexity of each problem. This can bias BIs' intervention reducing its importance given that the more complex the problem, the more likely that firms seek support in several sources or take longer to solve the problem.

This study opens many promising future avenues for research. Further studies can focus on disentangling even deeper the complex relationships between experiencing problems, providing support and solving those same problems. As Nickerson and Zenger (2004) suggest, problems have different degrees of complexity and, as a result, solved

problems will not have the same impact in the firms capability pool (Nickerson and Zenger, 2004, p. 628). The complexity of the problem also implies different governance modes to improve the chances of finding a solution. One possible way of improving of knowledge of the incubation process would be to use more specific and complex problems as unit of analysis and map their solution quest in real time. Future research should also shed light on what might be the role of the BI in helping tenants when the solution is searched internally. Arguably, even when managers choose to find a solution internally, BIs can still have a role in facilitating this process.

If taken together, the findings about age and human capital suggests an important research plan. If older and more experienced tenants solve less problems this suggests the BI intervention to be deficient. In other words, the negative coefficient of human capital suggests that BI admit tenants who are experienced enough to be less likely to seek support and when they do, the BI is not capable of supporting them. The same happens with age: BI are currently allowing tenants to develop enough capabilities while in the incubation period till they reach an expertise in which they do not and cannot profit from the BI's support. Future research should investigate the value of support against the backdrop of both BI's and tenant firm's capabilities pool.

## **7 Conclusions and Implications**

In sum, our results represent an advance in BI literature. While prior studies provided almost no theoretical perspective to adequately measure BI performance, we showed that using knowledge base theory of the firm insights together with RBV and organizational capabilities thinking yield important results. Furthermore, by choosing tenants' problems as unit of analysis, we were able to measure the BIs' intervention in terms of amount of help provided to their tenants.

The major contribution of this study is to ascertain the value of the BIs' intervention in their tenants. Our results show that BIs indeed facilitate their tenants' development by having a significant role in helping them to solving their problems. However, the negative relationship found between age, human capital and amount of problems solved suggests that the BIs' ability to help their tenants is limited. This would not be a shortcoming if the limit would always be beyond their tenants' needs.

Taken together, our results yield important implications for BI managers, prospective tenants and BI planning actors. BI managers are now more aware of how to help their tenants. Making resources such infrastructure, business support and access to networks is available is certainly valuable; however, it is by helping their tenants to solve their specific problems that the real value of being incubated lies. As a result, tenants will accelerate the process of creating of important routines and capabilities. Our results also point to the limit of the BIs' ability to help their tenants. BIs have two ways of making sure that no tenant is left without the needed assistance: a) assemble resources and develop internal capabilities to cope with tenants' more complex problems; or b) impose graduation policy based on goals instead of age of tenants. This will ensure that tenants' needs are more likely addressed. Prospective tenants are also now better informed about the value of incubation when starting their ventures. Entrepreneurs can enjoy valuable help to solve their developmental problems while always keeping ownership of the solution. Finally, BI planning actors such as universities, regional authorities or corporations gain better insights on how and what to establish in terms of resources and capabilities when setting up a new BI. Our study points that finding a good balance between resources and capabilities to be crucial for the effective help given to new firms.

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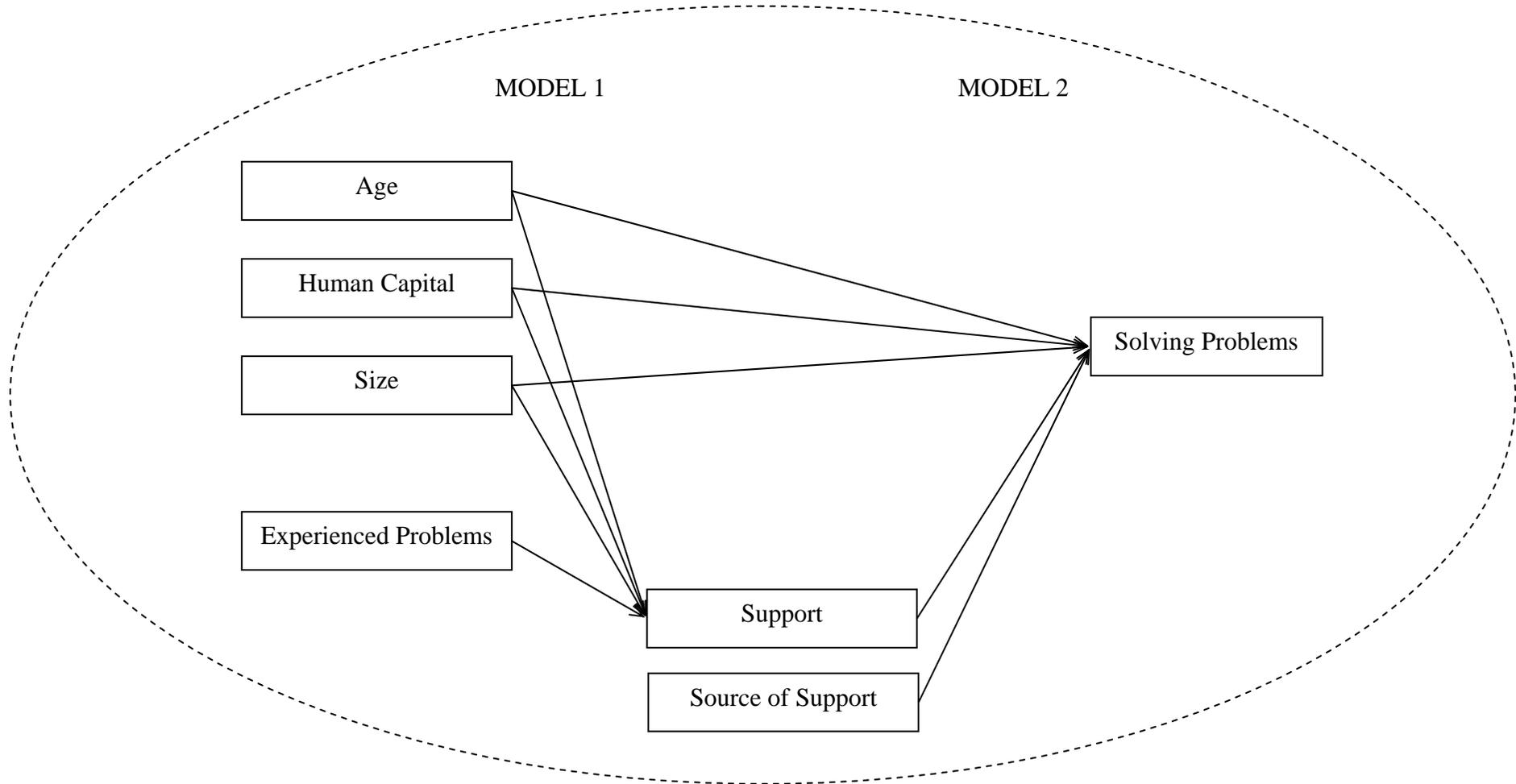


Figure 1 – Conceptual model for solving problems for firms located within business incubators  
 [Legend: Model 1: Seeking Support = f (Age, Experience, Size, Problems); Model 2: Solving Problems = f(Support, Source of Support, Age, Experience, Size)]

Table 1 – List of problems and references organized according to Groen and colleagues (2008)

<b>Area</b>	<b>Problems (grouped according to Groen et al., 2008; cf. Parsons, 1964)</b>
Strategy	Get advantage over competitors
	Introduce new products in the market
	Generate new business ideas
	Accelerate Time-to-Market of products
	Write/Present BP
	Increase credibility
Finance	Obtain finance
	Improve cash flow
	Save on labor costs
	Save equipment costs
Management	Professionalize management
	Increase entrepreneurial skills
	Hire personnel
	Comply administrative regulations
	Develop new technology
	Find office/production space
	Get additional external advice
Networks	Build/expand market base
	Establish suppliers contacts
	Ally with enterprises

Table 2 - Descriptive Statistics and Bivariate Correlation Matrix

	Mean	S.D.	1	2	3	4	5	6	7	8	9
1 Total number of problems solved	6,22	4,46									
2 Total number of problems experienced	10,52	4,98	0,644								
3 Total number of problems for which support was sought	5,33	4,44	0,661	0,633							
4 Total number of support sought within the incubator	2,16	2,99	0,601	0,462	0,638						
5 Total number of support sought next to fellow tenants	0,59	1,51	0,096	0,149	0,365	0,175					
6 Total number of support sought directly outside	3,45	3,76	0,510	0,561	<b>0,828</b>	0,248	0,234				
7 Current age	4,63	5,04	-0,260	-0,256	-0,235	-0,165	-0,015	-0,230			
8 Employees	3,25	3,47	0,077	0,102	-0,054	-0,027	-0,098	-0,028	0,384		
9 Prior business start experience	0,36	0,48	-0,037	0,101	0,185	0,055	0,281	0,255	-0,037	0,235	
10 Average work experience	9,44	6,73	-0,114	0,073	0,003	0,004	0,000	0,054	-0,160	-0,155	-0,079

N=73

Table 3 – OLS estimation of support sought and problems solved

	Dependant Variable		
	Total Problems for which Support was Sought	Total Problems Solved	
	Model 1	Model 2a	Model 2b
Constant	-0,032 (1,308)	5,413 (1,133)****	5,768 (0,969)****
Total number of problems experienced	0,565 (0,087)****		
Total number of problems for which support was sought		0,566 (0,100)****	
Total amount of support sought within the incubator			0,634 (0,123)****
Total amount of support sought next to fellow tenants			-0,039 (0,250)
Total amount of support sought directly outside			0,430 (0,105)****
Current age	-0,015 (0,093)	-0,180 (0,089)**	-0,144 (0,083)*
Employees	-0,200 (0,135)	0,277 (0,126)**	0,242 (0,118)**
Prior business start experience	1,402 (0,876)	-2,436 (0,872)***	-2,518 (0,852)***
Average work experience	-0,038 (0,062)	-0,106 (0,061)*	-0,123 (0,056)**
R2	0,442	0,447	0,553
F	10,612****	9,204****	9,704****
N	73	63	63

\*  $p \leq 0,1$

\*\*  $p \leq 0,05$

\*\*\*  $p \leq 0,01$

\*\*\*\*  $p \leq 0,001$