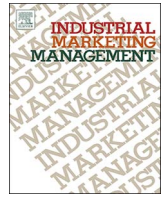




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A start-up embedding in three business network settings – A matter of resource combining

Maria Landqvist^{*,1}, Frida Lind

Department of Technology Management and Economics, Chalmers University of Technology, Gothenburg 412 96, Sweden

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ABSTRACT

This paper focuses on how newly established technology-based start-up companies become part of the business landscape. In more detail, the aim of the paper is to analyse how a start-up becomes embedded through its networking behaviours in a business network. To approach this phenomenon, the theoretical frame of reference is based on the industrial network approach to industrial markets separating developing, producing and using settings. The business network settings are combined with networking behaviours consisting of both strong and weak ties. Importantly, for a start-up to become embedded through networking, resources of the start-up need to be combined with resources in the three business network settings. The paper relies on a case study methodology focusing on a start-up, founded at a technical university in Sweden, and its networking behaviours. The paper concludes that networking behaviours relying on strong ties are crucial to resource combining. However, the analysis also shows the importance of networking behaviours of weak ties, acquiring information and interaction to sensing new opportunities. The paper ends with managerial implications for start-up managers, pinpointing the need to work with both strong and weak ties as a platform to eventually become embedded in business networks.

1. Introduction

In the past decades, incubation of research ideas with the purpose of commercializing research and establishing university start-ups have become increasingly important (Aaboen, 2009; Baraldi & Havenvid, 2016; Lundqvist, 2014; Mian, 1997; Mian, Lamine, & Fayolle, 2016). University start-ups are created when students or employees at the university attain or develop new technology or intellectual property and turn it into a product or business concept to be commercialized (Borges & Jacques Filion, 2013; Shane, 2004). In this paper, our research interest lies in how technology based start-ups originating from the university become part of and thus embedded in business networks.

Previous studies of the establishment and development of start-ups show that interaction with different actors and networks have a huge impact (Elfring & Hulsink, 2007; Hallen, 2008). For example, university incubators, being organizations that provide new firms with resources or services (Aaboen, 2009; Mian, 1997). Other aspects include the personal networks of the entrepreneurs (Bhidé, 1999; Hite & Hesterly, 2001), where the entrepreneurs' network are seen as a starting point for the emerging companies' initial network. Studies also show that it is not

only personal relationships that are important when establishing a new firm. Developing relationships with customers and learning in interaction with customers, as part of product development, has been recognized as an important part of becoming an established firm (Aaboen, Dubois, & Lind, 2011; Blank, 2013). In a study of 101 failed start-ups, 42% of the start-ups highlighted a lack of customers as a reason for failure while 29% cited a lack of money.²

Recently, industrial marketing research, and particularly research building on the industrial network approach, has begun to study start-ups as a phenomenon in business networks. Business networks consist of business relationships that contain interaction and typically revolves around a transaction in a business-to-business situation. A business relationship that develops between two companies both affects and is affected by other relationships. This interplay between relationships forms the basis of a network view of the business landscape (Håkansson, Ford, Gadde, Snehota, & Waluszewski, 2009; Håkansson & Snehota, 1995). The studies of start-ups in business networks emphasize early interaction with business partners such as potential customers and the start-ups' initial business relationships (Aaboen et al., 2011; Aaboen, La Rocca, Lind, Perna, & Shih, 2017; La Rocca, Ford, &

* Corresponding author.

E-mail addresses: maria.landqvist@chalmers.se (M. Landqvist), frida.lind@chalmers.se (F. Lind).

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² CB insights, *101 Startup Failure Post-Mortems*, <https://www.cbinsights.com/blog/startup-failure-post-mortem/> (29/01/2015).

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Snehota, 2013; La Rocca & Perna, 2014; Laage-Hellman, 2012).

Some relationships or ties (these terms are used interchangeably) developed by start-ups become strong and some weak (Elfring & Hulsink, 2007). In general terms, a strong tie refers to a relationship that is built on trust and reciprocity while a weak tie refers to a more infrequent or new contact that, for instance, can provide novel information (Granovetter, 1973; Uzzi, 1997). For example, start-ups originating from the university typically have a strong tie with the university (Johansson, Jacob, & Hellström, 2005). Furthermore, Jack (2005) emphasizes that the definition of what is regarded as strong versus weak may not have been specified yet, leaving some room for clarification. Elfring and Hulsink (2007, p.1852) also note that “the mix” of strong and weak ties may develop in different ways in entrepreneurial network development. Hence, independent of their strength, the ties and the networking of the start-up will form the basis for if and how a start-up becomes embedded and thus part of a business network.

The aim of the paper is to analyse how a start-up becomes embedded through its networking in a business network. For a start-up to become embedded through networking, relationships or ties of different types are critical. We therefore see embedding and developing relationships as strongly related. However, embedding is not only about developing organizational resources such as relationships but also about fitting into the established technical resource structures and combining resources in new ways. The aim will be achieved by studying a start-up that originated from an incubator at a major technical university in Sweden. A case research methodology is used to capture the complexity of the embedding of start-ups in business networks in terms of how the initial relationships impact the direction of the future development of start-up firms (Aaboen et al., 2011; La Rocca et al., 2013) and the networking behaviours of start-ups (Thornton, Henneberg, & Naudé, 2013). The industrial network approach is used as a theoretical foundation, and special focus is put on the resource dimension (Håkansson & Waluszewski, 2002) and the separation of developing, producing and using settings (Håkansson & Waluszewski, 2007; Ingemansson, 2010) of networks in order to study details of the combining of resources.

From a theoretical point of view, this paper makes a contribution by combining the networking behaviours (Thornton et al., 2013) with the business network settings (Håkansson & Waluszewski, 2007; Ingemansson, 2010). Related, it contributes to the understanding of embedding of start-ups in business networks through networking in terms of combining resources in the three business network settings (Aaboen, Laage-Hellman, Lind, Öberg, & Shih, 2016; Ciabuschi, Perna, & Snehota, 2012). From a practical point of view, the paper contributes to the understanding of how firms use relationships for different purposes in the process of becoming embedded, drawing on Jack (2005) who states that there is a need for further studies on the functions of network ties. As formulated by Thornton et al. (2013, p.1157) referring to strong and weak ties “the challenge for individual firms remains somewhat unexplored, i.e., how to exploit these two different types of relationships through specific types of behavioral patterns.”

This paper is structured as follows. First, the theoretical frame of reference, which acts as the starting point for this research, is presented. Then the methodology for the study is accounted for, followed by a case description and case analysis. The paper ends with conclusions and suggests implications.

2. Theoretical frame of reference

Seeing companies as embedded in networks is a key assumption within the industrial network approach (also referred to as Industrial Marketing and Purchasing [IMP] literature). Accordingly, the network model (Håkansson, 1987; Håkansson & Snehota, 1995) separating the three analytical dimensions of activities, resources and actors builds on viewing resources as part of – or embedded in – resource constellations,

activities as part of activity patterns, and actors as part of a web of actors. Below we start by identifying a number of networking behaviours that rely on assumptions of embeddedness (Thornton et al., 2013). These networking behaviours are decisive for start-ups since the initial relationships are important for further development (Aaboen et al., 2017; Aaboen, Dubois, & Lind, 2013). We then focus on the resources of start-ups to analyse how they need to be combined across the boundaries of start-ups in order for them, through their networking behaviour, to become embedded in business network settings (Aaboen et al., 2016; Ciabuschi et al., 2012; Håkansson & Waluszewski, 2007). This forms the basis of the analytical framework and formulation of research questions.

2.1. Networking through strong and weak ties

The embeddedness concept, in which social structures play a role in economic actions, has been used extensively based on Granovetter (1985). For example, Uzzi (1997) focuses on business exchange relationships and categorizes them as either arm's-length or embedded, where embedded ties are strong and characterized by trust, information sharing and problem-solving and that certain information and opportunities are only available through embedded ties. The related “strong and weak ties argument” (Granovetter, 1973) implies that the way in which actors use their strong and weak ties determines, for example, firm performance (e.g. Granovetter, 1973, 1985; Uzzi, 1997), and that the structure of the social network is the key to accessing novel information and opportunities.

A strong tie is a direct relationship with another actor consisting of mutual and joint resources and/or activities, trust and high quality information as well as high frequency of contact (Uzzi, 1997). A weak tie, on the other hand, is a newly formed relationship or an indirect one that can serve as a “bridge” for a focal firm to connect with other indirect actors. It also initially entails a lower level of trust since the interaction is less frequent as well as characterized by limited adjustment (Granovetter, 1973; Thornton et al., 2013). Jack (2005, p. 1251) emphasizes the usefulness of strong ties for entrepreneurs in that they both feed in information and seek it out in terms of being “feeders and seekers”.

However, in strong or embedded ties, opportunities are not just available to firms embedded in the networks (Jack, 2005; Thornton, Henneberg, & Naudé, 2015). Drawing on the basic assumption of the industrial network approach, it is when firms interact with other firms that they are able to identify and make use of new opportunities regarding, for example, how to solve technical problems. There may also be opportunities, for example, to fulfil offerings involving third parties coming from weak or indirect relationships. The various types of ties fulfil different purposes. This provides the foundation “to posit that it requires strategic networking [...] to access and capitalize on the resources that exist beyond the direct reach of a focal firm” (Thornton et al., 2013, p. 1157).

Thornton et al. (2013) conceptualize networking in more detail as four sets of behaviours: (i) information acquisition, (ii) opportunity enabling, (iii) strong-tie resource mobilization and (iv) weak-tie resource mobilization. Each of these sets reflects manifested behaviours identified from empirical research within the UK manufacturing industry and captures a distinct way in which firms utilize their relationships in an attempt to achieve anticipated goals. First, information acquisition refers to a firm's willingness to use both strong-tie and weak-tie relationships in order to obtain the desired information for making informed decisions. It could be, for example, knowledge about new markets. To obtain information, firms approach business partners, such as current customers and suppliers. Thornton et al. (2013) refer to this information as often complex, valuable and shaped to fit the specific situation. Novel information can be acquired through business contacts and trade events, i.e. from more arm's-length relationships.

Second, opportunity enabling relates to a firm's conscious acts to

sense the opportunities by “strategically” interacting with relevant parties in its network. Thornton et al. (2013) explain this as more direct and goal-oriented than the activity of information acquisition. This can be done by interacting with both current and potential customers and suppliers as well as attending, for example, industry seminars. Another way of opportunity enabling is by building reputation working with well-known partners and hence building network identity. Furthermore, influencing legislation through lobbying is an activity to enable selling of products.

Third, strong-tie resource mobilization is used by a firm to adjust, transfer and pool resources across various established relationships in order to address certain firm challenges. To mobilize resources in strong ties requires trust and cooperation as a foundation for solving problems and refining offerings. Through its strong ties, a firm can gain access to important resources. It is therefore important that the firm can sense this opportunity and mobilize resources. The firm can do this by adjusting its resources in the relationship to meet those of the counterpart or transferring resources across different relationships by working with synergies between its partners. It may also be able to pool resources through this networking behaviour, i.e. using the knowledge of the supplier to meet the requirements of the customers. As Thornton et al. (2013, p. 1161) explain, “*the supplier does not merely provide raw material [...] its involvement in the development in the process of offering development means that the synergy produced by the corporation cannot be imitated easily.*”

Fourth, weak-tie resource mobilization refers to the ability to mobilize resources that are linked to firms' less established relationships. According to Thornton et al. (2013), this is mostly done to introduce new relationships. Three sub-types are presented in this category. Mobilizing through bridging weak-tie relationships is one. In this case firms can use less established relationships to get access to the counterpart's web of relationships. Mobilizing through bypassing-flanking is used to influence the demand of the offering by reaching out to an influencing partner of the customer. Last but not least, mobilizing through bypassing-avoidance is a strategy to identify potential partners. Here, the firm enters a new market and tries to reach out to its competitors' customers and suppliers.

2.2. Resource combining in business network settings

The above networking behaviours, including different types of ties, are outlined in detail as they are important to access and use resources beyond a focal firm (Thornton et al., 2013). These relational aspects are profound for start-ups in need of combining resources (Aaboen et al., 2016; Ciabuschi et al., 2012) to become embedded in the network. Building on the industrial network approach, a resource is an object that can be organizational or technical (Håkansson & Waluszewski, 2002). Technical resources could be, for example, products, infrastructure and production equipment, whereas organizational resources can be strong or weak relationships and specific knowledge held by some actors. Drawing on the heterogeneity assumption (Alchian & Demsetz, 1972; Penrose, 1995), the value of a resource depends on how it is combined with other resources. A resource combination could, for example, be a new material used in an existing product, or between technical and organizational resources, such as a new supplier relationship developed in order to manufacture a complex sub-unit. It means that “*changing the resources with which one resource is combined, or the interactions that underpin these, will alter the value and emergent features of that resource*” (Baraldi, Gressetvold, & Harrison, 2012, p. 267). In addition, how a resource has been combined with other historically impacts on the specific features of a resource, and this applies regardless of whether the resource has its source in science or business (Ingemansson & Waluszewski, 2009).

Resource combining is a process that includes interaction between the involved actors and mutual adaptations of resource collections. Resource combining occurs in different situations. One is when

resources are used, including from a focal firm perspective, in situations when customers start to use a certain resource or suppliers use their equipment to produce a certain resource. Another situation is in development and includes, from a focal firm perspective, combinations with resources held by external actors, such as other technologies accessed from collaboration partners or testing functionality in a customer's operations. Consequently, resource combining can occur across different types of boundaries. Gadde, Håkansson, and Persson (2010) explained types of resource combining in relation to a firm boundary and existing and new resources. Gadde and Håkansson (2008) showed how resources were combined within business relationships and in connected relationships, and Lind (2006) pinpointed resource combining in development within and across an inter-organizational project boundary. Hence, for a start-up to become embedded, its resources need to be combined with resources of different constellations (Aaboen et al., 2016; Ciabuschi et al., 2012).

A new resource combination, for instance between existing and new resources, can be seen as an innovation (Ingemansson, 2010), which means that innovation and resource are related concepts, emphasizing the important point that a resource always needs to be combined with other resources in order to become an innovation. Håkansson and Waluszewski (2007) explain three different business network settings in which resource combining need to take place: the developing setting, the producing setting and the using setting. Within each setting, developers, producers and users can be found having their own resource collections that are of importance to the start-up. Embedding in the different settings is neither a standardized nor a linear process. There are times when the embedding overlaps, for example when companies choose to develop the product in interaction with a potential user to acquire a better understanding of what the user wants, or with a potential supplier to be able to produce the innovation in the future. There are also situations where the settings appear as far apart, which can make it difficult with regard to embedding the resource within them. As Ingemansson and Waluszewski (2009, p.22) state, “*...the larger the difference between the developing, producing and using settings, the larger the difficulties to create anything new that will fit into all these settings, and consequently, the larger the difficulty for the new to become an innovation.*”

The developing setting consists of researchers or other actors developing new solutions (Håkansson & Waluszewski, 2007). Development is a trial-and-error process that is often costly and takes a long time since it is hard to know exactly what the customer wants or how the resource will be able to fit future production facilities. From the point of view of a start-up, combining resources in the developing setting can involve working together with potential customers in order to conduct pilot tests of the product in their facilities or collaboration with other actors that have certain resources that are useful for developing the product/process (Laage-Hellman, Landqvist, & Lind, 2017). The university could be an important development partner when it comes to technology exchange and provision of new knowledge (Bercovitz & Feldman, 2006). In an initial stage, the university plays an important role, not only when it comes to research and development but also in helping the new established firms commercialize their product. Incubators connected to the university are organizations that support the development of new ventures (Cooper, 1985) by providing services such as shared office facilities and access to resources such as outside capital and business networks (Mian, 1997).

The producing setting is where the resource, such as a patent or prototype is transformed into a product or process (Håkansson & Waluszewski, 2007). The production will be influenced by the company itself as well as other actors, such as suppliers and sub-suppliers (Ingemansson & Waluszewski, 2009). The main challenge in this setting is how to utilize and adapt existing facility systems and consequently embed the new solution into a supplying network (Waluszewski, 2011). From the perspective of a start-up, embedding in the producing setting involves combining resources with the suppliers' facilities when the suppliers are going to use their facilities to produce certain resources.

Suppliers may also have an impact on the new product development process by providing innovative technologies to the innovating firm (Handfield, Ragatz, Peterson, & Monczka, 1999). This can reduce product development costs and time to market for the company (Ragatz, Handfield, & Scannell, 1997). Furthermore, the relationship between the supplier and the new venture has distinctive characteristics because of the dependencies shaped between the two firms. More specifically, and as Song and Di Benedetto (2008) state, integrating suppliers will often provide both new technologies and financial support.

It is in the using setting that the resource comes into use, i.e. there is a product or process that customers are willing to use and pay for (Håkansson & Waluszewski, 2007). According to Waluszewski (2011), users must see the benefits of integrating the resource into their production systems and also adapt the present systems to fit the new resource. Consequently, from the point of view of a start-up, to have a resource embedded in the using setting, it must be combined with other resources located outside the company boundary at the customer's. It means that customers play an important role both in the developing and the using setting. This is also in line with the claim by Prahalad and Ramaswamy (2000) that companies should view customers as a source of competence that can bring knowledge and skills to the product development. Thus, involving customers in an early stage is important for start-ups (Blank, 2013). A relevant issue regards “who” the customer is (Laage-Hellman, Lind, & Perna, 2014), and it may be necessary to interact with, for example, the customer and the end-user, as there may be one actor actually paying for the product and another using it. These two actors may be in the same company, or the customer buying from the start-up may be a middleman or a distributor that sells it further to the user.

2.3. Analytical framing and research questions

The aim of the paper is to analyse how a start-up becomes embedded in a business network, through its networking. The basis for analysing the networking of start-ups is the four networking behaviour types (Thornton et al., 2013): (i) information acquisition, (ii) opportunity enabling, (iii) strong-tie resource mobilization and (iv) weak-tie resource mobilization. Importantly, for a start-up to become embedded through networking, the resources of the start-up need to be combined with other resources in the three business network settings: the developing, producing and using setting (Håkansson & Waluszewski, 2007).

Hence, the analytical framework is based on the networking behaviours (Thornton et al., 2013) and resource combining in the business network settings (Håkansson & Waluszewski, 2007), which leads to the following research questions (RQs) regarding the embedding of start-ups in networks:

- What networking behaviours can be observed and how do they differ between the three business network settings?
- How do the networking behaviours pave the way for resource combining?

3. Method

This paper builds on a qualitative research method and uses a case study methodology (Easton, 2010; Flyvbjerg, 2006). A case method offers opportunities to capture complexity as well as to study a phenomenon in its context (Dubois & Gadde, 2002), which are good starting points for understanding the embedding of a start-up in business networks.

3.1. Case selection and data collection

The focal start-up of the case, referred to as Alpha (made anonymous), has its origin in an incubator at a major technical university in Sweden (referred to as UniTech). In 2014, two incubators at this

technical university were among the top ten in the world according to the UBI index.³ One of them, Incubator (made anonymous), which is connected to a School of Entrepreneurship at UniTech, was ranked eighth by the same index. Incubator is based on the idea of surrogate entrepreneurship, which means transferring the technology developed by a researcher to an experienced entrepreneur who creates the venture (Radosevich, 1995). This form of entrepreneurship, where the focus is on the combination of knowledge about the new product and managerial competence, has been shown to have a positive influence on venture performance (Jo & Lee, 1996; Lundqvist, 2014).

The main reason for selecting Alpha as a study object was based on an initial round of screening start-ups from the above-mentioned incubator. Hence, other start-ups originating from the same incubator have been used as reference points for the embeddedness of start-ups in all three settings. The start-ups from the Incubator were established with the aim of commercializing a technology stemming from either researchers or companies. From an understanding of the incubator context (see Table 1), Alpha seemed interesting because it had actually been able to build relationships with customers, suppliers and other partners, in contrast to other start-ups in a similar situation.

For Alpha in its network context, the main source of data has been semi-structured interviews (Kvale, 2001) with the CEO and co-founder and key partners in the context of Alpha. The interview questions were developed from theoretical categories constructed from concepts within the industrial network approach. The questions focused on the development of the start-up and of the relationship within the three business network settings and the connections between the relationships. This was a starting point for the interviews. The semi-structured interviews then allowed for new directions and themes to be discussed. The interviews lasted about 1 h and were recorded and transcribed soon after the interviews, see Table 2.

During the interviews, drawings of Alpha in its network context have been instrumental to the data collection. The initial drawing was developed through the theoretical framework and the idea of overlapping business network settings. Then drawings were developed as a preparation to each interview occasion and used as a tool for reflecting about Alpha's networking. Drawings can function as a tool to facilitate reflections of the present situation in light of the past (Aaboen, Dubois, & Lind, 2012). Hence, using the drawings, firstly, we were able to obtain a visualized and structured view of Alpha's current relationships at different points in time. Secondly, the drawings served as a processual tool to follow up previous interviews and let the interviewee reflect on the current situation based on the earlier interview. The drawings also led to engagement and a worthwhile discussion.

The case description has been sent to the interviewee at Alpha and checked for accuracy and that the data had been rightly understood and interpreted. As stated by Lincoln and Guba (1985) the ones best to tell are the interviewees. In addition, there have been several follow-up clarifications by e-mail, especially with regard to the product, which contains different offerings developed in interaction with various parties. In addition, interviews were carried out with one supplier and one user of Alpha's product to obtain an understanding of how Alpha's product was integrated into a producer and user context. Furthermore, Alpha's website, press releases and other information have been used to understand the firm and the product.

3.2. Procedure for analysis

The analysis procedure can best be explained by relying on “systematic combining” (Dubois & Gadde, 2002, 2014) where we have aimed for “matching” between the theoretical frame of reference and

³ The UBI Index is a European research initiative that focuses on the University Incubator Benchmark. Press release, <http://www.mynewsdesk.com/se/incubator/pressreleases/ny-rankning-encubator-i-topp-bland-vaerldens-inkubatorer-1012280>.

Table 1
Interviews and seminars in a business incubation context for Alpha.

Interviewee	Number of interviews/ seminars	Date(s) of interviews/seminars	Additional email contacts	Aim of the interviews/seminars
Business coach at the Incubator	1	9/2/2015	No	To understand how the School of Entrepreneurship at UniTech works in practice
Director at the School of Entrepreneurship	1	28/11/2014	No	To understand how the start-ups perform after the education
Seminars at the School of Entrepreneurship	2	27/2/2015, 13/3/2015	No	To experience a story from the School of Entrepreneurship at UniTech as well as how the students work at the Incubator
CEOs and founders of three start-ups from the Incubator	6	30/3/2015, 27/11/2015, 18/3/2015, 17/3/2015, 23/4/2015, 13/11/2015	Yes after most of the interviews	To get reference points for embeddedness in the three settings

the empirical data. The idea of the business network settings (Håkansson & Waluszewski, 2007) was in place already from the beginning. The data gathered during the interviews, specifically for Alpha, were coded according to the categories initially developed from the theoretical framework, i.e. identifying the relationships located in the different settings, which resources were combined in each relationship and with whom. The semi-structured interviews allowed the topic of the interviews to change and adapt to the specific interview situation. After a first read through of the transcriptions, it became clear that Alpha was the only one of the four start-ups with relationships in all three settings. This became the basis for the in-depth study focus on Alpha.

Throughout the coding of the transcription of the first interview, it was also evident that Alpha had many parallel discussions with actors going on in all three settings. Some discussions had a clear line of thought regarding the outcome while others were more open. The second interview with Alpha therefore focused on the development of the previous discussions with different actors. Had some of the discussions proceeded to clear interaction and resource combining or maybe just disappeared? Both situations were clearly seen. However, a third situation had arisen. Namely, some of the discussions also helped Alpha create relationships with a third party, i.e. the discussions acted as bridges for Alpha to develop new connections with other companies. The new discoveries in the empirical world led to new directions in theory to capture this phenomenon. Hence, it was not only about relationship building in three different settings but also about creating possibilities through weaker ties and connections between them. This directed us to the concepts of “weak and strong ties” (Granovetter, 1973; Uzzi, 1997) and related networking behaviours (Thornton et al., 2013). It resulted in a theoretical framework that included the distinction between strong and weak ties as a basis for the networking behaviours (Thornton et al., 2013) along with resource combining in the three business network settings (Håkansson & Waluszewski, 2007). With the emerging theoretical framework as a basis, the third interview round focused on Alpha's counterparts and details of the settings, respectively, in order to achieve matching (Dubois & Gadde, 2002) between the framework and the empirical study and analysis.

4. Case description

The case of Alpha embedding in its network context is described below. The case description is part of a larger study available in Landqvist (2017).

4.1. Alpha Inc. and its product solution

The start-up Alpha Inc. (hereafter referred to as Alpha) is focusing on developing intelligent solutions for the health care industry. Alpha was started as a project in 2012 by three students as part of their education at UniTech School of Entrepreneurship. The project ran for one year with the purpose of developing and commercializing a product solution, initially designed by a large Swedish paper manufacturer called Stora Enso. The product stemmed from the idea of assisting patients to take the right dose of medicine at the right time, i.e. to improve patient adherence. At first, Stora Enso focused on developing an appropriate package for medicine to achieve this objective. However, as the idea reached this school and the project developed, the team saw a chance to integrate the package into an IT solution to obtain real time feedback on whether the patient has taken the assigned medicine. Namely, Alpha's product solution consists of three parts. The *package*, which involves printed conductors that run underneath a blister pack. Once the pill is detached from the blister pack the circuit is broken. The package is attached to a *cellular (GSM) module* that delivers real time information about the removal of the pill, i.e. when the circuit is broken. Finally, there is the *IT solution*, which receives the real time data. It contains an Application Programming Interface, which lets the

Table 2
Interviews related to Alpha in its network context.

Interviewee	Number of interviews	Date(s) of interviews	Additional email contacts	Aim of interviews
CEO and founder of Alpha (founded 2012)	3	8/4/2015, 11/11/2015, 24/8/2016	Yes after each interview	Main source of data and study focus – a number of relationships in all three settings
User and tester (the retirement home)	1	19/8/2016	No	Collaboration between Alpha and its developing partner/potential user
Producer of prints	1	28/6/2016	No	Collaboration between Alpha and its supplier

customers choose which information is most relevant to extract according to their needs. The interface displays the observation data from the packages, such as for example the number of detached pills, package ID and expected pill consumption.

After twelve months as a project at the school of Entrepreneurship, one student left and the project employed one part-time IT developer. Moreover, Alpha relocated to a science park connected to a university hospital and continued as a project until the summer of 2015, when it was turned into a registered corporation. During this time, the agreement with Stora Enso dissolved. The two companies are still linked through licence agreements, and they share knowledge when they occasionally meet. In addition, the network of Stora Enso has influenced Alpha's choice of partners to some extent, primarily on the supplier side.

The product solution is considered for two applications. Firstly, it is appropriate for clinical trials in which accurate observation data from patients are critical when trying to evaluate if a drug will make it to the market. By increasing the patient's compliance with taking the pill and logging when, the clinical trials can give more valid outcomes. Secondly, the company is trying to enter the homecare industry, where the product solution can facilitate the treatment of the patients. By letting relatives, patients and doctors follow the intake of the drugs in real time and sending out reminders to the patients, more effective treatment can be achieved.

Alpha collaborates with a number of companies to develop the different parts of the product solution, such as the package and IT solution. The basic idea of measuring when the circuit is broken and storing the information is present regardless of the application area. What is important to remember is that all users have their own requirements when it comes to how to display and use the information. Furthermore, features such as print, colour and size of the package are also fixed according to the user requirements. Except the relationships with R&D partners, Alpha has many discussions on going with companies, which hopefully will end in a fruitful exchange.

4.2. Alpha in its network context

4.2.1. Relationships within the developing setting

Today, Alpha aim for establishing a position on the home health care market. By being part in different R&D projects Alpha is able to develop its product according to user needs. The start-up was able to initiate an R&D collaboration with the Swedish homecare service together with support from Sweden's innovation agency Vinnova since Alpha's product has huge potential when it comes to rationalizing the processes within homecare service. One example is making it easier for the homecare service to observe its patients' intakes of medicine. However, this is a difficult market to enter due to the regulations and the amount of actors involved. For example, one actor pays for the product and another actually uses it in the end. As a result, this demands that the project include appropriate users and buyers already from the start.

The tests conducted within the R&D project started in 2014 and involved two workers and a handful of patients living at a retirement home. They were able to test the product's function for a few weeks. During the test the participants had to eat sugar pills at specific times

during the day and if they missed one and the circuit did not break, they received a reminder in the form of a text message or call. The latter was more suitable for the elderly patients as they did not have mobile phones. Each test was followed by meetings at which Alpha had the chance to obtain feedback on the usage. During these feedback sessions, it became clear that the integration of the package and the GSM module was hard to manage. As one of the participating nurses explained, "... *there was a small box which should be connected to the package. If you take the pills for more than 14 days you have to change package and also move the box to the next package. It was a bit hard to connect it correctly.*" Integrating the GSM module into the new package required precision, and neither the elderly nor the workers managed it fully. As a result, Alpha modified the shape of the package to become easier to use.

The meetings between Alpha and the retirement home were often dedicated to the technical parts of the testing, where Alpha and the retirement home talked about visible errors in the tests. Several meetings took place and were open to both the workers and the elderly people to highlight questions such as did the test person receive a reminder when he/she missed taking a pill? Did the test person take the pill when the reminder arrived? Thus, the meetings required Alpha to be both clear and pedagogical.

As illustrated above, being part of the tests also placed demands on the workers and the residents of the retirement home. The majority of the workers perceived it as an extra workload, and the elderly people could not see the benefits of participating. However, the two workers who participated in the first test round were eager to proceed to the next stage of the test, and they are now trying to persuade the personnel to be part of the next test round. One of the participating nurses clarified this, "*There is always interest in improving and reducing the deviation of forgotten pills. We are only human and if we can get help to reduce the deviations it will be of great interest to us, as it is important that the people who live here get the right medicine at the right time,*" and the nurse continued, "*Science is really interesting, as long as it can contribute in a relatively easy way. As I said, without it taking too much time and effort as everything else has to be done too.*"

As another important step in understanding the users' needs, market research projects are being conducted with several actors related to clinical research forums, retirement homes and offices for innovations.

4.2.2. Relationships within the producing setting

To produce the package, Alpha has a supplier that produces the cardboard without the specific circuits and colours. The ordered cardboard is then sent to a printing firm in Sweden where the circuits and colours are printed on it. The packages are printed on commission and according to Alpha's requirements. After printing, the cardboard is sent to another firm in Sweden, located close to the printing firm, which punches out the package. This firm regularly works with the printing firm on other projects. Alpha sets the requirements for which colours and design to use before approaching the printing firm and works with different suppliers when it comes to evaluating which colours to print.

When it comes to the printing process, Alpha uses a specific printing machine at the printing firm for half a day, two days a week. The head of marketing at the printing firm explained with regard to its weekly operations, "*They [Alpha] have bought hours and booked a time slot every Tuesday and Wednesday [...] our staff are of course present at the printing*

machine but they [Alpha] are active and take part in helping with the printing process. They then head on to another firm to get it punched and glued.” Namely, Alpha is present at the production of the printed packages to follow up that everything goes according to plan. Every batch could be observed as a new test in which the current measures may or may not turn out to be useful. From a technical point of view, parameters such as conductivity are an important measure to follow up. As the colours conduct electricity, they are developed before going to the printing firm, as the printing firm does not have the expertise to develop this special colour itself. Yet, the printing firm assists with its printing expertise and every time the prints are carried out the firm has people positioned by the machine. Moreover, the same machine is also used by Stora Enso, which introduced the printing firm to Alpha. If it turns out that Stora Enso and Alpha print on the same day, they often have informal dialogues to share information on their particular printing process.

The printing firm perceives itself as a partner that helps Alpha develop its product. When Alpha approaches the printing firm with new suggestions, the printing firm is keen on adjusting its machine to meet the requirements, for example a new line has been bought with a dryer that is faster than the original one to make production more efficient. Even though Alpha is considered a small customer and no common plans or forecasts have been developed between the two companies, it is important for the printing firm to be part of this kind of innovative projects. As the head of marketing expressed, “*It is always interesting with new companies and exciting to be involved in new projects. When it eventually hits the market it is always fun to be part of it. This is something we try to do with other companies as well, trying to help develop the product.*”

With regards to Alpha's current requirements for design, colours and circuits, the printing firm has the capacity to produce approximately 10,000 packages per batch. As Alpha continues to grow and hence plans to produce more packages, it might be needed to consider involving new producers. To choose a suitable printing firm is about following one's instincts. For the process of printing colours and circuits on cardboard, Alpha can choose from a large number of suppliers. When Alpha wants to test something new, it chooses the supplier it believes in most. Currently, the printing firm in Sweden is frequently hired, but there is also a printing firm in Denmark that has been part of the printing process. Alpha believes it is important to always be aware of other options, and it has initiated discussions and started working with other printing firms located in Sweden, Denmark, Finland and Eastern Europe. Alpha evaluates the producers to see if they are capable of printing the cardboard according to given parameters for colour, circuit and design. Moreover, the time perspective is important when evaluating the firms, as is the ability to develop good relationships with the printing firm. For Alpha, it is important that the printing process, especially when it reaches a high volume per batch, is conducted autonomously.

The product solution's GSM module is developed together with an IT company in Finland. This is a relationship that has been maintained since the beginning of Alpha's journey. Alpha decides what the module's characteristics should look like, and at that point the IT company develops the module through coding. Alpha then tests the module to see if it meets the requirements. However, the IT solution system (the Application Programming Interface) is developed by Alpha itself. When it comes to developing the graphics, which are later printed on the cardboard at the printing firms, Alpha works with a number of designers, such as students or consulting firms.

4.2.3. Relationships within the using setting

Alpha has three paying customers, two of which are also involved in developing the product. One of these customers is placed in the UK and is a supplier to pharmacies that use the package for its medicines. There are two reasons for approaching the UK market at an early stage of the product development: the pill organizers were suitable for Alpha's

package and the pharmacies had an active role when it came to patient care. For example, they have the right to take out the pills from their original package and place them in specific pill organizers. This is not yet a widespread phenomenon in Sweden, which made it hard for Alpha to approach the Swedish market in the beginning. For more than two years there has therefore been continuous testing in the UK of Alpha's package and the related IT solution, which has directed the product solution towards its current characteristics. By testing how Alpha's product solution works together with the customer's medicine and seeing how appropriate it would be to integrate the solution into the customer's clinical trials, new product features can be developed. For Alpha, it is important to work with a company for which it is possible to follow up and hence make use of customer feedback.

Furthermore, there is one packaging company in Canada that is involved in buying and testing Alpha's package solution. This company is also involved in the smart packaging industry and perceives Alpha's solution as valuable. The company delivers a design for the potential package that Alpha evaluates and comments on. Alpha and the customer then agree on a product that is suitable for production and also meets the customer's requirements.

Although Alpha is highly dependent on customer feedback, the start-up currently has one customer that is just a buyer. This is a market research company located in the UK that buys and tests Alpha's products on behalf of a pharmaceutical company. As the pharmaceutical company changed focus from the US market to the UK market, Alpha also changed market research company from one located in the US to the current one in the UK. The market research company with which Alpha works today attains the requirements of the pharmaceutical company, reaches out to suitable packaging suppliers such as Alpha and tests how the product functions and is perceived by its users. If everything turns out well and the pharmaceutical company is pleased with the results it may end up in a future customer relationship for Alpha. Today, Alpha has direct contact with the end-user, the pharmaceutical company, but no tests are conducted between the two companies.

Looking at potential customers, Alpha has discussions with and is evaluating a number of different firms within the pharmaceutical industry. These firms are located in Sweden, the US, the UK, France and Germany. Alpha also attends trade shows and conferences to be part of the ongoing discussion in the industry and where one example is the welfare technology fairs. During these events managers and officials in municipal health care meet and by participating in these fairs, Alpha is able to reach out to future customers and users within the area.

5. Case analysis

In the case analysis below, the networking behaviours of Alpha are analysed in the three business networking settings (RQ1). This is in order to scrutinize how the networking behaviours pave the way for resource combining (RQ2), which in turn forms the basis for fulfilling the aim of the paper. The case of Alpha's networking is interesting as it reveals different kinds of relationships in all three settings. As can be seen in Fig. 1, Alpha being the focal firm is illustrated as a midpoint with its surrounding relationships, in which the dashed arrows illustrate weak ties and solid arrows depict strong ties. By initiating relationships with customers, suppliers and developing partners, new resources become available as potential starting points for resource combining.

5.1. Observed networking behaviour in the developing setting

In the developing setting, Alpha works with both strong and weak ties to different actors in order to acquire valuable information on how to proceed with the development of the smart package. Working with business partners such as the retirement home has helped Alpha to understand how to develop the next application area for the smart package. Namely, the second application area involves facilitating the

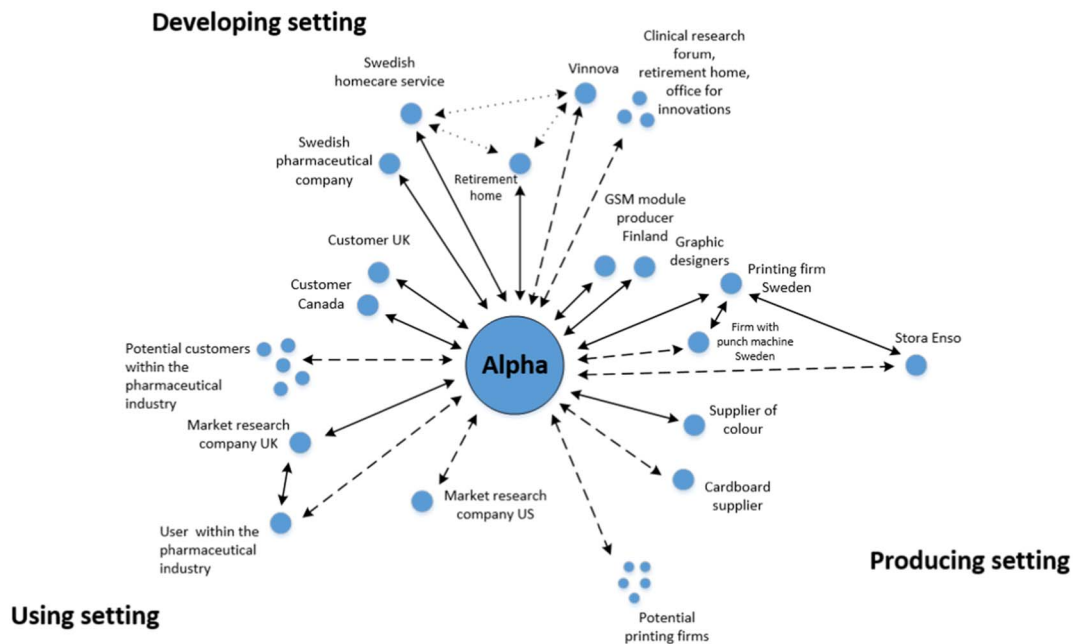


Fig. 1. Alpha's networking in three business network settings.

treatment of patients by logging the patients' intake of medicine.

It is crucial to obtain information about potential users' needs already in the beginning of the product development, especially for a start-up like Alpha that does not have long experience in the field. Furthermore, talking to other retirement homes or business contacts as well as taking part in clinical research forums provides valuable input on how to proceed to the next stage.

The R&D collaboration with the Swedish homecare service and the retirement home would not have been possible without the help of Vinnova. The interaction with Vinnova can be perceived as what Thornton et al. (2013) refer to as *opportunity enabling* and the behaviour of signalling self-perceived network identity. By strategically interacting with Vinnova, a highly reputable funding agency in Sweden, Alpha started to create its own reputation and thereby legitimacy of being a reliable and attractive business partner. Furthermore, by attending other networking events such as clinical research forums, Alpha is able to sense new opportunities.

In the developing setting, the networking pattern is characterized by *weak-tie resource mobilization*, where weak ties helped establish ties that developed into strong ties. By interacting with Vinnova, Alpha had the opportunity to access its web of relationships and gain important access to potential users. Tests of the product are conducted and evaluated through the interaction with the retirement home. In the future, the idea is to sell the product to the Swedish homecare service, which in turn will use it in its working procedures. By involving the users (the elderly people) at the retirement home at an early stage of the product development, Alpha acquired valuable information on how to adapt its product to suit the users' needs.

In the strong tie with the retirement home, Alpha's product is integrated with the retirement homes' employees and patients. When the elderly people take sugar pills from the package at certain times of the day and logging the intakes, it is possible for Alpha to follow up on the usage of the package. *Strong-tie resource mobilization* is present with the two counterparts having a mutual interest in adapting their resources to enable resource combining. Such adjustments could be, for example, changing the shape of the package to make it easier for the test persons to integrate the GSM module into the package. Furthermore, the retirement home is trying to mobilize its staff to take part in the next test round.

Hence, the product is intended for use in daily routines in the future

but requires everyone involved at the retirement homes to be on board. This is not an easy task when not everyone sees the value of taking part in the tests and hence finds it time-consuming. However, the product has been adapted to this setting, and resources have thus been combined during the first test round in terms of the product and the potential users' knowledge of the process of taking the medicine in this specific context. Integrating its own resource collection over time into that of the retirement home and continuously using the feedback it provides will help adapt the characteristics of the product.

Today, Alpha is also involved in more sporadic collaborations and discussions, seen as weak ties, in the shape of market research projects. There are weak ties with clinical research forums, retirement homes and offices for innovations to test the product. Hence, Alpha currently manages several weak ties in the developing setting in parallel to the above-described strong-tie collaborations.

5.2. Observed networking behaviour in the producing setting

When it comes to the producing setting, both strong and weak ties are used to produce the smart package based on the different elements of the product. Alpha works with a single GSM module producer in Finland to deepen the interaction, hence simplifying the active participation in the development of the module. This is part of the product solution that needs continuous testing, and it is therefore necessary to build a strong tie to this supplier, including high frequency of contact and exchange of information. On the other hand, the package is produced together with a number of different suppliers. Firstly, an order is sent to a cardboard supplier, a firm which produces cardboard according to guidelines and could therefore be perceived as a weak tie. The cardboard is thereafter sent to a printing firm, which prints the cardboard, with the prints developed by the graphic designers. Even though every new batch could be seen as a test for Alpha and an opportunity to see if the colours and circuits are suitable for printing, Alpha does not see the relationship with this specific printing firm as endless. After the printing process, the printed cardboard is sent to a firm with a punch machine that is located close to the printing firm. The printing firm suggested this punch supplier to Alpha, which could imply that there is a strong tie between the printing firm and the punch machine supplier.

Not only is it important with correct *information* on what to produce,

as can be seen in the using setting, but also on how to produce what the customers require. Here, the current suppliers play an important role. Whether or not they are the ones producing the GSM module or supplying colours to the printing process, they provide valuable information to guide Alpha's decisions. Furthermore, by using its weak ties and evaluating potential printing firms alongside this collaboration, Alpha makes sure it makes use of information that could lead to a more efficient printing process by changing supplier. In the producing setting, Alpha uses its business partners' knowledge rather than approaching business contacts such as other organizations outside its business sphere to obtain relevant information.

The networking behaviour *opportunity enabling* is not as visible as in the developing setting. Namely, sensing opportunities through networking events is present to some extent in the producing setting by keeping doors open to other printing firms. However, signalling a self-perceived network identity is not as necessary in the producing setting as in for example the developing setting and using setting (see below). One reason for this could be that there are a number of suitable suppliers that are willing to sell their services within printing. The perception is that Alpha generally chooses suppliers through convenience sampling and experience, not to build its own reputation. Furthermore, there are not as many activities going on in the producing setting when it comes to using indirect contacts and their web of relationships. The producing setting is more of a calm pond and stable in this sense with the focus on keeping and developing the relationships with the GSM module producer, the graphic designers and the suppliers of colour and cardboard. It is also quite easy and straightforward to change suppliers connected to the package part.

When looking at the weak ties present in the producing setting, none actually implies mobilizing resources in the sense that it deals with bridging, bypassing-flanking or bypassing-avoidance. Instead it is characterized by straight forward ties in terms of sporadic contact with cardboard suppliers and the punch machine firm. This is in line with the above comment on less activity regarding opportunity enabling in the producing setting. In this phase of development, Alpha is keener on working with its strong (and weak) ties in the producing setting and letting them be immersed. The weak ties will be part of Alpha's supplier network as long as they provide value. Consequently, Alpha is not alien to changing suppliers if necessary.

When it comes to *strong-tie resource mobilization*, the networking behaviour is straightforward. Regarding the GSM module, Alpha has a strong tie with the IT company in Finland. This relationship has been developed over a long time, as it was initiated already at the School of Entrepreneurship. In this case, Alpha sets the standards and lets the IT company develop the whole GSM module through coding. It could be seen as necessary to use a strong tie when developing the IT solution as Alpha does not have the capabilities to do it by itself. Moreover, resources are combined in terms of the GSM module needing to fit with the other parts of the product solution, which means that Alpha needs to be able to integrate its own knowledge with that of the IT company. As the Application Programming Interface is developed by Alpha there is a need to continuously test the compatibility. By having the opportunity to work closely with the IT company, resources are combined in testing and improving the GSM module according to Alpha's requirements.

Additionally, there is strong-tie resource mobilization between Alpha and the printing firm. Here, resources are also adjusted and combined to create a finished product solution, i.e. the printing firm sees opportunities in being involved in new projects and is willing to adapt its printing machine to Alpha's requirements. By combining Alpha's cardboard with the printing machine and also adapting the machine by buying a new line, it is possible to produce 10,000 printed packages per batch.

5.3. Observed networking behaviour in the using setting

Alpha has several paying customers. Today, two paying customers also take part as partners in developing the product. These strong ties not only allow Alpha to make use of knowledge about the customers' requirements but also to open up the opportunity to develop close relationships with its customers, which in turn may ensure future orders for its product and hence earnings. In the using setting, *information acquisition* is a vital activity for Alpha to make informed decisions. Alpha's product solution is continuously tested and adapted to the customer's needs via business partners, such as the customer in the UK, who also is a developing partner. Moreover, Alpha has the ability to obtain information that can improve the products for other customers. By working with highly regarded partners and towards matching their needs with its product solution, Alpha is also able to build a reputation and hence signal its competence to other potential customers.

Having the ability to use already established relationships as a source of information is important for newly established firms such as Alpha. Having close relationships with potential users can secure an initial income and hence open up for investments in new application areas. This is something Alpha has started to work on by also acquiring information from business contacts (potential customers in the pharmaceutical industry) as well as by visiting trade events. The latter is useful as it provides valuable information on industry trends and potential buyers.

The interaction to acquire information goes hand in hand with that of *opportunity enabling*, which Thornton et al. (2013) explain as a more goal-oriented behaviour than information acquisition. By taking part in networking events and other types of gatherings, Alpha tries to interact with potential buyers and hence build a reputation within its industry as well as seize information that could lead to new opportunities to sell the product. Building a good reputation by working with attractive partners is also an activity Alpha pursues. Having a well-known company that uses Alpha's product is a good reference when reaching out to potential customers. Building a strategic network identity appears to be important to Alpha as it opens up new opportunities to interact with potential users. One example is the customers in the UK and Canada, two well-known companies, which now use Alpha's product. As a result, Alpha can use those customers as references when reaching out to other potential users within the pharmaceutical industry.

The strong ties with the customers in the UK and Canada are not only a source of income but also part of the development of Alpha's product. By integrating the product into market research projects conducted by the supplier of pharmacies in the UK, it is possible to see how suitable it will be to use the product in clinical trials and if necessary also make adaptations. Moreover, the packaging company in Canada buys and tests Alpha's package solution and provides potential designs and improvements to the package. In return, Alpha evaluates and comments on the suggestions. Hence, through *strong-tie resource mobilization*, Alpha continuously assesses the customer's resources and adjusts its own to suit the customer's processes. Since Alpha is a newly established firm it is vital to invest in the established relationships with the customers in the UK and Canada.

Resources are combined through interaction with the market research company in the UK, which attains the requirements of the pharmaceutical company, reaches out to suitable packaging suppliers and tests how the product functions and how it is perceived among its users. If the pharmaceutical company is pleased with the results it may end up in a future customer relationship for Alpha. The strong tie to the market research company in the UK was a result of *weak-tie resource mobilization* conducted by Alpha. Hence, Alpha's indirect connections (weak tie) to other actors enabled a relationship with a new customer, i.e. through bridging a weak-tie relationship Alpha gained access to this actor's web of relationships. This new customer in the UK conducts tests on behalf of a pharmaceutical company with which Alpha does have direct contact but not a developed relationship, and in this sense there

is low frequency of interaction and limited quality of information. As the pharmaceutical company wanted to enter the US market, the company used a market research company in the US. Hence, this market research company was a customer of Alpha in the beginning. However, when the pharmaceutical company changed to the UK market, Alpha could make use of the weak tie to the pharmaceutical company, which linked Alpha to the market research company in the UK.

Nevertheless, there is still a connection to the market research company in the US, which may be useful in the future if Alpha decides to make new attempts on the US market. Moreover, Alpha is working on its weak ties to eventually develop them into strong ties. Evaluating potential customers in the pharmaceutical industry in Sweden, the US, the UK, France and Germany will not only develop new relationships but may also provide information about market needs that can benefit Alpha's R&D process.

5.4. Summarizing comments on Alpha's networking behaviour and resource combining

The following networking behaviours in the respective business network settings emerge from the case (see Table 3). As can be seen, Alpha works with all sets of networking behaviours but in different forms in all three business network settings to achieve its goal of selling an intelligent package for the health care industry.

In this case, with regard to the *information acquisition* type of networking behaviour, we see that some sub-types of information acquisition seem to be present in all settings. In the using and developing settings, Alpha acquires information through business partners, business contacts as well as trade events. In the producing setting, weak ties (or business contacts) provide information on whether to make the decision to stay with the current printing firm or change to another.

The *opportunity enabling* type, as sensing opportunities, is also to some extent present in all settings. This is especially salient in the developing and using settings where Alpha works actively to create new opportunities by initiating contacts. Sensing through networking events such as signalling self-perceived network identity is crucial for Alpha. One example is the strategic interaction with Vinnova, which opened up the opportunity to interact with the Swedish homecare service and, as a result, a strong tie to a retirement home could be developed.

In the producing setting, a less active approach to sensing opportunities appears. The reason for this could be the early stage of establishment for Alpha, which needs to focus on the customer side of the firm, i.e. paying customers will naturally open up opportunities to work

Table 3
Networking behaviours in the developing, producing and using settings of Alpha.

	Developing setting	Producing setting	Using setting
Information acquisition			
- Via business partners	X	X	X
- Via business contacts	X	X	X
- Via trade events	X	–	X
Opportunity enabling			
- Sensing through networking events	X	X	X
- Signalling self-perceived network identity	X	–	X
Weak-tie resource mobilization			
- Mobilizing through bridging weak-tie relationships	X	–	X
- A straightforward tie	X	X	X
Strong-tie resource mobilization			
- Mobilizing through adjusting resources	X	X	X
- Mobilizing through pooling resources	–	X	–

with suppliers. Sensing or influencing the legislation through lobbying has not been observed in any setting.

Both *strong-* and *weak-tie resource mobilization* are seen in Alpha's network. With regard to the latter, mobilizing through bridging weak-tie relationships is present in both the developing and using setting. For example, the start-up used the weak tie to the pharmaceutical company to initiate a new customer relationship. The weak-tie resource mobilization is a way of gaining access to important knowledge from both potential and indirect partners. However, in the producing setting, none of the sub-types developed by Thornton et al. (2013) could be seen. Instead, there is a direct tie in terms of a straightforward weak tie to a number of suppliers and potential suppliers. The reason for this may be the nature of the product or, as mentioned above, the need to put most time into finding developing partners and paying customers. Strong-tie resource mobilization is more common in the three settings to address the firm's current challenges. Therein, resource pooling can be seen as a vital activity, as Alpha is dependent on suppliers to acquire knowledge on how to improve the product to meet the customers' demands. As Thornton et al. (2013) explain the supplier does not only provide raw material but its involvement in offering development could imply unique synergies. This is visible in the relationship with the GSM module provider where frequent meetings, evaluations and changes to the module allow Alpha to improve and niche its product. Working with either strong- and weak-tie resource mobilization in a particular relationship is strongly related to the complexity of the product or material being delivered. Namely, a complex product, such as the GSM module or the printed circuits, requires a continuous dialogue and adaptations within the specific relationship with the supplier. Consequently, strong ties are needed. On the other hand, ordering standard products such as card boards does not require the same intense interaction. Weak ties may be suitable since it is more of a standard procedure where no adaptations are necessary.

The networking behaviours pave the way for resource combining in different ways. In the using setting, Alpha manages to combine its resources in the strong ties with its customers by letting them test and give feedback on the product. This procedure is also visible in the strong tie with the market research company in the UK, where the weak tie to the pharmaceutical company opened up the opportunity for testing. In both situations, technical resources are combined in new ways (Håkansson & Waluszewski, 2002), resulting in new features of Alpha's product regarding user-friendliness. In the developing setting, the R&D collaboration with the Swedish homecare service and the retirement home were possible through the interaction with Vinnova. Namely, through opportunity enabling and weak-tie resource mobilization, Alpha was able to combine its technical resources with the organizational resources in terms of a newly established relationship as well as feedback from the retirement home based on their existing resource structures (Gadde & Håkansson, 2008; Lind, 2006). In the producing setting, the strong tie with the IT company enables resource combining to develop the GSM module. The organizational resources linked to the two parties' knowledge are combined, which enables compatibility between the technical resource interfaces (Gadde & Håkansson, 2008; Håkansson & Waluszewski, 2002), in this case between the GSM module and the package. In the relationship with one of the suppliers, the printing firm, the strong tie entails resource combining, as the printing firm has been willing to adapt its machines to Alpha's package. In this case, the weak tie to Stora Enso enabled a first contact between Alpha and the printing firm.

In sum, resource combining occurs in strong ties with the networking behaviour strong-tie resource mobilization as a base. However, it is important to remember that to reach resource combining, different networking behaviours in the three settings are necessary.

6. Conclusions and implications

While many studies have pinpointed the importance of networks

and networking to start-up companies and entrepreneurship more broadly (Hoang & Antoncic, 2003; Jack, 2005; Slotte-Kock & Coviello, 2010), this paper adds to the understanding of these phenomena by explicitly combining an IMP interpretation of resources and resource combining in business network settings (Håkansson & Waluszewski, 2002, 2007) with the networking behaviours by Thornton et al. (2013), containing both strong and weak ties rooted in economic sociology. This combination has enabled us to reach conclusions and implications regarding start-ups embedding in business networks.

6.1. Conclusions of the paper

Embedding in a business network from the point of view of a start-up is a challenging process. Many start-ups do not survive or manage this process even though various initiatives are taken at, for instance, universities to support these firms (Baraldi & Havenvid, 2016; Lundqvist, 2014). While previous studies have shown the importance of social ties, and the role of venture capitalists and incubators to start-ups (Elfring & Hulsink, 2007; Hallen, 2008; Wright, Lockett, Clarysse, & Binks, 2006), this study adds nuances and details on how specific resources through networking are combined in the use, production and development settings of a start-up. The combining of resources across the boundaries of the start-ups forms the process of embedding in business networks. This conceptualization of start-ups' embedding in business network settings pinpoints the active form of embedding and resource combining and, accordingly, starts to link resource combining with the actor dimension of industrial networks (Håkansson, 1987), as called for by Baraldi et al. (2012). The conceptualization of embedding of start-ups in business networks through networking as a matter of resource combining in the three business network settings forms the first and main conclusion of the paper.

This conceptualization is also a contribution to the recent studies of start-ups in business networks based on the IMP literature (Aaboen et al., 2011, 2016, 2017; Ciabuschi et al., 2012; La Rocca et al., 2013). Using the networking behaviours as part of the framework has enabled us to capture the role of various relationships in the early phases of a start-up's development. In addition, it provides evidence of resource combining in “strong tie resource mobilization” (Thornton et al., 2013) in the three business network settings as a detailed way to understand start-ups' embedding in business networks.

The second conclusion regards the observed differences between networking behaviours in the business network settings. The networking behaviour of the producing setting stands out as different from the other two, as it is not characterized by opportunity enabling and specifically signalling self-perceived network identity to the same extent as the using and developing settings, and this setting may thus be considered more stable. The analysis of a particular start-up's networking also enabled the identification of a direct connection, referred to as a straightforward tie, in the producing setting, which can be seen as a refinement of the networking behaviour of the “weak tie resource mobilization” of Thornton et al. (2013).

The third conclusion regards the nature of the business network settings in terms of how they interrelate and their proximity. This relates to Ingemansson and Waluszewski (2009) stating that the greater the differences between the business network settings, the more difficult it is to make a new resource fit into a setting. There is a well-known and important interface between the using and developing settings, for example strong ties with customers involved in product development as also seen in the case of Alpha. The developing and producing settings interface is also known, for example when problems brought up during the tests have an implication for production. The interface between the using and producing settings is less obvious for start-ups. The reasons for this could be related to the early stage of development of start-ups. As in the case of Alpha, no paying customers directly impacted the production of the package. This interface may be more visible in the later stages when users' requirements may influence the number of

produced batches, or if the packages are built to order. Interestingly, specific ties seem to function as “bridges” (Scholten, Omta, Kemp, & Elfring, 2015) between the settings, and these ties can then help create proximity between the business network settings. Proximity has previously been related to geographical dimensions (Freel, 2003) and later also included technological dimensions and vision aspects between two actors in a business relationship (Cantù, 2010), which may be a way of contributing to understanding the differences between settings as identified by Ingemansson and Waluszewski (2009).

Eventually, specific relationships, strong or weak, become crucial to bridging between settings and creating proximity. Some of them form the basis for combining resources in the respective setting. What is interesting is that not all strong ties form the basis for resource combining, and there are instances of weak ties contributing to resource combining. This observation is in line with other studies building on the IMP literature (Gadde & Snehota, 2000; Thornton et al., 2013) stating that all relationships cannot be strong but the important issue, from a firm's perspective, is to find the appropriate balance between strong and weak relationships. Clearly, the picture that emerges of embedding as a matter of resource combining is a complex one, which leads to raising the issue of whether resource combining should be regarded as a networking behaviour in its own right. According to Thornton et al. (2013), on the one hand, strong-tie resource mobilization is close to what we refer to and conceptualize as resource combining, including mutual adaptations within the relationship. On the other hand, resource combining is different from mobilization in that it is always a mutual process that requires interaction and adaptations from both parties. It may be possible to see resource combining as a networking behaviour in its own right with regard to the function that is performed at the network level.

6.2. Implications of the study

In this paper, we have illustrated embedding in the three business network settings with a case study methodology (cf. Easton, 2010). We have not made any attempts to draw conclusions regarding performance measures, but it is possible to argue that the focal firm, Alpha, compared with other start-ups, had a rather straightforward process to becoming embedded in all three settings. When analysing the networking behaviours in the three business network settings, differences were observed between the settings. It would be interesting for further research to conduct a longitudinal study to explore connectedness between specific relationships (Håkansson & Snehota, 1995) and if observed stability may dissolve over time or even transfer to the other settings. It would also be interesting to look further into the networking behaviours of start-ups to explore the interfaces and proximity in different dimensions (Cantù, 2010) between the settings.

The implications of this study for start-up managers are that to become embedded in business networks, various relationships are needed with customers, suppliers and other partners. In this case both strong and weak ties are necessary and finding the right balance between them. Strong relationships take time to develop and need to be mutual. Furthermore, these will always depend on both parties, their resources and willingness to invest in the relationship. Another implication is that it is necessary to work with weak ties, given that the resources of start-ups are limited, choosing which people to work with and events and trade fairs to participate is important decisions for managers. Likewise, selecting which e-mails to write and phone calls to make and/or return is also of significance. These weak ties will function as a platform from which some weak ties can develop into strong ties and some into new weak ties. The interplay between strong and weak ties forms the foundation for resource combining, which in turn forms the basis for a start-up to become embedded in business networks.

References

- Aaboen, L. (2009). Explaining incubators using firm analogy. *Technovation*, 29(10), 657–670.
- Aaboen, L., Dubois, A., & Lind, F. (2011). Start-ups starting up-firms looking for a network. *The IMP Journal*, 5(1), 42–58.
- Aaboen, L., Dubois, A., & Lind, F. (2012). Capturing processes in longitudinal multiple case studies. *Industrial Marketing Management*, 41(2), 235–246.
- Aaboen, L., Dubois, A., & Lind, F. (2013). Strategizing as networking for new ventures. *Industrial Marketing Management*, 42(7), 1033–1041.
- Aaboen, L., La Rocca, A., Lind, F., Perna, A., & Shih, T. (Eds.). (2017). *Starting up in business networks*. London: Palgrave Macmillan.
- Aaboen, L., Laage-Hellman, J., Lind, F., Öberg, C., & Shih, T. (2016). *Exploring the roles of university spin-offs in business networks*. Industrial Marketing Management.
- Alchian, A. A., & Demsetz, H. (1972). Production, information costs, and economic organization. *The American Economic Review*, 62(5), 777–795.
- Baraldi, E., Gressetvold, E., & Harrison, D. (2012). Resource interaction in inter-organizational networks: Foundations, comparison, and a research agenda. *Journal of Business Research*, 65(2), 266–276.
- Baraldi, E., & Havensvid, M. I. (2016). Identifying new dimensions of business incubation: A multi-level analysis of Karolinska Institute's incubation system. *Technovation*, 50, 53–68.
- Bercovitz, J., & Feldman, M. (2006). Entrepreneurial universities and technology transfer: A conceptual framework for understanding knowledge-based economic development. *The Journal of Technology Transfer*, 31(1), 175–188.
- Bhidé, A. (1999). *The origin and evolution of new businesses*. New York: Oxford University Press.
- Blank, S. (2013). Why the lean start-up changes everything. *Harvard Business Review*, 91(5), 63–72.
- Borges, C., & Jacques Filion, L. (2013). Spin-off process and the development of academic entrepreneur's social capital. *Journal of Technology Management & Innovation*, 8(1), 21–34.
- Cantù, C. (2010). Exploring the role of spatial relationships to transform knowledge in a business idea—Beyond a geographic proximity. *Industrial Marketing Management*, 39(6), 887–897.
- Ciabuschi, F., Perna, A., & Snehota, I. (2012). Assembling resources when forming a new business. *Journal of Business Research*, 65(2), 220–229.
- Cooper, A. C. (1985). The role of incubator organizations in the founding of growth-oriented firms. *Journal of Business Venturing*, 1(1), 75–86.
- Dubois, A., & Gadde, L.-E. (2002). Systematic combining: An abductive approach to case research. *Journal of Business Research*, 55(7), 553–560.
- Dubois, A., & Gadde, L.-E. (2014). "Systematic combining"—A decade later. *Journal of Business Research*, 67(6), 1277–1284.
- Easton, G. (2010). Critical realism in case study research. *Industrial Marketing Management*, 39(1), 118–128.
- Elfring, T., & Hulsink, W. (2007). Networking by entrepreneurs: Patterns of tie—Formation in emerging organizations. *Organization Studies*, 28(12), 1849–1872.
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219–245.
- Freel, M. S. (2003). Sectoral patterns of small firm innovation, networking and proximity. *Research Policy*, 32(5), 751–770.
- Gadde, L.-E., & Håkansson, H. (2008). Business relationships and resource combining. *The IMP Journal*, 2(1), 31–45.
- Gadde, L.-E., Håkansson, H., & Persson, G. (2010). *Supply network strategies*. Chichester: John Wiley & Sons.
- Gadde, L.-E., & Snehota, I. (2000). Making the most of supplier relationships. *Industrial Marketing Management*, 29(4), 305–316.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6), 1360–1380.
- Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91(3), 481–510.
- Håkansson, H. (1987). *Industrial technological development: A network approach*. Beckenham: Croom Helm.
- Håkansson, H., Ford, D., Gadde, L.-E., Snehota, I., & Waluszewski, A. (2009). *Business in networks*. West Sussex: John Wiley & Sons Ltd.
- Håkansson, H., & Snehota, I. (1995). *Developing relationships in business networks*. London: Routledge.
- Håkansson, H., & Waluszewski, A. (2002). *Managing technological development*. London: Routledge.
- Håkansson, H., & Waluszewski, A. (2007). *Knowledge and innovation in business and industry*. Abingdon: Routledge.
- Hallen, B. L. (2008). The causes and consequences of the initial network positions of new organizations: From whom do entrepreneurs receive investments? *Administrative Science Quarterly*, 53(4), 685–718.
- Handfield, R. B., Ragatz, G. L., Peterson, K., & Monczka, R. M. (1999). Involving suppliers in new product development? *California Management Review*, 42(1), 59–82.
- Hite, J. M., & Hesterly, W. S. (2001). Research notes and commentaries. The evolution of firm networks: From emergence to early growth of the firm. *Strategic Management Journal*, 22(3), 275–286.
- Hoang, H., & Antoncic, B. (2003). Network-based research in entrepreneurship: A critical review. *Journal of Business Venturing*, 18(2), 165–187.
- Ingemansson, M. (2010). *Success as science but burden for business?: On the difficult relationship between scientific advancement and innovation* (Doctoral Thesis)Uppsala: Uppsala University.
- Ingemansson, M., & Waluszewski, A. (2009). Success in science and burden in business. On the difficult relationship between science as a developing setting and business as a producer-user setting. *The IMP Journal*, 3(2), 20–56.
- Jack, S. L. (2005). The role, use and activation of strong and weak network ties: A qualitative analysis*. *Journal of Management Studies*, 42(6), 1233–1259.
- Jo, H., & Lee, J. (1996). The relationship between an entrepreneur's background and performance in a new venture. *Technovation*, 16(4), 161–211.
- Johansson, M., Jacob, M., & Hellström, T. (2005). The strength of strong ties: University spin-offs and the significance of historical relations. *The Journal of Technology Transfer*, 30(3), 271–286.
- Kvale, S. (2001). *Den kvalitativa forskningsintervjun*. Lund: Studentlitteratur Lund.
- La Rocca, A., Ford, D., & Snehota, I. (2013). Initial relationship development in new business ventures. *Industrial Marketing Management*, 42(7), 1025–1032.
- La Rocca, A., & Perna, A. (2014). New venture acquiring position in an existing network. *IMP Journal*, 8(2).
- Laage-Hellman, J. (2012). Exploring and exploiting networks for knowledge-intensive entrepreneurship. *AEGIS: Advancing knowledge-intensive entrepreneurship and innovation for Economic growth and social well-being in Europe*.
- Laage-Hellman, J., Landqvist, M., & Lind, F. (2017). R&D collaboration and start-ups. In L. Aaboen, A. La Rocca, F. Lind, A. Perna, & T. Shih (Eds.). *Starting up in business networks: Why relationships matter in entrepreneurship*. London: Palgrave MacMillan.
- Laage-Hellman, J., Lind, F., & Perna, A. (2014). Customer involvement in product development: An industrial network perspective. *Journal of Business-to-Business Marketing*, 21(4), 257–276.
- Landqvist, M. (2017). *Start-ups in business networks: Resource development through interaction* (Licentiate thesis)Gothenburg: Chalmers University of Technology.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Vol. 75. Beverly Hills, CA: Sage Publications.
- Lind, F. (2006). *Resource combining across inter-organisational project boundaries* (Doctoral thesis)Gothenburg: Chalmers University of Technology.
- Lundqvist, M. A. (2014). The importance of surrogate entrepreneurship for incubated Swedish technology ventures. *Technovation*, 34(2), 93–100.
- Mian, S. (1997). Assessing and managing the university technology business incubator: An integrative framework. *Journal of Business Venturing*, 12(4), 251–285.
- Mian, S., Lamine, W., & Fayolle, A. (2016). Technology business incubation: An overview of the state of knowledge. *Technovation*, 50, 1–12.
- Penrose, E. T. (1995). *The theory of the growth of the firm*. New York: Oxford University Press.
- Prahalad, C. K., & Ramaswamy, V. (2000). Co-opting customer competence. *Harvard Business Review*, 78(1), 79–90.
- Radosevich, R. (1995). A model for entrepreneurial spin-offs from public technology sources. *International Journal of Technology Management*, 10(7), 879–893.
- Ragatz, G. L., Handfield, R. B., & Scannell, T. V. (1997). Success factors for integrating suppliers into new product development. *Journal of Product Innovation Management*, 14(3), 190–202.
- Scholten, V., Omta, O., Kemp, R., & Elfring, T. (2015). Bridging ties and the role of research and start-up experience on the early growth of Dutch academic spin-offs. *Technovation*, 45, 40–51.
- Shane, S. A. (2004). *Academic entrepreneurship: University spinoffs and wealth creation*. Cheltenham: Edward Elgar Publishing.
- Slotte-Kock, S., & Coviello, N. (2010). Entrepreneurship research on network processes: A review and ways forward. *Entrepreneurship Theory and Practice*, 34(1), 31–57.
- Song, M., & Di Benedetto, C. A. (2008). Supplier's involvement and success of radical new product development in new ventures. *Journal of Operations Management*, 26(1), 1–22.
- Thornton, S. C., Henneberg, S. C., & Naudé, P. (2013). Understanding types of organizational networking behaviors in the UK manufacturing sector. *Industrial Marketing Management*, 42(7), 1154–1166.
- Thornton, S. C., Henneberg, S. C., & Naudé, P. (2015). An empirical investigation of network-oriented behaviors in business-to-business markets. *Industrial Marketing Management*, 49, 167–180.
- Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42(1), 35–67.
- Waluszewski, A. (2011). Rethinking innovation policy. *The IMP Journal*, 5(3), 140–156.
- Wright, M., Lockett, A., Clarysse, B., & Binks, M. (2006). University spin-out companies and venture capital. *Research Policy*, 35(4), 481–501.

Maria Landqvist is a doctoral student at the Department of Technology Management and Economics, Chalmers University of Technology. She mainly focuses her research on start-ups and their relationships with external actors in the business network. The aim of her research is to create a better understanding for how start-ups interact with other companies and in which way they contribute to innovation and change in already established network structures. She published her licentiate thesis in 2017 and has previously published in *Industrial Marketing Management* as well as a book chapter on the topic.

Frida Lind is an Associate Professor at the Department of Technology Management and Economics, Chalmers University of Technology. Her main research interests are in the areas of innovation, resource development and starting up in business networks. She has published papers in *Journal of Business Research*, *Industrial Marketing Management*, *Scandinavian Journal of Management*, *IMP Journal*, *Journal of Business & Industrial Marketing*, *Journal of Business-to-Business Marketing*, and *Technology Analysis & Strategic Management*. She has recently been the co-editor of a book published at Palgrave on *Starting Up in Business Networks*.