

The network mediation of an incubator: How does it enable or constrain the development of incubator firms' business networks?

Tommy Shih*
Lund University
Department of Business Administration
P.O. Box 7080
SE-220 07 Lund, Sweden
E-mail: tommy.shih@fek.lu.se

Lise Aaboen
Norwegian University of Science and Technology
Department of Industrial Economics and Technology Management
NO-7491 Trondheim, Norway
E-mail: lise.aaboen@ntnu.no

Abstract

Incubators are organisations or structures that usually offer five types of services in order to accelerate start-up development: access to physical resources, administrative services, access to financial resources, assistance with start-up procedures and access to networks. The aim of the present paper is to investigate the mediating role of the incubator. More specifically, it examines how the incubator's mediation is related to incubator firms' development of broader business networks. The primary data comprised 34 face-to-face interviews with 19 respondents from an incubator and its incubator firms and with other actors with which the incubator had a relationship. The paper offers three conclusions concerning how the network horizon influences the incubator's capacity to mediate relationships, the necessity for incubator firms to be proactive in order to utilise the mediation activities of the incubator and the influence of public-funding agencies in the development of incubator firms, which is based on their role as third actors in connected business relationships.

Keywords: incubator; start-up; mediation; business relationship

Author bio sketches

Tommy Shih is a senior lecturer in the Department of Business Administration, Lund University, Sweden. His research involves the study of business networks, government policy, start-ups and innovation. He has previously published in *IMP Journal*, *Industrial Marketing Management* and *Journal of Strategy and Management*.

Lise Aaboen is associate professor of technology-based entrepreneurship at Norwegian University of Science and Technology, Norway. Her research interests include incubators, new technology-based firms, entrepreneurship education and early customer relationships. She has published in a range of journals, including *Technovation*, *Industrial Marketing Management* and *Journal of Purchasing and Supply Management*.

Highlights

- The aim of the present paper is to investigate the mediating role of the incubator.
- The IMP approach is used in order to provide conclusions regarding the following issues:
 - 1) The network horizon influences the incubator's capacity to mediate relationships.
 - 2) A start-up needs to be proactive in order to utilise the mediation activities of the incubator.
 - 3) Public-funding agencies influence start-ups by serving as third actors in connected business relationships.

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Abstract

Incubators are organisations or structures that usually offer five types of services in order to accelerate start-up development: access to physical resources, administrative services, access to financial resources, assistance with start-up procedures and access to networks. The aim of the present paper is to investigate the mediating role of the incubator. More specifically, it examines how the incubator's mediation is related to incubator firms' development of broader business networks. The primary data comprised 34 face-to-face interviews with 19 respondents from an incubator and its incubator firms and with other actors with which the incubator had a relationship. The paper offers three conclusions concerning how the network horizon influences the incubator's capacity to mediate relationships, the necessity for incubator firms to be proactive in order to utilise the mediation activities of the incubator and the influence of public-funding agencies in the development of incubator firms, which is based on their role as third actors in connected business relationships.

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1. Introduction

The importance of start-up firms for innovation and economic growth is well established in the academic literature (Aaboen, La Rocca, Lind, Perna & Shih, 2017; Oakey, Groen, Cook & Van der Sijde, 2013). As such, they have received extensive support from policymakers, regional governments and universities (Storey & Tether, 1998). Technology-based start-up firms are of particular interest because academics, investors and policymakers regard them as having strong potential to contribute to innovation and economic growth (Autio, 1997). However, the high failure rate of these firms is an issue of concern (Aaboen, Laage-Hellman, Lind, Öberg & Shih, 2016). Hence, there are a number of intermediary organisations that seek to assist start-ups. Among these actors, incubators are considered to play a particularly important role (Bruneel, Ratinho, Clarysse & Groen, 2012). Incubators accommodate start-up firms and help them manage their growth. Start-ups locate in incubators primarily to find support for their entrepreneurial endeavours, build on resource endowments and gain legitimacy (McAdam & McAdam, 2008), whereby the mobilisation of resources can take place both directly and indirectly (Suk & Mooweon, 2006). Against this background, Carayannis and Von Zedtwitz (2005) define incubators as organisations or structures that usually offer five types of services: access to physical resources, administrative services, access to financial resources, assistance with start-up procedures and access to networks. Recently, the incubator's provision of interorganisational network relationships and its role as

a mediator (Cantú, 2017; Mian, Lamine & Fayolle, 2016) have received increased attention from scholars. This research has situated the function of the incubator in a broader context.

Previous studies of incubators have acknowledged that their start-up firms (hereafter ‘incubator firms’) may have different needs during different stages of development (McAdam & McAdam, 2008). Soetanto and Jack (2016) argue that it is important for the incubator to be able to design flexible support for the individual needs of firms. Further, Hannon and Chaplin (2003) suggest that incubator firms should be segmented so that service design and provision can be matched with the needs of diverse firm types at different transition points in their development. Still, how well incubators can do this is a matter of debate (cf. Phan, Siegel & Wright, 2005). Incubators facilitate the business development of incubator firms generally by providing generic services and network relationships. Therefore, it is also the responsibility of incubator firms to make use of the services and relationships offered in ways that benefit them (cf. Soetanto & Jack, 2013). The incubator firms may utilise the provided relationships and initiate additional ties. However, as Hoang and Antoncic (2003) note, start-up firms are dependent on the network for legitimacy and resources. Consequently, incubator firms’ actions tend to rely on the coordination of the incubator and its network provision (Sá & Lee, 2012). Nonetheless, not all resources and capabilities will be found within the incubator’s network. Roig-Tierno, Alcázar and Ribeiro-Navarrete (2015) therefore maintain that in order to develop and succeed, start-up firms need to combine help from different network structures. Particularly, the development of a business network is integral for further value creation (Aaboen et al., 2016; Tötterman & Sten, 2005). Hence, it is not their presence in the incubator per se that will help incubator firms become viable businesses, but the interactions in which they participate while there as well as their networking with actors that are not closely affiliated with the incubator or located inside it (Rubin, Aas & Stead, 2015). In this context, the mediation of the incubator can both enable and constrain an incubator firm’s development of a business network (Sá & Lee, 2012). As Baraldi, Fraticelli, Perna and Gregori (2017) note, the first relationships play a central role in a start-up’s development. Thus, over time, the incubator should mediate to incubator firms relationships that are conducive for business development. Here, the concept of network horizon is important, because it describes how the mediating actor is able to identify relevant network structures (Holmen & Pedersen, 2003; Holmen, Aune & Pedersen, 2013; Huemer, 2017).

Against this background, the aim of the present paper is to investigate the mediating role of the incubator. Although the extant literature has shown that the incubator's mediation of interorganisational relationships is an important supportive function, how it actually develops the business networks of incubator firms has been given less attention. Accordingly, a research area requiring further attention is the incubator's facilitation of internal and external networking for incubator firms and how the networks relate to each other (Cantú, 2015; Cantú, 2017; Sá & Lee, 2012). This paper examines how the incubator's mediation is related to incubator firms' development of broader business networks. The study's central research question is as follows:

- How is the mediating role of the incubator connected to its network horizon, and how does it enable or constrain the development of incubator firms' business networks?

The present paper contributes to the literature on incubators' assistance of start-up firms and to the description of incubators as networked commercialisation enablers (see Mian et al., 2016, for an overview). It does so by using the industrial marketing and purchasing (IMP) perspective (Ford et al., 2003) in order to address how the incubator's mediation both enables and constrains incubator firms' network development. The analysis is conducted by illustrating how the incubator's mediation affects incubator firms' development of a broader business network. To that end, the paper uses an embedded case study of a publicly funded Swedish incubator and two incubator firms. The paper is structured as follows. The next section presents the conceptual background regarding the network view of incubators and the theoretical framework, which outlines key notions related to mediation in networks. This is followed by a description of the methodology. The subsequent sections present the empirical illustrations based on an incubator and two incubator firms. The paper ends with the conclusions, including a discussion of the study's contributions, managerial implications and suggestions for further research.

2. Conceptual background

2.1 Towards a network view of incubators

The first incubators were established in the late 1950s, but the popularisation of such organisations came in the 1980s, with the intensifying focus on innovation through the

increase of technology-based firms and the growth of academic entrepreneurship (Hackett & Dilts, 2004; Mian et al., 2016). The formation of incubators and similar initiatives has increased rapidly since the beginning of the present century (Link & Siegel, 2005), with academic research on the incubator phenomenon frequently described in entrepreneurship, innovation management and policy-related literature (cf. Bollingtoft & Ulhoi, 2005; Bruneel et al., 2012; Hannon & Chaplin, 2003). However, as Soetanto and Jack (2016) propose, knowledge of incubators and incubation practice remains fragmented. For example, a shift in incubators towards intangible and high-value services has been observed (Cantú, 2015; Hoang & Antoncic, 2003; Grimaldi & Grandi, 2005). Moreover, previous studies have tended to discuss three generations of incubators: the first focusing on job creation and finding tenants for office buildings (cf. Bruneel et al., 2012); the second moving towards additional provisions such as networking and offering business support services (Aerts, Matthyssens & Vandembemt, 2007); and the third exhibiting the deepening of these additional services, such that incubators participate more actively through business coaching and funding provisions (Bruneel et al., 2012). The development of service provisions among incubators is, however, ongoing. According to Lai and Lin (2015), this is especially evident with respect to services that prepare incubator firms for the barriers in later stages of development, after graduation from the incubator. These services include, for instance, intellectual property service capabilities, brand construction, executive strategy and business planning.

Moreover, in recent years researchers have focused more intensively on the actors surrounding the incubator (cf. McAdam, Miller & McAdam, 2016; Pettersen, Aarstad, Oystein & Tobiassen, 2016; Soetanto & Jack, 2013). Baraldi and Ingemansson Havenvid (2016) posit that incubation is a more multifaceted and complex phenomenon than has been acknowledged in studies focusing only on the incubator organisation. For example, Stokan, Thompson and Mahu (2015) find that incubated firms receive five times as many business services, such as legal, financial and marketing, than do similar nonincubated firms. In this vein, Mian et al. (2016, p. 2) find that incubators in science parks have ‘evolved from a stand-alone technology garden to a networked commercialization enabler’. In addition to an increased focus on services rather than offices and new types of incubators (for example, accelerators), the authors also note the increased attention paid to a nested view of business incubators. Here, value creation across a broader arena, including the relationships between incubators, start-up firms and other stakeholders, is of central interest (Baraldi & Ingemansson Havenvid, 2016). In line with this understanding, McAdam et al. (2016) argue

that the role of incubators in the regional and local innovation ecosystem requires further investigation; that is, analyses should include the entire context of incubation in order to capture the different links to the ecosystem.

Leveraging the network view of incubators, scholars have described the main function of incubators as brokers, hubs and connectors between various actors inside and outside the incubator (Bruneel et al., 2012; Hansen, Chesbrough, Nohria & Sull, 2000). According to Hughes, Ireland and Morgan (2007, p. 156), the incubator management team ‘constructs and frames the network and makes it available to the incubating firms’. The incubator should preferably possess or continuously build its network of relationships with actors that can contribute to the development of incubator firms (Schwartz & Hornych, 2010). Consequently, incubators have relationships with multiple actors that will have differing perspectives and thus exert an influence on incubators’ missions and operational procedures (McAdam et al., 2006). In this context, the extant literature on incubators has acknowledged the importance of their role in building relationship capital (e.g. Etzkowitz, 2008; Kitigawa & Robertson, 2012). Cantú (2015) notes that more efforts have been made to describe interorganisational interactions in incubators as well as the networking of incubator firms beyond the mediated relationships. Sá and Lee (2012) suggest that different kinds of networks are created in the incubator environment and that not all network structures will be helpful for business development. Thus, incubator firms need to develop networking capabilities in order to sort among networking opportunities.

2.2 Incubator firms’ interactions within and beyond the incubator

Interorganisational interactions differ between various kinds of incubators. Grimaldi and Grandi (2005) make a general distinction between nonprofit and for-profit incubators. They describe how the latter gain income from the incubator’s firms and as such are often able to provide more support in terms of management, facilities, funding and network contacts than the former, which often focus on the provision of logistical services. Lin, Wood and Lu (2012) investigate the relative importance of different resources and capabilities in enhancing the service performance of incubators. Their study shows that the greater the availability of government or policy resources, the lower the likelihood that the incubator will develop the operations and networking capabilities needed to perform well. Similarly, the main conclusion of Tamásy (2007) is that incubators should be run as private profit-making organisations without public funding. However, these studies have failed to recognise that the

rationale for publicly funded incubators is to help firms that are in their very early stages, which for-profit incubators may deem too risky to invest in (Frenkel, Shefer & Miller, 2008). Public funding thus serves the purpose of taking on risks that private capital is not willing to assume. Moreover, Cumming and Fischer (2012) find that public-funding programs that aim to foster entrepreneurial activity do play positive roles in firm growth, yet an important factor is related to the capabilities of the advisors. Such an observation therefore emphasises the nature of the incubator's network rather than its non- or for-profit aim. As such, it is important to identify the common relationships that enable the incubator to fulfil its role and how these relationships in turn shape incubator firms' ability to grow.

The incubator may work as an intermediary between incubator firms and a network of external potential partners, such as customers and suppliers, providers of specialised services, research facilities or financial and funding institutions (Schwartz & Hornyk, 2010). It is also important to promote relationships between incubator firms (Hansen et al., 2000). The networks are supposed to provide resources that support business growth, as well as adding to credibility, facilitating knowledge exchange and generating collective learning (McAdam & McAdam, 2008; Sullivan & Ford, 2014). Hughes et al. (2007) argue that too many initial relationships will discourage the incubator firm from participating in further networking with the other firms in the incubator. It is additionally noted that this will diminish the advantage of being located in the incubator, because it is incubator firms' involvement in interactions and in seeking and sharing resources that determines the likelihood of additional value creation (cf. Soetanto & Jack, 2013; Witt, 2004). Moreover, incubator firms bring or develop their own external relationships. For example, the initial relationships of a start-up firm from, for instance, a university often come from the source organisation (Grandi & Grimaldi, 2003). This has also been found in Sweden, where, as Johansson, Jacob and Hellström (2005) argue, it is common among founders of university start-up firms to retain their position in academia. This condition enables founders to easily maintain their academic network and use resource facilities, because they are still members of the community.

Although incubator firms are often dependent on the incubator for legitimacy and resources, scholars have noted that incubator firms' own actions within and beyond the incubator network is more important for business development than being in the incubator (Rubin et al., 2015). As Cantú (2017) contends, incubator firms are in need of resources from a heterogeneous network in order to develop. From this perspective, the background and

experience of entrepreneurs are important. For example, Albort-Morant and Oghazi (2016) find that entrepreneurs who provide the most positive evaluations of the incubator in which they are located tend to be well-educated, to have professional experience and/or to come from a family of entrepreneurs. Thus, these entrepreneurs can, to supplement the support provided by the incubator, solicit help from their external professional network as well as their families. This suggests that incubator firms need to be able to navigate both within and beyond the network environment of incubator-mediated relationships.

2.3 Theoretical framework

As noted in the preceding section, the incubator is increasingly viewed as an intermediary between the incubator firm and external actors, such as potential customers, suppliers and other service providers (Bruneel et al., 2012; Schwartz & Hornych, 2010). The incubator is assumed to construct, frame and make the network available to incubator firms (Hughes et al., 2007). The focus on networking has shifted the view on incubators from service providers to networked commercialisation enablers (Mian et al., 2016). In the incubator environment, firms are assumed to be involved in interactions, and they seek and share resources. Through these activities, incubator firms are expected to gain value from being located in an incubator (Soetanto & Jack, 2013). Although the incubator literature has shown that the incubator's mediation is an important supportive function, less focus has been placed on how it actually develops the networks of incubator firms. Recent studies departing from the IMP perspective have started to address this subject (e.g. Cantú, 2015; Cantú, 2017; Baraldi & Ingemansson Havenvid, 2016).

The IMP perspective's focus on network interaction can assist in providing more details about the role of an incubator's mediation. The IMP approach departs from the analysis of actor bonds, activities and resource combinations across firm boundaries (Ford et al., 2003). Waluszewski, Baraldi, Shih and Linné (2009) identify relationships as a central resource. The starting point of the theoretical framework is therefore that relationships are an especially important type of resource for an incubator because they enable the incubator firm to complete the incubation process, that is, developing into a viable and freestanding firm. However, it may be difficult for an incubator firm to know what types of relationships it needs due to its lack of experience (cf. Baraldi et al., 2017). In other words, the incubator firm is assumed to have a less developed *network horizon* compared to the incubator. From this point of view, it is the role of the incubator to assist in broadening the networks and network

horizons of incubator firms. The network horizon establishes the boundary of a network that an actor is able to overview (Holmen & Pedersen, 2003) and therefore influences the room for strategic action (Holmen et al., 2013; Huemer, 2017). There are, however, only a few actors within the network horizon with which a firm has direct relationships. Nonetheless, through these actors the firm can access other parties. The direct relationships thus enable an actor to connect to other parties without being involved in that part of the network (Ford, Gadde, Håkansson & Snehota, 2003). How the network horizon of an organisation appears will depend on the actors in the direct relationships in terms of interest, abilities and third-party relationships (Holmen & Pedersen, 2003).

An incubator's ability to mediate relationships to incubator firms will be influenced by its network horizon. The network horizon provides information about what relationships the incubator is able to mediate as well as what relationships the incubator firm needs. The ultimate goal of mediation by the incubator is for the incubator firm to achieve 'insidership' in the network (Johanson & Vahlne, 2009). Insidership makes it easier to discover opportunities for development, but it may cause actors to be less inclined to collaborate with others (Håkansson & Snehota, 1995). In other words, when a relationship develops, opportunities emerge, but it simultaneously constrains the actors because the two parties become interdependent (Håkansson, 1987). Furthermore, collaborations and relationships will also structurally imprint (Milanov & Fernhaber, 2009) the network of the incubator and incubator firms. Thus, mediation by the incubator may affect firms' network horizons and networking strategies, which can both enable and constrain business development. It is nonetheless important to note that the usefulness of a network is not necessarily about size; instead, it is about having meaningful relationships (Håkansson & Snehota, 1995). Here, the development of a business network in particular is integral for further value creation (Aaboen et al., 2016; Tötterman & Sten, 2005).

When the incubator mediates the relationship between an incubator firm and another actor, it is viewed as a third actor. Aarikka-Stenroos and Makkonen (2014) identify five main tasks that a third actor can have in a relationship: sharing information, diminishing distance, sharing relations by connecting, establishing trust and lubricating the relationship-building process. However, there is variation in how third-actor tasks can be carried out. When mediating, the incubator may facilitate the process of relationship development between the incubator firm and the other actor either actively or passively, and at either the dyad level or network level

(Cantú, 2017). This suggests that third-party mediation in relationship development includes both direct and indirect roles (Huemer, 2017). Hence, in order to capture more details about the mediation that incubators perform, the theoretical framework distinguishes between *direct* and *indirect mediation*. Direct mediation is conducted when, for example, an organisation directly sets up meetings between actors or in other ways ensures that the meeting and interaction will take place. Here, the connecting activity lies at the centre of attention (Huemer, 2017). Indirect mediation consists of activities undertaken by the incubator to facilitate the initiation or development of a relationship without directly intervening. This can be done by providing contact information, informing actors about each other, providing a meeting forum for the actors or, even more indirectly, coaching an organisation on how to interact with other actors. Thus, mediating activities that enable coordination between a firm and its counterparts are defined as indirect supportive functions (cf. Aaboen et al., 2013).

Lastly, the theoretical framework distinguishes between the incubator-specific network and incubator firms' unique external networks (cf. Pettersen et al., 2016). This distinction is also discussed by Cantú (2017). The author defines the micro space as the actors with which the incubator has developed long-term relationships (e.g. service partners and incubator firms). The macro space, on the other hand, includes actors that belong to incubator firms' external networks. Although these actors are part of the incubator's network horizon, the incubator does not interact with them. Halinen and Törnroos (1998) make a similar distinction between triadic network structures (the micro net) and the broader network context (the macro net) within which these actors are embedded. For the purposes of this paper, we use the term *micro net* to refer to the incubator-specific network and the term *macro net* to denote incubator firms' broader networks. Based on the above description, the theoretical framework comprises four dimensions used to analyse the mediations that an incubator performs and their effect on incubator firms' network development.

- Direct mediation in the micro net: The incubator actively facilitates and is part of the relationship development between incubator firms and the actors in the micro net.
- Indirect mediation in the micro net: The incubator is not an active part of the relationship development between incubator firms and other actors in the micro net. However, the incubator supports the relationships through facilitating activities.
- Direct mediation in the macro net: The incubator actively facilitates and is part of the relationship development between incubator firms and the actors in the macro net.

- Indirect mediation in the macro net: The incubator is not an active part of the relationship development between incubator firms and other actors in the macro net. However, the incubator supports the relationships through facilitating activities.

3. Method

3.1 Methodological approach and case selection

In the IMP approach, case study methodology has been widely used because of its practicality for illustrating in-depth complex phenomena (Dubois & Araujo, 2007). Although case research does not aim at being representative of a given population, it is used to build and test theory (Eisenhardt, 1989). For such a purpose, even a single case can be enough to create a more sophisticated understanding of the phenomenon studied. However, the case(s) should be selected using theoretical selection criteria (Dul & Hak, 2008). Thus, as Johnston, Leach and Liu (1999) argue, the strength of case study research relies on its being systematic and logical. This paper seeks to illustrate the interactions that occur between an incubator, incubator firms and their networks. To that end, it uses an embedded case study approach, defined as involving more than one subunit of analysis (Yin, 1994), which allows for broader focus of the case (Stake, 2005). The rationale for an embedded case study with multiple subunits is to allow for a ‘broader exploration of research questions’ (Eisenhardt & Graebner 2007, p. 27). The starting and ending points represent the understanding of the case as a whole, but during the analysis the perspectives of different subunits are taken into consideration (Scholz & Tietje, 2002). The subunits of analysis were selected because they illuminate the logical relations among theoretical constructs (Eisenhardt & Graebner, 2007).

The empirical study begins with a description of an incubator, Ideon Innovation, located in South Sweden. The incubator has assisted 137 firms, most of them research based, since its establishment in 2004. To help start-up firms, the incubator has formed a loose network consisting of ties to business support organisations, policy actors and innovation support organisations. The decision to follow Ideon Innovation is based on the paper’s aim of investigating the mediating role of incubators. Mediation by the incubator in order to develop incubator firms has been described by an increasing number of studies. However, in order to grow, incubator firms also need to gain resources from a broader network (Cantú, 2015). Thus, an ensuing issue is how mediation is related to the development of incubator firms’

broader networks. Against this backdrop, two former incubator firms were chosen to illustrate the mediating role that Ideon Innovation had played in the development of their interorganisational networks.

The two incubator firms stem from university research, but they focus on different technologies, industries and product areas. There are also differences with regard to the founders' initial network horizons and business experience. In the case of Nattaro, the founders had several years of professional experience in research, marketing and/or product development. Greinon, on the other hand, was formed by two foreign students and had no prior business experience in Sweden. Due to their distinct backgrounds, the two incubator firms approached Ideon Innovation's mediation differently. Nattaro took a proactive approach to interacting in the incubator-specific network, whereas Greinon used a more reactive approach. These differences allowed for a cross-case analysis that illustrated the varied role of mediation. The fact that the firms had already graduated from the incubator allowed us to study their embedding in the incubator-specific network and their broader unique networks.

3.2 Data collection

The empirical material was collected by using both primary and secondary material between June 2013 and May 2017. The primary data included 34 face-to-face interviews with 19 respondents (see Table 1).

Insert Table 1 here.

The interview respondents comprised incubator managers and business advisors, science park managers, business advisors at the university's technology transfer office (TTO), representatives of support organisations and managers of incubator firms. The interviews ranged from 60 to 120 minutes, and the respondents were chosen because of their affiliations with incubators, start-up firms, the university, innovation support actors, public-funding agencies and policy organisations. Interview themes were outlined before each interview depending on the interviewees' organisation, role and experience. A certain degree of flexibility was applied in the interview situation to ensure that knowledge was situated in a specific context (cf. Mason, 2002). This interview strategy served to generate knowledge of broader processes and to provide the researchers with room to develop more detailed

questions for the (follow-up) interview (Edwards & Holland, 2013). Moreover, several rounds of interviews were conducted in order to address the need for additional data, because the analytical focus evolved during the authoring of the paper. The latter interviews (2015 and after) were conducted specifically for the present paper and were recorded. To substantiate the interview material, secondary data were also collected from sources such as websites, newspaper articles, policy documents, industry reports and statistical material. The secondary sources identified events, established timelines and gave varied perspectives on the development processes studied. The secondary sources thus not only helped to substantiate the accounts given by interviewees but also provided additional information (cf. Huber & Power, 1985).

3.3 Data analysis

As Pratt (2009) notes, empirical data in qualitative research should turn into meaningful representations of concepts. The research for the present study was conducted through an interactive dialogue between theory and empirical data collection (Dubois & Gadde, 2002; Gummesson, 1999). The study started as part of a larger project on university start-ups and their embedding in business networks. The initial focus was to explore what kind of network relationships university start-ups established. The initial research scope helped organise the empirical data description, including the context and unit of analysis (cf. Pratt, 2009). The research was driven by the idea that the first relationships have a significant impact on the subsequent business development of start-up firms (Aaboen, Dubois & Lind, 2013; La Rocca et al., 2013). The majority of start-up firms followed in the project were incubator firms, and we noted that they had similar network relationships due to being located in an incubator. How incubators mediate network relationships and how this affects the development of incubator firms therefore became an area of interest. Accordingly, we identified from our empirical material two incubator firms that had graduated from Ideon Innovation: Nattaro and Greinon. We mapped the networks of the two former incubator firms and distinguished between the relationships that were mediated by the incubator and those that were unique to each incubator firm. This distinction was made by juxtaposing the interview accounts of the incubator and the incubator firms. We used other secondary material to help derive the network structures.

The main concepts of the theoretical framework were identified through the empirical distinction between an incubator-specific network (i.e. actors in the incubator or closely

affiliated with it) and the broader unique networks of the incubator firms. Based on this preliminary analysis, the concepts of micro nets and macro nets, drawn from the IMP literature, were used to denote the two different types of network structures (cf. Cantú, 2017; Halinen & Törnroos, 1998). The mapping of the two incubator firms' networks also illustrated what mediation activities were undertaken by the incubator. This in turn demonstrated how incubator firms reacted to the mediation, whereby we empirically identified a reactive approach and a proactive approach. To structure the incubator's mediations, we applied concepts from the literature on strategising within networks (cf. Holmen & Pedersen, 2003; Huemer, 2017). In this way, the study was able to clarify the notions of direct and indirect mediation and of network horizon (which affects the possibility for mediation). Our research scope, including the research question, was thereafter further narrowed by analysing the direct and indirect mediations of the incubator in the different nets of incubator firms. Here, the interviews with the incubator, incubator firms and various partners played the important role of generating information about mediations, including their underlying logic. The summaries of the mediations in the different nets provided a picture of the incubator's mediating role. Based on the analysis of the mediations, moreover, we could conjecture that some of the enabling and constraining factors were connected to the reactive and proactive approaches of the incubator firms.

4. Empirical study

In Sweden, there are a number of private as well as publicly funded incubators associated with science parks, universities or the private sector. Currently, there are 20 incubators across Sweden that have received increased government support for developing start-up firms (SOU, 2015). This empirical study begins with one of these incubators, Ideon Innovation, and proceeds to describe the networking activities of two incubator firms.

4.1 Ideon Innovation

Ideon Innovation was established as a nonprofit incubator in 2004 and is located next to one of the largest research universities in the region. The incubator is situated in the Ideon Science Park, founded in 1983. There are currently 350 companies, with around 2,700 employees, in the science park. Roughly three-quarters of these companies are research based, and most have connections to universities in the region. Ideon Innovation was the first incubator in the

science park and, as of 2017, hosted 23 firms. Since 2013, Ideon Innovation has focused on start-up firms in the fields of telecommunications, clean tech, creative arts and software development. The annual budget for the incubator is 12 million Swedish kronor (hereafter 'SEK'), the equivalent of 1.26 million euros, the majority of which is spent on office rent and the salaries of administrative personnel and business coaches. Most of the funding comes from the Swedish government or regional agencies. The income from membership fees for incubator firms is modest; it amounts to around 2,000 SEK per firm per month. The incubator does not invest in member firms or provide any funding. Ideon Innovation offers incubator firms office space, shared coworking spaces and business coaching. The physical space is limited, and technical instruments are not offered as a part of the general infrastructure. Incubator firms can, however, keep technical instruments in their offices. Although some incubator firms conduct R&D in their offices, many collaborate with external partners such as the university or other companies. Given the incubator's limited resources, its main assistance comes in the form of the networking activities it can provide for incubator firms. The network contacts are expected to assist the firms in their business development.

4.1.1 The interorganisational context: Ideon Innovation's network

Policy actors are integral to Ideon Innovation's operations. As a not-for-profit incubator, Ideon Innovation is funded predominantly by policy organisations such as Vinnova (the Swedish Agency for Innovation Systems), Tillväxtverket (the Swedish Agency for Economic and Regional Growth), Region Skåne (the regional government) and Lund municipality. The duration of the financial support usually ranges from one to four years. In this context, Ideon Innovation's mission of supporting start-up firms is strongly associated with regional development goals. Policy organisations evaluate the incubator based on whether it advances broad policy aims, such as entrepreneurship, job creation, technology transfer and research commercialisation. The funding mechanism is an important norm-setting instrument in the environment. The incubator's ability to conform to policy expectations is an important factor in successfully gaining funding. Thus, policy expectations affect how the incubator's network structures are formed. For instance, forming local networks has been a main focus of Ideon Innovation. As a business coach notes, 'We offer a networked environment in the Ideon Science Park, where start-ups can collaborate with others to grow'. Incubator activities aim to bring companies together and to support organisations and universities in the region. This networked local environment aligns with the policy idea of a vibrant entrepreneurial and innovative region.

Hence, Ideon Innovation's management team characterises the incubator's role as a regional networking hub. Incubator firms are expected to develop by interacting with business support organisations. Moreover, the incubator's ties to the university are clear. Over half of the incubator firms were established by university researchers and/or were formed based on research conducted at the local university. There are also a number of incubator firms that were founded by students. Many of the university-related ventures first contact the TTO for advice concerning the commercialisation potential of the scientific/technological idea. When business registration has occurred, the TTO often advises start-up firms to become a member of an incubator. One of the TTO's most established relationships is with Ideon Innovation. Incubator membership signals that the firm is part of a regional innovation system, which facilitates networking opportunities in the environment. The incubator's relationship to the university's innovation support organisations are further strengthened through frequent meetings, common workspaces and joint funding applications. The participation of incubator firms in activities organised by local actors can positively affect grant applications, because the incubator-mediated contacts are part of a highly localised network characterised by the tight sharing of information. This leads to conformity among incubator firms' strategic actions.

Ideon Innovation generally does not develop ties with specific actors that can be potential customers to incubator firms or technology suppliers. The diversity among the incubator firms makes it difficult for the incubator to build a network that addresses the firms' specific needs with respect to their customer bases and products. Instead, Ideon Innovation broadly focuses on establishing relationships with general business support actors in fields such as tax and business advisories, public sector innovation support, intellectual property rights and finance. The incubator's relationship with the business support actors consists primarily of the former providing an environment where they can meet incubator firms. Another important source of information about local conditions and opportunities for the incubator firms is their internal knowledge exchange with one another. This interaction is encouraged and stimulated by the incubator through open workspaces and regular seminars on technical issues or business matters. As the management of Ideon Innovation acknowledges, sales knowledge is a missing capability in the incubator network. To address this, Ideon Innovation has attempted to set up collaborations with successful sales organisations to offer training. At present, such relationships have not yet been established. Several foreign delegations comprising

policymakers, funding agencies and companies also visit the Ideon science park each year. Some of these actors have expressed an interest in setting up funds with which to invest in start-up firms. Although foreign private and institutional funders have showed interest, no institutional ties have been established. The incubator's funding is typically used to establish ties with local actors.

4.2 Incubator firm: Nattaro

The idea behind Nattaro was created in 2010 by four participants in an entrepreneurship course organised by Mobile Heights, an industry-academia network, and Teknopol, an innovation support organisation. One of Nattaro's founders was an ecology professor at the university. Her research focused on how bedbugs communicate with each other. The other three founders had previously worked in multinational companies as either engineers or marketing managers. What they all had in common was a desire for alternative career paths. During the entrepreneurship course, they decided to form a project based on the bedbug research. These insects represented an increasing problem in Sweden. The idea was to, by understanding how they communicated, lure bedbugs to silicon powder, which would consequently exterminate them. The project members were encouraged by their course mentor to pursue the idea. In 2011, the founders contributed the seed funding, and Nattaro was registered as a company and moved into Ideon Innovation.

At the incubator, the start-up was provided opportunities to meet with different kinds of organisations, including policy agencies, innovation support organisations, business angels, other incubator firms and so forth. For Nattaro, many of these incubator-enabled meetings were helpful for starting off the nascent business. For example, the firm AWA Patent gave Nattaro a free patent investigation, and PricewaterhouseCoopers provided a free accounting course. The findings from the patent investigation, however, indicated that it would not be possible to protect the idea. Another benefit of being located in the centre of the science park's main incubator was the opportunity to establish ties with potential investors. An important aspect of the location was the opportunity to interact with funding organisations, business angels and other firms in order to understand how to solicit funding. Regular meetings with Almi Invest and Innovationsbron (both public-funding agencies) and Connect (a Swedish business angel organisation) gave Nattaro knowledge about the available grants as well as the requirements for gaining funding. From Almi, the firm received an innovation grant of 50,000 SEK. Moreover, a law firm with which the incubator had established a

relationship provided legal advice and assistance with writing contracts to incubator firms. Nattaro used these free services while at Ideon Innovation. The incubator's focus was to encourage incubator firms to evaluate the novelty of their ideas, write a business plan, interact with local financiers and learn about contract formulation and accounting practices. The emphasis on building the formal organisation was visible in Ideon Innovation's contact referrals. As for business contacts, the incubator did not have relationship capital to offer. The advice from business coaches concerned mainly general referrals to actors within the environment, which Nattaro could contact.

The incubator provided office space, but the lab was at the university. Therefore, the founding team frequently moved between the two. The connection to the university played an integral role in the initial stages, because it gave the incubator firm the opportunity to apply for a grant from the TTO to validate its business idea. A grant of 300,000 SEK, given to Nattaro at the beginning of 2012, was used to pay salaries and for product development. The established relationship between the TTO and Ideon Innovation provided incubator firms with various kinds of information, such as that related to funding opportunities. As one of Ideon Innovation's business coaches notes, 'We have very well developed ties, and I am part of the evaluation committee for the acceleration grant'. Representatives of the TTO and Ideon Innovation frequently interact. There are weekly organised meetings between these organisations in which they exchange information about start-up firms, joint activities and so forth. Funding or the possibility of gaining it can be partly affected by how many ties a firm formally builds with innovation support actors. Nonetheless, Nattaro specifically felt that the contacts with the incubator and its partners were not in fact leading towards the development of a business. Because three of the founding members had prior business experience, they were aware of the importance of having discussions with potential customers early on. The incubator had provided no support in terms of developing relationships with customers but focused more on supporting the formation of relationships with actors for technology evaluation. For these activities, the incubator and the local environment already had a well-established network.

During the first year, Nattaro reached out to potential customers such as pest control companies. These contacts were made at Nattaro's own initiative, rather than through discussion with business coaches at the incubator. Although no customer orders were received in the first year, the firm did learn from the experience. For example, potential customers

were informed of the existence of Nattaro's product, which served to educate the market. Moreover, the pest control companies suggested that Nattaro hold seminars to educate the market about the growing bedbug problem, which subsequently became a source of income. Additionally, pest technicians who were provided samples provided input and described the powder as too difficult and troublesome to use. As a consequence, Nattaro had to reconsider its product and came up with the new idea of putting the silicon powder on a piece of tape, which could be placed in the bedbug-infested room. The tape was investigated for patentability, and a patent was granted later in 2012. The first external investors came into the picture at this time. A business angel that had invested in another firm incubated at Ideon Innovation was interested in investing in Nattaro. With this investment, Nattaro was able to gain funding from Almi Invest as well. Almi Invest's condition was that an investment from a business angel had to be made before the public agency would come in. With these investments, broader efforts could be made towards product development. Later, the incubator firm that had provided the contact to the angel investor decided to invest in Nattaro.

No proof of concept was yet available in 2012, and Nattaro needed to demonstrate its product's effectiveness and efficiency in exterminating bedbugs. It needed to scale up production, but Ideon Innovation could not provide any lab space. Nattaro had earlier used the university's laboratories for R&D activities. However, with this rise in production and the hiring of nonuniversity researchers, Nattaro had to obtain its own research facilities. In late 2012, the company moved out of Ideon Innovation and into the Life Science Incubator (LSI), located in the same area. Ideon Innovation had not offered any laboratory space, nor did it offer any support for incubator firms to gain access to such facilities. The LSI was thus a better fit, because it provided forms of support tailored to life science firms. The LSI was founded partially as a response to this gap in the larger Lund innovation environment. The idea behind the LSI had been developed collaboratively by the local university, the city government and Ideon Innovation. Some life science-based firms had earlier been located at Ideon Innovation, but due to its lack of R&D infrastructure, the environment was not ideal. The new incubator, in contrast, provided R&D facilities such as clean rooms and laboratories, access to consumable products (for lab testing) and personnel familiar with laboratory work and processes.

With the new opportunities provided by the LSI, Nattaro could further develop its product using subsidised facilities. In 2013, the firm received its first customer for a pilot project. In

this project, the Swedish immigration bureau wanted to use the pest control product in homes for newly arrived immigrants. The results were positive, showing that bedbug problems could indeed be solved by the tape. Like Ideon Innovation, the LSI had not helped to develop customer ties but focused instead on support regarding technology development and infrastructure. Nattaro also believed that the support from business advisors was limited in the area of developing business contacts. However, the former experience of the founders in product marketing and development provided Nattaro with important capabilities to identify business needs and processes. Figure 1 illustrates Nattaro's network.

Insert Figure 1 here.

4.3 Incubator firm: Greinon

Greinon was founded in 2011 and develops lighting-control solutions. The technology can be used as an independent system on existing installations or as a component in a lighting unit. Smaller volumes and prototypes can be produced at the firm's own office, but medium-sized volumes are outsourced to a larger manufacturing site. The business idea was based on research conducted at the local university's faculty of engineering. Greinon's founder (and CEO) decided to take up entrepreneurship when writing his master's thesis on the topic of lighting systems. He teamed up with a business and marketing graduate from the same university. The team had little experience in technology commercialisation. The founder's academic supervisor, a professor in engineering, became a board member and provided the technical knowledge. During its first year, Greinon survived on very modest means, situated in a student incubator with free office space. The primary role of the student incubator was to provide an encouraging environment for aspiring student entrepreneurs. The incubator's employees themselves had no prior entrepreneurial experience, and they were tasked with guiding the student entrepreneurs through activities in the local innovation environment.

The university awarded the founder of Greinon a scholarship of 30,000 SEK after his graduation to pursue his idea over the summer of 2011. The start-up thereafter received an innovation grant of 50,000 SEK from Almi to develop a prototype. Research on the technology was conducted at the university in the engineering professor's laboratory. Greinon also contacted the university's TTO to obtain some additional support. The student incubator was partly under the management of the TTO. The business advisor at the TTO advised Greinon to more clearly identify the application areas and helped investigate whether the

technology was patentable. After looking at the idea, the TTO's patent attorney came to the conclusion that the technology was not patentable. Nonetheless, Greinon wanted to continue pursuing the product idea. The TTO awarded Greinon an accelerator grant (300,000 SEK) in 2013 that was used to develop a product prototype as well as pay a small salary to the founder. Some master's students in the engineering department wrote their theses on topics that were jointly identified by the founder and his professor. This was a way to develop understandings of the lighting project and prototype. In 2013, Greinon could no longer stay at the student incubator; however, two incubators in close proximity were available. One was Ideon Innovation, and the other was an incubator focusing on service firms. Staying in the vicinity was a natural choice, because the founding team had already become accustomed to the local environment and had developed relationships with the university's innovation support actors. The incubators also had close ties to the university.

For Greinon, Ideon Innovation was the most suitable incubator considering the business scope of the start-up firm, namely developing energy-efficient lighting solutions. What Greinon found attractive about Ideon Innovation was its explicit support in terms of network contacts and business advisory. Neither of the start-up firm's partners had any working experience in Sweden. Hence, the information provided by the incubator support network about legal matters, business development and product protection helped them gain a general understanding of starting a high-tech business. The marketing manager explains, 'We would not be where we are today if we started somewhere in a garage. Because the two of us who started the company are not Swedish, we had to learn a lot about the process of starting up and running a business in Sweden. So the help we got was extremely important'.

By joining the incubator, Greinon was able to meet regularly with business angels and innovation and business support organisations, as well as with other incubator firms that were struggling to build their businesses. Moreover, as the marketing manager notes, 'It is helpful to use the brand name of Ideon Innovation to open up doors and initiate discussions with customers and other potential partners, rather than just coming as an unknown start-up'. The discussions with business angels did not lead to any investments, although they provided Greinon with information about local market conditions as well as knowledge of general business strategies within the clean-tech industry. The business support organisations, according to Greinon, seemed eager to gain new customers, especially the patent firms. Nonetheless, the TTO had already helped Greinon do a patent investigation. The interaction

with innovation support organisations consisted of receiving business advice, talking about the business idea and gaining knowledge of grant and funding opportunities in the local innovation environment. Because the firm was new and the founders fairly inexperienced, they were eager to explore the network contacts provided by the incubator. Greinon also participated in a number of entrepreneurship competitions organised by Venture Cup (an organiser of competitions at local, regional and national levels). The pitching training from the incubator was a significant factor in the incubator firm's success in the local and regional competitions. Greinon used the competitions to gain exposure, and because the incubator firm had no income, the prize money was used towards funding the business operations. Greinon was encouraged to participate in activities such as competitions and open pitches by the innovation support actors, but doing so required a considerable time commitment. No actual financial investments or customer ties were developed directly from these activities. In terms of product development and customer relationships, Greinon's academic network was more helpful than the incubator contacts. The incubator provided primarily generic advice on how to approach potential partners.

At this time, the professor, who was also the cofounder of the start-up, was able to help recruit a board member who had been the managing director of Ericsson's mobile platform division. This contact was created through the engineering faculty's industry-academia platform and was not mediated by Ideon Innovation. The incubator had general ties to innovation support actors at the university but had less contact with the faculties. The addition of a new board member helped give the firm more legitimacy when approaching potential customers or financiers. The first customer was the engineering faculty, which involved Greinon in one of its projects aimed at testing how various kinds of lighting affect people's well-being. Greinon's participation in the project, enabled by its academic network, provided the incubator firm with some income and with a verification stamp for its participation and proof of concept. The project also allowed the incubator firm to join a European lighting consortium with some big companies such as Philips, as well as start-ups and universities. Ideon Innovation was not involved in forming these relationships, nor did it play an active part in the support. With the EU-funded project, Greinon could participate in smart city lighting projects in some municipalities to further test its product. The consortium eventually fell apart due to lack of funding and poor project management. There had been many participating actors with their own agendas and no strong coordinating actor. However, for Greinon's part, contacts had been established, the lighting solution tested and a customer relationship

founded. In 2015, Greinon had signed a sales contract with a Danish lighting manufacturer. There were, however, technical and compatibility issues that needed to be solved. Applying for Vinnova grants that would support the development of such a relationship has been difficult, because Vinnova prefers Swedish collaboration partners.

During the latter period (2014–2016), when the incubator firm was busy with product development and forming customer relationships, interactions within the incubator network were scarce. Indeed, interactions with the contacts mediated by Ideon Innovation had been helpful in terms of gaining more knowledge, learning how to apply for grants and improving marketing. The latter included networking and participating in entrepreneurship competitions, which provided the incubator firm with prize money and recognition. For example, in 2015 a national clean-tech organisation (and competition) described the firm as one of the 25 most interesting clean-tech companies in Sweden. Nevertheless, according to the founders of Greinon, the efforts required to continue activities with the incubator network were too demanding. Moreover, such activities did not directly translate into product development or finding customers. Hence, although the incubator had played an important role in forming Greinon's early network, the firm had increasingly moved away from those initial relationships as a more customer-centric network was formed. According to Ideon Innovation, this was an expected progression, because the incubator aims primarily to enable networking rather than to participate actively in business development. However, as Greinon's marketing manager states, interactions within the incubator network had taken a considerable amount of time. In retrospect, the firm believed that more time should have been spent on broadening the network than on devoting time and energy to interacting in the local innovation environment. Interaction with customers was time-consuming and complicated, but it had been fruitful for Greinon in terms of gaining a stronger understanding of product development and the market relevance of its offering. Figure 2 illustrates Greinon's network.

Insert Figure 2 here.

5. Case analysis and discussion

In this section, we report the empirical findings from the case study. The theoretical framework presented in section 2.3 is used as the starting point for the analysis.

5.1 Mediation by the incubator in the different nets

Direct mediation in the micro net: The way the incubator advised both incubator firms about funding opportunities is an example of direct mediation in the micro net. The incubator not only provided information about how to apply but also directly facilitated interaction between firms and the relevant actors. Both firms were informed about how and when to apply for funding. The incubator additionally enabled interaction between the incubator firms, funding organisations and business angels through various activities. For example, the incubator holds regular meetings at which all incubator firms can interact with local funding organisations. In order to be able to perform direct mediation, the incubator regularly interacts with the local innovation support actors, including local funding organisations. The organisations in the local innovation support network have organised weekly meetings over the years, and this has developed their relationships. Because the organisations that meet have established trust between each other, it tends to be evaluated favourably if an incubator firm has been in contact with several of these actors when they apply for funding. Greinon's participation in entrepreneurship competitions is an example of another direct mediation in the micro net. Greinon was offered the information and resources necessary for applying and participating in the competitions. Moreover, the incubator provided pitching training that supported Greinon's success in the competitions. Because both Venture Cup and the incubator are part of a group of regional innovation support actors, the incubator is able to provide useful information, resources and training. For Greinon, the participation, even though it required a substantial time commitment, generated publicity and prize money. By extension, the publicity generated from the competitions is also beneficial for the broader local start-up environment.

Indirect mediations in the micro net: An example of the incubator's indirect mediation in the micro net occurred when Nattaro got access to new R&D facilities. Due to the close proximity of the incubator to the university, Nattaro was able to continue to utilise university laboratories. When Nattaro outgrew these laboratories, it was accepted into the LSI, which was able to provide R&D facilities. The LSI is part of the same network of local innovation support actors that gather regularly to discuss activities and support efforts as well as knowledge sharing and creating joint understanding. Greinon also reaped benefits from the incubator's indirect mediation in the micro net. The brand name associated with the incubator and the relationships that have been cultivated in order to develop start-ups had positive effects on contact making. For example, when Greinon reached out to external financiers and

potential customers, its association with Ideon Innovation frequently helped the firm to at least initiate a discussion.

Indirect mediations in the macro net: An example of indirect mediation by the incubator in the macro net occurred after Nattaro had established customer relationships. These customers were not part of the incubator's network horizon; instead, Nattaro took the initiative to form customer relationships based on its previous business experience. However, after the relationships were formed, the incubator was able to reinforce them by providing general advice on how to interact in relationships in a way that facilitates product development. The incubator also acted as a sounding board when Nattaro needed to discuss the relationships. The board member who was recruited to Greinon was another example of indirect mediation in the macro net. The board member was not someone with whom the incubator had an established relationship and was not recruited directly by the incubator. However, the incubator lubricated the relationship by making Greinon aware of what kinds of board members were needed. The incubator, furthermore, contributed to Greinon's legitimacy when the firm was presented to the potential board member.

Direct mediations in the macro net: The indirect mediation that took place in the macro net is difficult to connect specifically to actual relationship development. With respect to direct mediation in the macro net, the case shows that the incubator does not conduct such activities, and it appears that the incubator has few relevant connections. However, Ideon Innovation could have mediated in the macro net when private investors/funds showed an interest in establishing a relationship with the science park and incubator in order to find lucrative deals with incubator firms. However, as mentioned in the case description, the incubator believed there were not enough resources for it to follow up on visits from foreign investors and companies showing an interest in the incubator firms. Although such relationships with the incubator were difficult to develop, the examples show that the already existing relationships in the micro net exhibited rather frequent interaction. These expected exchanges of activities and information in the micro net make the relationships there rather costly to maintain. In other words, the relationships the incubator is able to mediate in the micro net indirectly pose a problem for its mediation in the macro net.

5.2 The incubator's use of relationships to carry out its mediating role

The empirical study shows that the micro net consists mainly of actors in the local innovation support structure. The incubator's network is a reflection of the policy-driven view of the innovation process as a funnel (cf. Baraldi & Ingemansson Havenvid, 2016). The analysis illustrates that the incubator primarily uses established relationships with innovation support actors in the micro net when directly mediating relationships to incubator firms. This network has been developed over a number of years, and the incubator invests time in developing the relationships with these support actors even further. The network horizon is kept geographically narrow by the incubator due to resource limitations and challenges with developing relationships to actors that do not share the incubator's vision of adhering to a regional innovation system. One reason for this is the funding agencies and their requirements. These findings are in line with previous studies (e.g. Aaboen, 2009), which have shown that public-funding agencies are important 'customers' for the incubator because the lion's share of its funding derives from these actors.

It appears that the incubator-specific network has limited usefulness for embedding the incubator firms in a broader commercial network. In order to establish a business network, including suppliers and customers, a more proactive approach to relationship building, such as the one displayed by Nattaro, appears to be more helpful. Compared to the more reactive approach used by Greinon, a proactive approach allows the incubator firm to benefit more from the indirect mediation conducted by the incubator. Through the established network, the incubator is able not only to mediate relationships, but also to gain knowledge about local conditions that it can share with incubator firms. Moreover, the incubator disseminates information about the incubator firms in order to facilitate future mediation on their behalf. Thus, the case findings illustrate that when the incubator directly mediates in the micro net, the incubator is able to complement this activity with indirect mediations. Examples of indirect mediation are when the incubator coaches incubator firms on how to interact with a certain actor or provides templates on how to act in the innovation support system. In this way, the incubator ensures not only that the initial interactions take place but also that the anticipated result is to some extent achieved. The incubator's indirect mediation in the micro net seems to be dependent on the same group of actors as the direct mediation. The incubator's role as a provider of networking opportunities (Schwartz & Hornyach, 2010; Hughes et al., 2007) is thereby effectively fulfilled only in the micro net.

5.3 The incubator's mediating role and its effect on incubator firms' network development

The empirical study indicates that the incubator mediated similar relationships to the two incubator firms despite their different needs. When embedded in the local innovation support structures, the incubator firms were encouraged to apply rather conventional strategic actions. Because it is a general as opposed to a specialised incubator, Ideon Innovation needs a wider range of actors in its network horizon in order to mediate relevant relationships to member firms. Simultaneously, Ideon Innovation has had a wide variety of incubator firms over the years. These firms and their relationships could potentially have developed into long-term relationships with the incubator as well – to the benefit of future incubator firms. Thus far, such organic growth of the incubator network does not seem to have occurred. This could be problematic with respect to the incubator's goals of enabling its tenants to grow, because incubator firms might focus on how to act in a network environment that does not always enable business development. However, an incubator firm could be less dependent on the network horizon of the incubator if it is able to form relationships with innovation support actors and use them as mediators to build business relationships. Here, it is important that the network horizons of these other support actors do not become too similar to that of Ideon Innovation and are able to provide access to a wider network. Moreover, the incubator firm's networking competencies, such as utilising the incubator network, forming external network relationships and tying these together, become essential (cf. Bollingtoft & Ulhoi, 2005; Pettersen et al. 2016).

By comparing the development of the networks of Nattaro and Greinon, we find some interesting developments. Greinon's management team had little high-tech business experience. Thus, becoming embedded in the incubator's network in the micro net provided the firm valuable help in terms of how to navigate within the local innovation environment. Later, however, these relationships inhibited Greinon's development of relationships in a broader commercial network. For the incubator firm, engaging in activities in the micro net required a great deal of time. In other words, the incubator-specific network that Greinon had at the starting point was not directly helpful in establishing customer relationships. As illustrated in the case, the relationships in the micro net did not aid in broadening Greinon's business network. The incubator could therefore not facilitate developments in a broader business network. Nattaro, in contrast, had a broader network horizon at the starting point and was able to initiate business relationships quickly, and the incubator could more easily facilitate the development of these relationships. Hence, the relationships that the incubator mediated to Nattaro complemented the relationships in the firm's business network.

6. Conclusions

6.1 Theoretical contributions

Increased scholarly attention has been devoted to understanding the network relationships of incubators and their ability to aid start-up firms in their development (Bollingtoft & Ulhoi, 2005; Cantú, 2017; Cooper, Hamel & Connaughton, 2012; Hughes et al., 2007; Kitagawa & Robertson, 2012; Pettersen et al., 2016). Against this backdrop, the present paper has aimed to study the mediating role of the incubator. The introduction raised the following research question: *How is the mediating role of the incubator connected to its network horizon, and how does it enable or constrain the development of incubator firms' business networks?* With regard to this question, the paper offers three conclusions.

The first conclusion is that differences in the possibilities to mediate relationships in the micro net compared to the macro net are highly connected to the network horizon of the incubator. The incubator described in this paper is able to directly and indirectly facilitate relationship initiation and development between the innovation support actors and the incubator firms (i.e. in the micro net). The relationships mediated by the incubator provide, especially in the initial stages, the incubator firms with knowledge of the local innovation environment, grants, patent analysis and other consulting services. This kind of support can enable firms to prepare more quickly for market testing. These findings are in line with previous incubator literature (e.g. Bruneel et al., 2012; Carayannis & Von Zedtwitz, 2005; McAdam & McAdam, 2008) that has defined incubators as providers, accommodators and mobilisers of business services that the incubator firms need in order to develop. However, the incubator's network is less useful in embedding the incubator firms in a broader commercial network (macro net). Extant studies have argued that such relationships are beneficial to the development of incubator firms. For example, incubators should mediate relationships between the incubator firms and a broader spectrum of actors to offer a variety of resources and flexible support (Hansen et al., 2000; Soetanto & Jack, 2016). As Cantú (2017) notes, a heterogeneous network environment will better enable incubator firms to grow. Furthermore, previous research has found that it is difficult for an incubator to provide support for all the development stages of incubator firms simultaneously (Hannon & Chaplin, 2003; Phan et al., 2005). Therefore, not all network structures in an incubator environment are helpful for business development (Sá and Lee,

2012). In this paper, we used the IMP perspective and the concept of network horizon (Holmen & Pedersen, 2003; Holmen et al., 2013; Huemer, 2017) to contribute to the understanding of why an incubator is able or unable to mediate relationships for its incubator firms. The findings illustrate that although the network horizon enables the incubator to mediate relationships in the micro net, it hinders the incubator's mediation efforts in the macro net. This is the case because the network horizon consists of actors that are located in close geographical proximity and that pursue closely related activities. Furthermore, these actors interact intensively with each other and consequently share many contacts. Thus, network analyses using the IMP perspective and the concept of network horizon complement the existing incubator literature by providing an answer to *why* incubators are unable to facilitate the development of business relationships for their incubator firms.

The second conclusion is that a proactive approach enables incubator firms to utilise the incubator's network and mediation activities in a more meaningful way. In our case, Nattaro was more proactive than Greinon (which was reactive) in using the incubator-specific network to develop a business network. The former firm's tangible market opportunities early on also made it less dependent on the incubator. With a proactive approach, the mediation of the incubator can therefore enable and help incubator firms' interactions in a broader network. A more reactive approach may subversively lead to a delay in forming business relationships, because the focus on interacting in an incubator-specific network requires time and effort. Further, the delay in business interactions means that additional mediations by the incubator cannot be made. This finding suggests that the incubator firm's ability to bridge the micro- and macro-net actors becomes even more important for the incubator firm's commercial development (cf. Bollingtoft & Ulhoi, 2005; Pettersen et al. 2016; Witt, 2004). Here, the two incubator firms' different networking approaches were indicative of how their broader business networks developed. This observation heightens the importance of viewing start-up firms not only as passive recipients of support, but also as network-bridging actors (cf. Aaboen et al., 2016). The notion that incubator firms need to be proactive in order to benefit from the incubator's network and mediation activities aligns with one of the basic assumptions of the IMP perspective: that all business relationships consist of two active parties (Ford et al., 2003). By applying the idea of two active parties, the present study combines two recent research streams from the incubator literature: on one hand, research on incubators as networked commercialisation enablers (e.g. Bruneel et al., 2012; Mian et al., 2016), and on the other hand, research focusing on the need for incubator firms to interact and

combine help from different network structures (e.g. Roig-Tierno et al., 2015; Rubin et al., 2015). Consequently, this study offers a dyadic view that focuses on the relationship instead of on only one of the two parties involved.

The third conclusion is that public-funding agencies influence the business development of incubator firms by serving as third actors in many of the connected business relationships. The case study illustrates that public-funding agencies become influential in the business development of incubator firms by being third actors in the relationships formed by the incubator. Hence, the network horizon of the incubator reflects the strong interdependencies formed by policy plans in the innovation support structures (cf. Brown, 2016; Brown & Mawson, 2015). As a consequence, and illustrated by the empirical material, some incubator firms might devote more time to learning how to navigate in such an environment than to pursuing business development and customer interaction. As previous incubator studies (e.g. Aaboen, 2009) have demonstrated, public-funding agencies are important ‘customers’ for the incubator because the lion’s share of its funding often derives from these actors. Applying the IMP perspective’s concepts of third actors (Aarikka-Stenroos & Makkonen, 2014; Huemer, 2017) and connected relationships (Håkansson & Snehota, 1995) allows for a more detailed examination of how the incubator’s funding affects its broader network.

6.2 Managerial implications

This paper demonstrates that the incubator provides its member firms with opportunities to gain knowledge and resources as well as to build networks. The initial network relationships that incubators mediate to start-up firms often involve business support actors, innovation support actors and policy actors. From the incubator firm’s perspective, it is necessary to navigate within this context in order to gain resources and knowledge, but it is also vital to form a broader network for business development. Hence, for start-up managers, it is essential to learn how to manage both within and outside of the logic asserted by the innovation support structures as well as to work towards the aims of customer-relationship building and development. Although these activities might not necessarily be contradictory, the empirical findings do show conflicts that need to be better understood and acted upon. For incubator management, this study suggests that it is necessary to consider how the incubator’s network horizon can be broadened. It may be relevant to formulate frameworks that use metrics that go beyond patent analysis, the number of local collaborations and so forth. Particularly, encouraging incubator firms to interact with potential customers should be of greater

importance for incubators. For such purposes, incubators should build the competencies necessary for handling issues that relate to forming customer relationships. Furthermore, incubator managers should focus more on the connection between the general incubator relationships and the relationships that each start-up has for cross-fertilisation. By not seeking to engage in the unique networks of the incubator firms, the incubators are losing a source of learning and future resources.

6.3 Limitations and further research

This paper has investigated the relationships of incubator firms and how the incubator's mediation affects their network development in one publicly funded incubator. It is likely that publicly funded incubators have narrower network horizons and fewer resources at their disposal with which to assist incubator firms than do for-profit incubators. The incubator followed in this study is also nonspecialised with respect to technological field. This could explain why less support was provided by the incubator to its firms in terms of developing customer and other business relationships. Thus, it would be of interest to study more kinds of incubators, including those that are privately funded, to understand how their networks assist member firms. Moreover, the needs and requirements of incubator firms are highly variable, meaning that the process of building networks might look very different depending on how broad or specific the scope of the incubator is. Hence, more studies focusing on incubator firms could illuminate the networking processes within incubators and their effects on business growth. Based on our three conclusions, we also call for additional incubator studies using the IMP concepts of *network horizon*, *relationships based on two active parties*, *third actors* and *connected relationships*. Such studies could further develop insights into how the structures and dynamics of the incubator network are connected to the business development of the incubator firms.

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