

Joni Rautio

THE EMERGENCE OF SOCIAL
EMBEDDEDNESS IN ACADEMIC
AND SOFTWARE START-UPS'
COHESIVE NETWORKS

UNIVERSITY OF OULU GRADUATE SCHOOL;
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JONI RAUTIO

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NETWORKS**

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Abstract

This dissertation examines the emergence of social embeddedness through economic actions in start-ups' cohesive networks. The motivation for this study came from the interest to explore a previously unknown phenomenon in Finnish start-up entrepreneurship. The purpose was to understand whether the acquisition of human resources is inherently enmeshed in the social relations of cohesive networks in both software and academic start-ups. A qualitative multiple case-study research method was used to understand the complexity of embeddedness, with the aim to replicate an existing theory using exploratory case studies, instead of building a new theory. Granovetter's embeddedness argument was used as a theoretical basis.

Based on the results, in academic start-ups' cohesive networks, social relations significantly helped the company supplement often initially scarce human resources. These social relations within the university faculty context provided significant business support for founders and founding teams in start-ups' early development by generating added value and further strengthening the business vision. This may have happened even long before the company was founded. The results from the software start-ups' cohesive networks slightly differed when compared to those from the academic start-ups, although certain similarities also existed. For instance, founders of software start-ups who had rented an office space in an accelerator or an equivalent entrepreneur community 2–5 years earlier had formed dense, cohesive networks that primarily consisted of social relations, such as founding team members, peers and experienced colleagues, in the same business. These cohesive network social relations were crucial to business development, including software development.

The present study makes primarily empirical contributions. Its findings indicate that researchers should further explore particularly academic start-ups' cohesive networks by testing Granovetter's (1985) embeddedness argument that may provide an excellent theory-testing platform, especially when the analysis is limited to university faculties and their cohesive network's social relations that generate added value.

Keywords: academic start-ups, cohesive networks, Granovetter's embeddedness argument, qualitative case study, social embeddedness, social relations, software start-ups

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Tiivistelmä

Tämä väitöstyö keskittyi tarkastelemaan sosiaalisen uppoutumisen syntymistä taloudellisiin toimiin start-up-yritysten koheesiverkostoissa. Tutkimuksen motiivina oli kiinnostus tutkia aiemmin melko tuntematonta ilmiötä suomalaisessa startup-yrittäjyydessä. Tarkoituksena oli ymmärtää, liittyykö kaikki taloudellinen toiminta luontaisesti yhteenkuuluvien verkostojen sosiaalisiin suhteisiin yritysten alkuvaiheessa sekä tutkimuslähtöisissä että ohjelmistostart-upeissa. Laadullista tutkimusmenetelmää käytettiin tekemään kohdeilmiö näkyväksi ja ymmärtämään ja tulkitsemaan sitä. Granovetterin kehittämää ns. upotusargumenttia käytettiin tässä teoreettisena perustana.

Tulosten perusteella akateemisissa, tutkimuslähtöisissä start-up-yrityksissä koheesiverkoston sosiaaliset suhteet voivat jopa merkittävästi auttaa yritystä täydentämään usein aluksi niukkoja henkilöresursseja. Nämä yhtenäisen verkoston sosiaaliset suhteet näyttivät tarjoavan varsin merkittävää tukea perustajille ja perustajaryhmille liiketoiminnan varhaisessa kehityksessä jo ennen yrityksen perustamista.

Ohjelmistostart-up-yritysten osalta tulokset olivat osittain ristiriitaisia, vaikka myös tiettyjä yhtäläisyyksiä oli. Muutamia vuosia aiemmin toimistotilaa yrityskiihdyttämöstä tai vastaavasta yhteisöstä hankkineet ohjelmistoyritysten perustajat olivat vähitellen, usein epäonnistumisten kautta, muodostaneet tiheitä, kohesiivisiä verkostoja. Ne koostuivat ensisijaisesti sosiaalisista suhteista, kuten perustajatiimin jäsenistä, vertaisista ja kokeneista työtovereista samassa liiketoiminnassa. Tämän tutkimuksen tulokset viittaavatkin osaltaan siihen, että olisi hyödyllistä tutkia lisää erityisesti akateemisten start-up-yritysten koheesiverkostoja, erityisesti jos analyysi rajataan yliopistojen tiedekuntiin ja niiden yhtenäisen verkoston lisäarvoa tuottaviin sosiaalisiin suhteisiin.

Asiasanat: Granovetterin upotusargumentti, koheesiverkostot, laadullinen tutkimusmenetelmä, ohjelmistostart-up-yritykset, sosiaalinen uppoutuneisuus, sosiaaliset suhteet, tutkimuslähtöiset start-up-yritykset

The emergence of social embeddedness in academic and software start-ups' cohesive networks

Acknowledgements

I wish to thank myself for reaching this point in my research. As the result of this project, I have gradually learned the basics of how to conduct research by doing practically everything on my own, using my creativity. I will continue to do so in the future. Indeed, I prefer working alone, because it motivates me the most and I get the best out of me; there are also much less distractions.

This research project has undergone a few challenges, particularly in the last 2 years. Starting in spring 2020, the COVID-19 pandemic quite significantly hampered my ability to carry out some of the personal interviews. However, internet connections and Zoom partially replaced the lack of physical contact. There were also other, mostly minor challenges during the course of my research project.

Even so, this project gradually advanced between fall 2021 and early 2022. This period also marked my highest personal effort and included several hours of intense research almost every day of the week. Working with the manuscript was sometimes hard, but also enjoyable.

Rovaniemi, Finland, October 2022

Joni Rautio

Key concepts

Embeddedness	Embeddedness refers to the social, cultural, political and cognitive structuring of decisions in economic contexts, demonstrating the inseparable connection of the actor to his or her social environment (Beckert, 2009). According to Krippner (2001), embeddedness enjoys a privileged – and, as of yet, largely unchallenged – position as the central organizing principle of economic sociology that slowly acquired its identity during the twentieth century, becoming a distinct field of sociological inquiry (Swedberg et al., 1987).
Embeddedness arguments	According to Dacin et al. (1999), embeddedness arguments are prominent among research paradigms that provide revitalized alternatives to prevailing modern traditions, and much of embeddedness research seeks to demonstrate that market exchange is embedded in, and defined by, larger and more complex social processes (Barber, 1995; DiMaggio, 1990; Granovetter, 1985; Portes & Sensenbrenner, 1993).
Social embeddedness	Social embeddedness of the economy describes the extent to which economic action is linked to or depends on action or institutions that are non-economic in content, goals or processes (Granovetter, 1985, 2005).
Social relations	Social relations are based on the exchange of favours and gifts. They are a type of relationship that constitutes the social structure underlying social capital; social capital, therefore, is derived from social relations (Adler & Kwon, 2002).
Start-ups	According to Blank (2020), the key differences between a start-up and big company are a bright and burning vision, a hope of something that could be and a goal that only few others are able to spot. Start-ups are small and recently formed, and thus need to survive with few available resources (Coleman & O'Connor, 2008;

Crowne, 2002; Paternoster et al., 2014; Ries, 2011; Sutton, 2000; Yoffie & Cusumano, 1999).

Academic start-ups

Academic start-ups are firms that have rich resources and several assets that help in early development, such as investors, founding teams, networks in which the firm is embedded and other external conditions that affect new firm creation.

Software start-ups

Small firms, such as software start-ups, have extremely limited human resources and challenges in early development. These small firms are often characterized by the ambiguous role of the entrepreneur and founder inexperience, but also passionate founder behaviour.

Cohesive networks

Cohesive networks are dense networks of a limited number of people who help start-ups acquire resources, such as financial and human resources and emotional support, in the start-ups' early stages. Characteristic to cohesive networks are that all actors in the same network context are connected (Alguezaui & Filieri, 2010), and both the volume of the information flow and the motivation to share relevant novel information are greater (when compared to diverse, disconnected networks; Aral & Van Alstyne, 2011).

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1 Introduction

The start-up lifetime has been studied from many different points of view. Examples include the marketing perspective (Blank, 2013) and innovation development (Heitlager et al., 2006). Many start-up studies concentrate mainly on general issues, such as company characteristics (Sutton, 2000), team and product development (Crowne, 2002) and the grouping of success factors (Chorev & Andersson, 2006). However, very few studies so far have considered start-up development from the perspective of embeddedness arguments or used socio-economic framework conditions to understand start-ups' evolving resource challenges. The present study may thus be the first qualitative case study in the Finnish start-up entrepreneurship context in which Granovetter's (1985) embeddedness argument is used to empirically test the emergence of social embeddedness in the economic actions of cohesive networks, with a focus on both academic and software start-ups. This cross-discipline research is both interesting and motivating, because so far, the emergence of social embeddedness has remained relatively unknown in Finnish start-ups' cohesive networks. Generally, the value of Granovetter's (1985) seminal contribution to embeddedness research is not fully understood in start-up research, so it is important to take this first step.

Granovetter (1985, as cited in Woolcock, 1998) emphasized that his contribution argues that *all* economic action is inherently enmeshed in the social relations of one configuration or another. His argument therefore stresses the role of the concrete personal relations and structures (or *networks*) of such relations as vehicles of trust and means to prevent malfeasance. Accordingly, "all market processes are amenable to sociological analysis and such analysis reveals central, not peripheral, features of these processes" (Granovetter, 1985, p. 505). The embeddedness approach to economic action is located one step "upstream" from social capital, and it does not distinguish between market and hierarchical relations but rather embeds both in social relations (Adler & Kwon, 2002).

There is currently a research gap, however, in embeddedness research. Instead of embeddedness, two main perspectives, according to Alguezaui and Filieri (2010), have been highly discussed in the literature: sparse networks, based on Burt's (1992) structural holes theory, and cohesive networks, based on Coleman's (1988) approach. In addition, there is contingency perspective which reconciles the two sources of social capital (Podolny & Baron, 1997; Burt, 1997, 2000). Per these micro theories, cohesive networks are of particular interest, because they provide start-ups with some of the most crucial resources at the start of their development

but may later turn out to be less beneficial to development (Alguezaui & Filieri, 2010; Gargiulo & Benassi, 1999, 2000; Hite & Hesterley, 2001). In contrast, Granovetter's (1985) embeddedness argument offers a viable alternative to micro theories and social capital benefits which has not been taken seriously until the present research effort.

What especially motivates this study is the difference in the resources that software and academic start-ups have for their development. In software start-ups, human resources have been reported to be extremely limited (Carmel, 1994; Coleman & O'Connor, 2008; Crowne, 2002; Paternoster et al., 2014; Ries, 2011; Sutton, 2000; Yoffie & Cusumano, 1999). Software start-ups also have challenges in product building, customer acquisition and funding (Wang et al., 2016). Their founders as well face development challenges, despite their often-passionate behaviour being one of the key determinants of start-up success (Giardino et al., 2014). In contrast, academic start-ups have innovation networks that enhance their embeddedness in social networks and increase their survival (Lockett et al., 2003; Murray, 2004). In addition, science parks and university's technology business incubator (UTBI) are examples of the environmental context for entrepreneurial activities (Rothaermel et al., 2007).

Generally, university policy, faculty, technology transfer offices, investors, founding teams, networks in which a firm is embedded, and other external conditions affect new academic firm creation (Rothaermel et al., 2007). In start-ups teams are assembled from pre-existing relationships within clusters (Lee & Jones, 2008). Practically, local cluster's embedded ties that start-ups use to assemble team members (Aldrich & Kim, 2007).

In this way, human resources represent the key point of difference between academic and software start-ups, and their examination in the cohesive network context may provide new and valuable information about start-up development. The present study takes this important step by utilizing the concept of embeddedness and Granovetter's (1985) embeddedness argument as an alternative to micro theories of exchange that have dominated the start-up research paradigm.

1.1 Research problem and research questions

The purpose of this study is to use Granovetter's (1985) embeddedness argument as a primary theoretical basis to examine the emergence of social embeddedness in the economic actions of start-ups' cohesive networks. Particularly, this research means to understand how all economic action is inherently enmeshed in the social

relations of start-ups' cohesive networks and emphasize the role of these networks as vehicles of trust and means to prevent malfeasance. Two distinct types of start-ups, academic and software, serve as the focus, as significant differences exist in their initial resources and networks that may help them develop. Especially human resources represent a bottleneck in software start-ups' early development. Because academic start-ups' human resources may not pose a similar development challenge, this creates an interesting comparison between the two types of start-ups. It is therefore insightful to empirically explore both of these start-ups to understand the role of social relations in human resource challenges within different economic actions associated with early development.

The following three research questions guided this study:

- 1) How is social embeddedness manifested in the economic actions of start-ups' cohesive networks?*
- 2) How is the acquisition of human resources inherently enmeshed in the social relations of cohesive networks in academic start-ups?*
- 3) How is the acquisition of human resources inherently enmeshed in the social relations of cohesive networks in software start-ups?*

These three research questions are both theoretical and empirical in nature, thus enabling an empirical exploration of the emergence of social embeddedness in cohesive networks' economic actions. The first research question aims to develop a general understanding of the emergence of social embeddedness on economic actions in both academic and software start-ups' cohesive networks and empirical environments. The second research question aims to deepen understanding of the emergence of social embeddedness on the acquisition of human resources in academic start-ups. Likewise, the third research question aims to assess the emergence of social embeddedness on the acquisition of human resources of cohesive networks' social relations in academic start-ups.

1.2 Theoretical positioning of the study

Granovetter's (1985) embeddedness argument is relatively simple and straightforward, particularly when compared to later and refined theoretical concepts, given its focus on social relations rather than on embedded ties, or social capital benefits (Figure 1). The later concepts also include social capital embeddedness (Portes, 1993) and structural embeddedness arguments (Uzzi, 1996),

which suggests that embedded ties provide the greatest access to the benefits circulating in a network. The concept of structural embeddedness concerns the material quality and structure of ties among actors (Uzzi, 1996), with the term *structure* referring to the way in which dyadic relationships are bundled into tightly knit but mutually isolated cliques, rather than dispersed throughout the population (DiMaggio, 1990). In contrast, social embeddedness concept (Uzzi, 1996) suggest that socially founded business ties positively affect organization outcomes in the absence of direct material transactions between firms or administrative fiat, whereas business groups that dominate the economies of many emerging and developed countries consist of a set of legally separate firms bound together in persistent formal and/or informal ways (Granovetter, 2005).

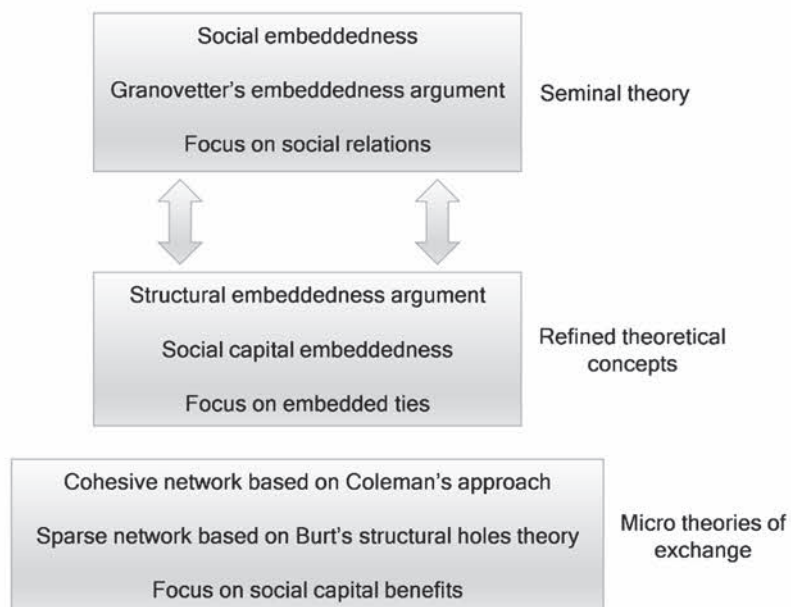


Fig. 1. Theoretical positioning of the study.

From a broader perspective, macro work on social embeddedness traces how networks and group affiliations affect the logic of markets and economic transactions (Granovetter, 1985; Thye et al., 2011; Uzzi, 1996, 1997). In contrast, Thye et al. (2011) argued that micro theories of exchange, such as structural cohesion theory (Fararo & Doreian, 1998; Granovetter, 1992; Markovsky & Lawler,

1994), capture the propensity for small, local structures to unleash emotional and cognitive processes, and therefore allow networks to take on group-like properties. According to Thye et al. (2011) relational ties among actors generate “sticky” and “socially embedded” transactions that often defy market logic (DiMaggio & Louch 1998; Granovetter 1985, 1992; Uzzi & Lancaster 2004; DiMaggio 1990).

Similar theories include social exchange theory (Emerson, 1981; Lawler, 2001; Lawler & Thye, 1999; Cook & Cheshire, 2013), and relational cohesion theory (Lawler & Yoon 1996; Thye et al., 2002; Thye et al., 2014), that has extended the dyadic logic towards network approach with person-to-group ties. Recently, embeddedness has gained increasing attention among professorial entrepreneurship (Kenney & Goe, 2004). Indeed, embeddedness and networks are often represented in entrepreneurship research (e.g. Hoang & Antoncic, 2003; Johannisson & Mønsted, 1997; Johannisson et al., 2002; Witt, 2004), having become a major part of scholarship on economic behaviour since the 1980s.

Granovetter (1985) described embeddedness theory as representing the middle ground between “undersocialized” and “oversocialized” views of action, or what Burt (1982) called “atomistic” and “normative” approaches. These two classic assumptions, according to Burt (1982), are answers to the question, how is one actor’s perception of utility in an action affected by other actors? While the atomistic perspective emphasizes each actor’s independence from other actors, the normative perspective highlights actors’ socialization with one another in circumstances in which they are still free to have independent interests. Burt (1982) aims to distinguish the actor-specific features of action from the features emergent in a system of actors, which represents Parson’s (1937) specification of the four elements of action ¹

Granovetter’s (1985) embeddedness argument is an important milestone in economic sociology, where researchers seek to integrate but not combine elements of economics and other social sciences into one integrated theoretical system (Etzioni, 2010). The majority of social life revolves around a non-economic focus, in which economic and non-economic activities are mixed, though non-economic activities affect the costs of economic activities and the technologies available. In

¹ Burt (1982) has defined the four elements of action, where despite similarities also certain fundamental differences exist. In first of those he defines that there exists persons, or actors who are capable regardless of the other actors, while in the second he claims that the actor has a total control of the private property in the form of goods and labour, with third element highlighting each actor’s motivation to engage in activity he or she regards as important from personal viewpoint, and finally the actor’s capability to evaluate the utility of alternative actions that is expected to produce the greatest personal gratification.

that sense, the economy's *social embeddedness* (Granovetter, 1985) describes the extent to which economic action is linked to or depends on actions or institutions that are non-economic in content, goals, or processes (Granovetter, 2005.) As a common example of social embeddedness, according to Granovetter (2005), a culture of corruption may impose high economic costs and require many off-the-books transactions to carry out the normal production of goods and services. In this case, the negative aspects of social embeddedness overshadow its more important, non-economic motivations (Granovetter, 2005).

Granovetter (1985) described how similar approaches resemble his work in their emphasis on how social connections affect purposive action, including Marsden's extensions of Coleman's theories. While the first of those extensions modify Coleman's model of collective action (Marsden, 1981), the later extension modifies Coleman's model of purposive action to encompass circumstances that occur in a situation in which actors have imperfect access to one another and thus are purely atomistic (Marsden, 1983).

1.3 Planned contribution of the study

The present study makes primarily empirical contributions. These can be considered more relevant than theoretical contributions, as empirical contributions may have more far-reaching theoretical implications than their many self-proclaimed theoretical counterparts (Ågerfalk, 2014). According to Ågerfalk (2014), empirical findings need to be interpreted and related to theoretical concepts and previous research, but they do not have to make a substantial theoretical contribution, and their value should even be acknowledged at the expense of theoretical contributions in the short term. Kilduff (2006) likewise told that the road to good theory leads not through gaps in the literature, but rather through engagement with problems in the literature.

Therefore, the purpose of this research is to personally engage with the problem, that is, the emergence of social embeddedness in the economic actions of start-ups' cohesive networks, and thus point the way to good theory, even at the expense of short-term theoretical contributions.

1.4 Methodological approach and empirical setting

The present study follows a qualitative, multiple case study research method. The qualitative approach allows the streamlining of interplay between people and

researchers, making it possible for researchers to understand the social context in which people live (Myers, 1997). The development of qualitative research methods has its origins in social sciences, with the purpose of studying social and cultural phenomena (Myers, 1997). The case study approach likewise encourages the examination of real-life phenomena in their natural settings, thereby allowing the researcher to retain their holistic and meaningful real-life characteristics (Yin, 2009). In each of these methods, the need for a case study approach rises from a willingness to understand complex social phenomena. Case studies are often used when longitudinally studying complex phenomena, or when complex units need to be studied intensively (Benbasat et al., 1987).

Another important argument in favour of the case study approach is its suitability in analysing interview material, including half-structured (i.e. theme) interviews (Hirsjärvi & Hurme, 2000). Half-structured interviews do not set strict boundaries in terms of choosing qualitative or quantitative research, nor do they require exact questions, a pre-determined subject depth, or a certain number of interviews (Hirsjärvi & Hurme, 2000). This point is very important for the present research, as no exact questions were presented to the interviewees, who all had some knowledge of how their academic or software start-up industry and its social networks operate.

The purpose of this study is not to conduct a longitudinal analysis or generalize the results to a larger population, but rather to utilize a socio-historical and thus extended and variable concept of time, which goes beyond the action that is the focus of the analysis (Swedberg et al., 1987) (See also Section 4.3 about case study research method). In this way, the case study method further suits the rapid changing of the information systems field, where several new topics emerge each year to provide valuable insights using case research (Benbasat, 1987). Naturally this development in information systems has accelerated into new heights. The number of newly founded start-ups has also dramatically increased, as has the number of business development support services, i.e. non-financial services and products offered to entrepreneurs at various stages of their business needs. This rapid development thus necessitates a qualitative case study research method.

1.4.1 Theory-testing research

The present qualitative case study does not aim to build a new theory but to replicate a past one, representing a normal procedure in economic sociology and embeddedness research. Theory testing is another potential contribution of

qualitative methods (Doz, 2011), and theory testing with cases is the process of ascertaining whether the empirical evidence in a case or in a sample of cases supports or does not support a given theory (Hak & Dul, 2009). This kind of research may not always produce new and significant insights, but instead yield modest results should it replicate past theory (Eisenhardt, 1989), extend or challenge the past theory's validity or establish its applicability boundaries (Doz, 2011). Theory testing with cases is the process of ascertaining whether the empirical evidence in a case or in a sample of cases either supports or does not support a given theory (Hak & Dul, 2009). However, Løkke and Sørensen (2014) questioned the appropriateness of case studies, mentioning that they as a tool for theory testing are still controversial, and discussions about the weaknesses of such research designs have previously taken precedence over their strengths. Colquitt and Zapata-Phelan (2007) noted that articles in which predictions are grounded in past conceptual arguments offer a moderate level of theory testing, but the arguments may not have been developed or refined enough to constitute true theory, nor do they provide a comprehensive picture of the phenomenon of interest.

The present study's purpose is to test the validity of Granovetter's (1985) embeddedness argument and compare the prediction that the theory makes about social embeddedness in the cohesive networks of academic and software start-ups, and either extend or challenge the theory's validity, or establish its applicability. Naturally, either or all of these are possible, but the last is more realistic, particularly as Granovetter's (1985) argument has never before been tested in the empirical start-up environment to establish its applicability.

1.4.2 Choice of empirical environment

Finland, particularly the Oulu region, is an interesting primary target for empirical research, since it has a long and significant history in the software industry. The Finnish start-up business ecosystem developed immensely due to Nokia's great success in recent years (Wallin et al., 2016). The ICT innovation threads beginning in Oulu were significant for the region, but their influence was not limited to the region of origin, but rather could be spun together with other threads (Oinas-Kukkonen et al., 2009). Over the last 5–10 years, a large number of start-ups have been established in the Oulu region, as well as in other parts of Finland. When choosing the right empirical environment (e.g. business accelerators, innovation centers, science parks, etc.), it is important to ensure a relatively dense firm population, which implies dense networks (cf. Wigren-Kristoffersen et al., 2022).

This implies the presence of primarily academic start-ups that aim to commercialize basic research results, and that there are transactions related to technological commercialization and innovation development. This involves, for instance, the founders of academic start-ups in the biopharmaceutical or an equivalent field, where rich opportunities stem from scientific research, commercialization, and entrepreneurship.

Business accelerators are also relevant because they help build a business team, fine tune an idea and mentor the business from idea conception, through the prototype phase and all the way to product development (Radojevich-Kelley & Hoffman, 2012). This type of empirical environment is particularly interesting, because economic actions, such as fine tuning an idea, are likely to generate dense cohesive networks, and most accelerators provide encouragement, assistance and help with technical issues, as well as a safe environment to share ideas or methods (Radojevich-Kelley & Hoffman, 2012).

Generally, the empirical environments in the present study must be suitable to theory-testing research. The empirical environment also decreases the risk of hindsight and success bias, although studying actual business founders in retrospect does involve these risks (Delmar & Davidsson, 2000). However, this may be a minor problem, as the socio-historical time concept in use goes beyond the action that is the focus of the analysis (Swedberg et al., 1987). This is one of the key points of the present study, because academic and software start-ups may have great differences in their business operations, especially during their first few years.

1.5 Research outline

The rest of this study proceeds as follows. In Chapters 2 and 3, the relevant body of literature is reviewed. Chapter 2 includes previous research on academic and software start-ups, and cohesive networks. First is an overview of start-up business in Section 2.1. This is followed by an analysis of the software start-up literature in Section 2.2, and development challenges in software start-ups in Section 2.3. In Section 2.4 the previous research on academic start-ups is addressed, followed by an overview of cohesive networks in Section 2.5, and cohesive networks in start-up development in Section 2.6.

Chapter 3 deals with the theoretical body of literature specifically relevant to the present research. Section 3.1 provides an overview of the embeddedness concept, followed by that of Granovetter's embeddedness argument and social

relations in Section 3.2, and the evolution of the concept of embeddedness in Section 3.3. Finally, this study's a priori model is presented in Section 3.4.

Chapter 4 describes the research methodology, with the first section introducing the philosophical perspectives of this study, followed by an outline of the qualitative research methods in Section 4.2. This is followed by a discussion of the case study research method in Section 4.3, case study research strategies in Section 4.3.1 and case study design in Section 4.3.2. Section 4.4 introduces the components of the research design, with the questions of the study outlined in Section 4.4.1, the study propositions in Section 4.4.2, the units of analysis in Section 4.4.3 and the linking of data to propositions and criteria to interpreting the findings in Section 4.4.4. Finally, Section 4.5 explains the data collection.

Chapter 5 covers the empirical analysis performed. Section 5.1 analyses the economic actions in academic start-ups' cohesive networks, with the founding team's economic actions outlined in Section 5.1.1, the founder's role as a visionary person stated in Section 5.1.2, and coaching and mentoring activities given in Section 5.1.3. Section 5.2 assesses the economic actions in software start-ups' cohesive networks, with entrepreneur communities' economic actions addressed in Section 5.2.1, economic actions with peers in Section 5.2.2, experienced colleagues as development support in Section 5.2.3, friendship, and partnerships as development support in Section 5.2.4, and intrapreneurship and business learning activities in Section 5.2.5.

Chapter 6 presents the discussion. Section 6.1 summarizes the key findings, and Section 6.2 provides answers to the research questions. Section 6.3 outlines the methodological implications, followed by empirical contributions in Section 6.4. Finally, Section 6.5 gives managerial recommendations.

Chapter 7 summarizes the conclusions. Section 7.1 outlines the study limitations, and Section 7.2 gives recommendations for future research.

2 Software start-ups, academic start-ups and cohesive networks in start-up development

This chapter reviews previous research on software start-ups, academic start-ups, and cohesive networks. First is an overview of start-up business in Section 2.1. This is followed by an analysis of the previous literature on software start-ups in Section 2.2, and development challenges in software start-ups in Section 2.3. Section 2.4 addresses extant studies on academic start-ups, followed by an overview of cohesive networks in Section 2.5, and cohesive networks in start-up development in Section 2.6.

2.1 Start-ups: An overview

Paternoster et al. (2014) indicated that entrepreneurship in its modern form was born more than three decades ago (Storey, 1982). Consumer internet markets later started their development in the mid-1990s, culminating in the “internet bubble” phenomenon caused by the internet stock market crash between January 1998 and December 2000 (Ofek & Richardson, 2003). We now live in a world of easy-to-access, ubiquitous internet, where high technology, such as mobile devices, have made it possible to lower the barrier for new entrepreneurs to enter the market. This period, which Paternoster et al. (2014) labelled the “start-up bubble”, has formed a solid base for the modern start-up ecosystem to grow. What generally differentiates a start-up and a big company is a bright and burning vision, a hope of something that could be and a goal that only few others are able to spot (Blank, 2020).

In contrast to larger organizations that focus more on costs, start-up organizations emphasize revenue generation through a specific technology (Latham, 2009). Instead of taking time to build a balanced plan, start-up entrepreneurs choose either a technical or sales strategy (Nobel, 2011). There exist many types of start-ups, which can be categorized as SMEs (small and medium-size enterprises), which focus on local markets, and IDEs (innovation-driven enterprises), which look at global markets (Aulet & Murray, 2013). The contemporary start-up research has already distinguished those companies that aim to global markets, from those that invest in products, services, and increase of customer base (Rasmussen & Tanev, 2015).

Possibly the most visible difference between start-up companies and established firms is that start-ups are small, recently formed and need to survive with just a few available resources (Coleman & O’Connor, 2008; Crowne, 2002;

Paternoster et al., 2014; Ries, 2011; Sutton, 2000; Yoffie & Cusumano, 1999). Start-ups also often try to access high-potential target markets, but they have limited people, funding resources and time schedules (Bosch et al., 2013). Newly founded start-ups thus have very high failure rates (Marmer et al., 2011), and for this reason are marked with unpredictable and uncertain functions (Heitlager et al., 2006; Paternoster et al., 2014; Ries, 2011), and low-experienced teams (Giardino et al., 2014). In a start-up business, the founder is the person who first discovers the existing business opportunity, then gathers a team of experts (Ensley et al., 2006). The ability to cooperate and work well together is critical to team's success (Barsade, 2002). The founder is also the person who gives the team freedom to act the way they want, including the opportunity to learn more about what entrepreneurship is (Ries, 2011). It is typical for an individual to identify an existing business opportunity, after which he or she must create a vision and goals for the new company to be created, as well as involve all the necessary parties (Ensley et al., 2006).

In addition, business accelerators help build a business team, fine tune an idea and mentor the business from idea conception, through the prototype phase and all the way to product development (Radojevich-Kelley & Hoffman, 2012). Most accelerators provide encouragement, assistance and help with technical issues, as well as a safe environment to share ideas or methods (Radojevich-Kelley & Hoffman, 2012). The single biggest difference to business incubators is that a business accelerator offers much more than an incubator; it is a full partnership (Fishback et al., 2007).

2.2 Software start-ups

Software start-ups (Figure 2) are still a relatively new phenomenon in entrepreneurship research, despite a vast number of such firms having been founded. Carmel (1994) was one of the first to note that some young software package firms are more innovative and successful than others. Software start-ups differ from larger software firms, and possibly also from other start-ups (Suominen et al., 2017). Software start-ups are entrepreneur-centric small firms characterized by entrepreneur role ambiguity, though the vision of a single entrepreneur's success has often been found to characterize these firms' early development (Crowne, 2002; Paternoster et al., 2014; Sutton, 2000). Certain confusion also exists in the definitions of the roles that entrepreneurs have, with start-up team members giving themselves different descriptions such as "CEO" or "engineer" (Wang et al., 2016).

Perhaps the most obvious differentiating factor is that software start-ups are young firms with approximately two founding members (Giardino et al., 2015), and are often initiated by a visionary entrepreneur who later assembles a team around that vision to start the business (Crowne, 2002). The start-up leader is a key component of the software development team; a stellar leader acts as a cohesive force in a team with diverse competencies, ensuring that ensuring that the team reaps the most benefits (Sutton, 2000). Despite their relatively long existence, both the knowledge management literature and the software process improvement literature have not yet fully addressed the start-up phenomenon. The tendency among software process improvement practitioners, however, is slowly shifting towards smaller firms that also include software start-ups (Larrucea et al., 2016.) Software start-ups represent a global phenomenon, with most coming from the United States (Giardino et al., 2015), and feature web applications that represent many development methods (Wang et al., 2016).

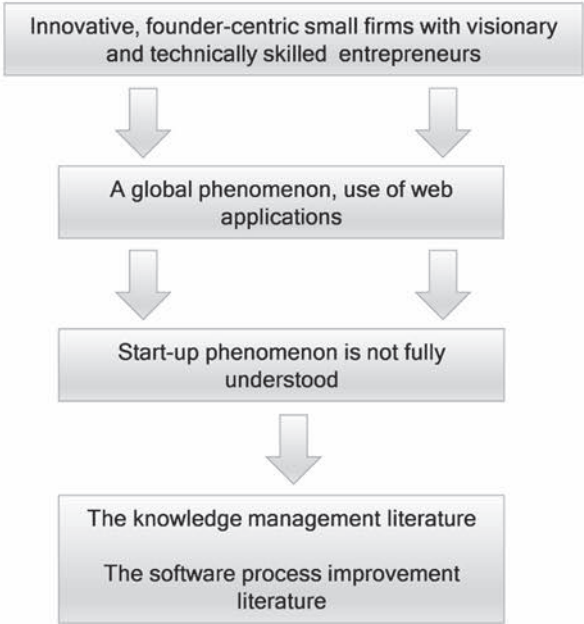


Fig. 2. Software start-ups.

Although not specific to start-ups, the technical skills of an entrepreneur strongly determine the product or service that he or she offers in the marketplace (Oakey,

2003). However, not all entrepreneurs are likely to exploit their opportunities with the same expected value (Shane & Venkatamaran, 2000). Therefore, entrepreneurship is not merely an economic process but draws from the social context, which shapes and forms entrepreneurial outcomes; as a result, the entrepreneurial process is really value-gathering (Jack & Anderson, 2002). Both “hard skills”, such as project management, and “soft skills”, such as politics and networking, can prove vital when creating a start-up in an often “roller coaster-like” early stage (Marion, 2016).

The start-up company path, from idea conception to maturity, has been reported in the literature from various perspectives (Paternoster et al., 2014). Often the initial start-up phase is the most examined in software start-up research literature. Crowne (2002) defined the start-up phase as falling between product conception and the first sale. Crowne (2002) also claimed that central to all software product companies is that they start with an entrepreneur and a vision. The entrepreneur first seizes a market opportunity, then uses skills to exploit that technology to satisfy it, and later gathers a small team of experts with needed skills to build the product. Crowne (2002) further stated that young software firms rapidly communicate, highly value commitment and energy, and take care to establish working practices. Leaving out this step can lead to a situation where they cannot scale to a larger organization and are thus not as apt to change.

2.3 Development challenges in software start-ups

Sutton (2000) was among the first to define the problems that specifically software start-up companies face. According to Sutton (2000), software start-ups have either little or no operating history, limited resources, multiple influences that can affect their decision making and often are forced to utilize disruptive technologies. For instance, a new technology initially embraced by the markets’ least profitable customers to tackle radical technical change and innovation can unexpectedly displace an established technology, rather than the established technology undergoing incremental improvements (Christensen, 1997). However, in the current dynamic global market, disruptive innovations are no longer enough: evolutionary innovations are also needed to achieve breakthroughs (Lee et al., 2012).

With this increased global competition, relatively few businesses can achieve success in the start-up world. This is highlighted, for instance, in the many challenges that internet start-ups face (Marmer et al., 2011). According to the

Startup Genome Report Extra on Premature Scaling (Marmer et al., 2011), with data from 650+ Silicon Valley web start-ups, 74% of high growth internet start-ups fail due to premature scaling. This can result, for example, from start-ups overdeveloping their product (Marmer et al., 2011). Therefore, while particularly small start-ups may benefit from the creation of disruptive innovation (Ries, 2011), there is a fine line between creativity and failure. In a multiple case study, Giardino et al. (2015) described how early-stage start-ups are still too keen to develop mature products without understanding the business problem, so when it comes to validating the problem/solution fit they rather continue to develop software than focus on the learning process.

Software start-ups are prone to various challenges during their early development, with this phase relatively well-reported in several studies. For instance, lack of resources, including human resources, are most often reported as extremely limited in software start-ups (Carmel, 1994; Coleman & O'Connor, 2008; Crowne, 2002; Paternoster et al., 2014; Ries, 2011; Sutton, 2000; Yoffie & Cusumano, 1999). More people may need to be hired later for the development phase, but often that comes with a shortage of money. Software start-ups must therefore survive with limited resources, personnel and time (Coleman & O'Connor, 2008). Wang et al. (2016) found that the three main challenges software start-ups endure are product building, customer acquisition and funding. Another study claimed that product and market challenges represent 30% of all their challenges (Giardino et al., 2015), though they may also have critical challenges during their early stages (Wang et al., 2016). Figure 3 lists the development challenges that software start-ups can face. In contrast with larger firms, software start-ups are forced to develop innovative software products while under time pressure and with scarce resources, forcing them to constantly search for sustainable and scalable business models (Berg et al., 2018). Wang et al. (2016) told that the current software engineering literature offers very limited understanding of the challenges in the software start-up context, so it is possible that other research perspectives, such as networking, may better clarify that understanding.

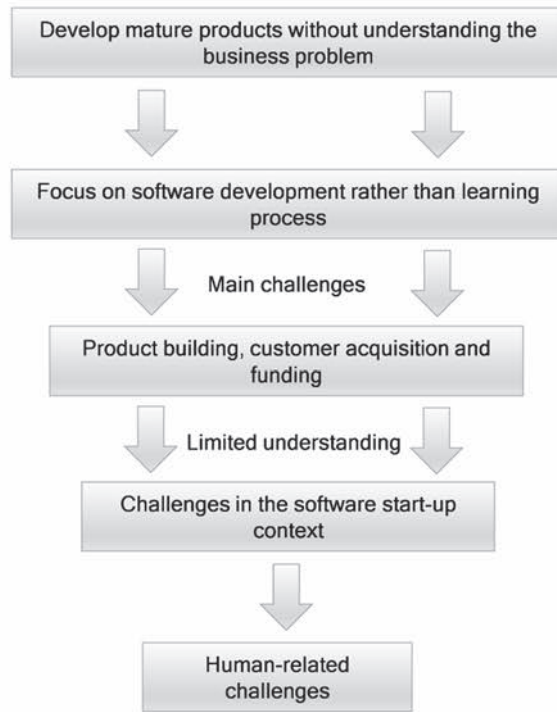


Fig. 3. Development challenges in software start-ups.

Founders of software start-ups face development challenges as well, despite their passionate behaviour forming one of the key determinants of start-up success (Giardino et al., 2014). Start-up founders are often young and inexperienced, and have resource limitations (Edison et al., 2015). Still, they usually need to quickly deliver their product to survive (Coleman & O'Connor, 2008). Therefore, although start-ups often have entrepreneurs filled with youthful energy and sheer willpower who use their creativity and new ideas to direct the company to market, it is just that attitude that often turns against them (Yoffie & Cusumano, 1999).

Generally, start-ups face a series of new and unique challenges (Paternoster et al., 2014), but few of those challenges have yet been identified in the literature. There thus exists a certain lack of knowledge about the processes to which software start-ups' challenges are related (Paternoster et al., 2014). Not much research has been published about human-related challenges in start-ups either, especially when compared to the well-documented software engineering themes. Particularly development challenges that refer to the founder's role in software start-ups are not

well-understood, although challenges that start-up founders face have been reported in previous research. For instance, whether a founder's passionate behaviour and other personal characteristics are linked to limited human resources is one question often less addressed in software start-up development. This is interesting, because software development generally is human-intensive in its nature (Lavazza et al., 2015; da Cunha et al., 2016).

Academic start-ups may provide researchers an interesting contrast to software start-ups, not least because great differences may exist in the availability of knowledge, innovation, human resources and networks during their first few years.

2.4 Academic start-ups, resources and networks

Rothaermel et al. (2007) described the rapid expansion in the literature on university entrepreneurship in both the United States and Europe, though also the fragmentation of that literature. Goji et al. (2020) found that case studies of biopharmaceutical start-ups suggest that the biopharmaceutical field has rich opportunities stemming from scientific research, commercialization, and entrepreneurship (Figure 4). Therefore, university scientists who create patents in, for instance, biotechnology start-ups presumably have more opportunities to enter the private sector than other scientists (Goji et al., 2020). Generally, universities have complex objective activities that involve a variety of educational and societal goals, as well as the interests of faculty members and the wider scientific community (Bercovitz & Feldmann, 2006), but no one has greater knowledge about the technology than the academic which speeds up market access (Nicolaou & Birley, 2003). Accordingly, product, process, organization, market, and resource innovation are enabled by the novel combination of existing knowledge, capabilities, skills and resources (Navarrete, 2019).

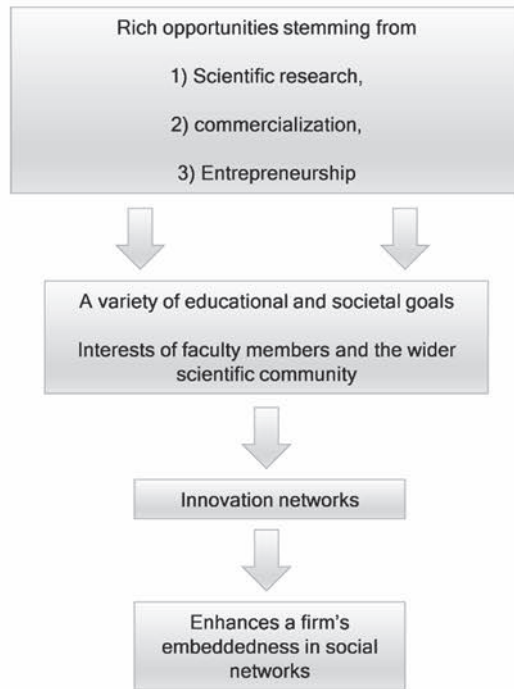


Fig. 4. Academic start-ups.

The evolution of entrepreneurial activity in the scientific community provides a fruitful opportunity for researchers to empirically explore the effects that social structures have on professional conduct (Stuart & Ding, 2006). Stuart and Ding (2006) empirically examined how measures of social proximity interact with other characteristics of scientists' work contexts and the broader institutional environment to jointly affect the likelihood that a scientist becomes an entrepreneur. The scholars found that relationships among members of a professional community constitute thick pipes that direct the flow of everything from task-relevant information to advice, gossip, opinions and referrals. Recently, Goji et al. (2020) made an interesting notion about the earlier literature, where resource-based theory (e.g. Conner & Prahalad, 1996) describes the commercialization of academic research: specifically, resources that enable start-up creation include knowledge assets, intellectual property assets, financial assets, social capital assets, personal assets and organizational assets. They also mentioned Rothaermel et al. (2007), who reported that university policy, faculty, technology transfer offices, investors,

founding teams, networks in which a firm is embedded, and other external conditions affect new firm creation.

Rothaermel et al. (2007) further noted research on innovation networks that highlights the benefits of such networks for technology-based firms, including that innovation networks enhance firm embeddedness in social networks and increase their survival (Lockett et al., 2003; Murray, 2004). Social networks play a protagonistic role in organisational emergence and facilitate organisational emergence by providing four substantive benefits, by: 1) augmenting the opportunity identification process, 2) providing access to a locus of resources, 3) engendering timing advantages, and 4) constituting a source of status and referrals (Nicolaou & Birley, 2003). In a rare case study from Finland, Autio and Yli-Renko (1998) studied five Finnish technology-based firms and encouraged researchers to explore the effects of social embeddedness on economic actions in the university invention network context. The systemic evolution model served as an interpretative scheme for the case studies. The authors analysed the mechanisms through which new technology-based firms become immersed in innovation and manufacturing networks, and thereby arrived at the concept of embeddedness.

University entrepreneurship represents a relatively new phenomenon among entrepreneurship research, and therefore has great potential to raise new information about the transactions that are related to technology commercialization and innovation development. The same applies to the environmental context, including networks of innovation, which has become one of the major research streams among university entrepreneurship (Rothaermel et al., 2007). This includes how innovation networks enhance a firm's embeddedness in social networks and increase its survival (Lockett et al., 2003; Murray, 2004). In this way, academic start-ups can more easily access networks and several important resources, especially when compared to software start-ups. Human resources are one of those resources that university spin-offs can rather easily access in certain environmental contexts of innovation. Rothaermel et al. (2007) mentioned science parks as links of technology transfer through spin-offs, research collaborations, and informal points of accessibility to various resources, including human resources (Quintas et al., 1992; Vedovello, 1997; Siegel et al., 2003). However, Quintas et al. (1992) suggested that the science park model itself is problematic. Therefore, despite university science parks are alleged to stimulate technological spillovers, there is a lack of empirical evidence on the impact of these facilities on research productivity (Siegel et al., 2003).

Generally, software and academic start-ups have great differences in their initial networks, people and resources such as human resources. Most scholars have highlighted the benefits of their related cohesive and sparse networks, though simultaneously failed to analyse their detrimental effects (Alguezaui & Filieri, 2010). According to Adler and Kwon (2002) the closure view may need to be complemented by the bridging view that addresses the structural holes, i.e. sparse networks that allow certain persons to create more opportunities compared to others in the network (Burt, 1997). Indeed, cohesive networks may provide researchers better possibilities to combine the development perspectives of academic and software start-ups. However, this requires researchers to carefully consider their theoretical approach for the purpose of the analysis. Sparse networks are simply too complex to combine with cohesive networks.

2.5 Cohesive networks: An overview

According to Alguezaui and Filieri (2010), a network is cohesive when all actors in the same network context are connected to each other. Podolny and Baron (1997) studied immigration networks and found that cohesive networks greatly differ from diverse, disconnected networks in their clear normative order, which makes it possible for individuals to optimize performance. In contrast, in diverse networks individuals are exposed to conflicting preferences and allegiances, which makes it much harder to optimize. In cohesive networks both the volume of the information flow and the motivation to share relevant novel information are greater (Aral & Van Alstyne, 2011), with redundant information delivered across channels (Burt, 2000). Actors in dense and cohesive networks typically internalize norms that discourage free riding and emphasize trust (Granovetter, 2005). Network density is also lower in all equal, larger groups, because people have cognitive, emotional, spatial and temporal limits on how many social connections they can maintain; indeed, in those larger groups there exists a lower capability to crystallize and enforce norms, including those against free riding. (Granovetter, 2005).

It is thus possible for actors in structurally cohesive networks to facilitate a collective sense of shared experience across network actors, even when those actors only interact with a limited number of others (Podolny & Baron, 1997). The network may also constitute a common focus for actors (Collins, 1993), allowing positive emotions to spread across different relations and make the network salient as a group entity (Barsade, 2002). The collective sense of common experiences should be even stronger in structurally more cohesive networks (Thye et al., 2011).

In studying the context of positive emotion and reduced uncertainty, Thye et al. (2011) found that actors come to perceive the network itself as a group. In more general terms, Thye et al. (2011) theorized, a collective sense of shared experience among network actors follows higher structural cohesion and the processes it unleashes.

2.6 Cohesive networks and start-up development

Cohesive networks are, in many ways, beneficial to start-ups' early development and the collection of important resources (Figure 5). Alguezaui and Filieri (2010), for instance, noted that proponents of the cohesive approach argue that dense networks provide numerous benefits to innovation in terms of trust, redundant information channels, risk-sharing attitude, and easy resource mobilization. In the early stages of start-up development, strong ties such as family connections, friendships and previous working environment may be more beneficial, as they enable firms to acquire important resources to establish their foundations (e.g. financial and human resources, emotional support, etc.; Gargiulo & Benassi, 1999).

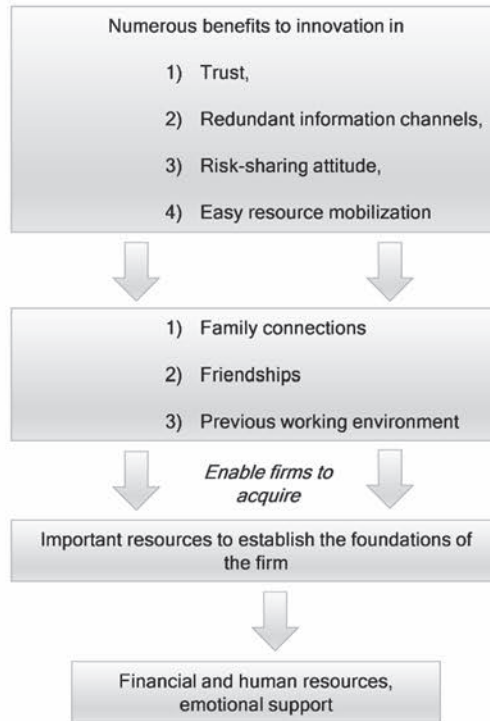


Fig. 5. Cohesive networks and start-up development.

However, later in start-up development, strong ties no longer bring these benefits. Algezau and Filieri (2010) highlighted that firms that are embedded within a cohesive network are compelled to maintain strong ties with partners that are no longer beneficial; as a result, they incur higher costs for maintaining these relationships, and cohesiveness prevents the development of new relationships. Therefore, in a later stage of the firm's life cycle, it may be over-embedded within its network of strong ties, which creates a liability that inhibits the start-up from sensing emerging opportunities and realizing potential development (Gargiulo & Benassi, 1999), and it may be difficult for a firm with an overembedded network for instance to pick up new information (Swedberg, 2010). Cohesive networks, despite being instrumental in the manager's identity within the organization, may also limit his or her flexibility in developing the type of social capital essential for his or her later professional growth, as well as the capacity to add value within the organization (Gargiulo & Benassi, 2000).

For entrepreneurs to maximize their social capital benefits, connections to networks must fill in for resources that are otherwise in short supply (Adams et al., 2014). Accordingly, entrepreneurs use both strong (cohesive) and weak (diverse) ties to find new opportunities (Martinez & Aldrich, 2011). Both cohesive and sparse networks are thus important for firm performance when they are aligned with and address firms' evolving resource challenges (Hite & Hesterley, 2001). However, unlike cohesive networks, sparse networks provide the benefits of accessing to novel knowledge at the expense of effectively exchanging tacit and rich knowledge (Algezau and Filieri, 2010).

So far, start-up research has mostly examined cohesive network ties and social capital benefits, i.e. micro theories of exchange. However, the concept of embeddedness provides researchers an alternative perspective to understand start-up development and the evolving resource challenges in cohesive networks' empirical context. This is because there is no need to focus on the effects of social embeddedness but rather on its emergence. Per a recent comprehensive review (Wigren-Kristoferson et al., 2022), the literature supports the notion that embeddedness is important for understanding entrepreneurship and entrepreneurs, and it does not necessarily support understanding of how or why embeddedness takes certain forms. The authors then recommended turning to process and practice theories.

This is relevant, because like all individuals, entrepreneurs are, to different degrees, embedded (or not) in contexts, and these contexts create the environment we interact with (Jack & Anderson, 2002; Wigren-Kristoferson et al., 2022). Embedding is the mechanism whereby an entrepreneur becomes part of the local structure, which enables them to draw upon and use resources, and where given contexts make it possible to handle liabilities of newness (Wigren-Kristoferson et al., 2022). Enhanced trust and reciprocity therefore motivate exchange partners to share their private information as a primary economic consequence of embedding economic exchange in social attachments (Uzzi & Lancaster, 2004).

Generally, embeddedness consists of several arguments that are prominent among research paradigms that provide revitalized alternatives to prevailing modern traditions (Dacin et al., 1999), particularly micro theories that have been dominant in cohesive network research. However, each of these arguments provides a slightly different perspective on start-ups development within the empirical cohesive network context, and in evolving resource challenges within that social structure. The researcher must then consider whether the chosen argument best supports the practising of that theory in a given empirical

environment, and whether it is the structural mechanism or the overall characteristic of the structure.

3 The concept of embeddedness, Granovetter's embeddedness argument and embeddedness theory evolution

This chapter discusses research on the concept of embeddedness and Granovetter's embeddedness argument. Section 3.1 provides an overview of embeddedness, Section 3.2 discusses Granovetter's embeddedness argument and social relations, and Section 3.3 presents the evolution of the concept of embeddedness. Finally, the a priori model for this research's empirical analysis is shown in Section 3.4.

3.1 The concept of embeddedness: An overview

Polanyi (1957, as cited in Uzzi, 1997) used the concept of embeddedness to describe the social structure of modern markets. Research on embeddedness has since become an exciting area in sociology, mainly due to its ability to advance our understanding of how social structure affects economic life (Uzzi, 1997). A group of critics emerged from various scientific fields to emphasize the embeddedness of economics in social and cultural forces, including markets, historians and sociologists, while others argued for the importance of integrity between markets and social structure (Powell, 1990). Sociologists have therefore developed a viewpoint where markets consist of ongoing relationships among concrete actors, instead of maximizing atomistic seller responses to impersonal market signals (DiMaggio, 1990). This is interesting, because in small firms, ongoing relations are established at various levels to capture the benefits of integration, but without the need to sacrifice autonomy (DiMaggio, 1990)

Embeddedness refers to the social, cultural, political, and cognitive structuring of decisions in economic contexts, demonstrating the inseparable connection of the actor to his or her social environment (Beckert, 2009). Polanyi (1944) originally used the term *embeddedness* to express the idea that the economy is not autonomous, as it must be in economic theory. Rather, embeddedness is subordinate to politics, religion, and social relations (Polanyi, 1944), although this subordination is not complete, and the ravages of the market are unacceptable even to capitalist elites. In response, the state limits the market scope (DiMaggio, 1990). As Polanyi (1957) noted, the human economy "is embedded and enmeshed in institutions, economic and non-economic" (p. 250). Polanyi (1957) significantly added: "the inclusion of the non-economic is vital. For religion or government may be as important for the

structure and functioning of the economy as monetary institutions or the availability of tools and machines themselves that lighten the toil of labor” (p. 250). Krippner (2001) noted that embeddedness enjoys a privileged – and, as of yet, largely unchallenged – position as the central organizing principle of economic sociology that slowly acquired its identity during the twentieth century, becoming a distinct field of sociological inquiry (Swedberg et al., 1987; Figure 6).

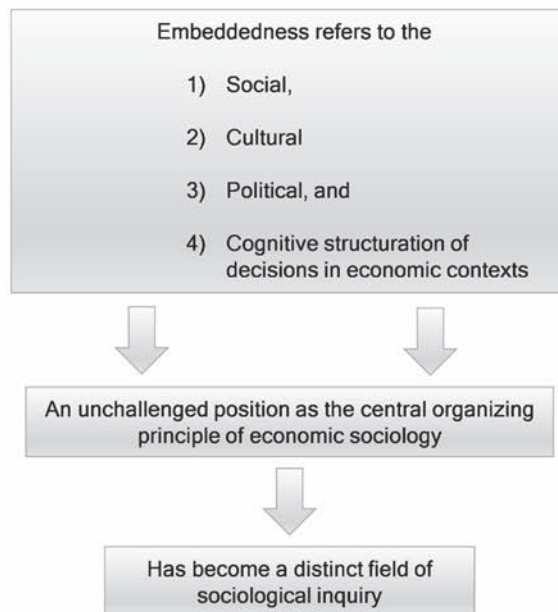


Fig. 6. The concept of embeddedness: An overview.

Dacin et al. (1999) told that embeddedness arguments are prominent among research paradigms that provide revitalized alternatives to prevailing modern traditions, though much of embeddedness research also seeks to demonstrate that market exchange is embedded in, and defined by, larger and more complex social processes (Barber, 1995; DiMaggio, 1990; Granovetter, 1985; Portes & Sensenbrenner, 1993). In short, embedded research offers the potential to gain insight into these arguments by highlighting both nested and constitutive aspects of context. In the same vein, experts in international management, technology management, organizational culture and cognition, teams, industrial economics, and entrepreneurship find embeddedness approaches useful for providing insights

into growing embeddedness research based on these different traditions (Dacin et al., 1999).

Granovetter (1985) in particular paved the way for later works in contemporary economic sociology. This publication, which adapts Polanyi's mid-century writings, stands out from sociological subfields with its clearly defined research program and internal coherence. Although economic sociology has undoubtedly been influenced by its relation to economics in this respect, Granovetter's highly influential programmatic statement certainly contributed to this coherence as well (Krippner, 2001). It also allowed the term embeddedness to gain widespread acceptance as representative of the core unifying themes of the subfield, which began to take shape at roughly the same time (Krippner, 2001). That development, according to Woolcock (1998), brought about a change in the kind, not degree, of embeddedness.

3.2 Granovetter's embeddedness argument and social relations

According to Dacin et al. (1999), Granovetter (1985) viewed embeddedness as consisting of arguments against the primacy of both individual attributes and aggregate outcomes, as well as antithetical to the role of self-interest as the sole guide for action. Dacin et al. (1999) further emphasized that Granovetter argues for emphasis of the interplay between social structures and economic activity in industrial societies, because "all market processes are amenable to sociological analysis and such analysis reveals central, not peripheral, features of these processes" (Granovetter, 1985, p. 505). Actors therefore do not behave as atoms outside a social context, nor do they slavishly adhere to a script written for them by the particular intersection of social categories that they happen to occupy. Instead, firms are distinguished not so much by their "informal" or "formal" qualities, since elements of both already exist within them (Granovetter, 1985).

The majority of social life revolves around a non-economic focus, where economic and non-economic activities are mixed, and the latter affect the costs of economic activities and the technologies available. In that focus, *social embeddedness* of the economy (Granovetter, 1985) describes the extent to which economic action is linked to or depends on actions or institutions that are non-economic in content, goals or processes (Granovetter, 2005; Figure 7).

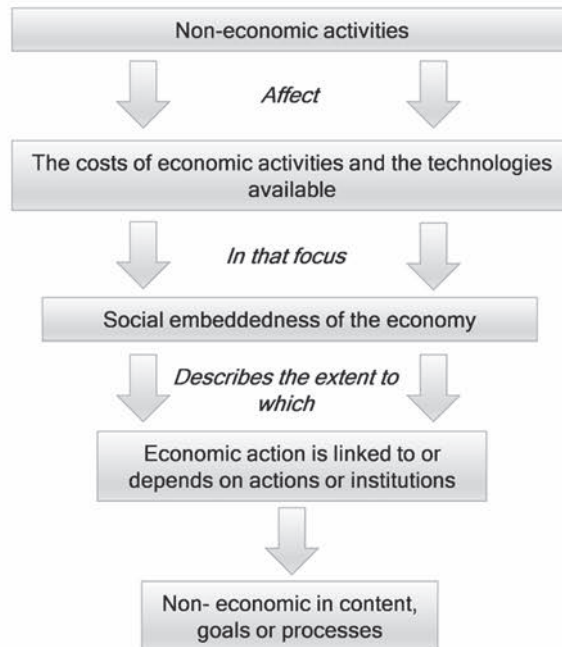


Fig. 7. Granovetter’s embeddedness argument and social relations.

Market and hierarchical relations are typically embedded in social relations, and to that extent all three types of relations are essentially *social* (Adler & Kwon, 2002). Granovetter (1985, as cited in Woolcock, 1998) also argued that all economic action is inherently enmeshed in social relations of one configuration or another, as the vehicles of trust and means to prevent malfeasance. Economic activity does not occur in a social vacuum, but rather is nested in patterns of economic and/or social relationships (Dacin et al., 1999).

The concept of social relations is distinct from the other two relation types (market and hierarchical). While (1) market relations, or “weak ties” (Granovetter, 1973), are described by either the monetary or bartered exchange of products and services, (2) hierarchical relations concern the exchange of obedience for authority over material and spiritual security, and (3) social relations are based on the exchange of favours and gifts (Adler & Kwon, 2002). Social relations also constitute the social structure underlying social capital; social capital is thus derived from the social relations that represent its source (Adler & Kwon, 2002). Granovetter (1985) argued that even diverse figures in the history of economic

research tend to take social relationships seriously, mentioning, for instance, Leibenstein (1976) and Becker (1976). In these instances, the authors described extremely stylized, average, “typical” interpersonal ties that lack reference to specific content, history or structural location.

Social relations are an interesting concept, but unlike the identification of the failures of the neoclassical model, it is much harder to develop an alternative scenario in which economic institutions are thoroughly integrated with social relations (DiMaggio, 1990). However, Nee (2005) made an interesting notion that, in contrast to transaction cost economics that emphasize hierarchies to solve the problem of trust, economic sociologists are guided by the embeddedness approach, and “pay careful and systematic attention to the actual patterns of personal relations by which economic transactions are carried out” (Granovetter, 1985, p. 504).

3.3 The concept of embeddedness: Evolution and critiques

DiMaggio (1990) noted that several significant differences exist between the way microeconomic theory and economic sociology look at economic reality. The scholar referred to how the paradigm crisis in neoclassical economics has created a gap for economic sociology to fill, with its focus on the notion of rationality, the theory of the firm and macroeconomic theory. Therefore, although orthodox economists have attempted to salvage the neoclassical model of the firm, it has become questionable due to its many challenges (DiMaggio, 1990). However, despite embeddedness providing a useful basis to understand the sociological failings of standard neoclassical schemes, it is vague especially in providing a concrete explanation of how social ties affect economic outcomes (DiMaggio, 1990; Uzzi, 1996). So, despite several researchers having managed to reopen space for social structures in the analysis of economic life (e.g. Block, 1990; Granovetter, 1985), the research gaps may only be possible to fill via extensive empirical research (Portes, 1993).

Beckert (2009) mentioned that embeddedness itself has undergone a great transformation since Polanyi (1944), and in the process significant meanings of the concept have vanished, while others have been added. Thus, despite the idea of the embeddedness perspective remaining fairly stable since Granovetter’s (1985) statement of “the problem of embeddedness”, a continuous evolution occurs in the way the concept itself is presented and defined, both in and outside of economic sociology (Dacin et al., 1999; Figure 8). Uzzi (1996) defended that the core statement that economic action is embedded in social relations, which sometimes

facilitates and at other times derails exchange, is vague, and developed a scheme based on existing theory and original ethnographic analysis that describes the features, functions, and sources of embeddedness. Dacin et al. (1999) also stated that social networks may facilitate interfirm exchange, but “social networks per se do not have content and as such do not entail interests, values, motives, beliefs”. When there is no reference to content, “it will be impossible to explain what kinds of social relations have what kind of effect on the behaviour of organizations and individuals” (Friedland & Alford, 1991, p. 252).

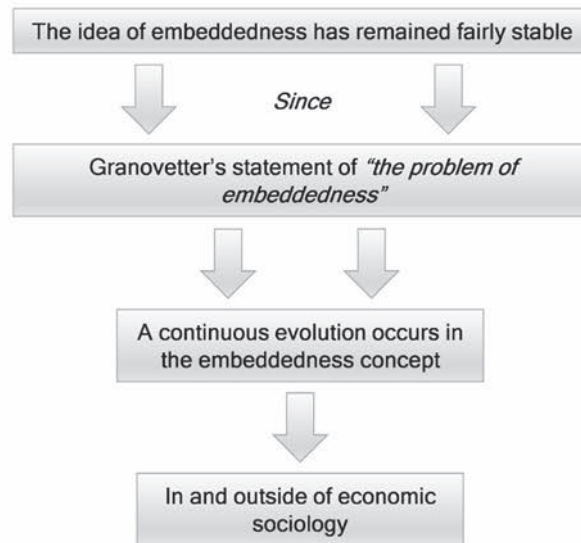


Fig. 8. The concept of embeddedness: Evolution and critiques.

DiMaggio (1990) argued that structural embeddedness, in its contextualization of economic exchange in patterns of ongoing interpersonal relations, also represents a more important form than either cultural or cognitive embeddedness. This dominant structural tradition focuses on inter-actor ties, or the linkages between the social actors, both firms and individuals, that comprise a wide variety of social network arrangements (Dacin et al., 1999). According to Uzzi (1996), structural embeddedness concerns the material quality and structure of ties among actors, and the structural embeddedness argument suggests that embedded ties provide the greatest access to the benefits circulating in the network. In structural embeddedness, *structure* refers to the way in which dyadic relationships are bundled

into tightly knit but mutually isolated cliques, rather than dispersed throughout the population (DiMaggio, 1990). In this way, embeddedness is constantly evolving, and Granovetter's (1985) seminal theory has continued to command attention that the author later refined in various writings (Smelser & Swedberg, 2005). One of those later studies provided a definition that according to Moody and White (2003) concerns the author's understanding of structural embeddedness as the degree to which actors are involved in cohesive groups:

[T]o the extent that a dyad's mutual contacts are connected to one another, there is more efficient information spread about what members of the pair are doing, and thus better [able] to shape behavior. Such cohesive groups are better not only at spreading information, but also at generating normative, symbolic, and cultural structures that affect our behavior. (Granovetter, 1992, p. 35)

An interesting discussion that was held in 2002 gathered a group of interdisciplinary scholars at the University of California, Davis, of which one session was devoted to clarifying embeddedness (Krippner et al., 2004). Views both for and against Granovetter's (1985) seminal embeddedness argument were presented. Krippner (2001), for instance, suggested that economic sociology has not settled for the legacy of its intellectual forebears, despite Granovetter's laudable attempt to distinguish the "new" economic sociology from the "old" economic sociology of Parsons and Smelser and others. In so tracing the transition between the two traditions, Granovetter becomes trapped by the limitations of the original formulations, which sharply separate the economy from society. The result is a poor analysis of both poles.

According to Nee (2005), Granovetter's embeddedness approach requires the construction of a taxonomy of structural contexts to become sufficiently abstract and generate a powerful analytical framework. In contrast, the classical sources of economic sociology, such as the writings of Weber, Schumpeter, and Polanyi, each outline analytical approaches that point to a broad institutional canvas of distal and deeper causal forces (Nee, 2005).

3.4 The a priori model

Figure 9 shows the a priori theoretical model used to empirically examine the emergence of social embeddedness in the economic actions of start-ups' cohesive networks, using Granovetter's (1985) embeddedness argument as a theoretical basis. The focus is on two distinct types of start-ups, academic and software.

Significant differences exist in their initial availability of knowledge, innovation, people and networks, which each may significantly affect their development during the first few years. In business environments, significant differences often exist in the initial availability of investors, founding teams, networks and embeddedness. Most interestingly, significant differences may exist in human resources, which the literature has reported to be extremely limited in software start-ups (Carmel, 1994; Coleman & O'Connor, 2008; Crowne, 2002; Paternoster et al., 2014; Ries, 2011; Sutton, 2000; Yoffie & Cusumano, 1999). Human resources thus represent a bottleneck in software start-ups' early development, providing an interesting starting point for empirical research. Furthermore, while academic start-ups have innovation networks that enhance their embeddedness in social networks and increase their survival (Lockett et al., 2003; Murray, 2004), software start-ups face challenges in product building, customer acquisition and funding (Wang et al., 2016). Cohesive networks are in many ways beneficial for start-ups' early development and resource acquisitions (Gargiulo & Benassi, 1999; Alguezaui & Filieri, 2010).

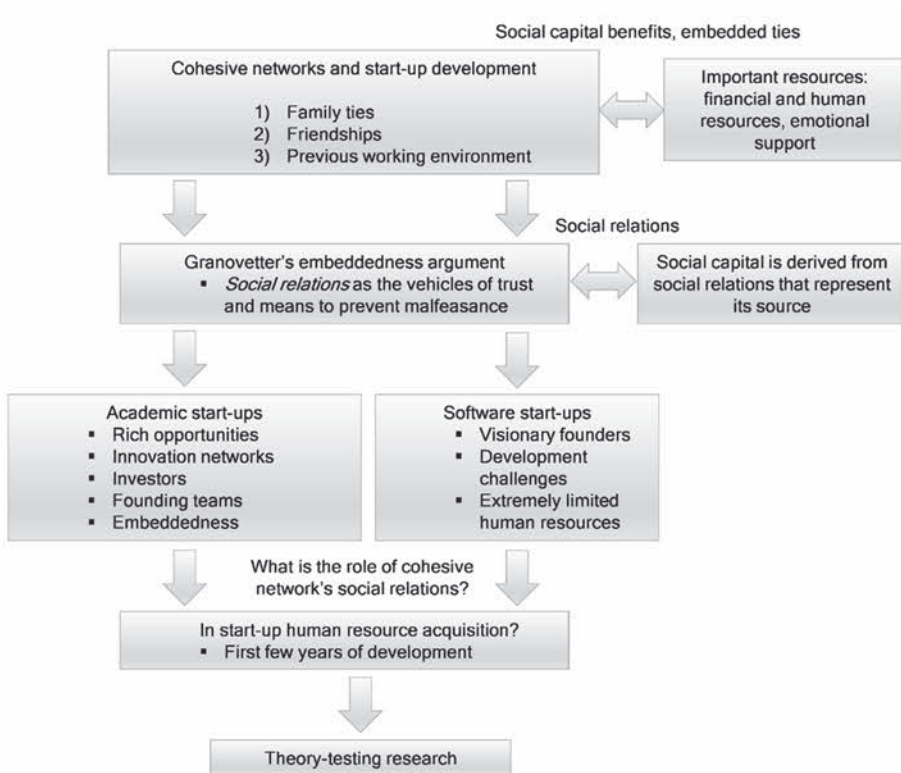


Fig. 9. The a priori model of the emergence of social embeddedness in start-up human resource acquisition.

There is no need to focus on the effects of social embeddedness but rather on its emergence. However, in both of these start-ups' literature streams, the emergence of social embeddedness in the economic actions of cohesive networks is poorly understood, particularly from Granovetter's (1985) embeddedness argument. Rather, micro theories of exchange and social capital benefits have dominated the research paradigm, as well as concepts such as social capital embeddedness (Portes, 1993) and the structural embeddedness argument (Uzzi, 1996), which suggest that embedded ties provide the greatest access to the benefits circulating in a network.

Granovetter's (1985) embeddedness argument is interesting, because unlike later theoretical concepts, it does not pay much attention to network ties and social capital, thus providing an alternative perspective. Rather, it emphasizes the role of social relations, whereas structural embeddedness concerns the material quality and

structure of ties among actors (Uzzi, 1996). This latter concept is too complex a theoretical approach for the present study, not least because it emphasizes embedded ties instead of social relations as the vehicles of trust and means to prevent malfeasance. Social relations constitute the dimension of social structure underlying social capital, meaning social capital is derived from social relations that represent its source (Adler & Kwon, 2002). However, Granovetter's (1985) embeddedness argument is also underdeveloped, and has received criticism both in and outside of embeddedness research. Still, this does not set limitations to empirical research, particularly when the purpose is to replicate the theory instead of developing it further. Theory-testing research may thus be relevant for present study's purpose.

4 Research methodology

This chapter introduces this study's research methodology. This includes the research philosophy behind the study and the qualitative exploratory case study research method used to capture the complexity of social embeddedness. Section 4.1 outlines the philosophical perspectives, and Section 4.2 gives an overview of the qualitative research methods. In Section 4.3 the case study research method is discussed, with the exact case study strategies used addressed in Section 4.3.1 and the case study design described in Section 4.3.2. Section 4.4 presents the components of the research design, with all study questions shown in Section 4.4.1, the study propositions in Section 4.4.2, the units of analysis in Section 4.4.3, and the linking of data to the propositions and criteria for interpreting the findings in Section 4.4.4. Lastly, Section 4.5 presents the data collection procedure.

4.1 Philosophical perspectives

This study adopts critical realism as its research philosophy, in relation to basic assumptions about reality and knowledge. Among critical realists is the assumption of the existence of a real world, although such an assumption cannot be proved or disproved (Easton, 2010), since social constructivists, pragmatists and even positivists are ready to present counterarguments. Although a relatively new orientation (Easton, 2010), critical realism has been applied in many fields, including economics (Lawson, 1997), sociology (Danermark et al., 2019; Sayer, 1997, 2004; Steinmetz, 1998) and criminology (Dawson & Tilley, 1997). According to Easton (2010), critical realism can be accompanied by case research. A critical realist case approach is well-suited to phenomena that are relatively clearly bounded yet complex. Easton (2010) indicated that these include organizations, interorganizational relationships or networks of connected organizations.

Among the applications of critical realism is the creation and development of business service relationships (e.g. Easton, 2010), which may involve a lot of complex interactions between actors in a social structure. Critical realism and social relations are connected to each other through discourse. Smith (2006), for instance, mentioned that critical realism recognizes the power of discourse, and also the concrete social relations that underlie and generate it (Bhaskar, 1989; Sayer, 1992; Chouliaraki & Fairclough, 1999; Fairclough, 2003). Critical realism's most fundamental aim is thus to find answers to the question "what caused those events

to happen?” (Easton, 2010). It is then possible that the critical realist case approach serves as an important tool to examine social embeddedness. Specifically, it may reveal what caused events to happen in the concrete social relations that underlie and generate discourse around start-up entrepreneurship.

All research, whether quantitative or qualitative, is based on underlying assumptions about what constitutes “valid” research, and which are the most appropriate research methods (Myers, 1997). It is therefore important to know what these sometimes-hidden assumptions are (Myers, 1997). For the present research’s purpose, the most pertinent philosophical assumptions are those which relate to the underlying epistemology that guides the research. According to Hirschheim (1985), epistemology refers to our theory of knowledge, particularly how we acquire it, and requires the examination of two basic points: (1) what knowledge is, and (2) how we obtain “valid” knowledge. A high amount of knowledge claims are produced in each society. Better arguments can then be created to support the arguments that were accepted earlier, thus representing the current best understanding that has been agreed upon at different points in time.

It may be necessary to consider how to obtain the “valid” knowledge that Hirschheim (1985) referred to. For instance, how can better arguments, compared to those that currently exist in our society, be created? How may those new arguments support the current ones? A question thus remains of whether the present research’s argument, which concerns social embeddedness in start-ups, represents a better argument that supports previously created and accepted arguments. The best means of answering this question is thus obtaining “valid” knowledge.

4.2 Qualitative research methods

The development of qualitative research methods has its origins in social sciences, with the purpose to study social and cultural phenomena. Examples of qualitative research include action research, case study research and ethnography (Myers, 1997). Qualitative research methods are used to uncover and understand unknown phenomena and interactions between various entities through rich and detailed descriptive data (Doz, 2011; Ghauri, 2004). Often no clear distinction is made between “qualitative” and “interpretive” research, though the word *interpretive* is not a synonym for qualitative (Klein & Myers, 1999). Rather, its definition depends on the researcher’s underlying philosophical assumptions (Myers, 1997). For instance, a qualitative researcher assessing management must tirelessly exercise intellectual curiosity in his or her reading (not just in the management field),

conversation and discussion, seeking “insights from the field” in exchanges with managers (Doz, 2011). Data sources in qualitative research include observation and participant observation (fieldwork), documents and texts, and the researcher’s impressions and reactions (Myers, 1997).

As opposed to quantitative research, the motivation for qualitative research comes from observation, which concerns the central differentiating factor between humans and the natural world, that is, our ability to talk. This means that qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live (Myers, 1997). Qualitative research methods also allow the streamlining of the interplay between people and researchers; thus, it becomes possible for researchers to understand the social context in which people live (Myers, 1997). There has been a general shift in information systems research away from technological to managerial and organizational issues, which was followed by increased interest in the application of qualitative research methods (Myers, 1997).

Qualitative research methods are, in many ways, relevant to the present research. In economic sociology research, descriptions and explanations based on empirically adjusted abstractions represent the general scientific method (Swedberg et al., 1987). For that purpose, qualitative research methods provide a useful tool to further improve the understanding of embeddedness.

4.3 Case study research method

Research based on case studies can take many forms, depart from a positivist or interpretivist approach, be either deductive or inductive, and rely on qualitative or quantitative methods (Løkke & Sørensen, 2014), or a mix of these extremes (Cavaye, 1996). According to Benbasat et al. (1987), a clear distinction can be made between a case study approach and other research methods: in case study methods, the researcher rarely has a priori knowledge of the variables of interest, and how they will be measured. Case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when there are no strict boundaries between the phenomenon and its context (Yin, 1994). Case study therefore allows the researcher to retain phenomena’s holistic and meaningful real-life characteristics (Yin, 2009). These can include single life cycles, small group behaviour, organization and management processes, changes in neighbourhoods, school success, international relations and industry maturation

(Yin, 2009). In each of these cases, the need for a case study method rises from a willingness to understand complex social phenomena.

Case study is often used when longitudinally studying complex phenomena, or complex units need to be studied intensively (Benbasat et al., 1987). Unlike in an experimentation method, the contextual conditions in case study research are not delineated and/or controlled but part of the investigation. Non-random sampling is typical to case study research as well, which is different from experiments as there is no sample that represents a larger population (Ridder, 2017). Case study is also suitable when analysing interview material, such as from half-structured (i.e. theme) interviews (Hirsjärvi & Hurme, 2000). Half-structured interviews do not set exactly formed questions or strict boundaries in terms of qualitative or quantitative research, subject depth or the number of interviews (Hirsjärvi & Hurme, 2000). Both of these points are important in the present research, and because the present research relies on interview data, a qualitative case study approach is most appropriate.

Previously, Aldrich and Kim (2007) found that experimentation may be needed in such conditions to understand particular entrepreneurial issues. It is not possible in these instances for researchers to discover distinct cases of each, so they must experiment. However, there is no sample that represents a larger population in the present study, nor a particular entrepreneurial issue that needs to be understood. Therefore, experimentation is not suited for this research.

Case study also allows researchers to explore the historical traces of events that have developed over time (Yin, 2009). This may become essential in the present research, which like other economic sociology studies looks at the extended and variable concept of time (i.e. the socio-historical time concept) that goes beyond the action that is the focus of the analysis (Swedberg et al., 1987).

4.3.1 Case study research strategies

Case study research can be accomplished as either a single case study (e.g. Yin, 2009) or multiple case studies (e.g. Eisenhardt, 1989). As a research strategy, a single case study focuses on understanding the dynamics within individual settings (Eisenhardt, 1989). In contrast, within multiple case studies arises a possibility for theoretical advancement, when comparisons are made between cases (Ridder, 2017).

When the generality of a situation or phenomenon is of secondary importance, case study can also be used for descriptive purposes (Runeson et al., 2012). Important to the present research, Benbasat et al. (1987) emphasized the rapid pace

of change in the information systems field, with several new topics emerging each year that provide valuable insights using case study research. This is important to the present study, which utilizes non-random sampling in its multiple case study approach. Baxter and Jack (2008) emphasized the importance of triangulation, and that the use of one or multiple data sources needs to be carefully considered. According to Ghauri (2004), no upper or lower limit exists on the number of cases to include in a study, and many times, just one case is enough.

Real-life context and question types

Should theories alone interplay with each other without connecting to a real-life context, there is the danger that the research becomes self-referential and thus irrelevant (Siggelkow, 2007). Therefore, theoretical events need to be confirmed to represent events that have occurred in a real-life context (Yin, 2009). In the present study, the qualitative case study approach uncovers specific details regarding the examination of start-up entrepreneurship in a real-life context (Yin, 2009). As an example, several participants who had been involved in either or both software and academic start-ups recalled their authentic experiences with real-life events. Accordingly, there should be no danger that the studied phenomena lack a connection to real-life events. However, studying actual business founders in retrospect involves the risk of hindsight and success bias (Delmar & Davidsson, 2000), so the relevance of retrospective interviews requires careful consideration in certain types of studies. However, in the present research, that may not be such a big concern.

To further contribute to reliability, a case study database was created to organize the data. According to Baxter and Jack (2008), there are many aspects of a case study database that can improve reliability, like the researcher being able to track and organize data sources such as notes, key documents, tabular materials, narratives, photographs and audio files that are stored in the database for easy retrieval. Data such as key notes, key documents and audio files were stored for later access. Tabular material and narratives were stored in the database for easy retrieval.

The case study method is particularly suited for answering *how* and *why* questions, as it allows researchers to explore the historical traces of events that have developed over time (Yin, 2009). This is relevant in economic sociology, which uses a socio-historical concept of time. It might thus be unnecessary to focus on a specific phase in start-up development, which may differ between academic and

software start-ups. This also applies to articles in the recent entrepreneurship embeddedness literature, which focus on how the liabilities of newness in an entrepreneurial start-up are affected by its embeddedness (Wigren-Kristoferson et al., 2022). Additionally, case study is suited to answering exploratory *what* questions (Yin, 2009). This study set *how* questions to understand complex social interaction phenomena, and thus explore the historical traces of events that have developed over time. It can be considered relevant, especially when its purpose is to uncover complex social embeddedness and understand its emergence in academic and software start-ups' cohesive networks. Exploratory *what* questions were also an option, but they proved irrelevant for present study's purpose, and they are more relevant when used with methods such as survey or archival analysis (Yin, 2009). Furthermore, because case study focuses on contemporary events (Benbasat et al., 1987), it is well-suited to the current study, which empirically examines modern and rapidly evolving start-up entrepreneurship.

4.3.2 Case study design

According to Yin (1981a, 1981b), case studies may be exploratory, descriptive or explanatory. They can also be structured or unstructured, inductive, or interpretative, and employed in many ways, leading to various types of research output (Cavaye, 1996). Yin (1994) argued that there may also be exploratory experiments, descriptive experiments, and explanatory experiments, which are not distinguished by hierarchy but consist of three other conditions. These are type of research question posed, the extent of control an investigator has over actual behavioural events and the degree of focus on contemporary, as opposed to historical, events. Still, strict boundaries do not separate these case study strategies, and the occasions of when to use each may not be possible to accurately determine (Yin, 1994).

Despite each of the strategies having their own distinct characteristics, they also overlap to a large extent (e.g. Sieber, 1973). The goal, therefore, is to avoid gross misfits, where a person plans to use one strategy, despite having chosen another that might actually be more advantageous (Yin, 1994).

4.3.3 Theory-testing research

According to Doz (2011), theory testing is another potential contribution of qualitative methods. There is a significant difference between theory replication

logic and theory building. Eisenhardt (1989) argued that new insights follow strong theory-building research, while modest results may arise when theory building simply replicates past theory. So replication is appropriate in theory-testing research, but in theory-building research, new theory represents the goal, so new and ground-breaking insights may result when this research is strong (Eisenhardt, 1989).

Although slightly less ambitious, qualitative research can also be used for theory testing, as it makes it possible to compare the prediction a theory would make about a phenomenon to the observed instance, extend or challenge the validity of that theory, or establish its applicability (Doz, 2011). Theory testing with cases is the process of ascertaining whether the empirical evidence in a case or in a sample of cases either supports or does not support a given theory (Hak & Dul, 2009). However, Løkke and Sørensen (2014) questioned the appropriateness of case studies, mentioning that they as a tool for theory testing are still controversial, and discussions about the weaknesses of such research designs have previously taken precedence over their strengths. Colquitt and Zapata-Phelan (2007) noted that articles in which predictions are grounded in past conceptual arguments offer a moderate level of theory testing, but the arguments may not have been developed or refined enough to constitute true theory, nor do they provide a comprehensive picture of the phenomenon of interest. In contrast, Dul and Hak (2007) pointed out that, contrary to popular belief, the case study is actually the preferred research strategy for testing certain types of propositions.

The present study's purpose is to test the validity of Granovetter's (1985) embeddedness argument and compare the prediction that the theory makes about social embeddedness in the cohesive networks of academic and software start-ups, and either extend or challenge the theory's validity, or establish its applicability. Naturally, either or all of these are possible, but the last is more realistic, particularly as Granovetter's (1985) argument has never before been tested in the empirical start-up environment to establish its applicability. It is also not currently well known whether either or both software and academic start-ups' empirical environments are suitable to empirically explore using this argument as a theoretical basis.

It is thus possible that Granovetter's (1985) embeddedness argument provides a moderate level of theory testing when compared to concepts such as social capital embeddedness (Portes, 1993) and the structural embeddedness argument (Uzzi, 1996), which researchers have already developed or refined to constitute true theory.

4.4 Components of the research design

There are several desirable individual attributes that characterize a good case study researcher, such as the ability to design good questions and interpret answers (Yin, 2009). There are also five important components of a research design for case studies (Yin, 1994): (1) the study's questions, (2) the study's propositions (if any), (3) the unit(s) of analysis, (4) the logic that links the data to the propositions and (5) the criteria that is used to interpret the findings. The importance of research design is highlighted in situations in which a design is flawed or not in the research plan (Yi, 1994). Thus, when a researcher completes a study by examining just one organization, he or she may not be able to draw accurate conclusions about interorganizational partnerships. This outcome might be possible to avoid by first creating an appropriate research design (Yin, 1994).

In the following sections, each of the five components of research design in the context of the present study are introduced in more detail. Careful attention is given to each component, which make it possible to later draw accurate conclusions concerning the present research problem.

4.4.1 Study questions

According to Yin (2009) in case study research *how* and *why* questions are more explanatory, in contrast to many other research questions. Therefore, they typically lead to the use of case studies, historical studies, and experimentation as the primary research method. Since *how* and *why* questions are generally the most appropriate in a case study approach, it is the researcher's initial task to clarify the nature of the study questions (Yin, 1994), which "deal with operational links needing to be traced over time, rather than mere frequency or incidence" (Yin, 1989, p. 18; Yin, 2003, p. 6).

Since social embeddedness is a complex social phenomenon, and this research is still at an exploratory phase, it was relevant to use *how* questions. The following three research questions guide this study:

1) How is social embeddedness manifested in the economic actions of start-ups' cohesive networks? 2) How is the acquisition of human resources inherently enmeshed in the social relations of cohesive networks in academic start-ups? 3) How is the acquisition of human resources inherently enmeshed in the social relations of cohesive networks in software start-ups? These three research questions allow to thoroughly explore the emergence of social embeddedness in the economic

actions of start-ups' cohesive networks. Particularly, to understand how the acquisition of human resources is inherently enmeshed in the social relations of start-ups' cohesive networks, and emphasize the role of these networks as vehicles of trust and means to prevent malfeasance.

Because embeddedness may also require redefinition (e.g. DiMaggio, 1990; Granovetter, 1985; Uzzi, 1997), rigorous empirical research is more important than building sophisticated a priori theoretical models, which has been the common practice in economics research (DiMaggio, 1990).

This study is also part of a realm of research in which very little or no a priori knowledge of the topic exists. This makes it likely that the research variables cannot be clearly identified early on, but only after rigorous empirical research has been conducted.

4.4.2 Study propositions

Propositions are the components that are needed to direct attention to something that should be examined within the scope of a study, with *how* and *why* questions capturing the researcher's original interest that led to the selection of the case study strategy (Yin, 1994). However, in certain research strategies, including experiments, surveys, and similar methods where the topic is the subject of exploration, there is legitimate reason not to make any propositions (Yin, 1994). However, this is not the case in the present study, which does not use any of these research strategies. Yin (1994) emphasized that *how* and *why* questions may even be inappropriate to point research in the right direction. Rather, only if the researcher is forced to state some propositions is it possible to properly guide the research, such as in situations where two organizations collaborate because they derive mutual benefits by doing so. The proposition must therefore reflect an important theoretical issue (e.g. no other reasons exist for collaboration, or they are unimportant), showing the possible location from where to gather relevant evidence.

Academic start-ups may be able to initially use a university's physical premises, such as innovation centres, science parks, or university's technology business incubator and its human resources. Generally, university policy, faculty, technology transfer offices, investors, founding teams, networks in which a firm is embedded, and other external conditions affect new firm creation (Rothaermel et al., 2007, Figure 10). In this way, they can allow firms to acquire important resources to establish their foundations (e.g. financial and human resources, emotional support, etc.; Gargiulo & Benassi, 1999). This may be particularly relevant in cases where

the founder still actively cooperates with founding team members, and there is no aim to broaden networks outside the company's own faculty and to allow the creation of opportunity through sparse network's structural holes (Burt, 1992, 2000, 2004) outside one's own faculty. Rather, these founders intend to acquire the resources that a cohesive network may initially provide to achieve development. In such circumstances, which is most likely already at a satisfactory level in the first 1–2 years of start-up development due to intensive basic research.

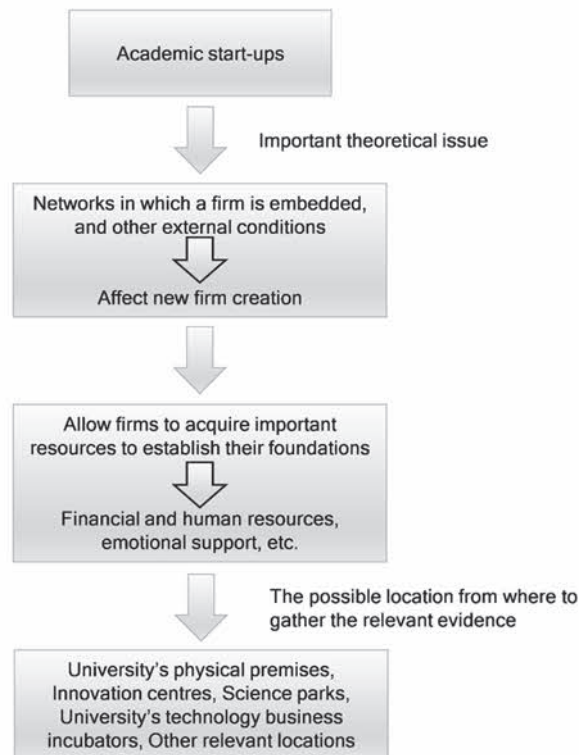


Fig. 10. Proposition to guide the research in academic start-ups.

In software start-ups, the dense firm population is likely to imply dense networks in the region where the empirical study is conducted (cf. Wigren-Kristofersen et al., 2022). Places such as business accelerators, and other entrepreneur communities where such dense populations can be found, act as potential places where cohesive networks may be relatively common social structures. In this case, it may be necessary for inexperienced founders in software start-ups to join the local start-up

community’s economic actions to supplement their often extremely limited human resources. This is relevant, because like all individuals, entrepreneurs are, to different degrees, embedded or not in contexts, and these contexts create the environment they interact with (Jack & Anderson, 2002; Wigren-Kristoferson et al., 2022). Embedding is then the mechanism whereby entrepreneurs become part of the local structure, which enables them to draw upon and use resources where given contexts make it possible to handle liabilities of newness (Wigren-Kristoferson et al., 2022, Figure 11). Furthermore, software start-ups founders are often young, inexperienced, have limited resources (Edison et al., 2015) and need to quickly deliver their product to survive (Coleman & O’Connor, 2008). Founders thus need the safety, human resources, and product development expertise that local entrepreneur communities’ cohesive networks – and their social relations – may provide.

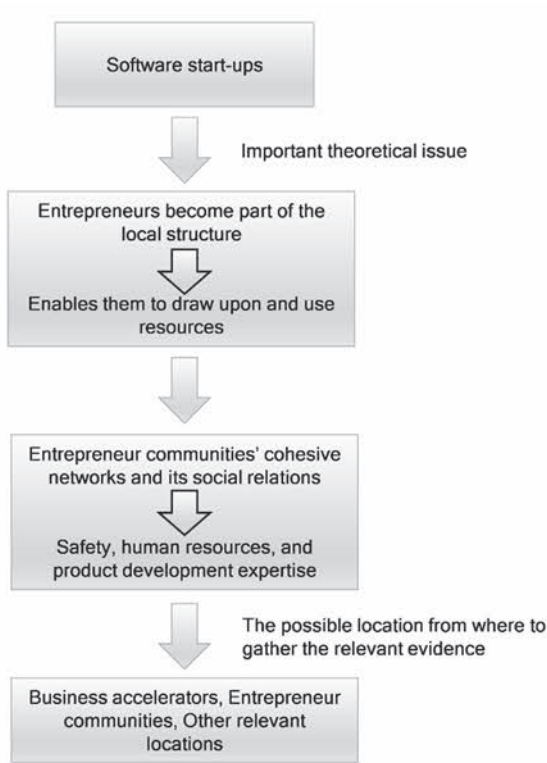


Fig. 11. Proposition to guide the research in software start-ups.

4.4.3 Units of analysis

The third component of research design, units of analysis, is related to the fundamental problem associated with the definition of *case*, which according to Yin (1994) has plagued many investigators at the outset of case studies. Yin (1994) noted that, for instance, in a classic case study, a case may be an individual. Importantly, the author emphasized that investigators may be tempted to collect relevant information about each individual for several cases to form a multiple-case study. However, to identify relevant information about an individual or many individuals, propositions are needed that help the researcher attempt the impossible, though it is also tempting to collect “everything”. Additionally, when the primary research questions are accurately specified, it becomes possible to select appropriate units of analysis, even if the units require a slightly different research design or data collection strategy (Yin, 1994).

Therefore, it may be crucial to avoid collecting evidence from too many individuals or groups of individuals, and on the contrary use propositions to guide the research. The proposition of the present study narrows down the research data to a minimum, or at least to such a level where the remaining amount of research data is still relatively easy to analyse. This follows Yin’s (1994) warning about the temptation to collect relevant information about each individual involved.

In the present study, founders of academic and software start-ups represent the minimum primary unit of analysis through which it is possible to collect a proper amount of relevant information that is easy to analyse. The primary focus is to collect relevant information from founders about their experiences with their start-ups’ early development and the economic action associated with their cohesive networks during that stage. Generally, founders of academic and software start-ups provided a suitable unit of analysis that allowed the narrowing of the research data, which may not have been possible by focusing on other people who may not have provided similarly relevant information about early start-up development. However, it was possible to gather relevant information from other people who may have been involved in start-up development, because in the early stages, strong ties such as family relations, friendships and previous working environment may be more beneficial (Gargiulo & Benassi, 1999). By primarily focusing on this dense, cohesive network, it was possible to collect evidence from each relevant individual without collecting “everything”.

4.4.4 *Linking data to the propositions and criteria for interpreting the findings*

Yin (1994) argued that the fourth and fifth components, linking data to propositions and criteria for interpreting the findings, are the least developed in case studies. These components represent the data analysis steps in case study research, which the research design should provide the basis for. However, there is no standard across scientific fields for researchers to link data to the propositions. Yin (1994) indicated that while there are a number of ways to link data and propositions, only the assignment of subjects and treatment conditions in psychological experiments are the most precisely defined, representing the way in which hypotheses and data are connected in psychology.

Since the present study uses Granovetter's (1985) embeddedness argument in a socio-economic framework rather than psychological experimentation or equivalent approaches, initial challenges existed in linking the data and propositions. Problems also occurred with the fifth component, the criteria for interpreting the study's findings. Yin (1994) notes that the idea of "pattern matching" (Campbell, 1975) whereby several pieces of information from the same case may be related to some theoretical proposition, represents one promising approach for case studies.

4.5 Data collection

Many data collection techniques can be applied in qualitative research. These include interviews, observational techniques such as participant observation and fieldwork, and archival research (Myers, 1997). Similarly, many techniques can include written data sources, such as published and unpublished documents, company reports, memos, letters, reports, email messages, faxes, and newspaper articles (Myers, 1997). It is typical for case studies to combine data collection methods, such as archives, interviews, questionnaires, and observations, with the evidence (both qualitative, such as words, and quantitative, such as numbers; Eisenhardt, 1989). Benbasat et al. (1987) argued that the investigator can also develop new hypotheses when making changes to site selection and data collection methods. More importantly, Eisenhardt (1989) told that in theory-building research, triangulation makes it possible to use multiple data collection methods, and thus provide a stronger substantiation of constructs and hypotheses.

In the present exploratory case study, interviews represent the primary data source (Figure 12). Each interview was conducted in Finnish. Techniques such as participant observation, unpublished documents or email messages were not used, because they were not considered to be relevant. Personal interviews, meanwhile, have recently been used in start-up research to address key challenges.

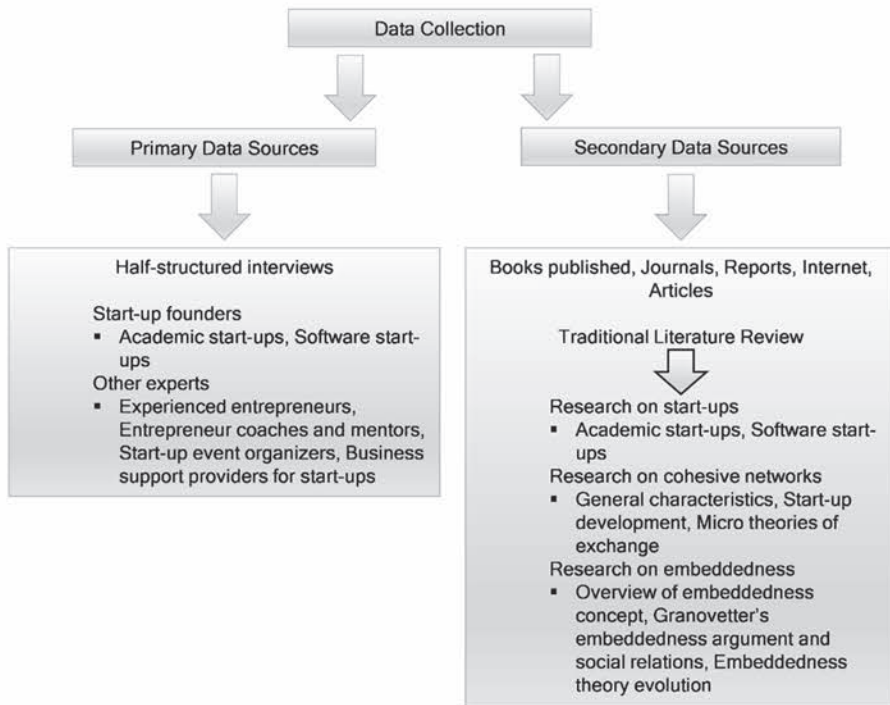


Fig. 12. Data collection procedure.

For the purpose of their study, Giardino et al. (2015) selected two cases that represent early-stage start-ups: EasyMedicine and MovyNext. Their interviewees were the two CEOs (Chief Executive Officer) of the start-ups and a developer from EasyMedicine. Generally, the participants who were interviewed in this study (see Appendix 1, Appendix 2, Table 1) represented various levels of society and expertise. They were not only start-up founders (both academic and software) but also other actors who had first-hand experience with either or both academic and software start-up development (e.g. coaches, mentors, other experts). Previously, Bosch et al. (2013) interviewed 9 founders, CTOs (Chief Technology Officer) and

early employees of start-ups, as they found it important to broaden the coverage of interviewees from start-up founders to experts to collect their primary data. Similarly, in the present study it was found important to contact potential participants who had more expertise from software business and start-up development, some even for decades in the Oulu start-up business. A few of those experts were chosen because they had first-hand experience of academic start-ups, as providers of personal coaching or mentoring at different points in their career. It was also important point that those experts had provided founders personal coaching, that clarified the founder's own career development as part of his/her company's development.

Secondary data sources in the present study include published books, journals, reports, internet sources and articles. Each relevant discipline was covered, including research on academic and software start-ups, cohesive networks (general characteristics, start-up development, micro theories of exchange) and the concept of embeddedness (overview, Granovetter's (1985) embeddedness argument, evolution and critiques). A traditional literature review was chosen, because it allows the researcher to work systematically without the explicit purpose of conducting a systematic review (Jesson et al., 2011), although systematic mapping (e.g. Mujtaba et al., 2008) or a systematic literature review (SLR) may have also been viable options. Compared to those more systematic methods, traditional literature reviews are often not as thorough or rigorous and are therefore conducted ad hoc rather than according to a specific methodology (Snyder, 2019). Since 2004 there has been an increased interest among software engineering researchers to conduct Systematic Literature Reviews (Babar & Zhang, 2009). Still, traditional reviews have an advantage over SLRs: they often provide insights that can be neglected or passed over in the steps towards exclusion and quality control (Jesson et al., 2011). Traditional reviews can also vary in format and style, often being based on a personal selection of materials from original authors that the researcher believes have made important contributions to current knowledge (Jesson et al., 2011).

Ethical considerations in research are a set of principles that guided the present study's designs and practices. These principles include voluntary participation, informed consent, anonymity, confidentiality, potential for harm, and results communication. Each of these principles were considered important.

In the present study, the purpose was to code the qualitative data so that the rich interview material was simplified, while on the other hand the data was restructured so that also new and surprising perspectives emerged. This was not

exclusively a technical classification measure but rather the classes, subclasses and the compilations of material formed from them were created largely during the coding process. Thus, coding is also about the choices made by the researcher and therefore it is not found as such in the material. NVivo was used in the initial stages to allow work more efficiently, conduct deeper analysis from more sources, and defend the findings. Also, to organize, store and analyze data. Later the technical classification was replaced by less technical method, and categories took shape clustered as the coding progressed. Therefore, initially there were numerous categories, but in the end it was considered reasonable to combine them.

5 The emergence of social embeddedness in cohesive networks – An empirical analysis of academic and software start-ups

This study's primary analysis objective is to use the qualitative case study research method to empirically explore the emergence of social embeddedness on economic actions in cohesive networks, with a focus on both academic and software start-ups. The a priori model of this research, based on Granovetter's (1985) embeddedness argument, acts as a theoretical basis. First, Section 5.1 outlines an analysis of the economic actions in academic start-ups' cohesive networks, with the founding team's economic actions analysed in Section 5.1.1, the founder's role as a visionary person in Section 5.1.2, and coaching and mentoring activities in Section 5.1.3. Section 5.2 analyses the economic actions in software start-ups' cohesive networks, with entrepreneur communities' economic actions addressed in Section 5.2.1, economic actions with peers in Section 5.2.2, experienced colleagues as development support in Section 5.2.3, friendship and partnerships as development support in Section 5.2.4, and finally intrapreneurship and business learning activities in Section 5.2.5.

5.1 Economic actions in academic start-ups' cohesive networks

Generally, cohesive networks provided a fruitful opportunity for inexperienced founders of software start-ups to increase their firm survival, particularly when they were involved in cohesive networks where both peer support and expert advice are available. However, in academic start-ups, where rich opportunities are more likely to stem from scientific research, commercialization and entrepreneurship, social embeddedness manifested as economic actions in the start-ups' cohesive networks. Academic start-ups highly reflected the involvement of cohesive networks' social relations (e.g. founder, founding team members, coaches, mentors) in their early development. This cooperation between dense, cohesive networks' social relations led to some positive expectations for academic start-ups' initial development. Additionally, academic start-ups' cohesive networks involved actors from broader institutional environments, who strengthened the companies' visions. Those human resources seemed to be involved in founding teams' economic actions such as strengthening of business vision, and software innovation development.

5.1.1 The founding team's economic actions

Particularly university scientists in their faculty's cohesive networks who joined in business development discussions received valuable ideas to initiate their business, though they benefited much more from their founding team's presence early in the company's development. There were a few businesspersons with 10 or more years of experience with university entrepreneurship who emphasized this point. Each of these interviewees provided interesting descriptions of their firms' communications during the first 1–2 years of development. One recurring theme was that it might be important for each person to fulfil their own role, and eagerly complement each other's expertise, until any external networks were contacted. Initially that mattered the most when entrepreneurs in academic start-ups, for instance, developed their software innovation, because the founder and founding team members already had the necessary expertise and skills, developed over the years through basic research. This may have concerned technology risks that the company needed to solve to further develop their innovation. In that economic action, the early involvement of the faculty's social relations was crucial.

However, it may often happen that academic start-ups' founders and founding teams cannot easily facilitate a collective sense of shared experience throughout network actors, even though there may only be a few team members present. One business expert mentioned that it often happens that team members just wait until others fulfil their own role, that is, take a less productive option. The interviewee had a lot of personal experience in cooperating with numerous scientists over the last few decades, and used it to emphasize this point:

Naturally it is one of those basic questions in teamwork how everybody provides help to each other. Once in a while there are such cases where each of the team members kind of has their own role, and they practically just wait [for] those others to fulfil their own role, with not much in common. Then there are those where everyone all the time has the aim to encourage each other on a daily basis, helping to go forward. Maybe it is just that [this] is the more productive option, just because it practically allows [the exploitation of] each other's expertise, also ensuring that those others' expertise is complemented, when the shortcomings may be possible to notice in time...and only then seek the expertise from outside, in those things where it is most needed. And then it is also useful to receive those external impulses. (Interviewee 13, 2020)

Sharing expertise and skills is easy to contextualize in the academic start-up social context, where dense cohesive networks allow founders to involve external network actors in the founding team's economic action during the basic research phase.

In the following case, the founder and founding team successfully strengthened their business vision in the first year before establishing the company. There were only a few cohesive network actors actively involved who were expected to bring added value to the company in its early development phase. What may be even more important is that those few contacts strengthened the company's vision when the company was still on the university's physical premises:

...It might have been a year before we established the company, we had – we were still in the university, but we [had already] made the first contact [with] possible, potential customers. We then [visited] them and also made additional tests...which the Vigo accelerator joined...probably it was just those persons we had there who strengthened our vision, that this could become a viable business idea.... (Interviewee 17, 2020)

This case exemplifies how it might be relevant for founding team members to actively seek external human resources outside the university's physical premises when they need to strengthen their business vision. At the same time, they should remain in small and cohesive groups without conflicting preferences or other distractions. However, this accelerator contact was already actively involved in the founding team's economic action, and further strengthened the company's business vision before its establishment, providing also emotional support.

Technology risk solution

In the same way as the founding team's sharing of skills and expertise, technology risk solution was another economic action that was strongly associated with cohesive networks' social relations in the above interviewees' case. Practically, this meant that the company's own faculty members were in close physical range. Therefore, few, if any, of those initial contacts represented the broader institutional environment, depending, of course, on whether the accelerator contact belonged to that same category. The initial network also remained dense and highly cohesive even after the start-up's establishment, and the company held no desire to quickly seek development support from any external networks' human resources. The founder, founding team, faculty members and the cohesive network's contacts were

thus the priority, because those contacts were easily accessible in the same faculty, and significantly helped when solving the technology risks:

...So, we had a lot of technology risks, and the team was completely in the university, so practically we only knew each other. So that was our team, and practically we didn't have any business experts from outside. But with that team we eventually, after some kind of a process...it was something [after] a year that we [figured out] whether the technology [was] worth further develop[ing] in our company. And then in 2012, I eventually established the company, and we started to further develop the technology and...initially in our case there were pretty few of those networks that we utilized...and the network then gradually started to broaden. (Interviewee 17, 2020)

There may have been a particularly strong sense of shared experience throughout the network actors, despite only a limited number of actors taking part in solving the technology risks associated with innovation development. Therefore, there may have been a cohesive “core” group that consisted of only the most important actors who brought additional value to the process, and each of the less important actors outside that dense social structure were ignored because they did not benefit just that activity. Those contacts most obviously have provided the emotional support for founder and his team during that early development phase.

This strengthens the idea that in university entrepreneurship, the founder and founding team consider it extremely important to first share each other's experiences and skills, rather than have an opportunistic strategy typical to software start-ups or start-ups in traditional industries. It might be that academic start-ups prefer to first fully utilize the human resources that cohesive networks provide, such as relations between the founder, founding team members and a select few others, until any networks are focused on the broader institutional environment. These are generally people who were initially involved in the cohesive network's economic actions and bring additional value to the company in the development phase and strengthen its vision. This may be even more important to help the founder and founding team believe in their vision during that critical phase.

5.1.2 The founder's role as a visionary person

In addition to the importance of having cohesive networks, the founder's visionary and strategic role were also observed to have great influence on a company's development in the first 1–2 years. Founders may learn to identify the right people

from their networks and grasp whom to involve in a cohesive network, so that the persons involved also bring added value for academic start-ups' initial development. The founder's (i.e. a university scientist's) strategic skills guide the company towards external networks, as it might not be initially relevant to utilize the broader institutional environment and its human resources. Rather, the cohesive networks and faculty members who are on the university's physical premises seem to be much more important to the founder. However, in some cases the broader institutional environment's actors may actively be involved in academic start-ups' economic action, but especially during the first 1–2 years. Indeed, the faculty's own cohesive networks are an important source of human resources.

There was a case of a 1-year-old technology start-up in which the founder, who had a background as a university scientist, provided an interesting perspective on academic start-ups' early development, where the early involvement of cohesive network actors may be crucial. The interviewee's description mostly covered events from the company's first year, as she had arranged personal conversations with a colleague from the same start-up network, who also had research experience. The two exchanged classified information about marketing and patenting, for instance. The interviewee emphasized the benefits that she received in those discussions with this acquaintance, who was already involved in dense cohesive social networks. These discussions were also highly confidential, according to the interviewee, which indicates only very few "trusted persons" may have had access to the same information:

Once I [had] an old acquaintance in start-up networks, well...I've always been able to ask for advice from that person. During the couple of times when we [met], there [was] always something [on] the agenda to form the basis of [what we discussed], based on the preparations I [made] before the meetings. It [included], for instance, preparing material or equivalent tasks...you are capable of reflecting your own ideas against your opponent's and what he/she thinks, discussing [those differences]. It is basically just [an] exchange of thoughts and [sharing] experiences about [a] certain issue that [we did]. For instance, it may have been marketing stuff or something else from which information [was] retrieved, who [did it and how it succeeded]...or then it may have been patenting stuff...The primary benefit [was] that I got different viewpoints about the topic, and in that sense proceeded with the conversation, and later there might have been a solution [to] the issue.... (Interviewee 3, 2019)

Particularly the founder's role as the primary visionary person and strategic leader were crucial in this start-up's case. The company pivoted towards less cohesive external networks and into the subsequent development phases (maturity and exit). The interviewee 17 highly emphasized that the transformation towards those external and often more sparse social networks had a secondary role during the first couple of years.

Yes, I consider that especially the founding team has a major role [given] its knowledge. It is really hard to replace...but as the company further develops...I wouldn't say it diminishes, but rather it kind of changes...but I personally consider that in the it is just the entrepreneur, the main founder who often also is the idea's father or mother and the primary visionary for the upcoming product and company...it is then important that there is some kind of a transformation and new people come along...But the founder definitely has a major role, let's say at least during the first couple of years...initially in our case there were pretty few of those networks that we utilized. (Interviewee 17, 2020)

The founder's role is thus significant during the first couple of years, as this interviewee highlighted. University scientists also prioritized dense cohesive networks during the first few years of a start-up's development. The founder's strong scientific (research) background and often very strong role as the company's strategic leader were both crucial to development in their start-ups' first few years. The faculty's human resources definitely are crucial for academic start-ups' early development.

Generally, the founder's role was crucial in start-ups' early phases, although several interviewees emphasized that great differences may exist between founders in certain resource-scarce software and academic start-ups, which may have full support from their faculty members. For example, one entrepreneur with more than 10 years of experience in start-up development (interviewee 10) highlighted the potential differences between novice and serial founders based on available social networks. Those differences become even more obvious when comparing start-up founders in software and academic start-ups.

5.1.3 Coaching and mentoring activities

Personal coaching was quite strongly associated with university entrepreneurship, with which scientists need assistance in various stages of their career, and a few interviewees, such as the entrepreneurship coach quoted below, highlighted the

possibility for entrepreneurs to receive personal coaching or mentoring at different points in their career. Coaching and mentoring networks provide more formal communication compared to the informal contacts that are described in previous sections, such as the founding team's economic action with human resources that provide additional value during intensive early development. There were also various support services and networks that guided primarily the founders of academic start-ups who have backgrounds in basic research and consider a career in entrepreneurship. This refers specifically to university scientists who consider whether to commercialize their university research results and establish an academic start-up.

According to the interviewees, these economic actions represent a form of development discussion in which it is not necessarily the goal to question how to establish the business anymore. Rather, these discussions may require at least some degree of trust and reciprocity between actors:

...Maybe the biggest help is needed in these [challenges] associated with company establishment...also other things than how to establish the company...they possibly need even more and different [types] of mentoring, when compared to what is needed in subcontracting firms...So there may be [some] little more experienced mentor to provide help in those pitfalls.... (Interviewee 13, 2020)

Several interviewees mentioned personal coaching and mentoring services, but generally these services seemed linked to the university context and cohesive networks where primarily academic start-ups, such as university spin-offs, use these services.

Another experienced businessperson who provided coaching for entrepreneurs had a lot of personal experience with certain idea sharing discussions, in which academic researchers consider whether to commercialize their university research. This type of economic action is still at a very basic level and lacks the personal form of communication found in cohesive networks, where most value-generating social relations are actively involved in a company's early development and also help strengthen its vision:

Then there is another line that [targets] those researchers who are considering a career as a start-up entrepreneur. But it then represents a different and more collective form of communication, and not so much personal communication...rather [it consists] of topics [such] as building the basis for [a] potential business plan from each direction and building the pitch, or practically

building the business presentation and preparing the application. (Interviewee 14, 2020)

Another interviewee had more than 10 years of experience in cooperating with primarily cohesive networks. These were mostly scientists who were about to change their business, or who needed a more experienced mentor with whom to share thoughts when they, for instance, were considering changing business. The interviewee's primarily positive personal experiences were reflected in his interview, in which he stated that he found it highly rewarding that he has been able to help start-ups through personal discussions about the strong experience gathered during own long career in entrepreneurship:

...When you get the chance to provide help for someone and bring some clarification [on] certain issues, to open the uncertainty about the future, I find that rewarding. At least for me, it is enough in terms of reciprocity that I can be happy, and that I can provide help...both of them had already established their company, and they had been doing that...or actually they had been doing the business alongside their research work...one of them already for years, while the other was in the phase where the nature of the work was possibly going to change a little, so he wanted to have a conversation...some help...I [was] not involved in those discussions when they [were] establishing their company. (Interviewee 14, 2020)

Another interviewee, also an experienced entrepreneur, similarly emphasized her experiences in which a network of personal coaches was highly important for academic start-up development, so she could achieve concrete results instead of having discussions with no particular focus. The interviewee also highlighted the importance of having some physical place where these services can be fully utilized to produce concrete results:

But then there is also individual coaching that is available...and there exist [some] of us coaches who actually drive those activities towards concrete results, so that the activity does not remain [at] the level of meaningless discussion...that might be the other part that I personally consider as [also] important...the fact that I should also be capable myself as an entrepreneur. [I should also develop] my own company...so...I can't fully focus on my own goals...providing others help there anymore...in these activities. But then again, primarily I tend to look at those issues from the coach's perspective, and from the perspective of conversation partner. (Interviewee 15, 2020)

General observations about coaching and mentoring indicated that these services may be ideal for founding teams in academic start-ups to direct the company towards the right development path during the most critical early stages, and to provide entrepreneurs challenging discussions. Generally, faculty's human resources are crucial for academic start-ups' development during the first few years. Innovation centers and science parks may provide the physical place for discussions. The physical place and general atmosphere may increase the possibility that all economic action in start-up development is inherently enmeshed in the social relations of cohesive networks, but that may take some time. Personal coaching and mentoring activities may primarily benefit academic start-ups that have already passed the most critical development phases as well, while those that have just started may enjoy the chance for discussions.

5.2 Economic actions in software start-ups' cohesive networks

Several interviewees who represented both university and software start-up entrepreneurship highlighted the importance of dense cohesive networks in early start-up development. The main observation was that cohesive networks are relatively common in, for instance, accelerators and equivalent physical premises, which provide inexperienced software start-up founders an opportunity to learn the basics of how to do business in an ideal empirical environment. Some of these persons were interviewed, as well as experienced businesspersons who emphasized the importance of having both peer support and experience available at the same time, both at the right scale to meet the company's current development objectives. Particularly friendship and partnership networks, though also networks of peers and experienced colleagues, were all crucial to software start-up development during the first few years, and those cohesive networks' social relations served as vehicles of trust and means to prevent malfeasance. Already a few software start-ups' cases were enough to confirm that frequently arranged physical meetings are essential to companies' development, especially when associated with the economic actions in cohesive networks where the above-mentioned social relations are actively involved in software start-up development. This was not the case for intrapreneurship and business learning activities, where economic action may primarily consist of discussions between entrepreneurs in large groups.

5.2.1 Economic actions with peers

The founder of a 2-year-old software start-up had very actively used the sales and marketing lines provided by his local accelerator, which provided an ideal opportunity to collaborate with other start-ups, as well as acquire human resources that are crucial for early development. However, these economic actions may only be possible when there is previous cooperation between start-ups, with the founder emphasizing that earlier cooperation served as a basis in his particular case:

We've had two lines here [in accelerator], of which one was focused [on] sales and marketing, where we together between companies figured out how to resolve challenges...we can recommend a certain firm to other customers, or then alternatively we make some kind of a cooperation agreement, where a firm orders something concrete from another firm. But I usually [distinguish] those from the mentoring itself, and rather categorize them as [a] natural [continuation of] the earlier cooperation. (Interviewee 1, 2019)

The founder and his company had thus managed to develop a few close customer relationships during their 2-year period, with the help of the founding team members' active presence and the guidance of the accelerator's cohesive networks, which consisted of colleagues in the same business (software). The interviewee also emphasized the importance of having the courage to openly share criticism should something require improvement. However, what the interviewee did not mention was that the business partners in this particular case managed to form a dense cohesive network after the initial challenge to cooperate:

Networking and trust are essential in every [business activity] ...For instance, here in [redacted] there are 30 companies. We have provided each other help, and we have received...let me calculate...I guess there are currently five customers. They valued our help when we provided it to them. We made them some development, for instance internet or mobile applications...and then also here in [redacted].... We once had a customer case [where we provided our assistance during the early development stage]. We arranged one or two meetings, during which we decided to tell them directly that this is not going to work like this. That [inability] to cooperate marked the end of our customer relationship, but they came back after six months and admitted that we had been right, carrying a new concept that they used to attract our interest again to cooperate. That then marked the initiation of our customer relationship. (Interviewee 1, 2019)

In this instance, the initially diverse and disconnected, or sparse, network of 30 companies had diminished to a smaller cohesive network that consisted of a few start-ups. The resulting smaller and more dense social networks made it possible for the start-ups to form new customer relationships, using its human resources. Below, a start-up founder described just that type of economic action. These relatively small and dense cohesive networks were essential for early career development, as the interviewee described, and there was a positive attitude towards helping each other succeed in tasks or projects, despite some of the network actors being competitors. The interviewee also highlighted the good spirit and open atmosphere of the local entrepreneur community, although it was uncertain whether it was still in the early phase. However, it became obvious that all economic action was already inherently enmeshed in the social relations of cohesive networks over 5 years after the company's establishment:

We have about 10 entrepreneurs here, so there's quite a lot of discussion going on with each other...some of us may be competitors, but we have good spirits here when [discussing] projects and inquiring if an expert can be found for some tasks or a project, or alternatively information about where to ask. Usually there are quite a few people here providing the information about those persons who may take your project forward. (Interviewee 5, 2019)

There were a few interviewees, mostly experienced entrepreneurs, who mentioned that start-up ecosystems are useful to creating a sense of community, as opposed to more opportunistic economic activity or opportunity and risk taking that was common. However, the other side of economic action is that certain types of start-up ecosystems become “echo chambers” that may restrict certain entrepreneurs' development. This highlights the importance of having a dense cohesive network that consists of founding team members and a few other persons within close range, such as in accelerators that have ideal physical locations, for start-up entrepreneurs in their first 1–2 years.

5.2.2 Experienced colleagues as development support

In the social relations of start-ups' cohesive networks that consisted of peers and experienced entrepreneur colleagues, the actors very eagerly shared their expertise with start-ups both during and after their early development. Some cases indicated that experienced entrepreneurs in particular may provide an ideal opportunity to learn the basics of business and develop in the company's first few years.

A recurring theme in the interviews was that entrepreneurs in software start-ups require support, both development and emotional, not only from experienced entrepreneurs but also from colleagues and peers. i.e. from cohesive networks' human resources. Indeed, many interviewees claimed that software start-ups need experienced colleagues for development support rather than persons from other businesses. Some of the interviewed software start-ups founders had also benefited from development discussions with companies from other fields. Those entrepreneurs may have used their extensive experience to share knowledge and understanding with inexperienced founders, positively contributing to start-up development.

One interviewee highlighted this aspect in his more than 10 years of experience with start-ups from various fields:

...There are those more experienced entrepreneurs who have [extensive entrepreneurial experience]. Those type of networks can be very good, just in that sense that they can be used to share knowledge and understanding...there should be all kinds of – a lot of variety [is good to have]...naturally also a certain level of experience, but then [it] is also good to include certain peer support to suit the needs of just that period. The closer and the more similarities the support includes in terms of experiences and time, the more valid it naturally is. (Interviewee 10, 2019)

Therefore, even if there are similar experiences between a new entrepreneur and someone in their cohesive network, those experiences might come from other fields that are not at all applicable to software start-ups. As such, despite some experienced colleagues having extremely valuable experiences and visions to share with new entrepreneurs, their experiences might not be directly applicable to software start-ups:

...So then, of course, such a person who just last year [successfully] managed to scale [a] similar SaaS service (Software as a Service) might actually have [a] completely valid experience which may [be] directly utilized...if you want to take advantage of a certain person, let's say someone who [manufactured] plastic shells in the '80s. Those people might actually have really valuable experiences and visions...while on the other hand, the applicability from those businesses to, for instance, software businesses and internet businesses might not be so straightforward. (Interviewee 10, 2019)

In the following software start-up's case, the founder had very actively utilized a cohesive network's social relations to overcome critical development challenges. This greatly facilitated the company's early development, especially when the founder utilized those existing contacts to, for instance, arrange meetings in different events. It then became possible to share experiences, because each of those persons had overcome similar development challenges. These existing cohesive network social relations were also relatively easy to access, because the founder had already created a connection several years earlier:

The already existing network is exposed to a new one when [in] the same space. Typically, it is just those industry meetings, or those where the existing network is present, often with [a] relatively long history and very strong relations...the network around you that has already been created earlier and that provides you [benefits]. At least for me, it was extremely beneficial to be part of the shareholder group and that there were people around me [with a] similar background in entrepreneurship, key people representing the same sector; owners and entrepreneurs who were sharing the same experiences and who had already overcome those challenges.... It [provides] a huge benefit.... It is rather difficult to locate that certain person during the first year of networking who might be willing to provide you [help] immediately. So, the already existing network is there at the top spot. (Interviewee 7, 2019)

One founder of a 2-year-old software start-up mentioned that these types of economic actions, where various entrepreneur generations are simultaneously present, is extremely valuable for entrepreneurs' long-term development. This was mostly due to there being a lot of ideas to further develop the company, making it possible for everyone to freely visit in these physical communities. Experienced entrepreneurs may also be present to provide assistance, according to the interviewee. In this case, the founder had been regularly visiting the local entrepreneur community for a few months and managed to develop dense cohesive networks in that empirical environment, using social relations in the process:

I would recommend [that] each entrepreneur [visit] some start-up cluster, or alternatively rent a space there. [At the] time when I started, there was a place called [start-up cluster], where it was possible to go for free and [discuss] your own ideas and develop [them]. After I had been [going] there more or less regularly for a couple of months, and receiving good feedback, we decided to start

a business...[the cluster provides] you with [plenty] of ideas to further develop your own idea, and so forth. (Interviewee 1, 2019)

In one software start-up's case, an inexperienced founder greatly benefited from an expert's assistance, and learned new marketing skills from this social relation during frequent and spontaneous physical meetings in a community office space. The interviewee greatly appreciated this experienced person's involvement because they had already had their own problems and done experimentation. It is just this difference in level of experience, according to the interviewee, that had the most positive effect on his company's early development. The founder thereby benefited from the business development support, as well as emotional support of experienced colleagues in his small entrepreneur community:

I started to receive an increasing number of tasks, and for some reason that just continued. I am not certain whether it was the other people who recommended me to certain others, or whatever the reason was, but I actually wasn't required to put much of my [effort] in the marketing process, and so the number of tasks just increased.... Maybe it's the more experienced ones, though. They have had their problems and...then they have also [conducted] different experiments. I would say those experienced ones...I have got more out of them, or actually benefited more. I guess there have been around 2 to 5 actors here, kind of a small group.... There are actors [with] 10 or more years of entrepreneurship experience. There [exist] some skills and experience. Normally those meetings are quite spontaneous, it depends...sometimes it is quiet, while at times they may be arranged on a weekly basis. (Interviewee 5, 2019)

The inexperienced entrepreneur in this software start-up's case significantly benefited from the early assistance of experienced entrepreneurs who were eager to help. This dense cohesive network's economic action, where it was not necessary for the entrepreneur to put much effort into his marketing process, reflects a high level of social embeddedness. Not least because the group sizes were so small that there was a collective sense of common experiences, despite the significant difference in experience between persons. All economic action was inherently enmeshed in the social relations of the cohesive networks, as the vehicle of trust and means to prevent malfeasance.

However, this process may have taken about 2–5 years and required several physical meetings, as the interviewee highlighted. This was the case of almost every other software start-up examined, particularly for those where the founder

was inexperienced and initially lacked human resources. Often experienced colleagues also required the start-up to have a pre-existing team before permitting any serious development discussions.

Several actors also highlighted a negative trend in some Finnish start-up ecosystems: the gradually diminishing role of network relationships.

5.2.3 Friendship and partnerships as development support

Generally, networks of friendships and partnerships are common in software start-ups that have spent 2 or more years in accelerators or similar entrepreneur communities. These networks were observed to help software start-ups develop, especially those that had limited human resources during their first few years. However, this process may still take several years for inexperienced entrepreneurs, requiring great activity and the ability to withstand disappointment. In some cases, that may also mean one or more pivots until the founder and company finally succeed, and that initial contacts might not always be the most beneficial. Several interviewees, both founders of software start-ups and experienced entrepreneurs who had years of experience working with them on, for instance, an accelerator's physical premises, highlighted this aspect.

For example, one start-up made several pivots, and only the latest of those produced positive results after years of struggling with several development challenges on the local accelerator's premises. The founder and founding team eventually managed to find their own path and located the "right" people in their networks after a few failures and hundreds of physical meetings. The founder in particular devoted an extensive amount of time to finding people who brought the most value to develop the firm, at least on the accelerator's premises, where he had arranged countless meetings with potential customers. Importantly, those people have provided also emotional support to survive from the early business development challenges. This whole process took 4–5 years at minimum, which the interviewee emphasized as the nature of this economic action, even though it mostly took place on the accelerator's physical premises:

I have had a personal business relationship with [business partner], which has lasted 4 years...well, 5 years, in which we have become entrepreneurial neighbours...we [drank] a lot of coffee together and provided each other support, and especially he has, but also [the] other way around, so that [is] how our business decisions should be made. It is as much [a] friendship as it is professional

respect...we all are friends with each other, and they are [actors] with whom I have been networking and come across. The thing is...they join in because they consider me [a] good person...each of our relationship[s] has had a professional situation. I have either tried to buy or sell them something, after which it has gradually progressed into a situation where more cooperation is involved. That way, it [deepened] into partnership or friendship. (Interviewee 2, 2019)

The interviewee also highlighted the reciprocal nature of these discussions, where actors who represent the accelerator's cohesive networks eagerly share ideas with each other in spontaneous physical meetings. This type of economic exchange resulted after years of physical meetings, according to the interviewee, and in this particular start-up's case, these mentoring relationships became standard practice, as there had been several of them:

It goes to both directions...so that either the person who provides mentoring [has] an idea, and then that idea is shared, after which it [is] either confirmed or alternatively modified and only then confirmed. (Interviewee 2, 2019)

In one case, a start-up founder emphasized the difference between social relations on the accelerator's premises and more occasional contacts that developed in different programs and competitions. The interviewee had gathered some experience from mentoring relationships over a 2-year period, generally social relations on an accelerator's physical premises where entrepreneurs from the same business help each other with daily economic actions. This economic action, according to the interviewee, was based on personal chemistry. In contrast, the interviewee said that there was not yet a personal chemistry in program-based contacts, simply because the mentor had not devoted enough time to get to know the company:

We provide each other assistance here...you are aware of each other's reactions already beforehand, because the personal chemistry has already been developed and so on. Then there's this type [mentoring service] what I mentioned, that is, in some kind of business accelerator program or business competition, and from there you get mentoring. So that's a bit of a different situation. The mentor doesn't have that much time to get to know the company, and the personal chemistry may not have been created before. And people are different, [which is noticeable] here during networking. (Interviewee 1, 2019)

This only further defends that social embeddedness in start-ups is strongly associated with local entrepreneur communities' cohesive networks of social relations, rather than, sparse external network actors based on formal programs, for instance. Generally, a founder and founding team members may have needed to devote 2–5 years to evolving initially professional relationships into friendships, and frequent physical meetings may have been significant during that period. An accelerator's physical premises also provides perhaps the best example, though any physical entrepreneur communities represent an ideal development environment for inexperienced software entrepreneurs. Both academic and software start-up cases stressed the importance of having frequent physical meetings with these social relations.

In one case of a 2-year-old software start-up, the founder and founding team had very actively utilized internet connections, though the founder emphasized the importance of having frequent physical meetings simultaneously. Indeed, although the interviewee had very actively utilized internet connections, in the longer term, only physical meetings with the cohesive network's contacts proved beneficial. The founder also relied on existing contacts to find new ones. This further highlights the importance of having a dense cohesive network of only a few people who may provide assistance to inexperienced software start-up founders, and supplement their initially limited human resources:

...So, I [was] in contact with that person, and that has also continued [to] today, and with meetings that take place approximately once a month. And then again...I guess [I found a few persons] who operate in just the same business sector that I [contacted], and then of course asked how they [worked]. And when I first started as an entrepreneur, those contacts [rather] openly shared [with] me their advice...there are already existing contacts in our sports sector, [so] I have always tried to utilize the meetings to form new contacts, hoping to find some [fellows], because I consider it easier to initiate a discussion or arrange a meeting...and then I [also] benefited from the use of investors...by managing to reach new investors through [already] existing investors...it is quite necessary for you to already know someone through which you may reach another person. Clearly it is not those cold phone calls or messages [where] you...receive an affirmative answer, [or no] answer at all.... (Interviewee 11, 2020)

In the software start-up case below, the founder recalled how the team's presence and sharing of ideas and expertise helped the company develop rather quickly, especially when the team developed their software product in cooperation with

another start-up. As the interviewee described, in the company's early development phase, the relatively small and dense network consisted of people who were beneficial in terms of software product and personal career development. Only later did the start-up contact new people:

I prefer the personal relationship[s], familiar people provide more benefits.... [Contacts] that have been formed through different events are, in my opinion, less important compared to my direct personal contacts, [who] may become potential customers for our own product, and that you can quite easily utilize when you want to have visibility [for] your product.... It depends on the nature of the business, but if the focus is to make a software product, you rather quickly go through your own networks, but in the early stage it is beneficial for you to have familiar people with whom to test the idea, and only then in the longer term there are those unfamiliar people [from] whom [you can] benefit. Those I [started] to utilize only in the later stages of my career as an entrepreneur, but not [in] the early stage. (Interviewee 6, 2019)

Cohesive networks were extremely valuable particularly for inexperienced software start-up entrepreneurs to boost the company's development during the challenging first 1–2 years, and to ensure the firm's survival, rather than develop highly innovative software products. The social element was then much more important than market success, although certainly there are some exceptions. To some extent, entrepreneurs who used start-up events as a springboard to make new network contacts also benefited from dense cohesive networks and their social relations, who provided the valuable emotional support in addition to business development support. In some cases, these dense social networks enhanced a firm's embeddedness in social networks and increased its survival and innovation development. However, in those few entrepreneur cases, firm survival, rather than innovation development, may have been the priority. Generally, the software start-up entrepreneurs did not have similar skills, expertise, or visions, which characterized the entrepreneurs in academic start-ups, where successful innovation development and embeddedness in cohesive networks were prioritized more.

5.2.4 Intrapreneurship and business learning activities

Newly founded start-ups may greatly benefit from economic actions where experienced colleagues provide assistance and are ready to share their own experiences, so that inexperienced entrepreneurs may learn the basics of how to do

business in a safe environment. A good example of this type of economic action are discussions of intrapreneurship and entrepreneurial ways of working. According to the below interviewee, an experienced entrepreneur, discussions in those networks may provide start-up founders their first genuine chance to develop business relationships based on trust. When an experienced person's expertise is unleashed in start-up entrepreneurship cases, smaller and more cohesive groups are formed:

Doing all those things together in that nice gang...going around in those nice circles. Naturally it provides you a feeling of being safe. But then again...you cannot stay [in that forever]...it depends [on] whether you are capable [of leaving] and...well...whether it is rational to start as an entrepreneur. It may then be that the topic of discussion is shifted into these...what we call [intrapreneurship], and those entrepreneurial ways of working...by doing so we get very close to the possibility to learn about entrepreneurship, when the other person has the [ability] to tell you stories that are often very harsh, but then also those great successes, there within the scope of [trust]...their expertise [is] unleashed for the use of companies' entrepreneurship cases...that might be the other part that I personally consider [also] important. (Interviewee 15, 2020)

Challenging questions are not yet presented at this early stage of development. Rather, the primary focus is on how to initiate business and whether it is relevant. Experienced entrepreneurs, according to the interviewee, may occasionally visit the entrepreneur community and tell their own entrepreneurial stories, which may often be harsh, but at the same time represent a great learning opportunity. The interviewee also emphasized that those persons' experiences were intended for use in entrepreneurship cases, which she considered an important part of the entrepreneurial learning process. These activities provide the basis of dense cohesive networks that start-ups may later use in their development.

One experienced businessperson's personal experience with this type of development discussion with primarily academic start-up founders indicated that it is very important for entrepreneurs to openly share their ideas with each other. However, that is often easier said than done, and entrepreneurs may even refuse to share their ideas because they are afraid that they could be stolen. This is especially the case when the business idea is still in development, and people may not be aware of what others want. As a result, the interviewee claimed that development discussions may not help start-ups develop:

Often people are not very eager to share their ideas with [other] companies or entrepreneurs, mainly to ensure their idea is not stolen...eventually those ideas don't matter that much, but rather what you do with them. And then it often happens [that] too little information is shared. It then has the consequence that the others may not be capable [of providing] their help, simply because they are not aware of the course of the events.... Then it easily becomes upper-level discussion that does not necessarily provide very many benefits.... (Interviewee 13, 2020)

The same interviewee had personally experienced how important it is for entrepreneurs to develop long-term relationships that are based on reciprocity and trust as well. The interviewee stated that it is beneficial for start-ups to invest early in development relationships, although they may not be useful until later in the company's development:

It is easy to just exchange ideas that still don't necessarily produce much intellectual capital. But then again...when we genuinely help [others], and when it becomes kind of [reciprocal], [there is] a requirement to develop [a] certain level of trust, but then again, there may also be [long-term] working relationships that are built on personal trust.... Reciprocity is very important, because it is also kind of part of the trust...it creates the trust, so it might be beneficial for you to trust the person and that the relationship might later become beneficial for you, although right at [that] moment it is not. (Interviewee 13, 2020)

There were several other experienced entrepreneurs who strongly emphasized the importance of having early reciprocal discussions with start-up entrepreneurs, not least because those discussions enhance the level of trust and facilitate start-ups' inter-communication with their entrepreneur community's human resources. However, social embeddedness also manifested itself through economic actions that were built around founders, founding team members and other dense cohesive groups that consist of social relations. Groups that form cohesive networks' social relations may better prepare start-ups to solve real business problems, as the networks have developed over several years and people within them have learned about each other.

However, possibly the best example of such economic action is the founding team's innovation development in academic start-ups, where the basic research phase, which lasts about 5–10 years, is followed by very intensive teamwork about 1 year before the firm's establishment, with social relations providing both emotional and business development support for founders and their teams.

6 Discussion

This chapter discusses the findings and answers the study's three research questions. The chapter is structured as follows. Section 6.1 provides a summary of the key findings, with Section 6.2 giving answers to the research questions. Section 6.3 presents the methodological implications and Section 6.4 the empirical contributions. Finally, Section 6.5 gives managerial recommendations.

6.1 Summary of the key findings

This study used Granovetter's (1985) embeddedness argument as a primary theoretical basis to empirically test the emergence of social embeddedness in the economic actions of start-ups' cohesive networks. The focus was on two distinct type of start-ups, academic start-ups (e.g. university spin-offs) and software start-ups, which significantly differ in the availability of knowledge, innovation, people and networks during their early development. The two types are especially distinguished by development challenges that are connected to human resource acquisition in their economic actions, such as innovation development, mentoring, coaching or general business development assistance in accelerators and equivalent entrepreneur communities.

While the literature has reported that software start-ups' human resources are often extremely limited (Carmel, 1994; Coleman & O'Connor, 2008; Crowne, 2002; Paternoster et al., 2014; Ries, 2011; Sutton, 2000; Yoffie & Cusumano, 1999), little information exists on whether this challenge is linked to economic actions in cohesive networks. The same applies to academic start-ups in the university context, where many more resources, such as university policy, faculty, technology transfer offices, investors, founding teams, networks in which a firm is embedded and other external conditions, affect new firm creation (Rothaermel et al., 2007). There is, however, a significant research gap regarding the use of embeddedness to understand start-ups' evolving resource challenges, such as human resources. So far, micro theories of exchange have dominated this research paradigm, including Burt's (1992) structural holes theory and the theory of a cohesive network based on Coleman's (1988) approach. Figure 13 illustrates the emergence of social embeddedness in the economic actions of cohesive networks in academic and software start-ups, as defended in this research.

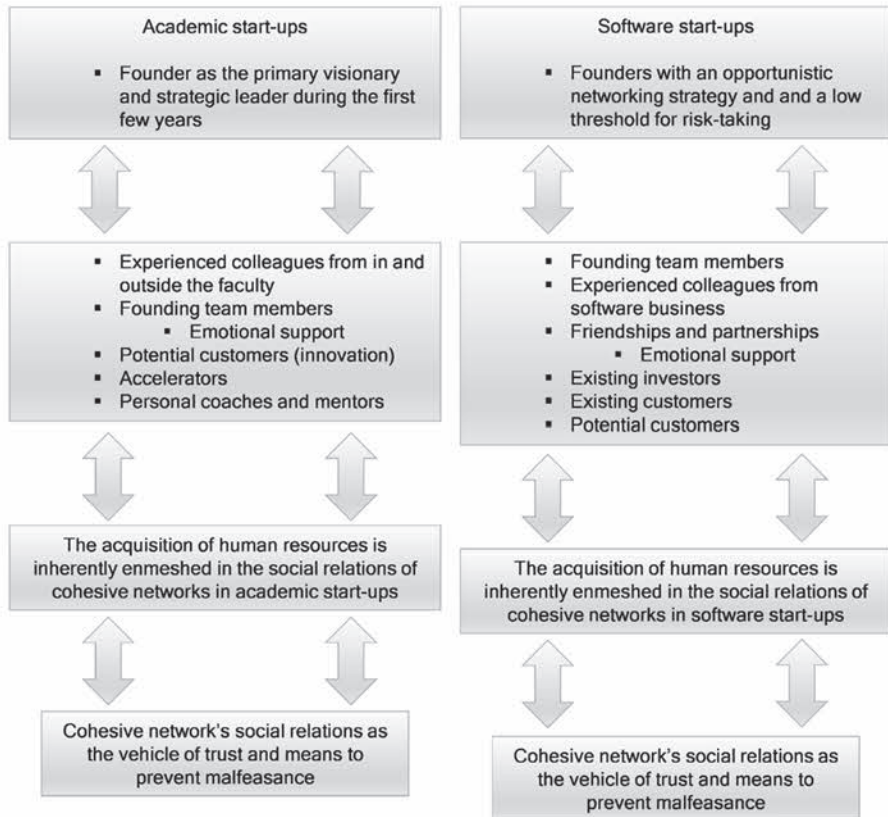


Fig. 13. The emergence of social embeddedness in the cohesive network economic actions of academic and software start-ups.

Based on this study's data analysis, academic start-ups' cohesive network social relations significantly helped companies supplement their often initially scarce human resources. This is particularly relevant to academic start-ups that initially used their faculty's cohesive networks and social relations, such as experienced colleagues, potential customers, personal coaches/mentors and different business development support services such as accelerators made available through their networks. These social relations within the university faculty context (e.g. innovation centers, science parks) significantly supported founders and founding teams in their firm's early development both before and after establishment. Founder was the primary visionary that founding team supported. Faculty's social

relations also provided the important emotional support in personal communication with founder and founding team.

One interesting result was that in academic start-ups, a few people may bring added value to the founding team's innovation development through active participation in that development, thus becoming involved in a dense cohesive network. These people strengthen the founder and founding team's vision during the first year, or even before the company's establishment. In this way, all academic start-ups' economic action is inherently enmeshed in the social relations of cohesive networks in the first 1–2 years after the company's establishment, and even before that in the basic research phase, as vehicles of trust and means to prevent malfeasance.

The findings on software start-ups' cohesive networks partially contrasted compared to academic start-ups, although they also had certain similarities. For software start-ups, the best business development support came from experienced colleagues from the same business who had experienced their own ups and downs, and could use their experience to guide inexperienced colleagues. For instance, founders of software start-ups who 2–5 years earlier had rented an office space in an accelerator, or an equivalent entrepreneur community had formed dense cohesive networks that primarily consisted of social relations with actors such as founding team members, friendships, partnerships and most importantly experienced colleagues. In some cases also existing investors, customers and potential customers. Generally, cohesive network social relations that software start-ups needed to establish the firm, to balance the opportunistic and risky networking strategy, and to supplement the scarce human resources. Based on the results, this was as much emotional support as it was business development support (e.g. software development, solving the technology risks), and included frequent physical meetings within small and cohesive groups, as vehicles of trust and means to prevent malfeasance. All software start-ups' economic actions, therefore, are inherently enmeshed in the social relations of cohesive networks 2–5 years after the company's establishment.

6.2 Answers to the research questions

The following three research questions were set for this study:

1) How is social embeddedness manifested in the economic actions of start-ups' cohesive networks?

2) *How is the acquisition of human resources inherently enmeshed in the social relations of cohesive networks in academic start-ups?*

3) *How is the acquisition of human resources inherently enmeshed in the social relations of cohesive networks in software start-ups?*

The research results demonstrate that particularly in academic start-ups' cohesive networks, actors do not behave as atoms outside a social context, but easily become embedded in certain, often complex configurations where mostly faculty's human resources are involved. This is primarily because scientists who are embedded in cohesive networks manage to solve technology risks in a relatively short period (e.g. 1–2 years) within the founding team. Economic actions in academic start-ups' cohesive networks do not occur in a social vacuum, but rather are nested in patterns of economic and/or social relationships (Dacin et al., 1999), where market and hierarchical relations are typically embedded in social relations. To that extent, all three types of relations (market, hierarchical, social) are essentially *social*, one step “upstream” from social capital (Adler & Kwon, 2002). This may follow as the result of the founder and founding team's very active and frequent communication with faculty's human resources some time before the company's establishment, in the basic research phase.

This dense cohesive network may primarily consist of academic start-up founders and founding team members, but social relations are also involved and bring added value to the founding team's economic actions, as well as important emotional support. This contrasts with extremely resource scarce software start-ups, where often inexperienced yet highly skilled founders struggle to find consistency during their firm's early development.

The founder's role as a visionary person and strategic leader in academic start-ups, where cohesive networks are crucial to a company's early development, the commercialization of university research and innovation development is the priority during the first few years. This technically challenging process primarily consists of a founder and founding team members, who together have solved the technology risks on a university's physical premises, using the faculty's own members in the process. The founder and founding team simultaneously receive valuable assistance from their faculty's social relations, though only from those persons in the faculty's cohesive networks who have brought some additional value to the company's early development and strengthened its business vision. Therefore, each of the less important actors outside that dense cohesive network were ignored

because they did not benefit just that activity, such as innovation development and solving the technology risks.

However, without the founder's own passion and determination, any significant development may not be possible, meaning the founder in academic start-ups represents the "father" of the company. Without the founder's own vision and business development skills, such as innovation development, it is possible that the whole company's development may cease. Generally, the founder's role determines the development of the whole company in academic start-ups during the first 1–2 years after the business is established, though also during the basic research phase. Therefore, all economic action is inherently enmeshed in the social relations of cohesive networks in academic start-ups that are currently in the development phase, where they need to strengthen their business vision and develop their innovation.

It was different with those software start-up entrepreneurs who had rented a space in some entrepreneur community, having spent 2–5 years there with even dozens of other start-ups, some of whom that were competitors in the same industry. These often very small, resource-scarce, and founder-centric software start-ups were distinct from academic start-ups, especially when comparing their economic action in cohesive networks, which entrepreneurs in a university's social context have. In software start-ups, the relatively long early phase was instead reserved for learning how to do viable business, although in some cases more opportunistic economic activity or opportunity and risk taking also occurred. Smaller and more cohesive "core" groups were thus first required, as well as frequent physical meetings between, for instance, founding team members and experienced colleagues to provide both business development support and emotional support. Practically, those human resources that are the most beneficial for software start-ups' early development in accelerators, for instance.

Generally, cohesive networks contrasted between every other type of start-up examined, especially extremely resource-scarce software start-ups, where the first 1–2 years after the company's establishment represented a learning opportunity for the founder, and only later did the company find its path and survive the critical early phase. Initially, however, sparse networks and its human resources represented more common configurations than cohesive networks in those companies. This was especially the case for start-ups where economic action was not yet inherently enmeshed in social relations, including friendships, partnerships, founding teams or experienced colleagues on an accelerator's physical premises.

6.3 Methodological implications

A qualitative exploratory case study research method was most suitable to empirically explore the emergence of social embeddedness in the economic actions of cohesive networks. The events in this case study were largely contemporary, rather than traced back very far in a company's history, although certain past events were also included, and by exploring mostly recent dynamic events, the present study could examine contemporary events (Benbasat et al., 1987). Practically, it was not relevant to include events that, for instance, took place 10 or 20 years ago.

The qualitative case study approach also uncovered specific details about the present research problem, which concerned events from a real-life context (Yin, 2009). In this sense, both contemporary and historical events proved important to exploring the emergence of social embeddedness in academic and software start-ups, from which little a priori knowledge is available in the literature, which instead focuses on the role of cohesive networks in start-up development. Still, overlap may have existed between the case and historical studies, and it was not possible to control it. Each research strategy has its own distinctive characteristics in addition to large areas of overlap as well (e.g. Sieber, 1973). The present research's goal was then to avoid gross misfits, where a researcher plans to use one strategy, despite having chosen another that might have been more advantageous (Yin, 1994).

6.4 Empirical contributions

While replication is appropriate in theory-testing research, in theory-building research, new theory represents the goal and may generate new, ground-breaking insights (Eisenhardt, 1989). However, for the present research's purpose, theory testing was the more relevant option, because the results primarily extended and challenged the validity of Granovetter's (1985) embeddedness argument and established its applicability. The study thus primarily made empirical contributions, which can be considered more relevant than theoretical contributions, as they may have more far-reaching theoretical implications than many theoretical contributions (Ågerfalk, 2014).

In the same way as theoretical contributions, however, empirical contributions need to show both originality and utility, and give rise to implications for both research and practice. Though unlike theoretical contributions, the originality of empirical contributions is not intrinsically tied to possible theoretical implications. The theoretical implications of empirical contributions are instead materialized

outside of the immediate research context and cannot be specified in full detail because they are beyond the control of the researcher and depend on how others perceive the research (Ågerfalk, 2014).

Empirical contributions were also relevant because empirical findings need to be interpreted and related to theoretical concepts and previous research, but they do not have to make a substantial theoretical contribution, meaning the value of strong empirical contributions should be acknowledged even at the expense of theoretical contributions in the short term (Ågerfalk, 2014). According to Kilduff (2006), the road to good theory leads not through gaps in the literature, but rather through engagement with interesting problems in the literature that show the way to good theory. Corley and Gioia (2011) made an important addition to this observation, stating that theorizing should not just run ahead of empirical research, but anticipate conceptual domains in need of theory and research.

Cohesive networks provided academic start-ups an optimal business development platform during their first few years, and in some cases before the company's establishment. In academic start-ups, where the founder and founding team members may conduct basic research for 5–10 years before the firm's establishment, an ideal empirical research platform may arise for researchers to further explore the emergence of social embeddedness in the economic actions of cohesive networks. Granovetter's (1985) embeddedness argument may provide an excellent theory-testing platform, especially when the analysis is limited to faculties and their cohesive network's human resources (Figure 14).

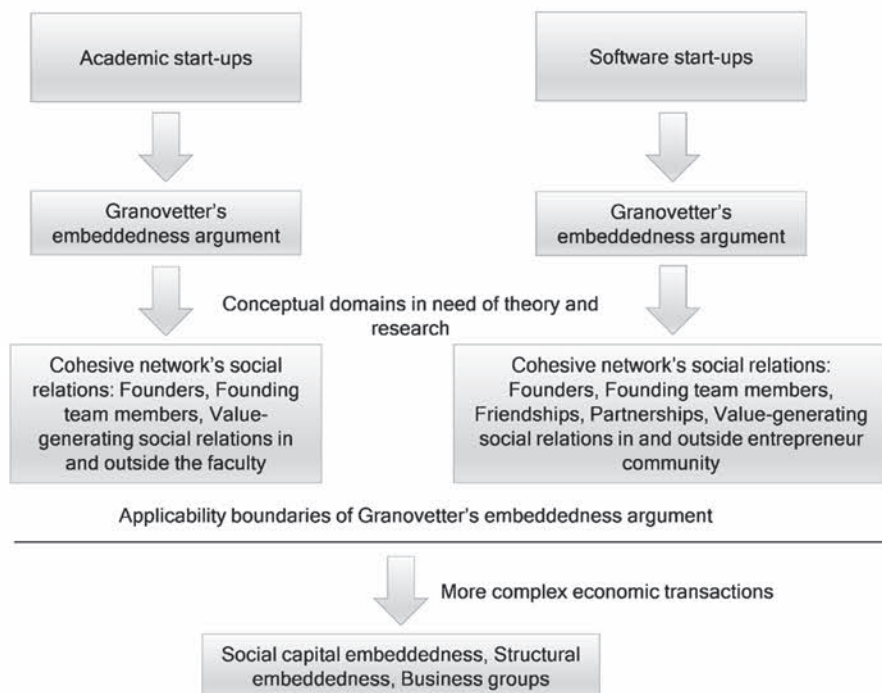


Fig. 14. Empirical contributions.

That is because a cohesive network's social relations are involved in the founding team's economic actions, such as when they need to strengthen their business vision up to 1 year before the firm's establishment, and only very few additional value-generating social relations are involved that manage to further strengthen the vision. In academic start-ups faculty's value-generating social relations thus constitute the cohesive network from most important human resources used to establish the company's foundations. In addition, some of those social relations may also come outside the faculty. The same applies to software start-ups that rented an office space in the local accelerator or an equivalent entrepreneur community a few years earlier, and managed to develop strong personal business relationships in that time, including friendships and partnerships where trust is not an issue.

These two empirical start-up environments and human resources that perfectly served the purpose to understand the emergence of social embeddedness in the economic actions of cohesive networks, but not necessarily more than that. Cohesive networks' social relations precisely set the limits of applicability for

Granovetter's (1985) embeddedness argument, as the networks' economic actions are simple and do not consist of complex economic transactions between two entities, meaning especially academic start-ups that may not yet have taken concrete steps to enter the market. The same applies to software start-ups that have decided to remain in the local accelerator's physical premises for a couple of years. In contrast, concepts such as structural embeddedness (Uzzi, 1996) and social capital embeddedness (Portes, 1993) can help researchers better understand whether embedded ties provide the greatest access to the benefits circulating in a network, and thus help extend the boundaries of analysis beyond the empirical settings described above. Structural embeddedness can also be understood as the degree to which actors are involved in cohesive groups, as Granovetter (1992) later found that cohesive groups are better not only at spreading information but also at generating normative, symbolic and cultural structures that affect our behaviour. In addition, concepts such as business groups (Granovetter, 2005) may in some cases provide valuable insights, and especially when research is conducted outside Finnish context, in emerging and developed countries consist of a set of legally separate firms bound together in persistent formal and/or informal ways.

Further research using qualitative research strategies conducted in academic and software start-ups' cohesive networks can further verify or disprove these results.

6.5 Managerial recommendations

The present research's findings are useful for both software and academic start-ups. Generally, the present research can benefit start-ups that lack information about the importance of embeddedness in both academic and software start-ups' empirical environments, primarily in small and cohesive groups such as founding teams. In particular, the results concretely show the importance of frequent physical meetings in a community, including local accelerators, where inexperienced or *nascent* entrepreneurs are the majority. Because those persons represent a heterogenous group, they don't share the same growth expectations or desires, after the decision has once made to initiate the business (Honig & Samuelsson, 2012). The findings are particularly useful for that group of founders. While this concerns founders in certain extremely resource-scarce software start-ups, university scientists who are considering a career in academic start-ups may also benefit from these results. That is because also among university scientists there are founders who need support in

the early development path and the safety offered by their community's cohesive groups, not only founding teams but also other cohesive network contacts.

It is thus extremely useful to arrange more opportunities for inexperienced start-up entrepreneurs to physically meet each other and more experienced entrepreneurs from the same industry who have overcome their own development challenges. This can positively affect the development of the local entrepreneurship population, while also potentially increasing the number of cohesive start-up networks. Social networks, including cohesive networks, are the most valuable initial source of human resources that start-ups need in their early development. The community should thus make new investments for the future by increasing the services and places where various entrepreneur generations may discuss business ideas, but also to provide emotional support, which is equally important compared to business development support. The best-case scenario is that these investments create a natural conversational connection between entrepreneurs, from which it is possible to progress to a confidential relationship in the future.

Both peer support and experience should be made available for founders at the same time. Experienced colleagues' support for founders should also suit their needs in just that early development period that is the most critical for start-ups. So, the more similarities the support includes in terms of experience and time, the more valid it is in terms of start-up founders. This type of intergenerational economic action is highly beneficial because it is likely to generate cohesive networks that are essential for both academic and software start-ups' survival, and innovation development during the companies' critical early stages. This may not be possible in large groups, so smaller ones may make it easier to address important development questions.

7 Conclusions

This chapter draws conclusions from the research. Section 7.1 discusses the study's limitations, and Section 7.2 proposes recommendations for future research.

7.1 Study limitations

Several limitations can occur in qualitative research, including extensive time requirements and the researcher's inability to verify the results. A few of these limitations exist in the present study. First, a vast amount of time was required to understand the complex social embeddedness phenomenon and verify the results that concern its emergence in two different empirical conditions (i.e. academic and software start-ups). Second, quantitative evidence was not collected, so the present study was based exclusively on qualitative research. This can be considered a minor limitation, though, because case studies can be based on any mix of quantitative and qualitative evidence (Yin, 1994).

However, it is possible that by mixing qualitative and quantitative evidence, a more synergistic analysis may have been possible that concerns relationships in start-ups which may not be salient to the researcher (Eisenhardt, 1989). This may especially concern economic actions in academic start-ups, where persons from wider scientific community are involved in the founding team's economic actions and strengthen the company's vision before the company's establishment. A similar limitation arose in some software start-ups cases, where the founder and founding team developed strong customer relationships with competing start-ups in the same business. For example, in one software start-up, the founder built very strong personal relationships with a customer company from the same business during the start-up's first years of existence. However, it was not possible to verify the emergence of social embeddedness in the economic actions of this start-up's cohesive networks, and whether they actually originated from people with whom the founder and his company had actively cooperated in the start-up's first years.

Another limitation was the lack of longitudinal research perspectives, which may have allowed a fuller exploration of the emergence of social embeddedness in the economic actions of cohesive networks. Case study is often used to longitudinally study complex phenomena, and complex units need to be studied intensively (Benbasat et al., 1987). Partially because of this limitation, the complexity of social embeddedness was not possible to fully uncover in academic and software start-ups cases where the early development phase occurred several

years ago. Most of the companies, although not all, were established 2 or more years ago, with some almost 10 years old. Therefore, it was not possible to verify if either academic or software start-ups' founders were studied in retrospect. Moreover, studying business founders in retrospect involves the risks of hindsight and success bias (Delmar & Davidsson, 2000). Start-up founders who were interviewed were asked to remember things that had happened several years ago. Most of the founders recalled positive events that have happened quite recently, but only few negative events were mentioned from the early stage of start-up's development. Therefore, it is possible that during the interview their thinking has changed.

7.2 Recommendations for future research

The present exploratory and qualitative case study research led to some unexpected findings. Most notably, academic start-ups' cohesive network contacts may come from outside a company's own faculty, and still significantly help founders and founding teams strengthen their vision, thus providing both human resources and emotional support which may be equally important. Cohesive networks and academic start-ups in general provide an interesting opportunity to further explore the emergence of social embeddedness in the economic actions of cohesive networks. For that particular purpose, Granovetter's (1985) embeddedness argument offers an excellent theoretical basis, as founders of academic start-ups and their founding teams may have spent several years in their university's social context by doing basic research, and later commercialized it. Accordingly, the company may have already formed very strong personal relations between the founding team's members and people in the same faculty, i.e. the cohesive network's social relations that have been most valuable during the early development phase.

The faculty's "safe" environment is an ideal empirical platform to further explore the emergence of social embeddedness in the economic actions of academic start-ups' cohesive networks as well because the people who generate the most value often come from inside the faculty and its cohesive networks, rather than from sparse networks. It is thus highly recommended to focus primarily on the first 1–2 years of academic start-up development, when founders and founding teams may still utilize their own faculty's human resources, i.e. social relations within the university and its physical facilities that provide both business development support and emotional support. For this purpose, both innovation centers and science parks

might offer a fruitful opportunity. The year before a company's establishment may provide valuable information as well when examining a founding team's economic actions, which may be very intensive in that period, or when founders and founding teams need to strengthen their vision and solve the technology risks associated with innovation development. In addition to qualitative case study methods, longitudinal study approaches may suit this field of research.

It is also highly recommended to focus on software start-ups in business accelerators and equivalent entrepreneur communities, where longitudinal research perspectives may allow a fuller exploration of the emergence of social embeddedness in the economic actions of cohesive networks. Especially friendships, partnerships and experienced colleagues may provide a fruitful opportunity for researchers to conduct more empirical research on the topic.

Qualitative evidence collection is highly recommended, although, for instance, case studies can be limited to quantitative evidence (Yin, 1994). Although evidence collected at the network level is preferable, in some cases dyads represent the basic unit of analysis between two actors (Ferris et al., 2009), and may provide valuable empirical evidence. For instance, to study the interactions between individuals or corporate actors in dyads, groups, organizations, or networks that can be viewed as social exchanges (Cook et al., 2013). Future researchers may also critically evaluate whether structural embeddedness involves the material quality and structure of ties among actors (Uzzi, 1996), further supporting Granovetter's (1985) embeddedness argument. Furthermore, concepts such as social capital embeddedness (Portes, 1993) may also provide similar possibility for researchers to study cohesive networks' empirical context more explicitly.

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Appendices

Appendix 1. Empirical data collection

Appendix 2. List of persons interviewed

Appendix 1. Empirical data collection

This study's data collection started on 23 March 2019 with the first personal interview. The first interviewee (male) was an entrepreneur representing a small start-up and low turnover firm which had been operating for about 2 years at the time of the interview in Oulu, Northern Ostrobothnia with 5 employees. The interviewee was also the firm's founder. The firm had spent its first 2 years in an accelerator with about 30 other small firms under the same roof. During that time, the firm was developing software applications for 5 customers. The interview lasted just over 41 minutes and covered the period from the firm's business initiation to the present.

The second interview was conducted on 29 March 2019. The interviewee (male) had been operating a speaker business in Oulu for 3 years at the time of the interview. The interview covered certain other periods that had occurred before the interviewee's business had opened, that is, the time before its latest pivot. The firm was operating in the same accelerator as the second interviewee's company, having been there for almost 2 years. This personal interview lasted about 45 minutes, and it mainly focused on the early start-up phase.

The third and fourth interviews were conducted in April 2019, lasting altogether approximately 80 minutes. The interviewee (female) was the founder of a low turnover firm in Oulu that manufactures software applications for sports clubs. The firm had been operating for approximately 1 year at the time of the interview. Another interview with the same interviewee was conducted later in the same month, lasting about 30 minutes. The first interview was conducted over the phone and lasted about 39 minutes, while the second was one-to-one and lasted about 40 minutes. These two interviews covered a period from the start-up's initiation to the present day.

The fifth interview was conducted on 6 June 2019, also over the phone, and lasted about 39 minutes. The interviewee (male) was a CEO in a larger 13-year-old company operating in Helsinki, Southern Finland. He had been cooperating with small start-ups and their entrepreneurs by investing in those firms and providing free mentoring. The interview covered mainly contemporary events and focused on start-ups.

The sixth interview took place on 6 October 2019 as a one-to-one interview, lasting about 32 minutes. The interviewee (male) was the founder of a small subcontracting software firm that had been operating for 6 years at the time of the interview. The interviewee shared the same physical space with several firms

representing many disciplines in the small town of Rovaniemi, Lapland, Finland. The interview covered mainly contemporary events, but also those that occurred at the time of the company's establishment.

The seventh interview took place on 14 October 2019, taking place over the phone and lasting about 22 minutes. The interviewee was the founder of a small subcontracting software start-up operating in Tampere, Pirkanmaa, Finland. While the interviewee had about 5 years of experience as the firm's CEO at the time of the interview, as in the previous interviews, the focus was on the firm's business initiation stages.

The eighth interview was conducted on 24 October 2019 one-to-one and lasted about 56 minutes. The interviewee was the founder of a start-up operating in Oulu. Having had about 6 years of experience as the CEO, the interviewee focused on the firm's initiation stages and their personal experiences as CEO.

The ninth interview took place on 12 November 2019 over the phone, lasting about 43 minutes. The interviewee (male) was one of the biggest social media experts in Finland and lived in Helsinki at the time. Using his 20 years of entrepreneurial experience, the interviewee provided extensive information from diverse start-up activities. Most of this information concerned the interviewee's personal experiences with start-up business.

The tenth interview took place on 13 November 2019 in Oulu. The interview was conducted one-to-one with an elderly entrepreneur (male) representing one of the most prestigious family businesses in northern Finland. Having 30 years of personal experience as the 100-year-old company's CEO, the interviewee was able to provide first-hand details about being an entrepreneur. Part of the interview concentrated on his conversations with a start-up entrepreneur who was also interviewed for this study, thus providing objective information about their one-to-one discussions.

The eleventh interview was conducted by phone on 26 November 2019, lasting about 58 minutes. The interviewee (male) had a long career in entrepreneurship in northern and southern Finland, where he was residing during the time of the interview. The interview itself focused largely on the general development of start-ups during the initiation stages, but also more detailed information about mentoring and networking opportunities in start-up business.

The twelfth interview took place on 27 November 2019 as a one-to one phone interview and lasted about 32 minutes. The interviewee (male) was the founder of a small subcontracting software start-up operating in Rovaniemi. The company had been operating about 2 years when the interview was conducted, and thus had

already passed the critical conception and gestation stages, while also had outgrown cohesive networks and moved towards more extensive and sophisticated networks. The interview mainly focused on the company's initial stage and certain contemporary events. As in the previous interviews, the primary focus was on the founder's networking in one local business ecosystem during his company's conception and gestation stages. Possibly having some previous experience as an entrepreneur, the interviewee was also able to reflect on those earlier experiences and compare them to contemporary events. As a result, the interview covered an interesting mix of past and present events.

The thirteenth interview was conducted as a one-to-one phone interview on 11 December 2019 and lasted about 20 minutes. The interviewee was an elderly businessman from a network that provides business development support to both start-ups and established firms in the Oulu start-up ecosystem, prioritizing the latter. The interview provided an important, albeit narrow and subjective perspective on start-up development. This information served as an upper-level perspective, though the interviewee's long career in entrepreneurship could have increased the data's reliability.

The fourteenth interview was conducted as a one-to-one phone interview on 12 February 2020, lasting about 38 minutes. The interviewee was an elderly businessman operating in the Oulu start-up ecosystem, with a background that included high positions in some of the region's central business service providers for start-ups. The interview provided a subjective and context-specific perspective on the region's start-up businesses, with a focus on firms in product business.

The fifteenth interview was a one-to-one phone interview that took place on 19 March 2020, lasting about 30 minutes. The interviewee was a businessman operating within a cluster built to provide initial business development support for academic start-ups (e.g. university spin-offs) in the Oulu start-up ecosystem. Having had the role as one of the cluster's coaches, the interviewee reflected on his extensive experience meeting with the entrepreneurs and their teams. Similarly, as in most of the other interviews, the main focus was the start-up conception stage, though also certain later-stage events.

The sixteenth interview took place on 20 March 2020. It was conducted as a personal interview using an online internet application and lasted about 53 minutes. The interviewee (female) was working as a business expert and developer in an Oulu start-up ecosystem cluster that supports both students and researchers in the conception stage. The interview covered both the interviewee's personal career experiences and those gathered from coaching students and researchers, as well as

past and present events. The interviewee also shared some general perspectives on the region's entrepreneurship, which provided valuable information.

The seventeenth interview was conducted as a personal interview using an online internet application on 25 March 2020. The interview lasted about 78 minutes. The interviewee (male) had previously worked in entrepreneurship but had since moved to a slightly different role in the Oulu start-up ecosystem's business networks. The interview covered both the interviewee's personal experiences from his previous occupation and contemporary events, with the interviewee comparing them to past events. Critiques were also part of that reflection.

The eighteenth interview took place on 5 May 2020 as a personal interview using an online internet application, lasting about 36 minutes. The interviewee (male) had originally been a researcher and university professor, and later started a career as the founder of a technology-based start-up in product business. Using his vast experience, the interviewee critically evaluated his past and present events in entrepreneurship, providing valuable information about the company.

Appendix 2. List of persons interviewed

Table 1

List of persons interviewed

Role	Location	Date	Duration	Method
Founder	Oulu	Mar. 2019	41 min	face-to-face
Founder	Oulu	Mar. 2019	45 min	face-to-face
Founder	Oulu	Apr. 2019	80 min	Phone/face-to-face
Expert	Helsinki	Jun. 2019	39 min	Phone
Founder	Rovaniemi	Oct. 2019	32 min	face-to-face
Founder	Tampere	Oct. 2019	22 min	Phone
Founder	Oulu	Oct. 2019	56 min	face-to-face
Expert	Helsinki	Nov. 2019	43 min	Phone
Expert	Oulu	Nov. 2019	56 min	face-to-face
Expert	Helsinki	Nov. 2019	58 min	Phone
Founder	Rovaniemi	Nov. 2019	32 min	Phone
Expert	Oulu	Dec. 2020	20 min	Phone
Expert	Oulu	Feb. 2020	38 min	Phone
Expert	Oulu	Mar. 2020	30 min	Phone
Expert	Oulu	Mar. 2020	53 min	Web app
Expert	Oulu	Mar. 2020	78 min	Web app
Founder	Oulu	May 2020	36 min	Web app

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