Connecting the Nodes

An interactive perspective on innovative microenterprises in a mature industry

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Connecting the Nodes – An interactive perspective on innovative microenterprises in a mature industry

Abstract

Innovative Microenterprises in Mature Industry

The emergent nature of the innovation process has always rendered it an elusive subject of study. Nonetheless, academics remained undeterred in their attempts to articulate the innovation process in academics terms as attested by the growing amount of research on the topic. Existing theories for explaining innovation (or the lack of innovation) center on empirical samples from large firms in the high-tech sectors such as electronics, software and information technology. This partly explains why popular concepts of innovation processes are associated with firms having characteristics such as strong science and technology components or the ability to conduct research and development (R&D) activities which should lead to commercialization. What these concepts do not explain well is how small and medium sized enterprises (SMEs), in particular microenterprises, which are increasingly credited with contributing to innovative output, are acquiring and converting resources that they do not possess.

Microenterprises (also known as small businesses, start-ups, family owned-businesses) possess similar characteristics to their SME counterparts when innovating through interacting in networks to access external resources as a way to make up for their lack of resources. However, the challenges faced by microenterprises can differ in scope from those of the general population of SMEs, in particular by having an emphasis on the importance of external actor bonds, resources ties and activity links during their innovation process.

This thesis examined the interaction aspect of innovating microenterprises that are seen to be renewing the mature industry landscape. Set in the context of the food industry which have been viewed as traditional and having low levels of innovation, the innovation process of these Swedish microenterprises are examined through how they address the barriers to innovation each in their own way, utilizing and developing capacities through interaction in the network. Findings suggest that recommendations for microenterprises to build up the networks to gain access to external resources should be accompanied by an awareness of the types and quality of external resources and an on-going evaluation of the capacities that microenterprises have and continue to develop during the innovation process. This involves considering a strategic combination of actor bonds, resources ties and activities links that will connect the synergy between the capacities of both past and present nodes in the network to help overcome barriers in the innovation process for microenterprises.

Key words

Innovation process, micro, small and medium-sized enterprises, innovation barriers, inter-organizational relations, interaction and networks

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To my family

Contents

To be thankful

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Deciding to go back to school after working in the private sector for ten years in Singapore meant that I have had to relearn a lot of skills that I thought had been long forgotten. On top of that, being in a new country away from my family in Singapore and learning to live in a new culture also has had its challenges. There are various groups of family and friends that are responsible for this successful transition. To my girls' foodie group: Nuk, Yaqian, Natta, Maria, Mona, Jessie, Naishi and Wen. Thank you, firstly for sharing your kitchen and company, and secondly for filling up the tummy with warm, comforting food that made some cold lonely days in Sweden much more bearable. I also had a "personal bodyguard" for the many late nights spent at

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爸爸，祝你七十大寿快乐。这本书是献给您一份礼物。
妈妈，虽然您先走有十五年了，我还是天天想你。
今天终于当博士了！

Lund, 15 May 2016

Clarissa Sia-Ljungström

1 Introduction

> Our [microenterprises] ambitions are always very high, and we don't always [achieve them]. It is both a strength and weakness. Maybe because of the dreams, we don't always see the hurdles we need to pass, and we might underestimate the hurdles. In a smaller company, we forget about all the trouble, we just go for it. Of course, it can be a risk if you dream too much and do not tackle the problem enough in advance. Dreaming is good because it pushes us forward, but it can also be dangerous if you don't take into consideration risk management.
>
> Jörgen Holm, former CEO Doublegood AB (Personal Communication, March 20, 2014)

The emergent nature of innovation processes has rendered it an elusive object of study. However, researchers remain undeterred on the topic of innovation, as attested to by the growing amount of research (Fagerberg et al., 2005, Edwards et al., 2005, Tepic et al., 2014). There have been impressive inroads made in innovation studies where innovation has been seen to play a role in the survival of firms (Cefis and Marsili, 2006, Buddelmeyer et al., 2010, Cefis and Marsili, 2005, LeBrasseur and Zinger, 2005). Fagerberg et al. (2005) made a distinction between invention and innovation, with the former being a "first occurrence of an idea for a new product or process" and the latter as a "first attempt to carry it (the invention) out into practice." Van de Ven et al. (1999) viewed innovation as "the process of developing and implementing a new idea. The idea may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach that is perceived as new by the individuals involved." This process of developing and implementing a new idea or an innovation involves examining "a sequence of events or activities that describe how things change over time" (Van de Ven, 1993).

Van De Ven et al.'s definition illustrates just one of the few interpretations by scholars in innovation studies. An extensive review of the definition of innovation used by various fields of studies was conducted by Baregheh et al.

(2009). They concluded that innovation could be classified by six attributes: nature (e.g., new or improved), type (e.g., product/process, radical/incremental), stage (e.g., adoption, implementation, development), environment (e.g., organization, customer, consumer), means (e.g., idea, market, creativity), and aims (e.g., economic, competition)[1]. This thesis has adopted the definition of innovation from Baregheh et al. (2009):

> Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace.

Van de Ven et al.'s (1999) exploration of the innovation journeys of 14 companies described innovation processes as non-linear and fluid, highlighting the constant development of interaction between internal and external actors and different types of resources. The innovation process used to be one that was considered to be contained within the confines of a firm, but now it is increasingly being recognized as a process that has interactivity as a core element. The focus by some innovation studies has been limited to examining the process whereby new information is "acquired and converted to innovation" (Varis and Littunen, 2010, Sara et al., 2005, Popp, 2000, Cooper et al., 1991, Levy and Powell, 2004). However, the complex process of the acquisition and conversion of resources involves a high level of interaction which is increasingly being identified as a key to generating and transferring knowledge within and outside the organization (Kline and Rosenberg, 1986, Bengt Åke Lundvall, 1992). The recognition of relationships as part of the equation required a new way of viewing innovation processes as changes on "any side of the relationship (*equation)* will affect it(*the innovation process*) in terms of changes in links, ties or bonds" (words in italics author's own) (Håkansson and Ingemansson, 2013). The process of making the transition from the invention as an idea to a practical form that can be used for the intended audience can involve engaging different types of actors at different points of time (Benneworth et al., 2009, Tödtling and Kaufmann, 2001). The level of engagement undertaken by the innovating organization is also dependent on the existing resources and capabilities of the enterprise (Baregheh et al., 2009). Havenvid et al. (2016) further explained from the industrial network approach that the innovation process may be viewed as a "result of

[1] See BAREGHEH, A., ROWLEY, J. & SAMBROOK, S. 2009. Towards a multidisciplinary definition of innovation. *Management decision,* 47, 1323-39. for a complete discussion.

interaction processes among several parties that adapt their resources and activities in relation to each other in problem-solving and attempting to achieve increased efficiency." Halinen et al. (2012) described these interaction processes observed in networks as "comprising sequences of connected events and activities that unfold over time in and around networks."

The DUI (doing, using, and interacting) model of innovation is being used to explain higher innovation performance levels in STI (Science and Technology Innovation) types of firms (Asheim and Coenen, 2005). Firms engaging in a STI-mode of innovation have been regarded as having a 'closed' innovation process as innovation activities are conducted mostly in-house. The combination of interactive elements from DUI modes of innovation and STI-focused innovation processes (Isaksen and Nilsson, 2013) has also brought attention to the increased level of interaction and performance in these firms (González-Pernía et al., 2014, Trippl et al., 2015). González-Pernía et al. (2014) explored firms that combined collaboration with STI partners and utilized internal DUI-related capabilities. Their findings suggested that product innovations were more likely to emerge from such collaborations and that it is the simultaneous engagement of both modes of actors that can harness the "different strengths and complementarities among partners of a different nature."

Despite Varis and Littunen (2010) claiming innovation to be the "elixir of life" for firms of all sizes, there has been less research explaining the role of newly founded small firms or microenterprises (European Commission, 2013) innovating within their sectors. Small businesses or small and medium-sized and microenterprises (SMEs) have long been suggested to be the "lifeblood of the economy" (Hausman, 2005), providing jobs and innovation (Hewitt-Dundas, 2006). Governmental bodies such as the European Union have outlined plans (such as Horizons 2020, the latest EU Research and Innovation program launched in 2015) to encourage development of SMEs in the various industrial sectors they populate. Microenterprises[2] are defined those businesses that employ fewer than ten persons and whose annual turnover and/or annual balance sheet total do not exceed EUR 2 million.

Recent research on regional development (Frykfors and Jönsson, 2010, Vorley and Nelles, 2010, Henning et al., 2010, Asheim et al., 2011, Hansen and Winther, 2011, Coenen et al., 2015) has examined the role of innovation

[2] Definition taken from Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003H0361

and the key players involved in the renewal of mature industrial sectors. Hu and Hassink (2015), for instance, highlighted old industrial sectors in certain regions that faced greater challenges in adapting or revitalizing themselves due to functional lock-ins (inter-firm relations, close trade interdependences, and mature infrastructure) or institutional-political factors. Such mature industrial sectors may renew themselves through innovations that are based in the "recombination of different but related knowledge, skills and competencies found in existing industries in the region" (Coenen et al., 2015), introduced by certain types of players in the industry. Trippl et al. (2015) observed three modes of renewal for mature industries: path extension, path renewal, and new path creation. Their findings suggested that new path creations were often introduced by radical innovations that challenged the status quo. In these new path creation instances, newly founded small firms were often found to be the key agents of change (Trippl and Otto, 2009).

The food sector can be considered a mature industry in that it has often been classified as a traditional sector using mature technologies and having slow growth and low levels of R&D (Muscio et al., 2010). It has a large number of small firms, particularly microenterprises. The Swedish food industry nonetheless is the fourth largest industry in Sweden with a production value of €18.8 billion and with more than 3,000 companies (Swedish Trade Council, 2011). As one of the largest sectors in Sweden in terms of employment and production value, interest in promoting innovation in this sector is growing, evidenced by the number of intermediaries, clusters, and initiatives designed to assist firms in this sector with their innovation journeys. In the EU context, the food industry accounts for 11% of total employment and has linkages with other industries (Avermaete et al., 2003). Research on innovation in the food industry (Baregheh et al., 2012, Muscio et al., 2010, Lagnevik, 2008, Sarkar and Costa, 2008, Beckeman and Skjöldebrand, 2007, Avermaete, 2006, Costa and Jongen, 2006, Avermaete et al., 2004) has shown a wide range of topics surrounding innovation in this sector. There have also been cases demonstrating the transfer of knowledge from research-based institutions to SMEs (Braun and Hadwiger, 2011), and how open innovation has been practiced in the food sector (Sarkar and Costa, 2008, Batterink et al., 2010, Isaksen and Nilsson, 2013, Nilsson, 2008).

The literature review from Hoffman et al. (1998) showed that, while small firms were generally acknowledged as innovative, research results have been mixed and have only provided a generic overview of innovative small firms. This is due in part to researchers treating small firms as a homogenous category rather than segregating the sample by type. This sampling method may have

"trivialized" findings where certain phenomena warranted more than a casual transfer of understandings from a larger firm onto microenterprises (Frank and Roessl, 2015).

1.1 Diversity in Innovation

1.1.1 Heterogeneity of innovative firms

While the diversity in the types of innovative firms is generally acknowledged, empirical accounts of successful innovative firms are often drawn from studies of innovation in large firms, (Jensen et al., 2007) or firms operating in the high-tech sectors (Hoffman et al., 1998) such as electronics, software, and information technology (Keizer et al., 2002, Larsen and Lewis, 2007, McEvily and Zaheer, 1999), or specialized innovation agents such as universities and research institutions. This provides the impression that successful innovation should have elements of formal R&D activities, specialized expertise, and a critical mass of resources in the innovation process. This notion of innovation being mostly associated with the STI model of innovation that is "based on the production and use of codified scientific and technical knowledge" (Jensen et al., 2007) or characterized by firms that have dedicated resources for formal R&D (Edwards et al., 2005) is challenged by emerging fields of studies, for example, in mature and LMT sectors (Low-and-Medium Technology). Diverse streams of research have attempted to address this bias through cases that demonstrate the success of innovation despite the lack of formal R&D (Moilanen et al., 2014, Rammer et al., 2009, Sternberg, 1999). These cases have illustrated SMEs or small firms engaging in alternative, non-R&D innovation pursuits (Hoffman et al., 1998, Rothwell and Dodgson, 1991, Rammer et al., 2009, Raymond and St-Pierre, 2010, Moilanen et al., 2014).

Hirsch-Kreinsen (2015a) pointed out that the bias of looking to high-tech sectors has undermined the innovativeness of other types of firms that operate in mature sectors. Similarly, Hyvärinen (1990) criticized such traditional innovation indicators that tend to neglect non-economical innovation results and tend to measure only the input (time, money, etc.) and output (such as patents) of innovation processes. These indicators may misrepresent microenterprises innovating in the mature industries or small niche markets. This thesis echoes the need for a better understanding of the innovation

processes of microenterprises (Zinger et al., 2001, T Edwards et al., 2005, Scozzi et al., 2005, Avermaete et al., 2004) in the context of mature industries.

1.1.2 Heterogeneity of small firms

Studies on small firms have the tendency to consider all small firms under a homogenous category of SMEs (Hoffman et al., 1998, Gibb, 2000, Tödtling and Kaufmann, 2001, Davidsson, 2007, Mallett and Wapshott, 2015, Frank and Roessl, 2015). Shaw and Blackburn (2000) pointed out that the diversity among small firms highlights the uniqueness of each innovation experience due to the different ways of organizing innovation aims and outcomes. Thus, generalized statements made based on the "enormous heterogeneity of SMEs" are subject to "the risk of being superficial and platitudes" (Frank and Roessl, 2015). Curran and Blackburn (2000) pointed out a "heterogeneity problem" in their book *Researching the Small Enterprise*:

> To these problems can be added the heterogeneity problem. As the opening chapter showed, not only is the population of SMEs large, but there is an exceptionally wide range of different kinds of small businesses from mortgage brokers to medical instrument makers, run by an equally wide range of different kinds of people with a comparably diverse labour force and differing links with the wider economy. Owner-managers engaged in different kinds of activities may be more or less reluctant to participate in research. This causes considerable problems in ensuring samples are representative where the research seeks to offer authoritative conclusions about small businesses generally.

Even though there is a vast body of research on innovative small firms, there has been a lack of research explaining specific cases of the innovation process of microenterprises (Roper and Hewitt-Dundas, 2015) particularly in mature industries (Hirsch-Kreinsen et al., 2005, Scozzi et al., 2005, Hall et al., 2009, Hoffman et al., 1998). The notion that new and small firms such as microenterprises are innovative, while not new, has started to gain more attention among researchers (Simpson, 2001, Tu et al., 2014, Roper and Hewitt-Dundas, 2015). While there are similarities in the innovation process between small firms (similarities that have allowed the process to be categorized along the different innovation types such as incremental/radical, product, or market innovation), there exist enough differences to warrant dedicated sampling for understanding the innovation process of microenterprises.

Literature on the liability of smallness and newness (Stinchcombe, 1965) showed that greater efforts are required of smaller firms in managing their relations (both internally and externally) and the environmental changes (Frank and Roessl, 2015) during the innovation process. Hyvärinen (1990) suggested that "the smaller the enterprise, the nearer its innovative behavior is to that of an individual. The bigger the enterprise the more the personal traits of the manager are replaced by the characteristics of the enterprise such as products, strategies, resources and organizational behavior." For microenterprises, having an entrepreneur with well-established ties in the industry might be more beneficial for the innovation process than having a large number of employees like in a larger-sized firm. The correlation of personal characteristics of an entrepreneur to the enterprise have been studied in entrepreneurship studies, but this thesis focuses on the need for an holistic understanding of the aspects influencing the innovation process of microenterprises (Zinger et al., 2001, T Edwards et al., 2005, Scozzi et al., 2005, Avermaete et al., 2004), particularly in terms of the interaction that takes place in the renewal of mature industries.

Since the availability of internal resources for microenterprises has been shown to play an important part in the innovation process (Roper and Hewitt-Dundas, 2015), even the slightest deviation in the size of small firms may curb the availability of resources required for innovation. Due to the nature of the organizational structure in microenterprises, which tend to be more family-business oriented or a one/two-person operation, the quest for external resources or collaborations during the innovation process might mean that ties are established in a different way or of a different nature from that of larger firms (informal versus formal ties). Large firms may have the advantage of having resources that allow substantial investment with external ties. The ability of large firms to restructure existing resources can aid them in the maintenance of dominance in the market and reduce their reliance on external alliances for access to external resources (Gomes-Casseres, 1997).

Due to the size of microenterprises, the impact of barriers in a mature industry may be perceived as a greater challenge by them than they would be by larger firms. The rate of failures due to the inability to overcome barriers to innovation by newly founded companies (one-person or microenterprises) (Frank and Roessl, 2015) meant that a specific contribution could be made to this fragmented literature on small businesses. The lack of empirical research concerning innovation activities in small firms (Bjerke and Johansson, 2015) does not diminish the importance of small firms, including microenterprises.

What this highlights instead is that the understanding of the innovation process for microenterprises can be enhanced.

1.2 Innovation Barriers in Microenterprises

Past literature has categorized barriers to innovation according to internal or external barriers (Hoffman et al., 1998, Madrid-Guijarro et al., 2009). The more common types of barriers encountered by small firms often relate to financial, personnel and marketing resources (Larsen and Lewis, 2007). However, more studies are needed to understand the factors influencing innovation processes in small firms that can make or break the innovation process (Zinger et al., 2001, Monahan et al., 2011). The impact from barriers to innovation is felt more by microenterprises as compared to larger firms (Madrid-Guijarro et al., 2009) particularly in terms of cost and limitations in material resources and exisiting capabilities (Hewitt-Dundas, 2006). Due to the variance in innovation conditions between the SMEs and microenterprises, the limitation of resources (such as the number of employees, network ties, knowledge, skills, etc.) for microenterprises and the unexpected consequences from management decisions may be magnified in the context of microenterprises.

Small businesses are said to possess certain behavioral advantages (Rothwell, 1989, Hewitt-Dundas, 2006) that can help them address barriers encountered during the innovation process despite their resource constraints (Freel, 2000). Rothwell (1989) observed that while large firms' innovatory advantages lay mostly in being endowed with tangible assets (having strong financing, for example), small firms, on the other hand, often have had an edge on innovation due to their entrepreneurship, internal flexibility, and responsiveness to changing circumstances. Grunert et al. (1997) further pointed out that these behavioral advantages manifest through lean bureaucracy, high commitment and motivation, fast reaction to competition, better R&D efficiency, and growth through niche strategies, which Nieto and Santamaría (2010) agreed can help provide an innovation advantage in their environments which can encourage innovativeness, flexibility, and rapid response. Gulati (2007) provided a complementary view to the understanding of how these behavioral advantages may be developed in the context of networks to aid small firms in the innovation process. During collaborations with partners in the network, small firms may be influenced in their behavior

through their interaction with its partners. These interactions can help shape the behavioral aspects of microenterprises that can help them deal with future potential opportunities in the innovation process. Microenterprises may seek to reduce innovation barriers through collaborations with other firms and organizations (Gomes-Casseres et al., 2006). These collaborations for innovation (of different permutations) open up opportunities to combine resources or complement each other in their business functions (Wernerfelt, 1984). Freel (2005, 2000) pointed out that small firms could enhance their behavioral advantage during the innovation process through these collaborations and knowledge networks. Moilanen et al. (2014) pointed out that there was an increasing emphasis on external knowledge as a critical element in innovation.

The use of external knowledge, which holds specific importance to microenterprises (Rammer et al., 2009), is one way microenterprises can combine different knowledge sources for innovation (Tödtling et al., 2009, Robertson and Smith, 2008, Asheim, 2007, Håkansson and Waluszewski, 2007). This points to the utilization and dependence on external knowledge that may vary across firms due to size (Bjerke and Johansson, 2015). Hirsch-Kreinsen (2015b) suggested that the concept of a distributed knowledge base provides another perspective in understanding how innovative microenterprises behave when innovating in mature industries. In seeking external knowledge, microenterprises may be looking for less expensive or risky alternatives to formal R&D (Spithoven et al., 2011) that may require substantial investment from a financial and human resources' perspective. Seeking alternative resources can present a different set of challenges; small firms have been observed to exhibit behavioral advantages (Rothwell, 1989, Hewitt-Dundas, 2006) in the innovation process that can help them overcome these barriers.

1.3 An Interactive Approach to Innovation

The field of research of business relations and networks can help to explain how small firms continue to innovate despite the lack of resources. The study by Hirsch-Kreinsen et al. (2003) of SMEs in the LMT sector showed how small firms continue to innovate even when they lack resources (such as formal R&D) by using other alternative modes to innovation. The innovation process involves not just actors within the firm, as "the locus of innovation is not the firm but rather the network in which the firm is embedded" (La Rocca and

Snehota, 2014). This means that the innovation process can be viewed as a process of co-creation (Mele and Russo-Spena, 2015) and the concept of interaction in particular provides a perspective of innovation as a process of how resources are combined in a network to provide a novel end product. Open innovation, for instance is one way in which small firms can attempt to utilize and harness the structural support available in the innovation system (Kaufmann and Tödtling, 2002, Scozzi et al., 2005, Lee et al., 2010, Sunjoo et al., 2010, Van de Vrande et al., 2009). Other alternatives ways small firms innovate include utilizing external collective research (Le Bars et al., 1998) instead of relying on in-house formal R&D, applying the relevant practical knowledge and core competencies that small firms already have, and/or establishing contacts with actors from different fields and sectors (Hirsch-Kreinsen et al., 2006).

Business networks studies views interaction as a core element that connects different actors or enables access to external resources for learning and collaboration. These connecting relationships and the introduction of external resources for innovating firms have modified the formerly held linear perception of the innovation process. The linear perception of the innovation process had assumed an internal, direct, and sequential flow of one phase of the innovation process to the next phase. The network perspective has a more encompassing view of the firms' relationships and the complex and at times discontinuous connection to the environmental context (La Rocca and Snehota, 2014, Tödtling et al., 2009, Segarra-Blasco and Arauzo-Carod, 2008, Lundvall, 1988).

La Rocca and Snehota (2014) pointed out that the need to understand how new businesses (such as newly formed microenterprises) with no preexisting network embed themselves into a network. One way which new business may 'join' new networks is through the process of interacting when they are trying to access external resources via actors in a network. The types and level of access to external resources that small firms gained through establishing bonds with actors in the networks during the innovation process could provide them additional benefits such as advice and problem solving (Hoang and Antoncic, 2003). Tödtling et al. (2009) suggested that depending on the type of innovation (for example, incremental or radical), the types of resources accessed at different stages of the innovation process would also differ due to the positions that the actors hold in their networks (Greve, 1995). The implications for small firms who developed dependence on particular actors or resources through these processes of interaction remain a neglected area of study for their significance and impact to the overall innovation process

1.4 Innovation in Mature Industries

Hirsch-Kreinsen (2015a) and his colleagues have, in their contribution over the years to the literature in low-and-medium technology (LMT) industries, illustrated how non-research intensive industries are innovative and play important roles in developing the country's economies (Hirsch-Kreinsen et al., 2005, Hirsch-Kreinsen et al., 2006, Hirsch-Kreinsen and Jacobson, 2008, Hirsch-Kreinsen, 2008a, 2015a). These non-research intensive industries may also be referred to as mature industries and are mostly seen as populated by low technology and/or small firms (Hirsch-Kreinsen, 2015a). Nonetheless, scholars examining these sectors saw a rejuvenation in recent years with newly founded small firms playing a role as agents of change as they recombined knowledge and competencies to bring about new changes in the sector or region (Trippl et al., 2015, Trippl and Otto, 2009, Coenen et al., 2015). Through modification or recombination of existing/new knowledge and existing/new technology, microenterprises are "niching" their way into, for example, the food sector which has been traditionally populated with a large number of SMEs and some very large firms. The niche markets created by microenterprises shows them not just innovating "near-to-market" or at "initial market diffusion" (Freel, 2000, Rothwell, 1989), but creating new food functions and technologies that could redefine the food sector.

Redefining the food sector means that, in addition to existing challenges in the food sector, firms innovating in the food sector also need to address new groups of stakeholders emerging in the innovation process. For instance, the increasing need from consumers for knowledge about food sources, production and processing methods means that knowledge and skills need to be built up for these innovating firms quickly. This is especially true for functional-food products, which can also introduce new areas of concern such as the need for ethical standards for new food products (Earle, 1997). Such inter-related issues can quickly emerge in a sensitive and mature sector such as the food industry. This means that firms innovating with new food products and processes are required to react quickly and set aside an additional buffer of resources to drive the innovation process along. In addition to the above-mentioned considerations, the wariness of some groups of consumers toward new food products and processes can post additional challenges when innovative food products are introduced (Sarkar and Costa, 2008).

Lagnevik (2008) pointed out that it is not only the changing demographics of consumers, but also the shift of experienced professionals who leave their

previous positions in larger companies to start up or join small, innovative firms that promotes innovation influx in the food sector. This represents a way in which microenterprises can innovate "below the surface" of existing established industries when they "deviate from the rules of the existing regime" (Geels, 2004). By examining not just the actors, but also the connection process through the relationships microenterprises form and how they interact to address barriers to innovation may help place the focus on understanding how these professionals are supporting the innovation process below the surface of conventional innovation policies.

1.5 Purpose and Contribution

The purpose of this thesis is thus to increase the understanding of the innovation[3] process of microenterprises and how the capabilities developed during the interactions with external actors to access resources can help address barriers encountered during the innovation process. This means that the barriers to innovation are examined in the context of each case's innovation process. The integration of external resources and establishment of relations with external actors and resources through innovation-related activities are examined in connection to how these microenterprises overcome these barriers.

This study elucidates the challenges faced by microenterprises innovating in a mature industry. Building on the basis of four microenterprises' innovation process case studies in the Swedish Food sector, a detailed understanding of the innovation process in relation to barriers to innovation encountered by these microenterprises is presented. The thesis examines in particular the interactions that occurred during those critical events when barriers to innovation were experienced. The findings from these studies are presented in an understanding of the theoretical framework. This study contributes to the literature on barriers to innovation for small businesses in particular, the microenterprises' sector that was often subsumed under the SMEs category. Besides a novel approach to understanding the innovation

[3] The definition of innovation is taken to be "the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace". BAREGHEH, A., ROWLEY, J. & SAMBROOK, S. 2009. Towards a multidisciplinary definition of innovation. *Management decision,* 47, 1323-39..

process of microenterprises through examining the interactions of the nodes that connect the different actors, resources, and activity in each network, this thesis aims to augment past literature by investigating how the interaction of these elements has helped to address the barriers to innovation faced by these microenterprises in a mature sector.

1.6 Structure of Thesis

The thesis continues with a literature review in Chapter 2. A description of past innovation process models is presented, followed by a discussion on the characteristics of innovating microenterprises. Barriers faced by innovating microenterprises are related to the capabilities that can aid them in addressing the challenges encountered during the innovation process. The interactive approach explored in past studies in understanding the innovation process is also considered and the chapter concludes with an analytical framework that maps out the theoretical understanding of the mechanisms that influence the innovation process for microenterprises.

Chapter 3 explains in detail the methodologies used in this thesis. Here, the reasons for using sampling methods and the critical events approach [Events-Based Network Process Analysis by Halinen et al. (2013)] for identification of focal networks and interviews is expounded upon. The process of inquiry and the composition of the story of each innovation process case using narratives help to set the background for Chapter 4.

In Chapter 4, the narratives of the collected empirical data for each case are constructed in relation to the detailed accounts of the interactions captured in the context of the critical events identified. The aim of these narrations is to convey the considerations and exchanges between the different layers of actor bonds, activity links, and resource ties in each unique innovation process. The key actors' networks surrounding the critical events associated with innovation are mapped to define the relationship patterns in the network. Each case study ends with an individual case analysis and a network map related to the ARA model.

Chapter 5 discusses the four cases along three main themes identified from the insights derived from the individual case analyses and the consideration of the theoretical concepts presented in earlier chapters. This comparative overview of the four cases takes note of the similarities and differences of these

four cases and connects the understanding of the theories discussed to the observations from the data.

The thesis ends with Chapter 6, concluding with reflections in the areas of theoretical, managerial and policy contributions. This includes addressing areas of limitation for this research that serve as suggestions for future research.

2 Theory and Literature Review

> There is a lot of dimension with innovation that one has to work with. It's both enthusiasm and anxiety—that is the life of an entrepreneur. It's a bumpy road; it's a very bumpy road. There's lots of questions that you don't even dream of and you probably don't want to go in if you knew these questions before.
>
> Rolf Bjerndell, (Personal Communication, February 27, 2015)

Despite the myriad of studies on small firms, the innovation process of microenterprises still remains unclear (Hoffman et al., 1998, Edwards et al., 2005) as conflicting recommendations about how microenterprises innovate are being churned out by scholars from various fields of studies. This chapter provide an overview of the literature discussing innovation processes and innovative microenterprise by first providing a chronological journey of innovation process models over the decades in Section 2.1. This highlights some assumptions associated with the understanding of the innovation process through these models over the decades. The discussion continues by exploring the challenges microenterprises face during the innovation process (Section 2.3) and how these barriers to innovation are mitigated by characteristics or capacities (Section 2.4) possess by microenterprises. This relates to the use of capacities and capabilities that can aid microenterprises in the interactive innovation process. The interactivity characteristics during innovation processes are explored further in Section 2.5 by understanding the different approaches used in the study of interaction at various levels. A preliminary analysis framework is presented in Section 2.6 to enable an application of this framework to the empirical data collected to analyse and understand the innovation process of microenterprises.

2.1 The Eras of Innovation

Innovation has many facets, which stems from the various research fields that have taken an interest in studying innovation. Schumpeter's (1934) pioneer work in innovation research, for example, revealed an exploration of the role of entrepreneurs in the innovation process. Entrepreneurs were described as "challengers" who introduced disruption (through a new innovation) to the current status quo that was maintained by previous innovators (Malerba and Orsenigo, 1995). This interest on characteristics of entrepreneurs can also been seen in fields such as entrepreneurship studies. Schumpeter's (1942) subsequent interpretation on the importance of innovation by large firms prompted the Schumpeterian debate of small firms versus large firms (Acs and Audretsch, 1988). This debate revolved around the advantage of large firms' extensive in-house resources (R&D, financial and manufacturing resources, etc.) which the lack of these resources act as barriers to innovation for small firms (Malerba and Orsenigo, 1995). SMEs, including microenterprises, have been a perpetual feature of the economies of many countries and while the definition varies across the board (O'Regan and Ghobadian, 2004), this thesis adopts the definition of microenterprises from the European Commission that defined a microenterprise "as an enterprise which employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million."[4]

There has been diverse interest in various research fields on this topic but there are still inconclusive results on the advantages or disadvantages small firms have over larger firms during innovation. The understanding of innovation at any point in time is dependent on the context of the era in which it is being situated (Radas and Božić, 2009), as will be illustrated in section 2.1.1. The varied conditions of the industries studied and the complexity in the relationships between the size of firms studied implies that there may be conflicting parameters influencing the innovation process (Edwards et al., 2005) being proposed. Besides the variance on the units of analysis used when studying innovation, innovation processes themselves can also be viewed from different perspectives, such as the meso, micro, or macro level. A review of the contextual understanding around the different generations of innovation process models can clarify the underlying assumptions that were considered

[4]Official Journal of the EU, Recommendation by the European Commission 2003/361/EC dating from 060503, Annex Article 2*, Eur-lex.europa.eu.* Retrieved 2016-03-30.

crucial to the innovation process models and provide a better appreciation for these models and how it can help in the understanding of the innovation process of microenterprises.

Criticisms of early innovation processes models pointed out that these models were largely derived based on empirical data from larger companies, often in the technological industry (Hirsch-Kreinsen, 2008b, Hirsch-Kreinsen and Jacobson, 2008, Hirsch-Kreinsen, 2008a). Based on these models, characteristics of innovating firms were thus more related to characteristics of large, technological firms, such as having large R&D departments or specialized functions that handle each phase of the innovation process (Hirsch-Kreinsen et al., 2008, Bender, 2004). Subsequent innovation models began to incorporate the element of interaction, with increased awareness on the involvement of external interaction as an important element that drives the progress of the innovation process. The industrial marketing perspective suggests viewing innovation itself as a result of interactions that include resources and activities (Havenvid et al., 2016, Håkansson et al., 2009). This meant considering the innovation process as " activate and maintain a complex set of relationships between activities, resources and actors, to systematically handle reactions to friction forces across these productive entities, and to maintain and advance the necessary framing needed to coordinate interactions across the development, production and using contexts of commercial innovations across all their interfaces to already existing business resources, activities and actors, who represent their own framing" (Håkansson and Olsen, 2011).

A chronological trip through the decades is thus needed to appreciate the evolvement of innovation process models and how it can aid in the understanding of innovation processes in microenterprises. Kotsemir and Meissner (2013) provided an extensive study of the different generations of innovation models from the early models ranging from linear process (1950s-1960s), market (need) pull (1960s-1970s), coupling (1970s-1980s), interactive (1970s-1980s), integrated (1980s-1990s), networking (1990s), and open innovation (2000s) to the open innovator model (2010s). Section 2.1.1 takes inspiration from their study to present a background on past innovation process models. For the ease of grasping an overview, the discussion groups Rothwell (1994) and Tidd (2006) five generations of innovation process models under three main headings: 1) linear/sequential models, 2) phased/coupling models, and 3) integration/interactive models.

2.1.1 Generations of innovation process models

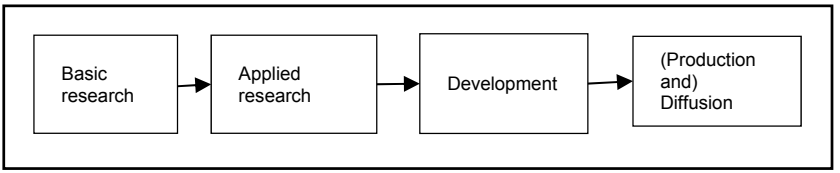

Figure 1.
Linear process model (Godin, 2006).

2.1.1.1 Linear/sequential process models

The first category of linear innovation process models (*Figure 1*) featured an 'essential' presence of in-house R&D resources. The idea of R&D as a key contributor to innovation has held a central position when it comes to understanding innovation. The first linear process model emerged in the 1950s (Rothwell, 1994) which inspired a series of sequential models that introduced different elements into the linear process model subsequently. The linear process model was adopted in a period when industrialists, consultants, business schools, and economists believed strongly in R&D and how it enabled breakthroughs in technology (Kotsemir and Meissner, 2013). Although the linear innovation process model is now referred to as "something of a conceptual zombie" (Bender, 2008), there are still obvious remnants of the model having influence on current policy making, which continues to place an emphasis on support for R&D-specific industries (Hirsch-Kreinsen et al., 2005, Godin, 2006).

Innovation process models continued to metamorphose over the years to include new elements over time, always with some form of emphasis on the role of R&D, either as a crucial origin of innovation or an essential step before any innovative ideas can be commercialized. While this thesis recognizes the role R&D has played, especially in certain industries (such as life-sciences), this can also be attributed to the concentration empirical samples being drawn from large technology companies. These large firms are often equipped dedicated R&D departments. This is not the case for many companies, especially for microenterprises even though their business might be dependent on R&D-related innovation activities.

The linear process model has received its fair share of criticism for being too simplistic and not representing the complexity of the actual processes (Bender, 2008). As seen from *Figure 1*, R&D has been regarded as an

important component and has constituted a type of resource in many innovation studies. It is often conceptualized as a precursor to the commercialization phase of an innovation,[5] often mentioned as being combined with some form of innovation-related activity. There has been a neglect of the mention actors or other types of activities in these linear models, other than a focus on research as the prominent type of resource. This assumption implies that there is an 'invisible mechanism' connecting both actors and activities. This may be explained by the perception that innovation was seen as an internal development of a company's competitive advantage that was kept within the walls of an organization, and thus actors and activities were taken for granted to be already connected internally.

A series of similar sequential-type innovation process models that subsequently emerged (Rothwell, 1994) included other components that were slightly "outward-looking," which relate to companies recognizing the voice of the marketplace (customers and suppliers). These components can be seen in market-pull models (Berkhout et al., 2006) which introduced the element of external activities to understand market demands. This understanding of the demand from the market then dictates the types of innovation that should be developed for the target market. R&D activities are then customized to meet the demands of the market. While this model has the merit of including the market aspects (external actors) of an innovation process, it remained in principle a type of linear innovation process model. The components of these sequential innovation process models, like the linear innovation process model were mostly connected via one-directional linkages and 'ignored' the realities of both internal and external logistical considerations, as well as changes in demand and competition. As such, innovation projects based on this model tend to be short-term (Berkhout et al., 2006) projects and can be observed to be still for certain types of businesses.

[5] The term "innovation" is used to describe all types of innovation products, processes, or services in this thesis.

2.1.1.2 *Phased/coupling process models*

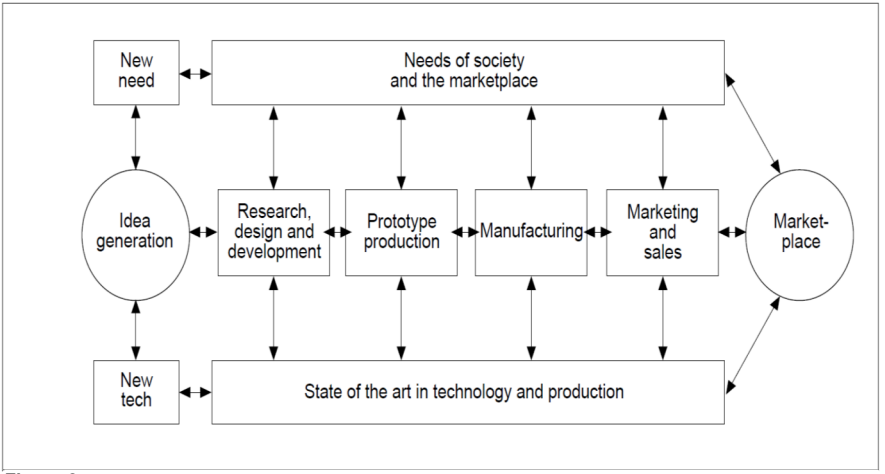

Figure 2.
Coupling innovation model (Rothwell, 1994).

The second category of innovation process models falls under the category of phased/coupling process models (*Figure 2* and *Figure 3*). Like the name suggests, innovation processes are being grouped under different phases, proceeding in a sequential manner, but included some external components that differed from their predecessors. As illustrated in *Figure 2*, the coupling innovation model shows how the combination of new need, idea generation, and new technology brought forth the innovation concept to be further developed by the R&D department. Included in these models, unlike the linear process model, were innovation activities that describe the interaction of resources and activities to find new needs of the society and the marketplace. The stage-gate process model in *Figure 3* also illustrates this through an orderly evaluation of objectives after every stage of the innovation process, with inclusion of more customer involvement in the process. The inclusion of an external test with customers (external actors) is conducted only from stage 4 onward for the purpose of validation and commercialization, with most of the innovation activities evaluated in-house. This assumption implied that the organization should possess in-house capabilities to conduct these innovation activities. This indicated that this model might be more applicable to larger firms that would have the resources to ensure in-house capabilities to drive the innovation process.

This generation of innovation process models possessed characteristics that were more inclusive, such as the chain-linked model (Kline and Rosenberg, 1986) that emerged in the late 1980s and incorporated R&D, market activities and feedback loops. The main feature that differentiates this generation of innovation process models as compared from earlier generations of innovation process models was that feedback loops were coupled with the interaction aspect between the research and the knowledge bases (Gadrey et al., 1995). There is also an element of interaction where the entrepreneurs engage with external sources of knowledge for identifying potential markets. There are limitations as acknowledged by Kline and Rosenberg (1986) in that these type of phased or coupling models were visualized as macro-level process models that may neglect the intricacies of innovation processes as acknowledged today.

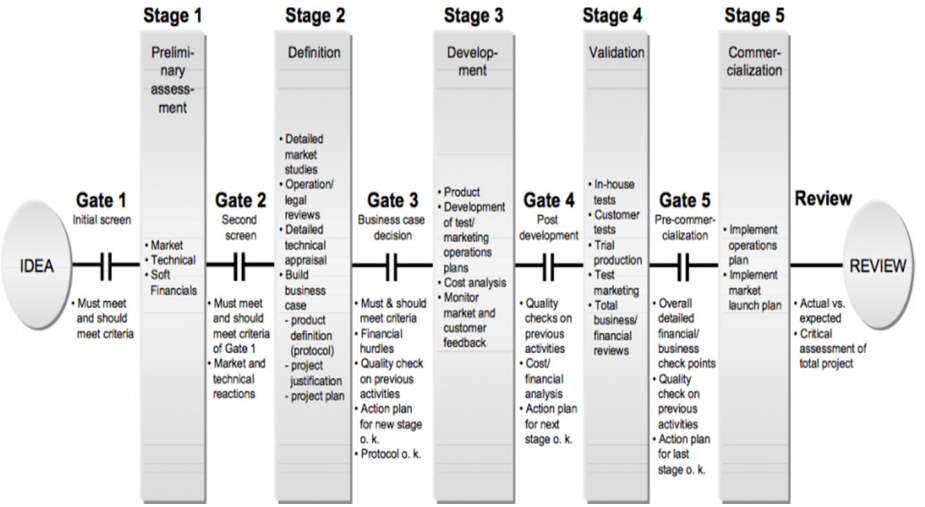

Figure 3.
Stage gate process model (Cooper, 2008).

Visualizing the innovation process in phases helps to reduce some form of uncertainty in the innovation process and holds a degree of predictability in its sequences. Cooper (1990) described the stage-gate model as one used by firms when developing new products to help "manage, direct and control" the innovation process when developing a new idea to a product. However, the applicability of this type of innovation model is limited for microenterprises, as it would be more structurally unlikely for microenterprises to effectively segregate the innovation process into piecemeal phases to be handled by

dedicated groups of resources due to the common organizational structure of owner-manager. The recognition of interactivity and an awareness of the interaction component in the innovation process can be seen in the third generation of innovation process models under integrated or distributed processes of innovation.

2.1.1.3 Integrated or distributed processes of innovation

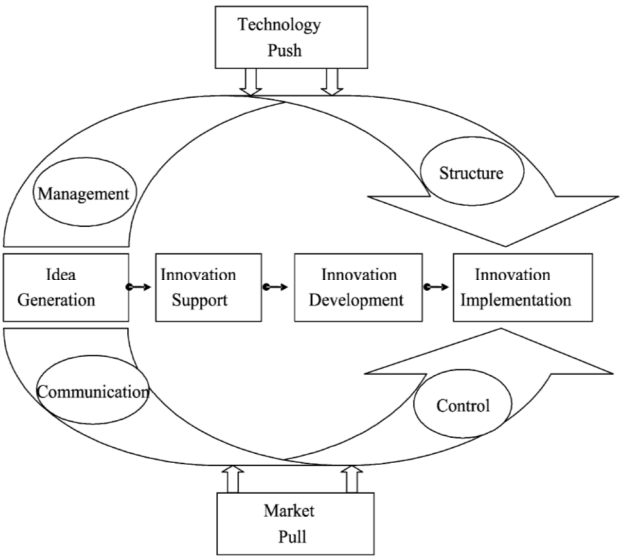

Figure 4.
Integrated innovation process model (Bernstein and Singh, 2006).

The last category of innovation process models under integrated or distributed process of innovation placed emphasis on the role of multiple actors within and external to the firm that can be relevant to the study of the innovation process of microenterprises. In these models, "systems integration and extensive networking, flexible and customized response, continuous innovation integration and parallel development" (Tidd, 2006) are emphasized. In *Figure 4* which shows the integrated innovation model, bridging the "internal functions of a firm to the external knowledge pool" (Bernstein and Singh, 2006) can be observed in how the internal components of the company functions are integrated to address the external demands.

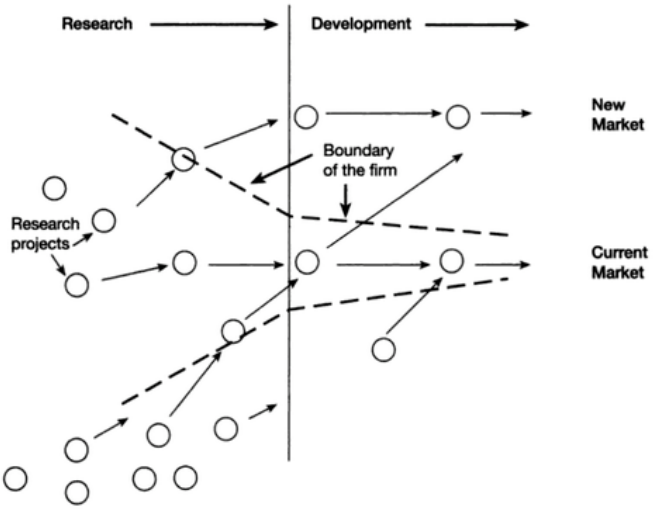

Figure 5.
Open innovation model (Chesbrough, 2006b)

The open innovation and user innovation process models are referred by Bogers and West (2012) as a "distributed process of innovation." The increased participatory nature of innovation is observed not just from the connection of nodes in a network (Kotsemir and Meissner, 2013) but in these interactions, "links and connections become as important as the actual production and ownership of knowledge" (Tidd, 2006) in the innovation process. The open innovation model (*Figure 5*) proposed by Chesbrough (2006b) viewed the innovation process as continuous "purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough et al., 2006). Open innovation has also received criticism for being seen as 'more applicable' to high-tech industries and larger firms (Chesbrough et al., 2006) based on the application of the model on such industries. However, more recent studies have acknowledged the use of open innovation process models for small firms. Gassmann et al. (2010) noted, for instance, the development of open innovation being used by LMT sectors and small firms "opening up" their innovation process by reaching out externally for collaboration to overcome the liability of smallness. The liability of smallness suggested by Freeman et al. (1983) is related to Stinchcombe (1965) concept of the liability of newness, which suggested that new (and likely small) organizations were more likely to

fail compared to organizations that were established. These discussions will be further elaborated in relation to microenterprises in section 2.2.

User innovation has been described as a form of "democratized innovation" (Von Hippel, 2005) or distributed process of innovation in that it allowed the users a role in the development of the innovation process, even if they may hold different profile. The role of the user is thus not only having a need, but having the ability to "combine and coordinate innovation-related efforts via new communication media such as the Internet" (Von Hippel, 2005). These users have the mentality and ability to want and buy a product that exactly fits their needs. This allows the benefits from the innovation outcome to be received directly to those who were involved in it. This user-centered innovation process model differentiates itself from previous generations of innovation process models not just through having more user input, but also through showing less inclination to keep the innovation process closed and protected (Von Hippel, 2005). The feedback or suggestion from others is considered as being more valuable to the innovation process than what patents can offer in terms of protection in this type of innovation process.

2.1.2 Appreciating the past to understand the future

The purpose of reviewing the innovation process models is because "it shapes the way in which we try and manage it (innovation)" (Tidd, 2006). The understanding of innovation has evolved over time and innovation studies conducted at different points in time highlighted certain components and the role they play in successful innovation outcomes. Recent innovation studies view interaction as essential to the innovation process and also extend the study of innovation beyond high tech sectors or large firms (Gassmann et al., 2010, Von Tunzelmann and Acha, 2005, Kirner et al., 2009, Hirsch-Kreinsen, 2008a). The evolution of innovation processes models can be seen as a fulfillment of Rothwell's (1994) succinct observation that "innovation has increasingly involved horizontal linkages such as collaborative pre-competitive research, joint R&D ventures and R&D strategic alliances, i.e. innovation is becoming more of a networking process." This review does not dismiss past innovation process models as being unsuitable for application to microenterprises, nor does it imply that newer is better. Rather, it is recognition of how innovation processes are multi-faceted and an observation of how interaction of different components in the innovation process play an

increasing or decreasing role in each of the innovation process models, especially in the context of microenterprises' innovation processes.

Innovation processes differ not just from one generation to another, but that they can also have significant differences within the same sector. It is thus not appropriate to state that only one type of innovation process is the best or most applicable, nor can these components be all directly applicable for microenterprises due to the organizational set-up, availability of resources, or the multiple roles played by owners-managers as compared to larger firms. In departing from the linear progression of innovation toward the more encompassing view of the innovation process, these models start to point to the complex nature of activities, use of resources, and interaction of actors, which can happen simultaneously, overlap, or even restart again in the middle of the process. Although the interactive aspect of innovation processes has gained acknowledgement, application of the integrated/interactive type of innovation process models is still limited. There has also been limited discussion on the applicability of these process models for microenterprises. Pavitt (2005) suggestion provides a possibility in considering innovation processes at the firm level in the microenterprises' context. This described three overlapping sub-processes: cognitive, organizational, and economic. These processes can be related to the operational and collaborative aspects of microenterprises for example with other firms, their capacities and abilities, and also how innovation is driven in a desired direction. Hence, a combination of these understanding with an aim to examine the operational and collaborative aspects, capacity, and ability of microenterprises during the innovation process will be discussed with reference to related literature further in section 2.4.

2.2 To Be New, To Be Small, To Be a Microenterprise

To have a complete idea of the innovation process for microenterprises means there are necessary areas that need to be addressed in this study. What does it mean to be a microenterprise? What are the characteristics of microenterprises that can make it challenging for them in the innovation journey? It should be acknowledged that in understanding microenterprises, it is a field of study that can be contributed to from a wide range of research on entrepreneurship, small business in connection with innovation, small firms growth, etc. The aim of

this section is not to provide a summary of these researches, but rather to draw from these studies and focus on aspects relevant to microenterprises.

Microenterprises are often included under the definition of SMEs.[6] Most studies agree with the definition by the European Union that is based on having less than 10 employees in the firm. Entrepreneurial studies defined microenterprises as small businesses that employ less than ten people, and often only one or two (Honig, 1998). These studies also listed the characteristics of microenterprises as often having owners/managers or family members who may work for free, being highly efficient but also having a high rate of failures (Liedholm and Mead, 2013). There have been plenty of post-mortem studies on how start-ups or microenterprises failed to survive (Witt, 2004, LeBrasseur and Zinger, 2005), but it remains unclear what factors in their innovation processes contributed to the failure of innovating microenterprises (Zinger et al., 2001, Monahan et al., 2011). There is, however, a need in innovation studies to differentiate between SMEs (as a generic group of small business) and microenterprises.

A study from Baum et al. (2000) provided an inkling of some characteristics of microenterprises when forming alliances that may help reduce the number of casualties (Aldrich and Auster, 1986) in microenterprises. Past literature (Mintzberg, 1979, Johannisson, 1987, Miller, 1987, 1990, Johannisson, 2000) suggests that new and small ventures (which include microenterprises) tend to adopt simple structures such as a family-based business or having a small number of employees with most of the tasks being performed by the owner/managers themselves. Miller (1990) argued that firm configurations and relationships are affected by four imperatives, namely structure, environment, strategy and executive personality. Four types of configurations of formal organizations were suggested: bureaucracy, adhocracy, simple form and diversified form. The simple type of configuration is used to describe most small, young firms which are dominated by a chief executive or a founder (Miller, 1990). This type of organizational structure may still be continued even as small businesses grow due to the advantages recognized by these owner-managers through informal communication that can lend to the effective operations within the firm. The coordination of such small businesses are influenced largely by direct supervision, but decisions are done through an

[6] Definition of SMEs in European Union Report EUROPEAN COMMISSION, E. 2013. *Small and medium-sized enterprises (SMEs) What is an SME?* [Online]. Available: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/ [Accessed 29/05/2013 2013].

informal structure and decision-making style (Miller, 1990). In this respect, the combination of direct actions combined with a large degree of flexibility to adapt to unexpected contingencies can be seen as a characteristic of these small businesses, particularly for microenterprises. However, this simple type of configuration might also mean domination under the leadership of the owner-managers and hence changes to the leadership of the owner-managers (Miller, 1990) may have unpredictable consequences. The study of individual traits of entrepreneurs has been addressed in entrepreneurship studies and related fields. This thesis focused on how these individual traits characterized and influence the development of microenterprises' innovation-related characteristics during the innovation process. The characteristics of microenterprises have also been described as number of employees or the value of the assets and organizational/leadership structure (O'Dwyer and Ryan, 2000). Traits of the owner-managers such as education level, managerial management skills, and entrepreneurialism (Simpson, 2001) have also been associated indirectly as equivalent to the characteristics of microenterprises (O'Dwyer and Ryan, 2000).

Some other characteristics of this simple structure include having a low degree of formalized behavior (rules, procedures, and job descriptions), a loose division of labor, and strong entrepreneurial leadership to get things going. Since the internal knowledge base is dependent on the competencies of owner-managers in small firm (Johannissson, 1998), Johannisson (1987, 2000) theorized on the benefits of a network in effectuating entrepreneurial activities, where the trust carried by personal networks may bring legitimacy and help in mediating human, as well as financial, capital. Social ties are often included in the networks of small and young firms, where they are more enthusiastic at networking, with the primary network often located locally (Johannissson, 1998). The 'reciprocal and multi-faceted interdependencies' of relationships with actors that are considered both 'friend and business colleagues' (Johannissson, 1998) can mean that even as these relationships might have discontinued, it may have 'enough thematic, structural or strategic cohesion left to regenerate' at a later point in time (Miller, 1990).

One stream of literature that has provided another potential area of discussion on the characteristics of microenterprises that are more related to the constraints faced by small firms under the hypothesis of the "liabilities of age and size" (Bruderl and Schussler, 1990, Aldrich and Auster, 1986, Baum et al., 2000, Freeman et al., 1983, Stinchcombe and March, 1965). The term "liability of newness" originated from Stinchcombe's (1965) seminal study and has become associated with limitations that firms that are new to the market

but also small in size are confronted with in various situations. These liabilities can refer to general problems faced by small and young firms and are highly applicable to the specific context of innovation for microenterprises. There are three main constraints recognized for new organizations regardless of their size (Stinchcombe, 1965): learning new roles (due costs involved), inventing new roles (conflict with capital or creativity), and establishing new social relations (lack in trust and structure) (Bruderl and Schussler, 1990). In the words of Freeman et al. (1983) and with reference to Stinchcombe (1965): "new organizations suffer a liability of newness, a greater risk of failure than older organizations, because they depend on the cooperation of strangers, have low levels of legitimacy and are unable to compete effectively against established organizations." The common denominator in these challenges is that they all required investment from the firm in terms of time and efficiency, which are scarce resources in the context of microenterprises.

Baum et al. (2000) and Pe'er et al. (2014) related these concepts of the liabilities of newness and smallness to the environmental structure of small firms. Baum et al. (2000) explored this in the context of alliance network, emphasizing the importance of small firms overcoming these liabilities through enhancing their performance via an efficient network. Alliances were seen to provide benefits to small, young firms who had resource limitations by mimicking the forming of relationships to gain access to required resources. Small firms often form strategic alliances to address these challenges through their organizational and environmental conditions. Baum et al.'s (2000) review showed that besides the ties formed with different types of organizations, there were also benefits to be gained through the experiences shared by actors in the network. Small firms that had prior established working relationships with various partners in the network showed impacts on the firms' performance in terms of sales, innovation, and commercialization efforts in various industries (Baum et al., 2000).

Aldrich and Auster (1986) observed that challenges that small firms faced stemmed largely from pressures of fending off market competition while needing to establish a niche market. This is an apt description that can be applied to microenterprises, which, while being touted as being flexible and adaptable, are subjected to the double-edged sword of being small and new. This combination can increases the risk of dissolution in the early stage of formation of the organization (Aldrich and Auster, 1986). The hypothesis of the liability of smallness and newness is in many ways related to the barriers that microenterprises face when innovating, as it points to both internal and external obstacles that can make survival difficult for microenterprises (Fackler

et al., 2013). External obstacles refer mostly to market entry barriers that can make introducing a new product challenging due to various aspects such as manufacturing, competition, and regulations. Internal liabilities of age and size, on the other hand, have been seen to be largely related to roles of the workforce and structure of the firm, in relation to external obstacles that are related to market and regulatory factors (Stinchcombe, 1965, Bruderl and Schussler, 1990). Aldrich and Auster (1986) also cited experiential obstacles as challenges small firms could be confronted with. Through applying experience gained by older firms or experienced actors, small firms who could draw lessons from the failures they had withstood constitute a potential way in which small firms can compensate for the liability of their age. The application of this understanding in the microenterprises' context can be related to the interaction with allied partners as a way to mitigate the liabilities of newness and smallness. This is firstly established through creating a stable environment and secondly by establishing relationships with a network of experienced actors. Pe'er et al. (2014) cautioned against this type of growth and survival strategy, as the benefits were dependent on the type of local economic activity and local competitive structure. Growth is often seen as a solution or outcome when small firms prevail over the liability of smallness (Aldrich and Auster, 1986), but microenterprises should also take the innovation context in which they are situated into consideration to explore other alternatives that can help them overcome these obstacles (Pe'er et al., 2014). In addition, if growth is pursued as the primary aim, it can lead to issues of cost and risk such as not developing new capabilities and managerial resources in time to handle resource management demands (Pe'er et al., 2014). To quote Hyvärinen (1990):

> It is conceivable that the smaller the enterprise, the nearer its innovative behaviour is to that of an individual. The bigger the enterprise the more the personal traits of the manager are replaced by the characteristics of the enterprise, such as products, strategies, resources and organisational behaviour. (1990)

In this study, the focus is placed on examining the manifestation of capabilities that will be discussed in Section 2.4 and how firms could overcome the limitation of their size or age when innovating by adopting strategies that harness resources outside of the organization. For example, choosing to engage in interactions through alliances is a recognized strategy used by small firms to overcome limitations, which, in the context of microenterprises should prompt further consideration in terms of other complementary factors and to have an

au courant understanding of how microenterprises should innovate in their current context.

2.3 Barriers to Innovation for Microenterprises

There are a few choices that a microenterprise can make when confronted with an obstacle to innovation – choosing to identify and confront the challenge, to identify the challenge and live with it, or be ignorant of the barrier either involuntary or deliberately (Larsen and Lewis, 2007). How one views and faces an obstacle is partly determined by how the obstacle is being perceived (as a challenge that can be overcome, or that blocks a way of progression). When looing at external resources to help overcome these barriers to innovation, one can also risk having "too limited external contacts, exert too much control, are not aware of environmental changes and lack the appropriate education/training" (Madrid-Guijarro et al., 2009). D'Este et al. (2012) proposed the terms 'revealed and deterring' barriers to innovation as another way to perceive barriers to innovation. They found that different types of companies could have different interpretations of what constitutes a barrier to innovation. The perception undertaken by the firm (whether it is just a temporary issue or it is a barrier that needs external resources to overcome) can influence the type of "confrontation strategy" used to overcome the barrier.

This section provides some insights into how these barriers to innovation have been perceived by past literature and how they apply in the context of microenterprises. There is also a deliberate distinction made between larger, established firms and small, new firms (D'Este et al., 2012) to emphasize the differences in the barriers to innovations faced between SMEs and microenterprises. This applies not only to the consideration of differences in firm size but also to other related innovation activities and components in the innovation process. As discussed in previous sections, the generalization of past research results for a generic group of SMEs provided the impression that these findings of advantages and barriers are applicable to all under the SMEs category. However, this thesis argues that due to the heterogeneous characteristics of small firms, microenterprises can be said to possess their own characteristics when innovating. These taken-for-granted assumptions about small firms in general meant that restrictions to microenterprises' access to resources might not have been detected in previous studies. Through understanding these barriers and their applicability to microenterprises, a better

comprehension on the liabilities microenterprises face when innovating can aid in better innovation strategies (D'Este et al., 2012).

A report compiled in the 1980s for the European Union examined the barriers to innovation for European firms (Piater, 1984). This report provided a macro view of external barriers to innovation for these firms with a focus on regulatory barriers. Some effects of these macro level barriers that affects education & training, financing for innovation and product controls such as new product and exports can be seen as still applicable for small business in Europe some 30 years later. Examples from studies conducted in Cyprus, Spain, and the United Kingdom (Hadjimanolis, 1999, Larsen and Lewis, 2007, Madrid-Guijarro et al., 2009) reported SMEs encountering barriers that were associated with financial areas such as capital-related issues, lack of marketing skills when dealing with customers or developing overseas markets like their predecessors. Rush and Bessant (1992) attested to this observation when they pointed out that barriers to innovation are not encountered at only at one point during the innovation process but may reoccur at other phases of the innovation process. This simple distinction is however a cause for confusion, as different definitions exists and is used across various disciplines and studies. In addition, these studies also used varying types of empirical samples with their own applied perspectives. For instance, external barriers may be defined as those that originate externally (Madrid-Guijarro et al., 2009) or those originating within the environment of the firm in how it relates to the external market (Segarra-Blasco et al., 2008, Demirbas, 2010). The myriad of categories that can be used for classifying these barriers ranges between formal (governmental or policy related), informal (corruption, cultural, attitude), environmental (economic risk, financial concerns), and skill barriers (human resource qualification, information of market and technology)(Demirbas, 2010).

The continued challenge small firms faced through the decades without much change may be related to how barriers to innovation have been categorized. From past literature, the line is often drawn between external barriers (exogenous) and internal barriers (endogenous) (Hadjimanolis, 1999, Madrid-Guijarro et al., 2009, Hoffman et al., 1998, Keizer et al., 2002). Madrid-Guijarro et al. (2009) for instance, defined internal barriers as those "believed to be too difficult to overcome and negatively influence implementation of innovation activities" and external barriers as those manifesting as challenges in the firm's external environment. Radas and Božić (2009), as did Keizer et al. (2002) cited internal barriers as "characteristics and

policies of SMEs" and external barriers as "opportunities that the SME can seize from its environment."

In this section, barriers to innovation are re-examined in light of the relevance and impact for microenterprises. Madrid- Guijarro et al. (2009) conducted an extensive review on the barriers to innovation literature and classified fifteen types of barriers. While the study did not initially differentiate between micro, small, and medium-sized enterprises[7], further analysis based on the classification was applied to a sample of 294 Spanish manufacturing SMEs. These SMEs were subsequently identified as operating in the "low and medium-low technology industries that were very labor intensive, as well as low investment in innovation." Madrid-Guijarro et al. (2009) further noted that there were significant differences shown in the challenges faced by microenterprises and by small and medium-sized firms, especially in the area of innovation costs that were difficult to control. Cost factors may be attributed to the presence of economic turbulence and difficulty in accessing financial resources. Madrid-Guijarro et al. 's (2009) findings further suggested that for barriers that are related to cost factors due to suppliers of equipment, ingredients, and manufacturing technology, can have different level of impact between microenterprises and their larger counterparts within the SME category. Certain determinants of cost factors might not be applicable for microenterprises since they have a limitation on resources that would not allow them to consider such purchases or production processes. Microenterprises may, instead of purchasing equipment and working with suppliers on a formal supplier-customer relationship use network connections via actors who are connected to manufacturing and production contacts and facilities to circumvent their 'inability' to invest in machineries and ride on the benefit of their network connections instead. This "riding on" effect through network connections is a practical aspect and important key to for microenterprises progressing beyond the initial phases of the innovation process (Menrad, 2004).

For the purpose of analysis, this study takes inspiration from Madrid-Guijarro et al. 's (2009) classification and adapted D'Este et al. 's (2012) four classifications of innovation barriers which is shown in Table 1: cost factors, knowledge factors, market factors, and regulation factors.

[7] See MADRID-GUIJARRO, A., GARCIA, D. & VAN AUKEN, H. 2009. Barriers to innovation among Spanish manufacturing SMEs. *Journal of Small Business Management,* 47, 465-88. for the full list of references on which the 15 barrier variables were based.

The motivation for this adaptation was to address the limitation of the popular, yet simplistic distinction of barriers as external or internal as seen in previous studies and for application to the microenterprises' context. As mentioned in the introduction of this chapter, the perception undertaken by microenterprises can affect the way in which they can overcome them. Barriers do not affect every innovation process in the same way (D'Este et al., 2012) and the extent of their impact can also vary depending on the characteristics of the firm. Radas and Božić (2009) cited scarce resources, low market influence, and informal communications as barriers to innovation that were more applicable for smaller firms than larger firms. Similarly, Hadjimanolis (1999) and Madrid-Guijarro et al. (2009) pointed out that innovation activities can also pose as barriers that are felt more acutely by small firms than by larger ones. Table 1 shows the four classifications of factors that are elaborated in section 2.3.1 to 2.3.4

Table 1
Barriers to Innovation from a Microenterprise Perspective

Categories of barriers[8]	Internal barriers [9]	References	External barriers[9]	References
Cost Factors	High Costs: This refers especially to the capital investment during the initial phase of starting up, and also bringing the product to market.	(Galia and Legros, 2004); D'Este et al. (2012); (Demirbas, 2010);(Keegan et al., 1997); (Piater, 1984); (Mohnen et al., 2008)	High Costs: High costs can also refer to the cost of entering the market, including organizing, commercializing, managing	D'Este et al. (2012); (Demirbas, 2010); (Mohnen et al., 2008)
	Innovation Cost; Difficult to Control and Difficult Access to Financial Resources: This refers to	Hadjimanolis (1999); D'Este et al. (2012); (Keegan et al., 1997); (Hewitt-	Innovation Cost; Difficult to Control and Difficult Access to Financial Resources: The cost of outsourcing is not just seen in monetary value, but also in terms of time and energy needed to establish connections	Hadjimanolis (1999); (Hewitt-Dundas, 2006)

[8] Based on further literature review conducted during this thesis project, additional barriers have been added that are relevant to microenterprises.

[9] The internal and external classifications follow the original segregation by MADRID-GUIJARRO, A., GARCIA, D. & VAN AUKEN, H. 2009. Barriers to innovation among Spanish manufacturing SMEs. *Journal of Small Business Management,* 47, 465-88.. This table's adaptation noted that some barriers (as denoted by *) could exist as both external and internal barriers.

	the outsourcing of tasks (such as R&D, testing, certification, etc.) that can be difficult to predict.	Dundas, 2006)	and relationships to enable such outsourcing to proceed smoothly.	
	Excessive Risk: The risk here can refer to financial risks, including investment of own funds and the lack of track record as a new firm.	Hadjimanolis (1999); D'Este et al. (2012); (Mohnen et al., 2008)	Lack of communication channels to target audience, uncertain demands from consumers: This can be related to limitation due to costs in conducting feasibility studies to find out market trends.	Hadjimanolis (1999); D'Este et al. (2012)
	Lack of Qualified Personnel and Problems Keeping Qualified Employees: This refers to the ability to attract and retained qualified personnel, as well as powerful actors in the network such as investors, etc.	Hadjimanolis (1999); (Galia and Legros, 2004); (Demirbas, 2010); (Piater, 1984); D'Este et al. (2012); (Hewitt-Dundas, 2006)	Lack of External Partner Possibilities: This barrier can be costly for a microenterprise to rectify, as it is costly to establish relationships, especially new ones.	Freel (2000); Hadjimanolis (1999); (Hewitt-Dundas, 2006)
Knowledge Factors	Innovation Cost Difficult to Control and Difficult Access to Financial Resources: Finding further funding to support the innovation process or to further develop a current/new product; it can be difficult to convince new investors or during grant applications. This is in part related to network connections.	Hadjimanolis (1999); D'Este et al. (2012); (Keegan et al., 1997); (Hewitt-Dundas, 2006)	Lack of Information about Technologies: In some way related to the infrastructure, this lack of knowledge about technologies could be also due to the impression that most microenterprises are not high-tech or have a requirement for new technology. In fact, some of the lack of information on the market can be served by microenterprises, which are often specialists in their own field.	D'Este et al. (2012); (Demirbas, 2010)

	Excessive Risk: There is a risk in sharing knowledge through collaborations, as firms risk exposure of their competitive advantage that might be imitated by hired staff and predatory collaborative partners. This is not only confined to internal barriers.	Hadjimanolis (1999); D'Este et al. (2012); (Mohnen et al., 2008)	Lack of External Partners Possibilities: The lack of knowledge is dependent on external connections and can also be dependent on the network capability and management skills that the microenterprises possess or do not possess.	Freel (2000); Hadjimanolis (1999); (Hewitt-Dundas, 2006)
	Lack of Qualified Personnel and Problems Keeping Qualified Employees: Understanding of target market conditions may be limited due to inexperienced personnel.	Hadjimanolis (1999); (Galia and Legros, 2004); (Demirbas, 2010); (Piater, 1984); D'Este et al. (2012); (Hewitt-Dundas, 2006)		
	Lack of Internal Employee Training: The knowledge of employees is kept at the same level except for on-the-job training when there is no formal internal training arranged for new and existing employees.	(Hewitt-Dundas, 2006)		
	Employees/Manager Resistance to Change: This also relates to knowledge factors for the cause of resistance to change as unawareness	(Demirbas, 2010); Hadjimanolis (1999); (Hewitt-Dundas, 2006)		

	can increase the need to keep the status quo.			
Market Factors	Lack of Qualified Personnel and Problems Keeping Qualified Employees: Not having relevant commercializatio n experience or a knowledge of business operations; for example, a science-based microenterprise	Hadjimanolis (1999); (Galia and Legros, 2004); (Demirbas, 2010); (Piater, 1984); D'Este et al. (2012); (Hewitt-Dundas, 2006)	Economic Turbulence and Lack of Market Information: Market forces and competition are aspects that microenterprises find hard to influence. This can also be related to the lack of obtaining market information in time for them to make the necessary preparation and adjustments.	(Mohnen et al., 2008); Hadjimanolis (1999); (Galia and Legros, 2004); D'Este et al. (2012)
			Lack of communication channels to target audience, uncertain demands from consumers: This refers not only to access, but also in terms of having industry connections that can aid the marketing/commercialization phase of the innovation process.	(Peters and Etzkowitz, 1990, Etzkowitz, 2003)
Regulation Factors	Excessive Risk: Keeping up to date with current regulations and the risk of changing regulations may also render the innovation redundant or unable to be launched in the target market.	Hadjimanolis (1999); D'Este et al. (2012); (Mohnen et al., 2008)	Insufficient Government Support: This is not necessary a lack of initiatives, but the bureaucracy involved in applying for grants or aid. There has also been feedback on the lack of transparency concerning which type of firms received funding and on what type of qualifications.	Freel (2000); (Demirbas, 2010); (Keegan et al., 1997)
	Lack of Qualified Personnel and Problems Keeping Qualified Employees: Not having an understanding of regulatory and legal issues can be disadvantages when drawing up new agreements with	Hadjimanolis (1999); (Galia and Legros, 2004); (Demirbas, 2010); (Piater, 1984); D'Este et al. (2012); (Hewitt-Dundas, 2006)	Lack of Local and Regional Infrastructure/Regulations/Legisla tions: The lack of local and regional regulation and infrastructure aimed at microenterprises can be a considerable hurdle, as microenterprises have to adopt a hands-on approach. There is often a lack of awareness about programs even if they are available for microenterprises, pointing to a weak communication system.	(Hewitt-Dundas, 2006); (Mohnen et al., 2008)

	partners or customers			
			Lack of Information about Technologies: Infrastructure of the locality of the microenterprises can also play a part in the lack of awareness of technologies.	D'Este et al. (2012); (Demirbas, 2010)
			Lack of External Partner Possibilities: This can also be related to structural setup of the area the microenterprise is in, thus while there may be potential partners, they are not made easily available due to bureaucracy requirements for collaborations.	Freel (2000); Hadjimanolis (1999); (Hewitt-Dundas, 2006)

2.3.1 Cost factors

When it comes to the discussion on barriers to innovation, it is widely acknowledged that the challenges that most firms encountered are related to the financial aspect of the innovation process. Microenterprises, due to their newness and smallness are often confronted with financing relating to capital outlay quite early on during their innovation process (Hewitt-Dundas, 2006). The initial phases of financing of most entrepreneurial enterprises are raised from their own savings and "family, friends and fool" funding (Cumming and Johan, 2013). These types of funding are thus dependent on past and current relations, and often require the investors have a higher tolerance of the risk level. Formal funding institutes such as banks are perceived to be more inclined to low-risk investments and continue to rely on qualifications such as credibility, demonstrated track record, and value of assets for financing packages (O'Dwyer and Ryan, 2000).

While cost factors remained as one of the more common type of barriers to innovation across various fields of literature for small firms, it can also be viewed as a stimulus for innovation. Most of these obstacles have been related to the amount of financing required for different phases of the innovation process and the variety of obstacles due to the different perspectives from different stakeholders and fields of studies. These financial concerns spread across a large variety of costs associated with starting up, R&D, and marketing (Freel, 2000). From a long-term perspective, current financial constraint can be seen as a stimulant for investment in future innovation development. The

awareness of financial constraints implies additional efforts may be planned during the innovation process to prepare for the innovation process later in the phase (Hewitt-Dundas, 2006). Nonetheless, Hewitt-Dundas (2006) cautioned that while financial barriers can provide stimulus in the short term, if these barriers persist over a prolonged period, it can have a negative impact on the innovation process.

Associated with these finance-related barriers, are concerns regarding issues of risk and financial exposure perceived by the stakeholders (Madrid-Guijarro et al., 2009). Small firms having "less to lose" are more inclined to innovate than larger firms who stand "more to lose" if they were to try something different to be innovative (Hewitt-Dundas, 2006). This can include developing new products to prevent overdependence on one product, which also helps to increase the innovativeness of the firm in new product development (Hewitt-Dundas, 2006). According to Madrid-Guijarro et al.'s (2009) findings, costs (innovation costs difficult to control, economic turbulence, difficult access to financial resources) associated with innovation are particularly acute for small firms as compared to medium-sized firms. In relation to collaboration possibilities with external partners, the grants or funding that microenterprises require working with a scientific partner for example can be hindered by the requirements to provide feasible returns on investments. This can be hard to provide at early stages of the innovation process and is still reported to be one of the major ways in which such industry-academic alliances have been deterred. While this might be a constraint in the short term, it can act as stimulus to pursue an acquisition of these new knowledge to help adopt new technologies (Hewitt-Dundas, 2006). Freel (2000) agreed with Rothwell (1989) in that small firms are largely responsible for some types of innovations that are "near-to-market" or "initial market diffusion." What these two studies agreed on was the importance of financial factors in the early phases of enabling an innovation project.

Galia and Legros' (2004) study on the barriers to innovation focused on two particular groups of innovation projects: those that were postponed or abandoned. The study indicated that financial constraints played an important role in the longevity of these projects. The postponed projects cited lack of skills, customer responsiveness, and market information. The abandoned innovation cases, on the other hand, were more prone to barriers related to economic risk and financial costs. This indicated that cost factors can halt the innovation process totally and is not a category easily overcome by microenterprises. The difference in the considerations on the factors influencing innovation projects that were postponed versus those that were

abandoned may be related to D'Este et al. 's (2012) discussion on revealed and deterring barrier points. This lack of information is a double-edged sword, as it can be an indication of the awareness a firm has of their own capacities as they recognize the types of technology they need.

2.3.2 Knowledge factors

Asheim and Gertler (2005) described knowledge bases as a collection of sources of knowledge and input that shows interdependence between the actors and other organizations in the network, system, or region. These knowledge bases may be categorized into analytical or synthetic knowledge bases. Synthetic knowledge bases are observed during innovation in an industrial setting where existing knowledge is applied or combined to address specific problems that may occur (Zukauskaite and Moodysson, 2015, Asheim and Gertler, 2005). Analytical knowledge bases, on the other hand, are more apparent in contexts where scientific knowledge is important and formal knowledge creation plays a key part in the innovation process (Asheim and Gertler, 2005). The classification implies that "different mixes of tacit and codified knowledge, as well as different codification possibilities and limits" (Asheim and Gertler, 2005) affect the two different knowledge bases, which will have different requirements and challenges with regards to qualifications, skills, and dependence on organizations and institutions. A third type of knowledge base that is observed more in cultural industries such as media or advertising refers to the aesthetic attributes of products—to the creation of designs and images and to the economic use of various cultural artifacts (Asheim et al., 2007). Zukauskaite and Moodysson (2015) pointed out that these knowledge bases might also exist simultaneously at different phases of the innovation process. The development of the functional food sector was used as an illustration because it utilized both analytical and synthetic knowledge. An interesting observation was the use of "analytical knowledge base in traditional (synthetic) activities" as a crucial component of the innovation process (Zukauskaite and Moodysson, 2015, Coenen and Moodysson, 2009).

Knowledge factors thus include those factors that influence barriers relating to the access or integration of these knowledge bases for microenterprises. For example, Madrid-Guijarro et al. (2009) highlighted that the integration of new specialized knowledge may be met with barriers such as internal resistance. This is observed when new knowledge is being accessed through new informants and external knowledge bases (Hewitt-Dundas, 2006). This

internal resistance was observed in areas that had a lack of internal competencies (such as a lack of education and training for small business managers) (Madrid-Guijarro et al. (2009) to deal with knowledge and information accessed externally. The idea of building up knowledge bases is a concept that rings true for not just small but also large firms. However, the challenge for microenterprises accessing these knowledge bases may be higher when compared with larger firms that may have other resources (such as financial aspects) that can aid them in successfully accessing and integrated these external knowledge bases.

The size of microenterprises means that their knowledge stock might be constrained and hence they are more likely to rely on external knowledge sources. These accesses to external knowledge sources may exist in the different forms of collaboration with research institutions, or outsourcing part of the innovation process such as testing or knowledge domains specific to external actors in a network. Accessing external knowledge sources can also help microenterprises with the "recognition of new market opportunities for innovation, the ability to discover and coordinate knowledge concerning the availability of new technologies" (Hewitt-Dundas, 2006).

A firm's knowledge base has been said to be a representation of a unique form of resource for innovation (Zhou and Li, 2012). Knowledge bases are known as diverse knowledge domains and expertise that can be assessed by the breadth and depth of the knowledge content. However, the breadth and depth of knowledge bases should be considered together with both external and internal knowledge integration mechanisms (Zhou and Li, 2012). These include internal knowledge sharing and external knowledge acquisition in order to determine the usefulness of such knowledge bases for the firm. Knowledge and information play an important role in the innovation process; the lack of it is an indication of the infrastructure the microenterprise is situated in but can also be a good indication of the potential absorptive capacity of a firm. Being able to recognize the type of technology the microenterprise needs may pose a constraint in the short term; however, it can act as stimulus to pursue an acquisition of these new knowledge to help adopt new technologies (Hewitt-Dundas, 2006). Microenterprises require a certain level of absorptive capacities in order to integrate these external knowledge bases, which can include people with skills and knowledge that may also contribute to the existing absorptive capacities of the microenterprise.

Another perspective of knowledge factors can be seen in how D'Este et al. (2012) differentiated between firms that are scientifically and technologically driven versus those firms that are considered low-tech in the discussion on

knowledge factors that influence the innovation process. Scientifically driven firms have been described as having a tendency to overly emphasize on technology development at the expense of commercialization skills versus low-tech firms that may have a higher rate of commercialization success. Low-tech firms, on the other hand, being frequently associated with small firms (Hirsch-Kreinsen, 2008a, Hirsch-Kreinsen and Jacobson, 2008, Hirsch-Kreinsen et al., 2005, Hirsch-Kreinsen et al., 2003), are seen to have "poor management skills," "poor marketing skills," etc. (D'Este et al., 2012, Gallina, 2009, Goedhuys et al., 2013, Hirsch-Kreinsen et al., 2003, Robertson and Smith, 2008) when innovating. These weak management skills Hewitt-Dundas (2006) referred not only to the expertise and experience of the management team but also on how the management are committed to developing and implementing new products and to taking risks or forming external partnerships. Other aspects of management skills relate to the ability to recruit and retain skilled workers. The relationship between management and knowledge factors is that when small firms are assumed to have problems with recruitment and human resource related concerns; they also lose their advantages over the knowledge skills and connection the personnel may hold. On the one hand, when one equates having skilled workers to boasting the quality of knowledge bases of the company, microenterprises may once again slide toward the camp of disadvantage when it comes to the cost of hiring and retaining personnel. On the other hand, this might not be true for microenterprises, given their common owner-manager setup, thereby dissolving any barriers associated with human resources in that aspect.

Knowledge factors can also refer to the human capital pool of the firm (skills and expertise) that provides the knowledge and skills to support the innovation process. Related to knowledge factors are management skills referring to the ability to recruit, train and retain skilled workers. Barriers associated with knowledge factors can be effect of the education level of employees during the innovation process (Keizer et al., 2002, Hoffman et al., 1998). Education level may be perceived both as a challenge for microenterprises to invest in training so as to continue to attract talent to the firm and as a resource of a small firm which can help gain access to external knowledge resources through external networking by employees. The structures of small firm tend to be family-structured—good for flexibility and communication, but not so good for rising up the ranks. The behavioral advantages of a small firm (Vossen, 1998, Rothwell, 1989) can still have a positive impact on helping to overcome barriers to innovation related to knowledge factors. Knowledge integration mechanisms likened to the role of

absorptive capacity which is the ability to recognize, learn, incorporate, and apply new knowledge (Cohen and Levinthal, 1990) will be elaborated in Section 2.4.

2.3.3 Market factors

Market factors refer to the barriers encountered on the external market that can be related to stakeholders, such as suppliers, competitors, and customers. Factors that can influence the impact of these barriers for microenterprises in the innovation process may be related to issues such as the lack of skilled workers who are well versed with target market conditions and who are able to introduce the new product to market or who have good marketing intelligence (Van der Panne et al., 2003). D'Este et al. (2012) considered market factors such as market dominance by established enterprises and uncertain demand for innovative goods/services as obstacles that can hinder the innovation process. Market competition, in D'Este et al.'s (2012) view, can act as a deterrent for innovating small firms. Market conditions may be influenced at a macro level from the perspective of entry barriers being created to keep out foreign competition (Johansson and Elg, 2002). These entry barriers may also affect innovating microenterprises, which are being closed out of the market through such measures.

Existing actors in markets may use also their current positions in the established network to form barriers to entry. For instance, the use of relations to act as entry barriers was illustrated by Johansson and Elg (2002) with the Swedish food industry as an example. The types of relationships formed within a network can also mean certain types of collaborations may be exclusive and not accessible outside of the network. The establishment of new relationships can be disadvantageous for microenterprises due to the high cost of committing time and resources. Hoffman et al. (1998) pointed out cases where the network became a constraint for small firms, as they needed to first "qualify" certain conditions to belong in the network before the benefits of the network could be reaped. Often, these benefits are not reaped immediately, so the cost of taking steps to qualify to belong in the network are not seen as a good "returns on investment" due to unsuitable or lack of suitable partners within the network. The inclusion of value-added chain actors in the innovation process also introduced additional aspects of market factors consideration. These value-chain actors bring with them both synthetic and

analytical knowledge bases that needs to be integrated with the existing knowledge base of the innovating microenterprise.

The power of certain groups of stakeholders in the value-chain can also form a powerful force in influencing the market factor barriers for microenterprises. Continuing with the illustration of the Swedish food sector, Saghir (2002) noted that Swedish retailers have increased in size and market power in comparison to Swedish food producers. This meant that access or sharing of information might be restricted along the value-chain for the purpose of strengthening market positions. The increasing power of retailers in the market has been pointed out in various literature (Saghir, 2002, Beckeman and Skjöldebrand, 2007, Anselmsson and Johansson, 2007), and this phenomenon acts against newly started up microenterprises as it has often meant that certain conditions, such as price reduction (Zukauskaite and Moodysson, 2015), need to be fulfilled as part of the negotiation. Retailers that have access to a large variety of products hold the power to decide the acceptance of a new product; they can be seen as "gatekeepers" (Beckeman and Skjöldebrand, 2007) who are influenced by what the perceived consumer trends are or are to be expected (Batterink et al., 2006).

Even though retailers as a group of stakeholders in the market may be seen as gatekeepers for consumers, the distance between retailers and innovators or development of new products remained "unconnected" as observed by Beckeman and Skjöldebrand (2007), as interactions normally occurred between "a sales person and a purchasing representative." The consumer market also represents an increasingly powerful market factor that needs to be included in the innovation process. This type of open mind-set when innovating may, however, better serve the interests of microenterprises, as they would be able to immediately connect with consumers and implement user-based inputs to the innovation process more directly.

2.3.4 Regulation Factors

The last category of factors relates to barriers formed in the environment of innovating microenterprises that are legislative and regulatory in nature. These can also be referred to as external or environmental factors. Hewitt-Dundas (2006) observed that the "bureaucratic burden" experienced by small firms from this category of factors posed a challenge for the internal resources and capabilities that can have an adverse impact on the innovation process. In some cases, the failure to abide by legislative requirements can "indicate weakness in

the internal resources and capabilities of the organization," which can impede the innovation process (Hewitt-Dundas, 2006). For instance, concerns around financial factors can occur at any stage of the innovation process, even simultaneously at times. However, most debates have occurred around making capital available to small firms. This can come in the form of aid such as government initiatives aimed at small firms or bank loans. The regulatory requirements surrounding these aids, however, can pose as a challenge to the access to such funding by small firms. Some examples of regulatory factor barriers are the high cost of borrowing from banks, unclear application details for government grants, and unfavorable conditions to undertake the financial commitment—these are just some of the difficulties small firms encounter. Even though there might be many government initiatives introduced to small firms, there is often much bureaucracy that the small firm must fulfill before being deemed eligible for such loans.

The benefits or hindrances are experienced to different degrees by microenterprises and are dependent on the type of innovation and industry into which the new product/process is to be introduced (Hadjimanolis, 1999). What this mean is that a microenterprise operating in the food sector may need to undergo more stringent regulatory requirements or make extra effort to keep up with current regulations (Avermaete et al., 2003). The food sector has often involved trade barriers between different countries that can pose challenges in the product value-chain (Bengtsson et al., 2000). For instance, Zukauskaite and Moodysson (2015) illustrated the difficulties for young and small food companies when they innovate with a food product that can be claimed to have health benefits. The European Food Safety Authority (EFSA) has stringent requirements that can make it costly to develop a scientifically supported dossier to support the health claim, which can make this challenging for the resource-scarce microenterprise.

The resource constraint in relation to the fulfillment of regulatory requirements is one of the more common grouses highlighted by microenterprises in this area of regulatory factor barriers. Regulatory requirements tend to be established practices that may no longer be relevant to current innovation progress, which has seen a rise in the number of multidisciplinary collaborations. Menrad (2004) recommended, "national and international policies should not solely concentrate on stimulating knowledge generation but should also have the additional target to support advances of the knowledge bases of the food industry companies themselves."

Another aspect when considering regulatory factors that can affect the innovation process of microenterprises relates to the legislation and regulation

that can influence institutional conditions of the target markets of these innovations. To illustrate, Zukauskaite and Moodysson (2015) cited support by regional authorities as an example of how regulatory actions can promote the innovation development of particular industry sectors. These "favorable institutional conditions" may encourage the innovation process of a microenterprise in that sector, but other macro levels of regulation (like EFSA regulation) may not support the progress of this innovation development. Hence, the misalignment or "catch-up" between the local/regional and the macro level of regulations can pose unspoken challenges from the perspective of innovating microenterprises.

2.3.5 Managing capabilities and capacities for innovation

The aim of this section on examining the barriers to innovation was to apply understanding of the barriers to innovations literature to the context of innovating microenterprises. Scholars have reached various verdicts and recommendations for overcoming these challenges. The inconsistency in the perceptions of what constitute barriers to innovation is one area that may be explained by the variety of firm size for innovation studies. Barriers may be perceived differently due to the size of the firm—a large firm may not view cost factors in the same regard as a smaller firm that has limited financial resources. The magnitude of impact is perceived differently for mid-size SMEs as compared to a microenterprise set up using personal funding. Consider also that more established SMEs might view the innovation itself as a barrier, as new products/processes/services may run the risk of cannibalizing the existing profitable product line. A young microenterprise that has started out with just one product will view innovation not as a barrier but as an opportunity to create a new market niche.

Van der Panne et al. (2003) pointed out that grey areas exist due to the innovation process being regarded as a complex phenomenon fraught with obstacles and failed examples. A determinant of innovation for one microenterprise can be turned into an obstacle to innovation for another microenterprise, simply due to a difference in the innovative conditions. It is often not just a single barrier that confronts a firm at any point of time. Such obstacles are often unforeseen and can occur simultaneously at various stages of the innovation process. This can create critical points in the innovation process of microenterprises. D'Este et al. (2012) suggested that when barriers are encountered in the innovation process, firms could view them as obstacles that

prevent innovation from progressing or as an opportunity to successfully overcome barriers. That is, firms can adopt the attitude of viewing barriers as a form of deterrence, and prevent themselves from stepping beyond their comfort zone (deterred barriers). This attitude can prevent them from even starting innovation activities or from adopting a learning attitude from failed innovation attempts. This observation extends the commonly held view of how culture can be an internal barrier to a potential driver of innovation due to risk-adverse personnel, from a strategic point of view for microenterprises. Madrid-Guijarro et al. (2009) pointed out that the impact of the barriers to innovation is dependent on different considerations:

> …Process and management innovation are affected negatively by internal barriers, such as human resources and weak financial position and positively by barriers originating from the environment. Furthermore the risk factor associated with cost and financing problems is significant for only management innovation. The most significant barriers are associated with cost, whereas the lowest barriers are associated with manager/employee resistance. Additionally, the results demonstrate that the costs associated with innovation have a disproportionate impact on small firms, which are affected more than larger firms.

This is connected to understanding how microenterprises can overcome these barriers through their attitude and their own way of innovating. Microenterprises, due to their size and organizational structure, often remain composed of passionate founders who can have the flexibility and eagerness to succeed. Studies have also shown that when a firm is actively engaged in innovation, they have had an elevated sense of awareness of the barriers to innovation than those firms that are not active in innovation (revealed barriers) (D'Este et al., 2012, Silva et al., 2007). However, beyond just relying on the characteristics of a firm to explain the innovation process, Larsen and Lewis (2007), like D'Este et al. (2012), suggested that for driving the innovation process along, how these barriers are being viewed should be considered too.

Small firms are often described as having the advantage when innovating due to "less bureaucracy, owner expertise and closeness between owners and customers" (Madrid-Guijarro et al., 2009). These advantages are related to the characteristics of a firm, seen as aiding the implementation process during innovation. These advantages can also be described as behavioral characteristics such as flexibility and motivated management (Radas and Božić, 2009). The liability of smallness and newness that microenterprises are subjected to can

also imply that they can adapt to changes and quickly adopt new accessible resources (Dennis, 2000). A common innovation activity that complemented these behavioral advantages is networking. Networking has the main aim of being used to overcome barriers relating to external information and linkages. There are internal constraints that have been noted to occur due to the lack of internal competencies for dealing with externally accessed knowledge and information.

Different motivations drive a firm to innovate. Whether these motivations are proactive (for example, being strategic in nature) or reactive (as a response to change in internal or external conditions), firms motivated by proactive factors are correspondingly more responsive in their marketing and product/process development activities (Bigliardi and Ivo Dormio, 2009). In Silva et al. 's (2007) research, deterring factors that were noted in their study such as lack of financing sources, lack of qualified personnel, and lack of customer responsiveness to new products had a restraining effect on the propensity for innovation. The removal of barriers has been viewed as essential to a successful innovation process.

This section is not positioning these past studies as invalid, but pointing to the difficulty in generalization for such a complex phenomenon as the innovation process, which spans a large range of industries and geographical areas. As such, while the sample size is small, the detailed empirical data of this thesis aims to provide a focused study on microenterprises. To complement the understanding of the innovation process for microenterprises, a review of the elements that can aid the innovation process is also explored in the following section. These factors may manifest in the literature describing characteristics of the firm that assisted in overcoming barriers through adapting organizational structures, culture and innovation process to gain competitive advantages in the new market place (Mosey et al., 2002, McAdam et al., 2004). In relation to this, the efforts made by both private and public sector organizations are aimed at helping the general population of SMEs stimulate innovative efforts and to overcome barriers encountered in the innovation process (Radas and Božić, 2009). The effectiveness of these initiatives at times casts a shadow of skepticism as microenterprises continue to feedback on the challenges they encounter while innovating. A main group of criticism centers on policies that pursue a “one-size-fits-all” type of solution (Tödtling et al., 2009, Tödtling and Trippl, 2005, Sullivan-Taylor and Branicki, 2011) for small firms to overcome innovation challenges. Despite the inconclusive views on the efforts provided to small firms to address the barriers to innovation, the

concept of interaction is one that most scholars have agreed on as key to successful innovation, not just for microenterprises but also for large firms.

2.4 Capabilities Influencing Innovation for Microenterprises

Innovation has been identified as sine qua non to surviving in the market, as it allows firms to build up their competitive advantage (Buddelmeyer et al., 2010). Innovation is an extension of all areas of operation for small firms (Demirbas, 2010), and hence it can be a strategy on its own as a way for small firms such as microenterprises to be more competitive than large firms (Radas and Božić, 2009). The study of antecedents to innovations can span various fields. The aim of this section is to acknowledge and discuss those factors that relate to microenterprises' capabilities when it comes to innovation. The discussion revolves around the capacities and capabilities of microenterprises that influence the innovation process, especially in how they can be advantageous in helping microenterprises overcome barriers to innovation.

This section focuses in particular on the "characteristic features and preconditions of innovations" surrounding the innovation process (Hyvärinen, 1990). This aligns with Caloghirou et al.'s (2004) aim to understand innovation "as a process in which the organization creates and denies problems and then actively develops new knowledge to solve them." Caloghirou et al. (2004) suggested that to understand this process, besides external sources of knowledge and competence, connections with other organizations was also required to "convert knowledge into new types of knowledge and develop new products, processes or services." However, the "reality" of the liability of smallness and newness (Bruderl and Schussler, 1990, Aldrich and Auster, 1986, Baum et al., 2000, Freeman et al., 1983, Stinchcombe and March, 1965) and the challenges faced by microenterprises as discussed in previous sections means that there is more that can be understood on how some microenterprises overcome these obstacles. Some microenterprises have had more successful outcomes than their peers, being small enough to be flexible and to adapt to changing market opportunities for survival (Gibb, 2000). The ability to be persistent (Jackson and Boxx, 2012) and adapt is considered key to survival in the innovation process. Demirbas (2010) suggested that these capabilities will change as the microenterprise grows and develops along with

its innovation skills as efforts at building up knowledge stock, technological capabilities, and other types of intangible assets (Cefis and Marsili, 2005) are cultivated in the process. Going through the innovation process then in this sense can help mitigate the survival chances (Cefis and Marsili, 2006) and build up competencies that can aid in the long-term survival of a microenterprise.

There are various concepts that can be considered when discussing these factors that influence a microenterprise's innovation process. Le Bars et al. (1998) identified "organizational competencies" that small firms in LMT sectors possessed while innovating: component and architectural competencies. Component competencies refer to skills or assets aimed specifically at particular activities, while architectural competencies are the ability to enhance new combinations between components either by designing or developing new products/processes. One of the more frequently discussed concepts is dynamic capability. This was first introduced by Grant (1991) but subsequently given various interpretations by studies examining the integration of external resources. Teece et al. (1997) suggested that dynamic capabilities should be understood in terms of "organizational structures and managerial process, which support productive activity." Borch and Madsen (2007), Wang and Ahmed (2007), and Hewitt-Dundas (2006) highlighted the key aspect of dynamic capabilities as the capacity to reconfigure or combine external and internal resources. This ability to reconfigure or combine different capabilities, or the "manipulation of knowledge resources," is said to be important in market dynamics (Eisenhardt and Martin, 2000) and to lead to the ability to innovate. Bjerke and Johansson (2015) suggested that firms innovate around areas where they are familiar or that are complementary to the current absorptive capacity. However, due to the popularity and hence broad application of the concept of dynamic capabilities, there are mixed interpretations of this concept (Wang and Ahmed, 2007). Some commonalities still exist across various studies, which Wang and Ahmed (2007) referred to as component factors, namely adaptive, absorptive, and innovative capability. These component factors are said to transform static resources into a source of competitive advantage for the company (Borch and Madsen, 2007) and thus are used for the understanding of how a microenterprise can be explained to be activating these capabilities to help overcome barriers in innovation.

2.4.1 Adaptive capability

The first component factor referring to adaptive capability described it as the ability to make something fit or work when faced with changes while balancing the resources explored and choosing what can be exploited. According to Wang and Ahmed (2007), adaptive capability is defined as "a firm's ability to identify and capitalize on emerging market opportunities." This process of search, balance, and exploitation has its strength in being flexible with both adopting available resources and applying the use of the resource (Wang and Ahmed, 2007) to address costs and market factors relating to barriers to the innovation process of microenterprises. Recognizing and accessing these external resources at the right time depends on various factors of the firm in connection to existing resources, connections with external actors, and innovation activities (Fabrizio, 2009). However, these external resources are also explored by a large number of firms and are also accessible by other firms that have established similar connections to these resources. Hence, it is not sufficient to only have access to external knowledge: One must also have the necessary conditions to integrate and apply it (Escribano et al., 2009). For example, according to a review by Radas and Božić (2009), governmental instruments targeting technology and policy, commercialization, and marketing efforts are often aimed at a group of firms at a certain stage of the innovation process. As such, it is the firm's skills when it comes to using these accessed external resources that can help yield a positive result from the collaborations (Tu et al., 2006).

Microenterprises possessing this ability to balance the configuration and recombination of knowledge, artifacts, and actors often involve being able to utilize their network to assemble various sources of knowledge in a creative manner. One way adaptive capability can manifest in the innovation process of microenterprises is through the forming of new alliances. Blomqvist and Levy (2006) identified a few levels of analysis in relation to literature on alliances, cross-functional teams, and intra-firm innovation. They discussed the types of characteristics associated with each level of collaboration:

- Individual level: Partner's skills, trust, and commitment; quality of relationship
- Team level: Team integration, collective competence
- Intra-organization: Common goals, shared values
- Inter-organization: Attitude, information sharing, involvement, knowledge exchanges, learning networks

These characteristics are interesting and have a bearing on understanding how inter-organizational level collaborations are established and maintained based on the relationships and their benefits (Blomqvist and Levy, 2006). Dyer and Singh (1998) pointed out that there were more benefits to a relationship if it was not transactional or market-based. This requires an ability and willingness to invest in exchanges to build up collaboration capabilities. Gulati (2007) cautioned that the ability to form new alliances in networks was mitigated by the availability of network resources or prior experiences that can affect the adaptation of new knowledge to prevailing innovation barriers. Prior experience and knowledge may exist in the form of scientific, codified, or tacit knowledge in different actors in the network of microenterprises. Adaptive capability for microenterprises would mean involving different actors who possess relevant knowledge and balancing the relationship's considerations while conducting innovation-related activities. This thesis proposes that while microenterprises may have the disadvantages associated with the liability of newness and smallness, they can develop adaptive capabilities through adjusting from experience-based learning gained from network actors who have undergone repeated occurrences of relevant business activities that are relevant to the innovation process of microenterprises (Gulati, 2007). The emphasis then is on the transformation (adaptation) rather than just identification of resources (Bender, 2008) to address the barriers to innovation faced by microenterprises. This implies that management of relationships of external collaborations in a timely manner also become an important consideration for developing adaptive capabilities.

2.4.2 Absorptive capacity

Closely affiliated with the concept of adaptive capability is the concept of absorptive capacities. While Wang and Ahmed (2007) referred to this as absorptive capabilities, Lane et al. (2006) conducted an extensive literature review of 289 papers to identify the more commonly used concept—absorptive capacity—as a construct in their studies. Starting with research citing Cohen and Levinthal's (1990) definition of absorptive capacities, this review assessed how these studies have understood and used this concept. Absorptive capability is acknowledged as the ability to recognize, learn, incorporate, and apply new knowledge (Cohen and Levinthal, 1990). Absorptive capacity refers to the management of external knowledge and how it is applied in the innovation process, as compared to adaptive capacity, a macro view of firms' adaptation of

external resources as a whole. This can help to address barriers to innovation under the knowledge, regulation, and certain aspects of market factor categories. This aligns with the approach to innovation studies that examines how firms use and apply external knowledge (Fabrizio, 2009). Escribano et al. (2009) pointed out the two parts to the role absorptive capacity contributes to the innovation process in relation to external knowledge. The first was the identification of new, external knowledge and the second was the exploitation of this new knowledge, converting it from potential to realized absorptive capacities. What this suggests for microenterprises banking on the acquisition of new knowledge to address obstacles encountered during the innovation is that there are a few aspects to consider ensuring they have a good identification process. For example, the identification process can be fortified through knowledge scanning mechanisms. This activity is important in that it ascertains the new knowledge that may influence the firm's absorptive capacity (Tu et al., 2006). These include monitoring of the environment and the identification of new knowledge, monitoring of patents, publishing papers, attending conferences, and using the Internet for competitive intelligence (Spithoven et al., 2011, Tu et al., 2006). Tu et al. (2006) suggested activities such as market tracking; benchmarking and customer and supplier surveys may also be included under knowledge scanning.

The second aspect of absorptive capacity is the exploitation of new knowledge, which includes integrating and applying new knowledge (Escribano et al., 2009). This is where external actors can have an influence on the internal process of a firm as they interact to introduce new sources and elements of knowledge. They can be involved in terms of collaboration with other firms, knowledge centers, and using external financial resources or support organizations (Keizer et al., 2002). In this aspect, experiences from past alliances can also help enhance absorptive capacities (Gulati, 2007). The accumulation of prior knowledge from actors within the firm's network has proven to be helpful in facilitating sharing, learning, and transformation of new knowledge to embedded knowledge during the innovation process (Wang and Ahmed, 2007). For example, being able to discern the environment and competition and making judgment on the use of new information at the appropriate time can use the judgment of an experienced actor to advise the final call on the action to take.

This places the emphasis of absorptive capacity on the "ability of individuals in the organization to assimilate, then process and transform external knowledge flows" (Escribano et al., 2009). The skills of the firm's employees are thus an important aspect of the absorptive capacity. This refers

not only to the existing skills, but to what is enhanced through interaction with other actors and external resources (Caloghirou et al., 2004). The skills that external actors bring with them and also their "awareness of where useful complementary expertise resides within and outside the organization help enhance existing absorptive capacities of the firm they get involved in. This sort of knowledge can be knowledge of who knows what, who can help with what problem, or who can exploit new information" (Cohen and Levinthal, 1990).

Microenterprises that are new to the business sector (for example, researchers from university spin-offs), may have a heavier reliance on experienced alliance partners. On the other hand, experienced industry actors who already have their own network of connections, including their own absorptive capability qualifications to aid them in the innovation process, can set up microenterprises. In addition, environmental factors should also be taken into consideration on the availability of external knowledge bases and ease of connecting to these knowledge bases. For example, a microenterprise being situated in an area where it may be densely populated and thus provide easier access to "social ties, nature of knowledge and the level of intellectual property rights" (Escribano et al., 2009). The interaction aspect of absorptive capacity is based on the importance of networking and external communication as an important determinant of innovation (Caloghirou et al., 2004). This is more apparent in environments that have high turbulence and tight intellectual property protection, according to a study conducted by Escribano et al. (2009).

2.4.3 Innovative capability

Not all microenterprise possess the relevant skills when it comes to adapting external resources to their own needs. Wang and Ahmed (2007) described innovative capability as the firms' "ability to develop new products and/or markets, through aligning strategic innovative orientation with innovative behaviors and process." This capability has some similarities to the previous two capabilities, but the emphasis here is on collaborating toward the end result of developing innovative outcomes in terms of new products, services, processes, markets, etc. This capability has linkages to the discussion on behavioral advantages (Demirbas, 2010) that microenterprises and small firms are said to possess that help them overcome the barriers to innovation in the market and regulation factor categories, as mentioned earlier in this chapter.

Nieto and Santamaría (2010) examined the role networking played in the development of innovation capabilities of small firms. They found that the effects of collaboration within networks could help narrow the gap of innovation outcomes between small and large firms in certain cases. The use of external networks was not limited to only small firms but also available for large firms. Small firms often form collaborations or alliances to better leverage the resources needed for their innovation process. These can impact the level of dependence microenterprises have on external collaborations as compared to larger firms. For microenterprises, these collaborations act as catalysts for the development of certain capabilities and can enhance their competitiveness due to their ability to access expert advice or sophisticated technology that they would not normally be able to obtain without these collaboration or alliances with well-positioned resources in the network. Since these collaborations have a greater impact on a small firm than a larger firm, a successful microenterprise is thus one that is, for example, able to use their network more efficiently to address their inherent limitations to resources. This "networking" aspect then becomes not just a strategy to gain more resources, but should also be regarded as a strategy for innovation by these microenterprises.

Hoffman et al. (1998) suggested that these behavioral aspects stem from internal factors of small firms influencing the success in innovation. Since the owner-manager in microenterprises often performs most tasks personally, management results of external and new resources can have a detrimental effect on the innovation process (Demirbas, 2010), sometimes turning these qualities into constraints in less than ideal innovation conditions. The ability to use new external knowledge depends much on having experience as it allows the recognition of the worth and relevance to the firm (adaptive capability) (Cohen and Levinthal, 1990). To drive the results of innovation activities to the commercialization phase may be dependent on "individuals who stand at the interface of either the firm and the external environment or at the interface between subunits within the firm" (Cohen and Levinthal, 1990). Though microenterprises have been credited with having behavioral advantages in the innovation process (Demirbas, 2010), Hoffman et al. (1998) also suggested that the internal factors of small firms play an essential role in determining success in innovation. The internal determinants of innovation can be attributed to highly qualified employees of firms, whether it is in the form of leadership or engineers and scientists (Radas and Božić, 2009). The behavioral aspects then may come from assessing personnel's qualities (Hoffman et al., 1998) or from key actors (Radas and Božić, 2009). The essential attribute for these actors in being able to align the innovation goals and processes is their

linkage to analytical knowledge bases outside of the firm. This may exist through qualified scientists and engineers (QSEs) maintaining contact with the research industry (such as research or academic institutions), owner/managers, or key actors in the network (Hoffman et al., 1998) who have connections with the manufacturing sector, who can provide advice, or who are experienced in bringing product to market.

2.4.4 Linking interaction and capabilities for innovating microenterprises

This section agrees with the concept of dynamic capabilities and its component factors that describe the types of abilities to successfully recognize, understand, and use external resources in the innovation process (Winter, 2003, Wang and Ahmed, 2007, Eisenhardt and Martin, 2000, Døving and Gooderham, 2008, Borch and Madsen, 2007). Having access to external resources during the innovation process is not the key to microenterprises driving their innovation process. Resources will remain as just physical assets or direct connection to other actors if they are to remain static. Resources need to be transformed; this often take place during the interaction process when new knowledge is gained and behaviors are modified to suit the new approach (Lundberg, 2002). The earlier discussion under absorptive capacity and innovative capability also highlighted this interactive aspect of human resources when external resources are adopted into the firm's mix of resources. Besides providing prior experience from other job capacities, external actors can help provide "opportunities for the companies to broaden their knowledge base, make up the internal shortages common to all companies today, develop useful knowledge more quickly than their rivals" (Camisón and Monfort-Mir, 2012).

Microenterprises, which have greater organizational flexibility as compared to larger firms, have been seen in terms of being structurally easier to reconfigure for the innovation process (Hewitt-Dundas, 2006). The level of activity in mobilizing external resources is dependent on the level of absorptive capacity of the firm. If the firm possesses a high level of absorptive capacity, there is likely a higher possibility of them proactively seeking out prospects in their network instead of being reactive only after problems are encountered (Cohen and Levinthal, 1990). This, according to Cohen and Levinthal (1990), is a "self-reinforcing cycle" that low-aspiring firms will have low innovative activity and will be less aware of the alternatives available in the environment, and hence invest lesser effort in innovation activities. The three component

factors of dynamic capabilities discussed allowed a closer examination of how the focus on the management aspect of scarce resources should be considered to achieve competitive advantage. Actual business processes brought into focus as the building of capabilities (which can be resource-related or in terms of a manager's skills and routines) have been examined in the face of change. Eisenhardt and Martin (2000) described these capabilities as "organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die." This element of change when markets "emerge, collide, split, evolve and die" insinuates a way of coping when routines are disturbed.

The consideration of the environment in terms of level of turbulence have been discussed by Escribano et al. (2009). Besides a stable environment to observe the benefits of these capabilities at work to aid in the overcoming of barriers to innovation, a networked environment in which linkages, ties, and relationships play a role in how collaborations or exchanges of resources can play out. Despite the wide application of the concept of dynamic capabilities, it has had its fair share of criticism. Critiques on not having a clear definition (Zahra et al., 2006) in terms of resources, process, and capabilities, paraphrasing of past literature and not having any distinction between capabilities and resources (Wang and Ahmed, 2007), and other aspects of the concept have been detailed in past literature (Pavlou and El Sawy, 2011). There are scholars who addressed these critiques and proposed new way of understanding this concept. Pavlou and El Sawy (2011) proposed a set of four dynamic capabilities (sensing, learning, integrating, and coordinating capabilities) that interact to reconfigure existing operational capabilities in the context of a turbulent environment. This thesis chose to view dynamic capabilities in terms of adaptive capabilities, absorptive capacities, and innovative capabilities to understand how microenterprises engaged with these concepts at critical episodes during the innovation process.

2.5 Interactive Innovation Approach

The evolution of innovation process models illustrates an increasing awareness of the factors that influence the innovation process of a firm. Departing from the linear progression of innovation to the more encompassing view of the innovation process, updated innovation process models (Chesbrough, 2006a, Bernstein and Singh, 2006, Kline and Rosenberg, 1986) have pointed to the

complex nature of activities, use of resources, and interaction of actors. Innovation is acknowledged to be an interactive process (Teece et al., 1997, Tödtling et al., 2009, Segarra-Blasco and Arauzo-Carod, 2008, Lundvall, 1988), that generates and diffuses knowledge. This section discusses the different interactive approaches that have been used to understand the innovation process (Doloreux, 2004, Teece et al., 1997), which views the innovation process as one that is never in isolation but embedded in network-like conditions (Menrad, 2004, Russo and Rossi, 2009, Rothwell and Dodgson, 1991, Robertson and Langlois, 1995, Oerlemans et al., 1998, Konsti-Laakso et al., 2012, Hanna and Walsh, 2002, Chetty and Stangl, 2010, Batterink et al., 2010). This means that there is an underlying assumption that firms are a "collection of resources and capabilities and considered as an organisation that can learn, share, diffuse and create knowledge through interaction" (Caloghirou et al., 2004).

Silva et al. (2007) summarized various relevant approaches (industrial cluster, systemic approach, etc.) that examined "fundamental elements to the study of the factors that stimulate and limit the innovative capacity" in clusters or systems during the process of innovation. These approaches described network-like conditions that maintain each component as interconnected and overlapping where a distinction can be drawn between the actors, resources, and activities to understand the innovation process (Håkansson and Waluszewski, 2007, Håkansson and Snehota, 1989, Håkansson and Ford, 2002). The interactive aspects of innovations are often studied starting with examining linkages to external parties (the role of cooperation in universities, for example, for the main purpose of accessing various types of resources) (Tether and Tajar, 2008, Perkmann and Walsh, 2007, Caloghirou et al., 2004). However, these interactions can happen simultaneously, may overlap, or even restart in the middle of the process. During the innovation process, both short and long-term interactions can help shape the behavioral characteristics of these innovating firms.

This thesis suggests that there is a need to differentiate microenterprises from the general SME category, as there are specificities during the innovation process that enable or behoove microenterprises to react differently as compared to the general SME population. One thing that distinguishes microenterprises from the general population of small firms may be the way different kinds of factors (both that aid and hinder innovation) encountered at critical phases of the innovation process influence the microenterprise. These factors, or how microenterprises address them, may be dependent on: a) the owner-entrepreneurs undertaking much of these interactions themselves

(Menrad, 2004), and b) the size of microenterprise making success or failure in integrating the factors have a larger impact on the innovation process.

In their study of Brazilian start-ups, Corradi (2013) positioned critical events as conceptual and analytical tools to explain the development of start-ups. They found that learning episodes (experiential learning), which can be triggered by both internal and external factors at various levels of analysis, made this development process discontinuous and could establish new routines. The critical events showed that there was a "demanded search for solutions, knowledge and resources by the entrepreneurs" at that juncture. The triggers for these critical events that Corradi (2013) found may have a positive impact on the firm. These critical events can disrupt the path of the firm through introducing new resources, services, and routines. This implies that critical events may be essential to the early part of the firm's innovation process to provide new solutions. Certain critical events may hold more learning value than others, and it has been argued that it is those events that combine both interpretative and practical dimensions of learning that can have an impact. They further suggested that future research could investigate the relationships between critical learning episodes and how they influence the evolution of different type of business. Clusel et al. (2012), pointed out that while all small businesses may face the same types of events (such as the departure of key personnel), they "do not all fail in the same way." There are two types of failure—the first being a "rapid" type of failure that is caused by a particular incident while the second type is caused by the consequences of a particular event. These incidents, when occurring in critical phases, make the firms particularly vulnerable to failures, even more so if the firm does not have the ability to anticipate and respond to the problem. The reaction of the firm to a critical event depends also in part on the growth phase of the small firm, the interactions between the firm and its environment, and its lifecycle. The use of critical events for identification of focal networks will be elaborated on in the analysis framework in section 2.6.

2.5.1 Innovation studies from an interactive perspective

Based on previous innovation studies, this section examines how innovation processes have been studied from an interactive perspective. This is structured from two perspectives: understanding the firm level of innovation and the connected cluster or regional level of innovation. Networks have been regarded as an effective and efficient form of organization, a form of new competition

with their lateral and horizontal inter-linkages (Dennis, 2000). Dennis (2000) identified five traits of networks. They were namely unity (shared experience), altruism (welfare for others), allegiance, trust (shared past situation), and parity. She pointed out that it was, however, more often the non-monetary aspect of the network that helped to create economies of scale that aided networks of small firms to have a long-term economic development goal.

The study of relationships between networks and innovation is a more recent research direction. Previous similar studies have examined vertical relationships between suppliers and customers and horizontal relationships with competitors providing the other spectrum of the phenomenon studied. Networks in this instance are regarded as evolving and temporal as they are made up of relationships that are "continuously constructed and reconstructed during interaction" (Grabher, 1993). Hyvärinen (1990) suggested that the environment of an enterprise could be seen in two aspects: the direct environment (demand and supply markets, consumer attitudes, environmental pollution, and possible anti-business attitudes) and the general environment (national and international economy and political situation, education, technology, and population). Bjerke and Johansson (2015) pointed out that while networking activities may be conducted both within and outside the organization, this was also dependent on how the firm is connected to the innovation systems (Lundvall et al., 2002).

2.5.1.1 Cluster/regional innovation levels

Literature focusing on a specific area or cluster of innovation can be drawn from studies on systems of innovation (Bengt-Åke Lundvall, 1992, Edquist, 1997). According to Lundvall (1992), innovation systems may be defined as "organizations and institutions involved in searching and exploring—such as R&D departments, technological institutes and universities." Innovation systems are often discussed in terms of actors, networks, and institutions, with the role of actors related to production structures, knowledge infrastructures, and support structures (Nilsson and Moodysson, 2011). Here, the subclass of regional innovation systems or clusters is examined in the context of microenterprises to investigate the advantages of the local environment for the innovation activities of microenterprises. Regional innovation systems or regionally networked innovation systems are understood to be "firms and organizations...embedded in a specific region and characterized by localized, interactive learning" (Asheim and Coenen, 2005). These systems have a deliberate element of intervention from the government and may be

characterized by public-private collaborations (Asheim and Coenen, 2005, Asheim, 2007). These agglomeration advantages "are the advantages gained by business from being located in regional environments where there are many other businesses and/or a high population density" (Henning et al., 2010). An example of such an environment is in industrial districts that may be characterized by small firms specializing in niches along the product value chain (Henning et al., 2010). While the industrial district illustrates localization externalities in which it is characterized by concentrations of firms in a traditional industry, the other end of the spectrum points out other forms of externalities such as urbanization and Jacob's externalities. These externalities highlight the accessibility of firms to different knowledge bases, services, and infrastructure due to the presence of different industries (Henning et al., 2010). A hybrid of these externalities can thus exist in a region where there are different actors in complementary industries.

An interesting concept comes from Mitra (2000) in the use of the term "environment munificence," which is claimed to "influence patterns of network change and plays an important role in the innovation process. Munificence describes the 'amount' of resources available to an organization from the environment and indicates the capacity of the environment to support innovation." Stressing the role of cooperation with other institutions for the main purpose of accessing various types of resources, such as with universities (Tether and Tajar, 2008, Perkmann and Walsh, 2007), collaboration on the regional level is often a way to gain access to resources without the need to invest in infrastructural changes, a condition that suits the resource-lacking small firm population. Håkansson and Waluszewski (2007) agreed with Penrose (1959) interpretation of the way a resource creates value for the firm: through combination with other resources, interaction with organizations, and relationships within and outside of the firm. The use of new knowledge is dependent on a firm's ability to integrate with its existing knowledge. This means that actors need to be "willing to experiment with established combinations to find new possibilities for utilizing old and new resources. This implies that mobilizing others is crucial, not in terms of developing a certain strategy others can join but more in term of creating endurance in the combining endeavors" (Håkansson and Waluszewski (2007).

The food industry provides an interesting illustration of the amalgamation of this form of hybrid externalities. The food sector has been portrayed as a stagnant industry in the past but is increasingly being looked upon by researchers as a sector that has its own dynamism with changing relationships and practices (Beckeman and Skjöldebrand, 2007, Sarkar and Costa, 2008,

Muscio et al., 2010, Menrad, 2004, Machat et al., 2004, Lagnevik, 2008, Grunert et al., 1997, Earle, 1997, Batterink et al., 2010, Baregheh et al., 2012). A mature industry like the food sector has been characterized by low technology firms with little radical change (Galizzi and Venturini, 1996). An innovation that starts as a research result from a food technology academic can have ripple effects on other parts of the food system, such as the way the product is distributed or consumed (Earle, 1997). Earle (1997) suggested that there were three types of innovation in the food sector: a novelty, an improvement, or a fundamental change. These innovations may be incremental and characterized by low levels of R&D due to some type of imitation strategy, coupled with a deliberate flow of new food introductions in consideration of market adjustments (Grunert et al., 1997). Avermaete et al. (2003) noted the importance of innovation for small food firms and pointed out that capital-intensive innovations were more likely to take place with small firms than with microenterprises. Innovation in the food sector can impact and involve more actors than one would normally expect of a sector with such little track record of innovation. The impact of innovation from one area to another in the food system needs to be taken into consideration when considering the innovation process in this sector. Grunert et al. (1997) suggested that introducing new products into the food sector was "an essential element of competition" and hence the understanding of this innovation process was critical. They observed that introducing new products to the food sector is often associated with technological change driven by R&D or market-oriented innovation, which is driven by a detection and understanding of potential customers. These types of innovation have often been explored by scholars of new product development (NPD) as they relate to coordinating development activities with a constant eye on market changes. Despite the recognition of technology-related innovations, the food sector is still considered as a low-tech industry due to the low R&D to sales ratio, as the technology used has typically originated from outside the industry (Grunert et al., 1997). While there are merits to the NPD approach to understanding the development during an innovation process, Costa and Jongen (2006) highlighted that it "does not explicitly address the role of chain actors other than consumers" in the product innovation process, thereby lacking in addressing the interactive aspects.

Beckeman and Skjöldebrand (2007) examined a cluster of frozen food producers and supporting industries in Sweden that was seen as an initiative driven by some entrepreneurs who networked with the government to provide information along the frozen food supply chain. This supply chain consisted of

the food packaging, equipment, ingredients suppliers, and trade partners. In their case study, they noted a new supply chain around frozen food and a "spontaneous cluster of food industries and supporting industries assembled in the south of Sweden, particularly around frozen food and with more or less strong links to the network" being formed. This network can be seen as one form of clustering, with agglomeration and industrial complexes forming two other forms of clustering (Gordon and McCann, 2000). Asheim and Coenen (2005) examined the Scandia functional food cluster in terms of understanding innovation from a learning economy approach that "was developed in a national context of small-sized industries relying on incremental, non R&D based product innovations." The emphasis in their research was therefore placed on knowledge bases in the innovation process of firms and industries. The study made a deliberate distinction between the concepts of learning economy clusters and regional innovation systems. In the specific context of the functional food cluster example in their research, the role of the university was pointed out to be a "seedbed for the original scientific ideas underpinning" the establishments of functional food companies. An important knowledge base was a cross-faculty research center supported by the Swedish public agency Vinnova to promote regional innovation systems in which the roles of knowledge workers were highlighted. At that point of research, Asheim and Coenen (2005) noted that the rise of the functional food sector needed the endorsement of both consumers and the traditional food sector. This highlights the multipronged barriers surrounding innovating microenterprises in the food sector, including an alignment of support from regional actors to local (microenterprise) demand. Bjerke and Johansson (2015) suggested that when small firms gain access to a larger network, they have the opportunity to be innovative like their larger peers. Interaction related to innovation, especially outside of the region the small firm operates in, can be important in the innovation process of small firms.

2.5.1.2 Firm innovation level

According to Hoffman et al. (1998), while there are similarities in the innovation activities of SMEs and microenterprises, innovation activities conducted along formal channels are often undertaken by larger SMEs while informal ones by smaller SMEs. This preference of microenterprises for innovation activities at the firm level tend towards those that are less capital intensive (Avermaete et al., 2003). This can explain why networking, which is perceived to to add value through the exchange of experience and knowledge

between network actors, can be an attractive option which allows small firms to enter different and perhaps bigger markets than they would have ventured into on their own (Dennis, 2000). BarNir and Smith (2002) examined the social networks of small-firm executives to understand how these executives form inter-firm alliances. They observed some properties of the social network that may be of interest to the study of microenterprises innovating at the firm level. For instance, the propensity for individuals to network to initiate social contacts can be used to access potential resources. While this is commonly associated with access to external resources, it also relates to the ability to mobilize and manage these resources. Small firms are also seen to have social networks that allow them to drew on the quality and strength of ties. A strong tie implies that efforts have been put into establishing and maintaining the relationship. The strength of ties can indicate the diversity and quality of information received; strong ties can be beneficial for the ready support that can be provided. Another property relates to the prestige of the network, which is associated with the status or positions of the actors that one socializes with. These associated qualities can improve the "reputation of the network" and can also be seen as providing better resources and information. In addition to improving the reputation of the individual firm, the small firm can gain legitimacy due to its association with actors in the network known for their reputation in the innovation context.

These interactions of networks at the firm level were examined by Powell and Grodal (2005) in networks consisting of actors from research institutions, industry, and academic sectors. While Powell and Grodal (2005) found that there were limited studies on how networks between firms affected innovative performance, Håkansson and Olsen (2011) reviewed studies that took an "anthropological research perspective" which viewed business practices as being interrelated and interdependent on external relations and that "innovations emerge through extended interactions." What this implies is that the interaction is a way through which actors, activities and resources are combined and linked. Medlin (2006) pointed out that how actors perceived each other in the network had a bearing on their actions and related behavior for the development of the network. In such a network, there is need for the firm to have the ability to convert network interest (collective) to self-interest to enable better innovation outcomes.

Past studies have shown that small firms have access to different types of external ties to knowledge or networks through which they gain access to external knowledge bases (Rothwell, 1989, Beesley and Rothwell, 1987, Rothwell and Dodgson, 1991). These knowledge bases have helped to

strengthen the existing competencies of the firm and improve their competitive positions. The success of these microenterprises (small firms, start-ups, SMEs) have been attributed to traits such as "entrepreneurial style, emotional intelligence, innovation capability as well as social capital and networking activities" (Hoang and Antoncic, 2003). Having a heterogeneous group of actors in the network is a generally accepted advantage, because it offers diversity and breadth of access to a variety of resources and assets in addition to diverse knowledge bases. These networks can also make up a common knowledge base from the combination of firms from which resources are pooled, enabling the development of new ideas and skills. Håkansson and Olsen (2011), in relating the interdependence of network actors, pointed out that "historical innovations" which made their mark in terms of material and social relations in the network include the existence of "sufficient interactive capacities" to aid in the manifestation of economic phenomenon. In their words, innovations have "a large number of interfaces towards a variety of existing resources, activities and actors." This setup is intensified when in the context of knowledge-intensive industries, but can also be observed in strategic alliances which have the in-house R&D and technology know-how to benefit from this locus of innovation.

Robertson and Smith (2008) defined distributed knowledge bases as "a set of knowledge/knowledge sources maintained across an economically and/or socially integrated set of agents and institutions." The firms are considered key to coordinating the different types of knowledge originating from different sources and locations (geographical, intellectual or social). According to the Robertson and Smith (2008) literature review, knowledge distribution among formal distributed activities such as joint ventures, strategic alliances, and outsourcing is viewed as "uncertain and uneven." This uncertainty can make it hard to trace relevant knowledge or may have "invisible" linkages. The management of knowledge bases in network interactions thus can be challenging not just due to the nature of knowledge itself. The sources of knowledge need to be traced, weighed in terms of importance, and mapped according to the circumstances in which they are utilized.

Innovation by microenterprises in low-tech sectors are often more practical and architectural in nature in that they recombine existing components to design and develop new products/processes. Small firms interacting in the network should not be confined to the start-up stage, according to Nieto and Santamaría (2010). The benefits to what microenterprises can gain through the actors in the network can range from tangible to intangible resources; the most crucial one is perhaps information and advice from expert actors in their

networks. These expert actors can be venture capitalists, professional services organizations like lawyers, or industry experts who have held management positions in their sector for ten to twenty years. They can provide advice for problem solving or direct the question to a suitable contact, and in certain cases, offer legitimacy to the enterprise. This may be due to the positive perception associated with the microenterprise when the expert actor or organization is recognized to have a committed relationship or stake in the microenterprise. These positive associations can have subsequent impacts on the resource requirements and exchanges of microenterprises with other actors in the network.

The studies on innovation based on the interactive approach can be described as a "virtuous cycle" (Powell and Grodal, 2005) between networks and innovation. Due to the linkages established to facilitate innovation, the innovative outputs attract further collaborations to be established. However, Cohen and Levinthal (1990) pointed out a vicious cycle that firms with low innovative aspirations have also suffered from. This observation compels further investigation into issues such as "the effects of the duration of linkages, experience with collaboration and the consequences of broken ties on rates of innovation" (Powell and Grodal, 2005), an area that this thesis hopes to contribute to. Powell and Grodal (2005) purported that "young and smaller firms may benefit more from collaborative relationships than do larger firms," but at the same time noted that "firms with a central location within networks generate more innovative output…both direct and indirect ties provide a positive contribution to innovation but the effect of indirect ties is moderated by the prevalence of direct ties."

The liability of smallness implied that there are assumed resource constraints of microenterprises that prevent them from developing competencies in-house. This is subsequently linked to a "natural" quest for external resources or organizations to learn from and then to leverage their revamped internal competencies with cooperation with others to enable, for example, innovation to occur. However, microenterprises are credited with being nimble in decision-making due to their small size. Since the owners/managers/founders have to oversee most things associated with driving the innovation process, they have a good overview of what is happening and are able to make critical decisions quickly. In addition, due to their social interactions and networking, they are also the resource that ventures to the outside world to bring new inspiration to the firm. This places an even higher emphasis on a microenterprise's ability to manage the complex process of coordination and communication as well as relations with external

organizations (Mitra, 2000). This ability may be to have a better awareness of the interaction level at which collaboration is managed as this can have implications for establishing the quality and expectations of the relationships (Blomqvist and Levy, 2006).

Bassayannis and Cronin (2009) suggested that interaction in networks can be viewed as "knowledge based resource interaction," which can be understood as the "ways which organizations, through networking, mobilize their knowledge bases to innovate." This type of interaction combines resources in an innovation network that are relevant to the innovation process. In the context of this research, finding organizational and technological complementariness in the innovation network is important for microenterprises (Bjerke and Johansson, 2015). Larson and Starr (1993) suggested in their network model that there were three stages of development with regards to network formation aimed at conducting activities to access economic and non-economic resources, which are required to start any business. Each stage shows a change in the content of the relationship; subsequent stages show evolvement through the addition of complexity and layers in terms of the nature of exchanges. The assembling of contacts that can help provide the resources to kick-start the venture defines the first stage. Essential relationships are harnessed through family and friends' ties, and existing and new contacts. The second stage is when these relationships develop beyond their functional role to include a social dimension. Social dimensions of these relationships may not only be pursued for advancement of economic interest at this stage. The third stage depicts an increase in complexity among the relationships and an improvement in the quality of exchanges between actors. This can be illustrated, for example, with the establishment of routine interaction and commitment among the actors. Another way that these concepts of interaction in a network can be explored is outlined in the field of studies conducted by the IMP (Industrial Marketing and Purchasing) group of researchers.

2.5.2 The ARA (Actor-Resource-Activities) model

As this study is concerned with the development of actors, resources, and activities when microenterprises encounter critical events, this section serves to provide some background on the ARA model and to provide some examples of research that has used the model to analyze similar phenomena. The interaction perspectives on business relationships between and within firms and among individuals have been a field of study pursued by The IMP group of

researchers (Håkansson and Ford, 2016, Håkansson et al., 2009, Håkansson and Waluszewski, 2007). The ARA model provides an understanding of the relationships and the outcomes of interactions of business relationships described through three layers: 1) Actor Bonds (interpersonal links through interactions), 2) Activity Links (integration and coordination of activities), and 3) Resource Ties (how assets, benefits, or means are adapted or combined as interaction develops between the counterparts) (Håkansson and Snehota, 1995, Ford et al., 2008). Although these three layers are described separately, they are in reality very much interconnected (Håkansson and Snehota, 1995). Taking these three layers into consideration expands the area of focus beyond that relationship to that of its surrounding environment and related third parties. The model has been said to deal with networks that have no clear boundaries but are connected through exchange relationships (Axelsson, 2010). This then is appropriate, as has been mentioned, with those microenterprises that would seek extant sources and linkages to capture the nuances of their interactions.

The ARA analysis framework (Håkansson and Snehota, 1995) provides a micro-level perspective on the understanding of innovation processes of microenterprises. This can provide an understanding on how the barriers of innovation encountered during the process can be overcome through understanding how "actors relate on a social level (bonds), how they combine technological and organizational solutions (ties) and finally how they are interrelated through the various activities they perform (links) (Havenvid et al., 2016)". The innovation process as presented in previous innovation models has been mainly understood from a distant and broad overview of all types of companies in general. However, for microenterprises, these innovation process models were not exactly based on an understanding of microenterprises' modus operandi, but on assumptions that relate more to larger organizations. As a firm driven by an owner-entrepreneur wearing many hats to fulfill the operation, strategy, and marketing requirements of the innovation process, the microenterprise can benefit from an understanding of the innovation process from the ARA model—in particular how external resources are introduced through interaction in the innovation process. The relationships formed between the interaction of the substance layer elements show how the combination of new and current resources can help develop capabilities for the innovation process of the microenterprise to address innovation-related barriers that they may encounter.

2.5.2.1 Actor bonds

> **Actor bonds** connect actors, influence how the two actors perceive each other and form their identities in relation to each other. Bonds become established in interaction and reflect the interaction process. (Håkansson and Snehota, 1995)

When discussing actor bonds, Håkansson and Snehota (1995) acknowledged that while it can be abstract to regard companies as individuals in a relationship, companies can be made up of just one person or multiple actors combined, such as in microenterprises. Just as in an interpersonal relationship, it can be influenced by multiple factors and beliefs, and trust underlies the commitment undertaken in most cases. "Commitment, identify and trust are processes that constrain and at the same time enable the behavior of the actors in relation to each other. To be committed, to have a certain identity, to be trusted means that an actor has to comply with some specific rules"(Ford, 2002). Bonds in this case do not only refer to relationship bonds but also to how such bonds are formed or strengthen through the provision of information and competencies when interacting in the network. Relationships formed in these networks can also help provide legitimacy in the way of having good connections with reputable actors or organizations that can help pave the way for future development. For relationship development, one element that has commonly been cited is the trust that needs to exist between actors. This can affect the "quality of resource flows" (Hoang and Antoncic, 2003), which can have a greater impact on microenterprises. The other two elements that can influence these interactions are network governance and network structure. Both of these elements, according to Hoang and Antoncic (2003), can impact the ability of actors to access different types of resources.

Blomqvist and Levy (2006) noted that for collaborations at the network levels, the position held by an actor and how the network was structured had influences on how the relationships progressed in the network. The ability to collaborate also had an impact on the development of actor bonds; this capability, according to (Blomqvist and Levy, 2006), is multidimensional and relies much on the actor's "capability to build and manage network relationships based on mutual trust, communication and commitment." This capability, as argued by Gulati (2007), can be built up from past ties. Gulati (2007) suggested that the experience gained from bonding with other actors could provide firms with the skills needed to enter into new relationships or attract potential partners, which could provide access to information and opportunities. Other aspects of previous actor bonds that can play a role in

influencing future actor bonds from forming include how the bonds were established and distributed in the network, affecting the degree to which network resources may be accessed. Hirsch-Kreinsen et al. (2008) identified some types of actors (such as developers, manufacturers, and service providers) that possess specialized knowledge that plays an important part in the innovation strategies of some companies. This points to the "importance of external actors and their specialist knowledge and the ability to coordinate network relations across company borders, especially with other companies within the value chain" (Hirsch-Kreinsen et al., 2008).

2.5.2.2 Resource ties

> **Resource ties** connect various resource elements (technological, material, knowledge resources and other tangibles) of two companies. Resource ties result from how the relationship has developed and represents in itself, a resource for a company. (Håkansson and Snehota, 1995)

Resource ties (including manpower, equipment, plant, knowledge, image, and financial means) are what support the activities of the company. Relationships are formed not just to acquire or access but in some cases to be combined in a new way, tying the resources of the two companies together, forming an aggregated resource structure—"a resource constellation." (Håkansson and Snehota, 1995) Thus, a resource can be an asset to one but a constraint to another within the resource constellation/network (Håkansson and Snehota, 1995). Resources represent an important element in the innovation process of microenterprises, whether they exist internally or externally. If used well, microenterprises have been known to use them to be of strategic advantage where external resource seeking behavior was observed. The lack of resources is also one of the most cited reasons for crippling the growth or innovativeness of microenterprises.

Barney (1991) defined resources broadly as including "all assets, capabilities, organizational processes, firm attributes, information, knowledge etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness." The difficulty in imitation lies in how resources are combined and used to develop competencies, not just the way of access to resources. As Håkansson and Ford (2002) proposed, the combining of fragmented resources is activated when the enterprise interacts with others, thus suggesting that it is not only the access to new resources that should be emphasized, but rather the combination of

resources that already exist that makes a difference in regards to how the resources are being used. This relates to the concept of competitive advantage and absorptive capacity (Cohen and Levinthal, 1990) as discussed in Section 2.4 as firms react to the environment in which they operate when considering the amount of resources employed for conducting innovative activities.
Ties are often initiated in the "context of existing sets of relationships that are conduits for valuable information that in turn shape the behavior of firms" (Gulati, 2007). This is particularly relevant as it relates to the network context in which this study is situated. Shared ties allow learning and also create an environment conducive for further collaboration. In terms of resource ties, since they are almost always related to an actor, these ties then should take into consideration how resources arise due to actor bonds in the network too. Gulati (2007) highlighted that "network resources arise outside a firm's boundaries and within its social networks. Most broadly, such resources encompass resources that a firm's partners may possess and are available to a focal firm through its connections with those firms." These resources may be referred to as network resources, which are composed of two distinct components—the relational aspect consisting of direct relationships and the structural component, which includes the entire social network that the firm operates in (Gulati, 2007). However, it should be highlighted that since these three substance layers are so highly interrelated, there will be overlapping descriptions of resource ties and actor bonds. A point should be made that seeking network resources can be conducted through innovation-related activities that bring different actors together to make available the network resource required for the innovation process (Gulati, 2007).

2.5.2.3 Activity Links

> **Activity links** regard technical, administrative, commercial and other activities of a company that can be connected in different ways to those of another company as a relationship develops. (Håkansson and Snehota, 1995)

Activity links refer to the flow of exchanges between two companies for technical, administrative, or commercial reasons. They link to other activities within the companies themselves and are subject to changes that have effects on both costs and effectiveness of the activities. Hence, they play a part in the productivity of a company and of the network. The type and strength of activity links also help to explain the effects of a relationship and how it can develop in their conceptual framework (Håkansson and Snehota, 1995).

Participating in activities implies the use of external conditions and supportive factors through establishing relationships with other companies and organizations.

Innovation activities are often treated as referring to the innovativeness of a firm and as being influenced by both the internal factors and external environment of the enterprise (Hyvärinen, 1990). Support for innovation activities comes in form of economic investments, in wages, education, personnel, sources of information, and ideas, which can be categorized under economical, strategic, know-how, and technological dimensions. This has some relation with the concept of absorptive capacity, as actors (both internal and external) need to activate resources through activities to apply new knowledge gained through the interaction. Cohen and Levinthal (1990) also found that absorptive capacity was more apparent in industries that employed mature technologies, which may fit with the profile of the food sector.

2.5.2.4 ARA analysis matrix

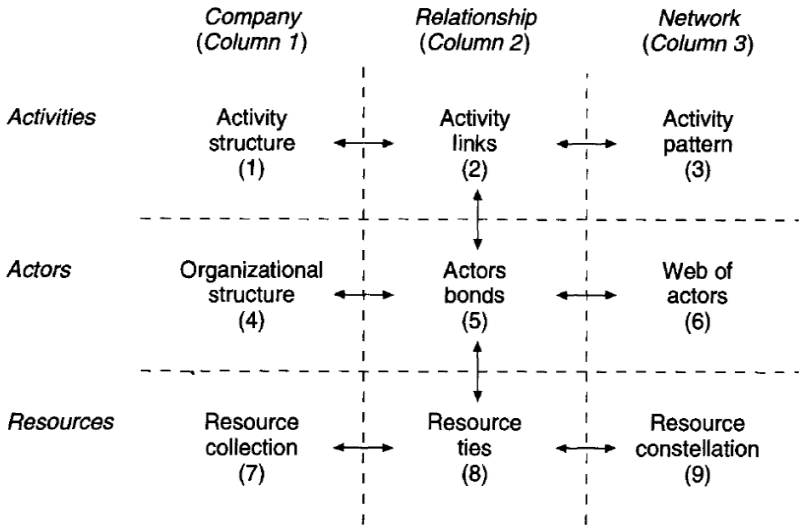

Figure 6.
Analysis scheme based on ARA model (Håkansson and Snehota, 1995).

The ARA model recognizes the interdependencies between actors, resources, and activities as well as the environment around them. This means that the relationships in a business network are dependent on the functional roles of each component and how these interactions not only allow innovation

activities to be conducted, but are also acting as conduits for resources, actors, and activities to be combined. These functional roles may be driven by intrinsic or extrinsic motivations and may be influenced by various factors during the interaction of the actors involved in the innovation process. The three layers of substance are related to the values and outcomes of a relationship and can be used to assess the dyadic relationship between two companies. The framework is proposed "to analyze the effects of change in relationship and/or identify the factors that affect the possibilities of development of a relationship" (Håkansson and Snehota, 1995). The matrix allows different forms of interactions or relationships between and among the different components. In addition, it can also be used as a diagnostic tool to identify critical issues, to intervene in relationships to achieve certain effects, or to distinguish possible effects of change in a relationship (Ford, 2002).

The matrix can also be used to identify the impact of change on the development of a relationship. Any change (in any of the cells of the matrix) can affect the development of a certain relationship. If, for example, one or both of the companies are changing some activities, this might have effects in both the horizontal and vertical dimensions of the scheme. It might have a direct effect in terms of increased or decreased efficiency in the performance of the internal activities of the company (cell 1), or some direct effects for some third parties who have to adapt to the new link with accompanying positive or negative outcomes (cell 3). The change might also have an indirect effect. It can give cause to make further changes within the relationship in terms of new ties (cell 8) or bonds (cell 5). It can also give cause to make adjustments in relationships to third parties (cell 3). In this way, one change can cause a number of reactions that might be both expected (wanted) and unexpected (surprises) for the party initiating the change.

This matrix acts as a guide for the purpose of this research, as it can be utilized to examine "innovative process that takes place over time in which actors are able to adjust and interweave transaction chains, accommodate routines that were strange before, transfer activities to other actors and build up common recipes, standards and cognitive maps" (Omta et al., 2001). In addition, as microenterprises are firms that are often connected by networks of (sometimes overlapping) formal and informal relationships, the ARA model provides a perspective that can readily be explored to glean insights into the innovation process of these microenterprises. Jensen et al. (2007), though, proposed considering an element of self and collective interest when analyzing the interdependence of the firms represented by the resource ties, activity links, and actor bonds. They suggested that by examining the difference between self

and collective interest, one could understand how firms develop networks. In other words, the importance of maintaining a firm's identity can provide an understanding of how networks are built to strengthen or diminish self or collective interests.

In the ARA model, long-term relationships are developed through building trust and commitment among the actors in the network. Steier and Greenwood (2000) observed that in such long-term relationships, which may provide access to one type of resource in the beginning, can evolve to provide access to different or more resources, thus becoming "multi-dimensional" in nature. The ability of the "orchestrators"(the microenterprises' owners themselves) has also been brought into the equation to find relevant sources of knowledge, the strength of their own networks, and also their competencies to create or recombine these resources for their innovation process (Lipparini and Sobrero, 1994). As such, the success of such a combination of actors, resources, and activities implies that there are interdependencies within the network that can be further explored to contribute to the literature in this area. This research thus identifies the focal network of cases through identification of critical events that have occurred during the innovation journeys of these microenterprises. As Machat et al. (2004) explained, events (expected or unexpected) are "often the engines for change in societal contexts, including B2B networks." This integrates the ARA model's framework while examining events that are of importance to these microenterprises' innovation journeys. Through the investigation of the change in innovation trajectories that may have deviated at an intersection of critical events, it is hoped that insights will be allowed into the determinants of the change and also "considers how interactions between network resources improves innovation performance" (Purchase et al., 2014).

2.5.2.5 Cases using ARA model

There has been some application of the ARA model as a conceptual framework that serves as an inspiration for how this model can be used to understand how microenterprises innovate; for instance, it can be used to examine changes in terms of business relationships. Relationships in this instance are taken to be those where mutual orientation and commitment underlies the interaction between companies, and where there is interdependency developed over time. Along with benefits that can be reaped from having a relationship, this also includes the restraints that can come with relationships: constrained behavior, demands, and compromises. Relationships are unique and this study of the

innovation process of microenterprises recognizes the unique processes each microenterprise undertakes when they are innovating. While the relationships themselves cannot be generalized, the effects generated from the interactions may be observed and may highlight dimensions that can be useful for other innovating microenterprises (Håkansson and Snehota, 1995). These effects can be categorized into what is affected by the relationship (along the substance layers) and whom are affected by the relationship (function—individual, dyad, or network). Changes in relationships are expected because they are made up of individuals and resources. These actors conduct activities that are related to others and they build up relationships with certain purposes in mind. One of these purposes may be to innovate. The impetus to innovate can be initiated in extensive and stable relationships, whether it is for a new product or process. Changes required in innovation may be in single or multiple dimensions, from different actors or activities in the business networks. These changes are more critical when they "concern the development of activity links, resource ties, and actor bonds in relationships" (Håkansson and Snehota, 1995).

O'Toole and McGrath (2008) utilized the ARA model as a framework for analysis to examine six relational capabilities in an SME network. They defined relational capabilities for microenterprises as "the capacity of an SME to interact proactively with a wide range of connected actors to purposefully exchange knowledge, create opportunities and joint process improvements including adaptations and innovations." They proposed six dimensions to measure relational capabilities: realization capability, assessment capability, access to knowledge, access to opportunity, coadaptation, and co-innovation. These relational capabilities were formed in the process of integration between the three layers in the ARA model. As these capabilities reside within a network, they can be difficult to measure or observe. The ARA framework allows the formulation of the six dimensions that can be more readily obtained through design of the empirical data. O'Toole and McGrath (2008) view this capability as enhancing the bundle of the firm's resources, as this capability is nurtured through interaction with external parties. For example, Bender (2008) more recently introduced the concept of innovation enabling capabilities as a form of dynamic capability to understand the performance of innovative firms and their antecedents. They identified two analytical dimensions in this concept: transformational capabilities and configurational capabilities. Transformational capabilities refer to the "enduring ability of an organization to transform available general knowledge into plant, firm or task specific knowledge and competence" (Bender, 2008). Welding as a traditional industrial technique is cited as an illustration, because it is a general technique

known all over the world. When it is transformed into a technique that produces high quality, zero-defect work, it becomes a competence that is innovative and competitive. Configurational capabilities refer to the ability to recombine knowledge, artifacts, and actors. One aspect deals with the innovating firm's ability to assemble various sources of knowledge in a creative manner. This knowledge may exist in the form of scientific knowledge, or codified or tacit knowledge in different actors. Involving different actors who possess relevant knowledge together also means having the ability to manage external collaborations and relations in a timely manner. The emphasis on these capabilities is on the transformation rather than identification of knowledge and the absorption of it, as is normally associated with absorptive capacity (Zahra et al. (2006). The capabilities discussed in this study bear some similarities to the discussion in section 2.4.

Ratajczak-Mrozek and Herbeć (2013) utilized the ARA model in their study of the Polish furniture industry. In that study, they highlighted the specific nature of the furniture industry from the perspective of the ARA model, and identified the main entities within the industry and the surrounding business environment as well as their characteristics. This analysis provided an overview of significant factors, including those that would not have otherwise captured those influences (both positive and negative) that the furniture industry gleaned from the interdependencies in its actors, resources, and activities layers along the production process. Given that the primary objective of this research is to employ the interrelated layers of the ARA model to empirically analyze relationships in the context of how microenterprises nurture, develop, and maintain business relationships in the innovation process, the deficiencies of IMP research should be discussed and acknowledged here.

The IMP perspective on business interaction has been quite wide, but it has also received its share of criticisms in various forms. For example, Lenney and Easton (2009) have shared (and received a response to) their thoughts on the limitations of the ARA model when viewing business interaction. Lowe et al. (2012) argued that while there are merits to the holistic aspects of the ARA model, IMP research has tended to focus on the "tangible elements" of actors, resources, and activities. They proposed that this could be complemented with a process-based approach to investigate the interaction elements. Lowe et al. (2012) referred extensively to Goffman (1961), who viewed the tangible elements of ARA as roles (actors), stages/props (resources), and scripts (activities). This type of dramaturgical analysis approach views the ARA elements in terms of "the roles played by the characters (or actors); the 'props,'

tools and spaces used by these characters (resources) and the role-playing of the characters within the drama (activities)." This was in line with the interrelatedness of actors, resources, and activities expressed by Håkansson and Snehota (1995), though it had not been apparent for all structurally inclined analysis using the ARA model to explain more tangible phenomena of the interaction process. Lowe et al. (2012) further clarified that "identity and strategic self-presentation…is a crucial part of the sense making process for networkers, whereby the construction of identity arises from a flexible, on-going, strategic process" and suggested a relabeling of the ARA model to "Character Actors, Resource Props and Scripted Activities." While they have raised some very valid points and perspectives, a relabeling of the model might not be necessary for the analogy of theatre in this context. As past studies have shown with the application of the ARA model, it provides a guideline for application in different contexts to understand the interaction aspect of business activities from the ARA elements.

Another limitation of the ARA analysis scheme has been pointed out in its identification of only where effects have occurred or can be observed. It does not provide guidance for assessing the likelihood or the magnitude of impact of changes in a relationship or elsewhere in the network: These require further analysis that permits the assessment of the strength of connections in the various layers of substance of the relationships and the economic consequences thereof (Håkansson and Snehota, 1995). Despite this limitation, the ARA model has been heavily cited for different illustrative and conceptual purposes. Some scholars, though, have noted the scarcity of empirical applications of the model. Lenney and Easton (2009) for example, while describing the model as broad and general in nature, made a suggestion to include "commitments" as an extension to the model. In their view, commitments were "agreements between two or more social actors to carry out future actions." In the context of the ARA model, they suggested that they could be regarded as a resource but also as reflecting the goals of actors and direct activities. Håkansson (2009), in his reply, partly agreed about the importance of "commitments," which can be identified in all the activities between two actors. Commitment should be emphasized when analyzing or describing business relationships. However, he disagreed with the notion that it should be included as a variable in the ARA model. He maintained that the ARA model should remain a basic model that gives an overview of the main components in how "single business relationships are related to the larger business network." Commitments in this sense will just be one aspect from the actor's perspective. Nonetheless, this author agrees with Lenney and Easton (2009) in that:

> In the case of the ARA model for example it has to be made clear when analyzing data who are the actors, what are their activities and with which resources they interact. In other words, there has to be a bridge between the theoretical and the empirical.

This thesis concurs with the need to examine the intangible aspects of the ARA model that can contribute to a novel application of this model. The application of the ARA model for this thesis will be elaborated in the following section.

2.6 Analytical Framework

This section brings together the concepts discussed in this chapter that help inform the analytical framework for this thesis. The discussion throughout this chapter provided a review of previous literature on various aspects of the innovation process but more importantly, an appreciation of the increased recognition of the role of interactions during the innovation process. Interaction activities when innovating can refer to a wide spectrum of things—from the acquisition of resources to the description of a series of events that lead to an innovation product/process or a documentation of a sequence of transactions. This thesis proposes an analysis framework that can allow the examination of how microenterprises utilize interactions during the innovation process and develop capacities that can help the microenterprises overcome the critical events or barriers encountered.

The discussion on barriers to innovation for microenterprises highlighted that these challenges and capabilities can occur at any point during the innovation process. The four types of barriers to innovation may be overcome through integrating the capacities from external actors when interaction occurs during the innovation process. It is therefore useful to understand in-depth the circumstances where these capabilities manifest so as to provide a contribution to the understanding of innovating microenterprises. To date capabilities have mostly been credited under a broad label of behavioral advantages held by small firms. These circumstances where capabilities manifest during the microenterprises' innovation process will be identified through the critical events approach. This stems from the critical incident technique (CIT) that had its beginnings in the Aviation Psychology Program of the United States Air Force in World War II when they were developing a method to choose and classify aircrews. Flanagan (1954) defined critical incidents as "any observable

human activity that is sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act."

Halinen et al. (2012) observed that this approach has often been used in research examining relationship and network studies. This is due to the nature of network processes, which are "often discontinuous in character can be detected through discernible events, which potentially trigger network formation or dissolution, or otherwise mark important transition periods in the evolution of networks." For example, in Fuglsang and Eide (2012) study of small tourism firms that innovated by turning the idea of experience tourism into reality using networks, the critical events approach was used to identify the behavioral aspects of network formation in micro-processes. They adopted a practice-based approach to highlight how network formation and innovation can be understood as process and practice. Schurr et al. (2008) examined interaction episodes that lead to relationship changes that can result in adaptation or changes in a business environment. Events, which can also be known as episodes (Håkansson et al., 2009) or moments (Medlin, 2002), are analyzed and used as building blocks that make up the interactive process in networks in this approach. Schurr et al. (2008) examined these changes in terms of actor bonds, resource ties, and activity links by employing CIT to "investigate interaction patterns that sustain a relationship."

This thesis proposes that the interactions between the actors, activities, and resources should also be taken into consideration when evaluating the ability of microenterprises to handle critical events in the innovation process. These above-mentioned studies are just some examples in which critical events can be identified from empirical data, such as through narratives as used in the case of Corradi (2013). These empirical data can be qualitatively analyzed to provide an understanding of the studied phenomenon. In the same vein, critical events are used to identify the focal network of actors, resources, and activities to analyze how microenterprises innovate. The critical events identified in this study are taken from descriptions of episodes where the key actors undertake actions, or decisions from a subjective point of view that has an effect on the actors' bonds, resource ties and activity links associated with the innovation process of the microenterprises. These accounts, which the key actors viewed as being significant to the innovation process, are seen to have contributed to the critical event encountered by the microenterprises in different ways.

The ARA model has had great influence on how business relationships and the field of network research are viewed (Omta et al., 2001). This model has a process perspective when viewing the interactions around networks and in how these interactions emerge (Bizzi and Langley, 2012). Håkansson and Snehota

(1995) stated that one of the reasons they formulated the ARA model was because they were dissatisfied "with how business relationships were looked upon in general, where the relationships were mainly seen as a consequence of what the two parties wanted to get out of the relationship. In other words, that they were the results of specific goals driving the actors to develop the relationship." The ARA model suggests that interaction outcomes can be described in the three substance layers: actor bonds, resources ties, and activities links. The actor layer touches on the interpersonal links that occur between actors through interactions. Bonds are established based on how actors influence each other within the relationships. The bonds established may open up or restrict opportunities for developing activity links and resource ties. This can aid in the adaptation of external resources and further strengthen or weaken the actor bonds and resource ties, depending on how the relationship plays out in the innovation process. What this ARA lens provides is a view on the key networking features that impact these layers during the innovation process. These have some parallels in how capabilities are formed, developed, or enhanced during the innovation process and can be seen as a supplement to address critics of the "intangible" elements of the ARA that were not on the forefront of discussion in previous literature.

By recognizing that each microenterprise has its own unique set of connected relations with other actors, level of activity, and ability to secure or source for the necessary resources, this thesis acknowledges the complexity of the innovation process as these microenterprises integrate external resources and build on capabilities through the interaction of these ARA layers as part of their innovation process. The analysis framework is thus adapted using elements from the ARA model to help identify the interactive aspect of the innovation process of microenterprises and explain how the innovation process is interrupted after encountering critical events, and how actor bonds, resource ties, and activities links are utilized at the intersection of critical events during the innovation process. This thesis suggests that microenterprises "take advantage" of the opportunities provided by these critical events to introduce or enhance their dynamic capabilities. These dynamic capabilities are described as adaptive, absorptive, and innovative capacity in the microenterprises' innovation process that may be enhanced through integrating external resources, or developed through interaction with these external resources. The development or enhancement of these capacities are aimed to address the barriers to innovation and may be a conscious or unconscious strategy.

The analysis framework is a broad preliminary framework based on theory that this empirical study can help to corroborate the elements presented. It is

expected that through the preliminary application of this framework, this tool can be adjusted based on the discussion of the analysis of the case in the concluding chapter.

3 Methodology

> No man is an island entire of itself; every man is a piece of the continent, a part of the main; if a clod be washed away by the sea, Europe is the less, as well as if a promontory were, as well as any manner of thy friends or of thine own were; any man's death diminishes me, because I am involved in mankind. And therefore never send to know for whom the bell tolls; it tolls for thee.
>
> From "No Man is an Island," Mediation XVII, *Devotions upon Emergent Occasions*
>
> By John Donne, 1624

Håkansson and Snehota's (1989) article titled "No Business is an Island: The Network Concept of Business Strategy" drew parallels between the above-mentioned quote and how businesses and their environments interact through the network model. This chapter describes the research design for this thesis, the research instruments employed during the data collection process, and delimitations of the sample. This thesis employs a qualitative methodology structured around a case study approach. The choice to use case studies was motivated by it being "an empirical inquiry that investigates a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used" (Yin, 2009). Eisenhardt (1989) emphasized the potential of case studies to capture the dynamics of the studied phenomenon: "The case study is a research strategy which focuses on understanding the dynamics present within single settings." Case studies provide depth and comprehensiveness for understanding a particular phenomenon. However, these objective may be met only if the study fulfills validity and reliability criteria, according to Gibbert et al. (2008). Gibbert et al. (2008) identified four aspects that can be assessed to ensure "the rigor of field research": internal validity, construct validity, external validity, and reliability. This chapter clarifies the study along these guidelines to provide an overview of the methodologies engaged for this thesis.

3.1 Background to Empirical Data

The Swedish food industry is chosen the as the empirical context for studying the innovation processes of microenterprises. Although food products, beverages, and tobacco are classified under the low-tech sector by OECD, the Swedish food industry has developed from a protected sector to one that is currently subject to international competition (Johnson and Onwuegbuzie, 2004), complete with microenterprises offering innovative products and services that toe the boundaries of food and medicine. The Swedish food sector can be seen as an aggregation of the food retail, food service and food processing segments. In this research, the focus was on the food processing sector, which had an estimated net turnover of €19 billion in 2011 with about 3100 companies, accounting for about 10% of Sweden's total industrial output (Chamber Trade Sweden, 2013). This study focuses on microenterprises which are defined according to the EU's definition as an enterprise that employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed €2 million. At the time of data collection for this thesis, the microenterprises should also have fulfilled the following selection criteria:

- Existing innovation process or new/improved product or services.[10]
- Innovation outcome is not under any stage of development, i.e., it is commercially ready.
- Innovating within the food sector or food related services and products.

The selection of microenterprises was concentrated in Skåne County in Sweden, which is part of the Oresund region (the Capital Region of Denmark and Region Zealand constitute the Danish side, while Skåne County constitutes the Swedish side). Drawing empirical data from the food industry was a deliberate choice for several reasons. First, it is a sector considered "traditional", i.e., highly controlled by regulations and described as a mature

[10] The definition of innovation is adapted from BAREGHEH, A., ROWLEY, J. & SAMBROOK, S. 2009. Towards a multidisciplinary definition of innovation. *Management decision,* 47, 1323-39.as "the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace."

sector or low-tech sector with slow growth populated mostly by small firms. However, this study proposed that these small firms, especially microenterprises, are challenging this long-held definition of the industry through their focus on innovation. The food industry is also undergoing changes by what Sarkar and Costa (2008) described as the consumers being "wary of radically new products and changes in consumption patterns." The combined pressure from both the production and consumption ends can undoubtedly create complexity in managing innovation within this sector. This research provides an opportunity to understand and empirically contribute to the innovation processes of microenterprises in the Swedish food industry.

This study had first set out to understand how intermediaries worked with innovation and SMEs within the food industry. With the insights gleaned from preliminary interviews that were conducted in conjunction with the NetGrow Project under the EU FP7 framework, a gap between the expectations of aid provided by intermediaries and the aid the SMEs felt they received was noted. This gap pointed to a misalignment in the understanding of the innovation processes of SMEs, both by external actors and even by SMEs themselves. A preliminary literature review concerning SMEs and intermediaries was conducted and the research tasks turned to the reviewing of research of innovating SMEs in the low-tech sector of food. There were two main observations garnered from this review: 1) Innovation studies were mostly being drawn from high-tech sectors; 2) There was an overemphasis or stereotype of the food sector as a low-tech sector.

The empirical data from the Oresund region showed that there was an emerging sector positioned between the food and the life-science sector, defined as the "functional food sector" in this research. There are currently no universally accepted definitions of functional food; legislation also varies by country. Innovating in the functional food segment of the food industry can be challenging as will be shown in some of the empirical cases in Chapter 4.

3.2 Plan of Inquiry

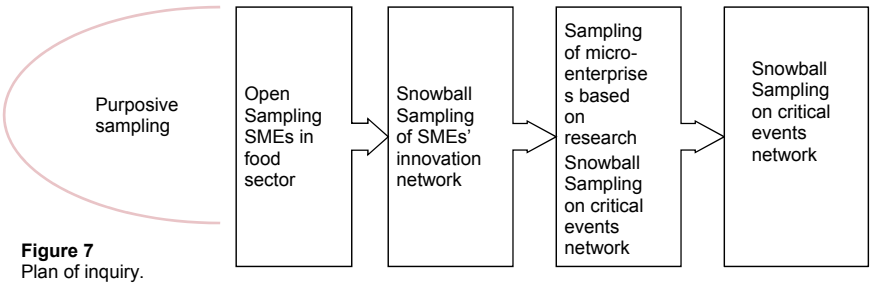

Figure 7
Plan of inquiry.

This section details the research design and the sampling process for the empirical data collected for this study. As shown in *Figure 7* the sampling shows how the cases were selected for this thesis. Case study was chosen as an approach for understanding the deeper structures of factors influencing the innovation journeys of microenterprises. It is also an appropriate method [as will also be substantiated by discussion on its fit within the four criteria proposed by (Siro et al., 2008)] mentioned earlier at the introduction of this chapter, evident in studies of processes that have documented the contexts and revealed the complexities in which processes occur as in real-life situations (Gibbert et al., 2008). In this study, preliminary data were first collected in 2011 by conducting structured interviews with SMEs in the Swedish food sector. This was followed by snowball sampling to trace each unique innovation network by identifying key actors, resources, or organizations that contributed to the innovative product/process. Through the preliminary data collection, a pre-understanding emerged of how small firms in the Swedish food sector attempted to address the barriers to innovation in their innovation journeys.

The analytical framework described in Chapter 2 demonstrated the inferences drawn from multiple theoretical reviews of past research. While the research had initially set out to explore how the roles of intermediaries in the food sector have impacted the innovation process of SMEs, it was observed that, for the food sector, many firms existed under the microenterprise category. Hence, the research goal was adjusted to narrow the focus to microenterprises in the food sector. The ambition to understand the barriers of innovation was extended beyond exploring the role of intermediaries to

understanding the mechanisms influencing microenterprises' innovation processes. With information from preliminary research and theories, the framework was constructed with the aim to fulfill internal validity to aid in identifying the patterns that may be observed in the subsequent data collection for the understanding of the innovation process of microenterprises. This included establishing a detailed understanding of how interactions play an important role to gain access to external resources that can help microenterprises overcome barriers to innovation.

3.2.1 Sampling criteria

This research contains, in part, empirical data gathered under the European Union Framework 7 (FP7) project "Enhancing the Innovativeness of Food SMEs Through the Management of Strategic Network Behaviour and Network Learning Performance" (acronym NetGrow).[11] Thirty interviews were conducted with food SMEs, microenterprises, and their network actors in Sweden in spring 2011, during the period from March to April either through face-to-face interviews lasting 1-2 hours or via telephone interviews with representatives from 28 organizations. This covered a total of 25 SMEs and microenterprises. As part of the purpose of the preliminary interview was to gain insight into how SMEs used informal networks for network learning, snowball sampling was conducted beginning first with the owners of the SMEs and contacts were provided where interviews were set-up. Semi-structured interview guides (Appendix E Interview Guide) were utilized to assist the interview process.

For story making, disconnected events and actions can be pieced together under a theme; this can be a useful way to manage interview materials collected from a snowball sampling method. This is because in the snowball sampling method engaged for this thesis, the main informants were asked to refer or recommend other actors that were connected to the critical event during the innovation process. The snowball sampling method has had its share of critics (Biernacki and Waldorf, 1981). These critiques have revolved around the selection, control, and verification of the sampling and the pace of follow-up

[11] NetGrow, a European FP7 project with duration of four years, started on the first of May 2010 and was aimed at enhancing the innovativeness of food SMEs through an improved management of network learning and strategic network behavior. More information can be found at www.netgrow.eu.

referrals. One of the limitations discussed and acknowledged for this thesis is that the number of actors covered by the sampling cannot be known in advance or it may be hidden, consciously or unconsciously, through the limits of actors that may lie outside their circle of networks. However, for this research, this worked as a "benefit," as the aim was to find related and known actors that had undergone one or a series of critical events together. The subject of bias can be discussed in terms of how close or how "coordinated" the accounts and viewpoints were of different actors involved in the same series of critical events. On the other hand, it is also useful to note if their interpretation of the events would be different, as that can also provide insight into how this combination of resources, activities, and actors played out in the reality that existed outside of this network of actors that they might not have been aware of. It can also be revealing about the level of trustworthiness of the accounts when actors who have had conflicts were willing to name their "opponents" for further interviews. This testifies not only to the reliability of the accounts, but acts as a form of triangulation necessary to address the criteria of construct validity for the rigor of the study (Gibbert et al., 2008). In the case of microenterprises, the sample may also be limited in the network's scope and reach. The boundary problem setting of each case is determined by the extent of the snowball sampling that started with the focal actor.

The background of the initial interviews conducted in this study had provided access to some potential candidates for further data collection work. New case study candidates were chosen through purposive sampling through a food intermediary contact for various reasons: First, an innovative product or process needs to be present in the microenterprise candidate for the study of innovation journey. Second, as the study was specifically within the food sector, it would be necessary to draw from microenterprises that were active and visible in this sector. Third, as the aim of the study was to provide unique insights into microenterprises' innovation journeys, priority was placed on obtaining in-depth qualitative data. From the selection of microenterprises' contacts garnered from the preliminary data collection, based on recommendations from the network intermediary and also web contacts, ten microenterprises were shortlisted.

These ten microenterprises were considered based on write-ups in innovation reports for the Swedish food sector and recommendations from food intermediary and key actors in the Skåne food sector. E-mail correspondences and phone interviews were first conducted to understand their fit based on the selection criteria. Five microenterprises were then selected. One firm was later taken out from consideration due to concerns on collection

of data by the owner during the period the interviews were conducted as snowball sampling entailed contacting the partners that the owner was not comfortable after the first preliminary interview. Two new microenterprises were identified along with two microenterprises that had been first contacted during the preliminary data collection. The four microenterprises included in this thesis are:

Case study	Innovating firm	Description of company
Managing the Sugar Spike (MSS)	InnovaFood AB	Research-based University Spin-off with a licensing model for the patents
The Honey Group (THG)	Concellae AB	Research-based University Spin-off on lactic acid bacteria of bees/honey-based patents
Baby Food Revolution (BFR)	Ottos Barnmat AB	Fresh baby food producer
The Cold O3 Treatment (CO3)	Pastair AB	Ozone pasteurisation company

3.2.2 Interviews and Data Collection

The second stage of interviews included other actors involved in the innovation journey. The main informant provided some contacts such as e-mail or mobile numbers during the interview or via follow-up interviews. Some other actors whom the main informant had interacted some time ago could only be provided by their names and/or organizations. Thus, these contacts were first checked with the main informant for confirmation before contact was made with them as part of the snowball sampling method employed in this research. This had some form of indication on the strength of the ties between these actors. Even though they may be perceived as important during the critical event, close contacts were not maintained. This could indicate that the necessities of certain actors/resources are considered during certain phases' of the innovation process. As this study maintains that the innovation process is not a linear process, phases of development of the innovation process can still be indicated.

After the contacts' particulars were obtained, interviews were requested when providing the background of the study. Each interview typically took between 30 to 90 minutes and was conducted in English, with some Swedish terms used during the conversation where necessary. This was viewed as essential not just to preserve the integrity of some uniqueness to the Swedish

expression but also to build rapport with these actors as they recollected the context around the events highlighted. The Swedish inputs from the interviewees were translated into English to be used in the text. These data were subsequently built into case studies to narrate the innovation journeys of the focal microenterprises. In addition, press releases, newspaper articles, and reports on funding from governmental agencies that were publicly available were searched and double-checked against information provided during the interview. This helped to provide those details that might not have been possible to recollect in whole during the interview. While these may present a dyadic view of interactions in the beginning, through cross comparisons of the four cases it may help to compensate any shortcomings as the four cases operate in proximity with each other (in terms of geography and industry), which can allow insight into the interconnectedness of the actors for the purpose of this research. For example, Halinen and Törnroos (2005) described four perspectives of networks that have been observed in the literature: actor-network, dyad-network, micronet-macronet, and intranet perspective. They suggested that the networks could be related to the business environment both at the vertical and horizontal levels. For example, connections through actors can lead to variance in geographic level, different levels in value chains, and also business settings. In this manner, the theme connects the actors and hence their stories together. As quoted from Czarniawska (2010):

> After some time, however, complete stories (of reform) begin to emerge, as the actors and the observers connect separate events and actions into a plot leading to a point. In doing so, they replace chronological time with kairotic time (that is time punctuated by meaningful events).

3.2.3 Composing the story of innovation processes

Figure 8 shows how the narratives were composed for each case. It starts first with the use of interviews and how it continued with process tracing to lead to interviews with actors in relation to the critical events. From these data, narratives are constructed and further interviews are conducted to help in the confirmation of information. Interviews as a research method have been described and debated in many methodological books and articles. Czarniawska (2010) described interview situations as "micro-site for the production of narratives, or just an opportunity to circulate them, where a researcher is allowed to partake of narratives previously produced." This

blending of the role of researchers during the interviews is "aimed at obtaining an historical description of a certain process." As such, the way the questions are formulated by the researcher can sway the form of output from an interview. This is not always the case when either party makes a conscious effort at producing any sort of narratives to just "stick to the facts."

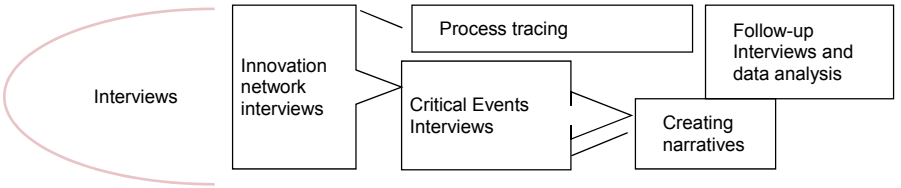

Figure 8
Composing the story of the innovation process.

According to Czarniawska (2010), there is a thin line between story making and story collection, and stories can be part of an organizing effort. The retrospective nature of the interviews collected from microenterprises in this thesis also attested to a form of sense-making (Czarniawska 2010). Sense-making, as pointed out by Pentland (1999) depends on the ability to think in "narrative terms," i.e., "to look back retrospectively, and ahead, prospectively, so as to construct an understanding of an event." The involvement of multiple actors and perspectives in processes also means that it inherits issues such as biases of views, based either on retrospective or predictive accounts of the processes by informants (Halinen et al., 2012), The limitation of relying on retrospective accounts of past events lies in the dependence on the sense-making ability and memory of the informant who recounted it. As the informant recounts past events, it is also difficult to control for the richness (or lack of) of the narratives (Halinen et al., 2012), as this can differ between individuals. In this study, "influence factors" (Halinen et al., 2013) is taken to refer to the underlying driving force or triggers that invoke a change or outcome. The respondents were asked during the interviews to describe their role in the innovation process (of a particular focal product/process) in as much detail as possible from (pre) conception to present day, with particular focus on reflecting on the critical events that had influenced the innovation process. This act of reflection is important in the consideration of both their roles (past and present) and how the event was perceived then and now.

For this thesis, external validity may be established through analytical generalization of the results. Analytical generalization is making a "reasoned

judgment about the extent to which the findings in one study may be used as a guide to what might occur in another situation" (Kvale, 1996). Halkier (2011) suggested viewing analytical generalizations as "producing context-bound typicalities" that provide representations of what is not always stable. For a good basis on analytical generalizations, Eisenhardt (1989) suggested that cross-case analysis should involve between four and ten case studies. Gibbert et al. (2008) remarked that while single or multiple case studies did not allow for statistical inferences, "this does not mean, however, that case studies are devoid of generalization." One of the criteria Dubois and Gadde (2002) proposed that can provide for a good analytical generalization was to have "logical coherence as a foundation…for quality in case research."

Based on the interviews conducted for the four cases, a process tracing (Bennett, 2010) exercise for within-case analysis was conducted. Process tracing is a tool used to draw "descriptive and diagnostic pieces of evidence—often understood as part of a temporal sequence of events or phenomena" (Collier, 2011). This also resulted in timeline construction (Appendix A-D) that aided in identification of the sequence of critical events in the innovation process of the microenterprises. This aided in the individual case analysis and was also used in helping to construct the narrative for each case.

3.2.3.1 Critical events identification

One aspect of construct validity this thesis has tried to fulfill is through the use of critical event identification to focus on the interactions that occurred during the microenterprises' innovation processes that had an impact on the dynamic capabilities manifested in dealing with the barriers that arose in these events. The eNPA (Events-Based Network Process Analysis) (Halinen et al., 2013) is considered as a tool when identifying the critical events in the four case studies. There are three components to this tool:

1. The research steering wheel to identify relevant events in the process through retrospective and real-time analysis,
2. The analytical scheme that examines the influencing factors that trigger critical events and results in change, and
3. The event trajectory that links the past with the present and future events through outlining logical connections (Halinen et al., 2013).

All these are aimed toward the identification of relevant events to explore the deeper structure or factors that trigger critical events and change, so as to

connect events in a logical manner. Critical events may be analyzed from different levels, such as company level or dyad level, and can refer to certain phases of an innovation process. All this can aid in pinpointing the mechanisms that may be a trigger or a signal of change, connecting events to the development along the innovation process. By adopting the critical events approach, it also takes into consideration those microenterprises that are still continuing their innovation journeys at the point of this thesis's inquiry.

Halinen et al. (2013) claimed that this tool was applicable to the study of multi-actor and multi-level networks using events as a unit of analysis. It is versatile in that it allows the possibility of multiple events simultaneously influencing a particular process. The relevance to this study is that the event trajectory component is used to:

> Select the most significant events in the context, at different levels and in various parts of the related network or the business environment. The interest is not in precisely relating to when something happened during the innovation process of the microenterprise but in revealing what else potentially happened before, after or at the same time, in order to track how events came into existence and developed, forming the process under study. (Halinen et al. (2013).

This interest to reveal what had happened before, after, or at the same time aligns with understanding the interaction between each substance layer as explained in the analytical framework. The next section continues with the construction of the narratives for each microenterprise's innovation process. Through the various rounds of interviews, story for each innovation process is pieced together.

3.2.3.2 Creating narratives

Through translating and contrasting the different (or similar) views of the focal actors' accounts, a deeper understanding of the innovation process of microenterprises was created. The various rounds of observation made in these case studies provided opportunities at discrete points of the data collection process to study different aspects of the phenomenon. This is applicable to the study of the innovation process for microenterprises, as innovation activities can juxtapose in a discontinuous manner. In this instance, since the sampling was done purposefully, adopting this understanding allows the awareness of retrospective recounting during the interview process to be present. In

addition, in the context of tracing the accounts around the critical events (as elaborated in section 3.2.3.1), being acquainted with these concepts of sense making can assist in the construction of narratives for each innovation process case.

This study recognizes that processes are influenced by many different factors, most of which are related to the nested nature of relationships in networks. The inter-relatedness and simultaneously evolving nature of relationships in networks can posed a challenge when it comes to deciding what to analyze. There can also be difficulty in distinguishing what episode in a process should be included, as the significance of the episode is dependent on the perspective taken. Accounts describing the process may be biased due to the interpretation, goals, interests or even different conclusions that can be made on the same event by different persons. Another issue when studying process is the treatment of an appropriate period for the unit of analysis. For example, to understand the behavior in a current event, one would need to know the history of the relationships of the actors/resources/activities involved. In addition, this would preferably be done over several events for robustness, not just a single one. This would greatly increase the complexity and analysis (Smith and Laage-Hellman, 1992). The approach adapted for capturing the flow of episodes of the innovation process is based on the method of process tracing, which "involves the examination of 'diagnostic' pieces of evidence within a case that contribute to supporting or overturning alternative explanatory hypotheses" (Bennett, 2010). In this case, following the red thread of critical events helped to trace and narrow the sequences and mechanisms in the unfolding of each for each innovation process case. This allowed for observable implications of the interactions that occurred, linked to the critical events examined at different levels of analysis for understanding the fit to explanations predicted by theories (Bennett, 2010). This method also had the benefit of ensuring equifinality was taken into account for the outcome and to test and develop theories as the numerous observations were considered, which were provided interdependently by the various actors in the network.

The composition of the narratives or stories for these innovation processes, following the red thread of critical events in each case, brought together the accounts provided by actors and secondary data from news and/or web archives. Documents and news archives formed an important part of plotting these events. This aimed to address the shortcoming of retrospective accounts collected during the interviews, which while versatile in that they allow interviewees to draw from their memories, can be affected by lapse in memory. The cases are presented using a narrative approach. This approach has been

found to be particularly appropriate when relating the chain of critical events that had transpired along the microenterprises' innovation journey. As Bizzi and Langley (2012) pointed out, "to offer a valuable contribution, pure contribution is not enough. A good study needs to have some kind of underlying theoretical plot." Similarly, Czarniawska (2010) referred to a narrative having a description of characters and a plot because "narratives based on sheer chronology are of little use for further interpretation." According to her, characters may not always be human and plots are complicated and contain events and actions, but they help to make sense of an account, turning it into a story. "Narratives mix together humans with non-humans, causes with reasons, explanations with interpretations. This makes them difficult but also interesting to interpret" (Czarniawska, 2010). While each microenterprise innovation process case may not have involved a large number of actors, their stories and their perspectives on the critical events form a plot that helps to make sense of the innovation process and the barriers while innovating in a mature sector such as the food industry.

Narratives can be used in various scenarios within social science, but mainly as an extension from the field of practice to the field of theory. For instance, one use would be to provoke story telling such as through interviews and assembling stories from the field of practice, analyzing the stories, and either write them in the form of a mimesis (representation) or emplotment (theory construction) (Czarniawska (2010). Narratives are considered to be suited for the development of process theories and explanations as they already include descriptions of the sequence of events. For this thesis, the narratives have been arranged in a way that contextualizes the innovation process of the four microenterprises to present "interesting (novel), credible and respectful" (Czarniawska, 2010) first-hand accounts of each innovation process, along with secondary documentation. The interpretations in this chapter attempt to "combine the explication with explanation, through asking the question, 'what does this text say? And how come?'" (Czarniawska, 2010).

The use of narratives in organization studies, for instance, as observed, has suggested that because researchers are interested in the underlying process of the pattern of events, narratives help to provide indicators for the process theory. Pentland (1999) described that stories "are like ruts in the road that people follow and thereby recreate." For process research, this is beneficial in that it allows a close approach to the phenomenon studied; access to this deeper structure can help explain what is observed at the surface (i.e., the text or discourse). Narratives follow and describe a sequence of events, but also provide details such as the context, the focal actors, the frame of reference, etc.

As such, narratives can contribute to analytical generalizations by understanding how actors make sense of their situations in narrative terms and also act purposefully to fulfill them according to their own expectations and values (Czarniawska-Joerges, 1997) in different contexts. These actors or characters referred to by Pentland (1999) are important in this deep structure because they connect the events together and provide continuity to the story. The characters sometimes perform more than one role or more than one actor performs the process, and how this relevance is built into the narrative can help the understanding of their role in the structure and networks in which the process is embedded. The availability or portrayal of multiple voices and points of view on the same story can also emerge in this process of forming the narratives and guiding the analysis. How does each actor perceive the event differently and view their engagement level, for instance? Can these differences or similarities be traced to the goals and values of these actors?

Narratives can also employ the use of dramaturgy for the purpose of learning points and extend the applicability of analytical generalization. Dramaturgy can be described as a "business dancing metaphor" when it includes elements of the ARA model as processes and orientates the research to view how actors create their realities or fiction. These can be seen when an actor frames a certain critical event to support the future vision of how the innovation process will turn out (Lowe et al., 2012). The narratives constructed in the following chapter have as a principal adhered to the spirit of how the account was provided by each actor interviewed, though this vision has at times been balanced with current contextual frames that may have persuaded the intended audience to participate or accept the presented version of the story. This thesis continues in the next chapter by detailing four microenterprises that have been innovating within the food sector areas of formulated foods and food manufacturing, fresh foods and distribution, and food qualities (including nutrition and safety).

4 Case Studies

> A story is a frame—a frame that emerges and is tried out, a frame that is developed and elaborated, or a frame that can easily absorb the new event.
>
> Czarniawska (2010)

These four microenterprises have a common theme: They have encountered events that have affected their innovation process. These events vary from experiencing a failure to achieving success—some events were expected, most events were not. They are all, however, interesting and meaningful according to the individual interpretations of the different actors who have tried to make sense of these critical events during the innovation process. These four cases were described by one of the interviewees who worked with innovating microenterprises as quite "tech heavy, research heavy, long time to market…typically research-based, not getting out of the starting blocks kind of companies."

Pentland (1999) instead suggested that paying "explicit attention to the evaluative dimensions of narrative data allows us to examine the ways in which culture guides action, among other things." He adopted a structuralist perspective and maintained this stance in a bid to recommend practical actions. Analyzing the context of these dimensions can also be used to show the underlying assumptions that could have influenced the seemingly rational actions as they act to provide legitimacy and accountability for their actions. *Figure 9* shows how the levels of structure in narratives are perceived and offered an understanding based on the generating mechanisms that produce the fabula, which is defined as "a specific set of events, actors and their relationships (e.g. who does what, in what sequence etc.)" (Pentland, 1999).

The story level allows the focalization of the fabula, which is represented as narrative in this thesis. The text level would then refer to the interview data collected. *Figure 9* thus represents how the analysis was conducted for this thesis starting from top-down from the collection of the text and the analysis of

the fabula or critical events. This chapter zooms out from the individual analysis of the microenterprises to explore, on a macro level, the types of mechanisms at play during the innovation process of these microenterprises in the food sector. This was aimed at being an exploration of the deeper structures or factors that affect the innovation process of microenterprises. The use of the critical event approach involves the attempt to address the discontinuities in the innovation process observed by knitting these narratives together to provide a higher probability of gaining insights.

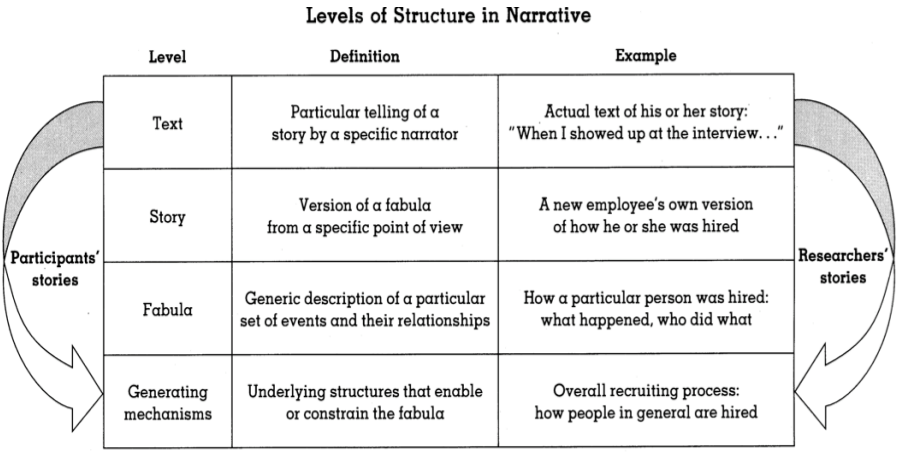

Figure 9
Levels of structure in narrative (Pentland, 1999).

The interviews were conducted between 2011 and 2015 and were aimed at capturing the nuances of the innovation process of these microenterprises. Through the identification of critical events, the focal network(s) essential for the innovation process of each enterprise has been mapped out.

Table 2 shows a summary of the four cases based on the case description parameters used by Sarkar and Costa (2008). In their study on the use of open innovation business models in the food industry, Sarkar and Costa (2008) pointed out that open innovation strategies of various forms were being used, even though the food industry is known as a "relatively more traditional and mature industry." Nonetheless, there remain the challenges of having to coordinate amongst different actors interacting across various sectors when innovating in the food industry. This thesis adapted the table Sarkar and Costa (2008) used in their study to summarize the main characteristics of the open innovation strategies employed in the food industry. This thus presents an overview of the nature of the cases, setting the stage for the narratives of each innovation case.

The storyline for each narrative of the innovation process has the following elements: an abstract that provides a summary of the case and an initial focal network diagram identifying the actors related to the critical events. The contextual background of the innovation process case follows this. The eNPA approach is used to identify the critical event(s) and each case is concluded with an analysis where a network diagram of the case showing the interaction elements is presented.

This chapter is supplemented by event timeline maps (Appendix A-D) that were drafted based on the collection of interviews from various focal actors detailing the types of interaction in relation to the critical events that have occurred during the innovation process. The critical events are identified in these timeline maps, which show the linked actors, activities, or resources. This included key actors named during snowball sampling from the first round of innovation process interviews and also from when the focus was placed on understanding critical events in subsequent rounds of interviews. These multiple sources from the different focal actors in the network acted as a form of triangulation concerning the critical events. These events were subsequently verified and updated again with the owners of the microenterprises and related actors along the innovation journey of the focal SMEs during follow-up interviews and correspondences.

Table 2
Case Summaries (framework adapted from Sarkar and Costa (2008))

Section	4.1	4.2	4.3	4.4
Case study	Managing the Sugar Spike (MSS)	The Honey Group (THG)	Baby Food Revolution (BFR)	The Cold O3Treatment (CO3)
Innovating firm	InnovaFood AB	Concellae AB	Ottos Barnmat AB	Pastair AB
External partner(s)	DoubleGood AB ALMI AFC	Skåne Food Innovation (SFIN) Packarna Bidrottningen AB Lustgårdens Biodling AB	Aventure AB Potato Specialist AB Skåne Food Innovation Network (SFIN) Customers	Various research institutes SIK, Lund University) Various funding sources Malmö Högskola
Type of relationship	Co-inventor and Customer Collaborators	Dyad at non-arm length	Vertically integrated dyad Dyad at non-arm length	Collaborators Dyad at non-arm length
Type of innovation	Product	Product	Product	Process
Stage of innovation process at critical event juncture	Initial Development	Product and process development, commercialization	Product development Business strategy	Process development
Business Strategy	Licensing	Licensing Crowd Sourcing	Redefining traditional retail market Creation of value network	Technology outsourcing
Supporting technology	Biotechnology	Microbiology	Cold chain management for ensuring freshness of product	Cold pasteurizing techniques
End product	New functional drink for regulating blood glucose during mealtime	Recovery products humans and animals	Fresh organic baby gruel and smoothies	Cold pasteurizing machines using ozone
Newness to market	Radical	Radical	Incremental	Radical
Organization/List of Respondents	1. InnovaFood - Elin Östman 2. AFC - Inger Björk 3. Aventure AB- Rikard Öste 4. InnovFood -Ulf Östman 5. DoubleGood - Jörgen Holm 6. LUIS 7. ALMI – Johan Bloem 8. DoubleGood – Par Lundqvist	1. Concellae – Tobias 2. Concellae – Alejandra 3. Bidrottning – Victoria 4. Lustgården – Christer Leder 5. Packarna – Morten Aarstad 6. Connect – Kent Lörd 7. Lund University – Per Eriksson 8. Rolf Bjerndell 9. LUIS	1. Ottos Baby Food – Mats Lönne 2. Potatospecialisten - Par Lundqvist 3. Potatospecialisten – Lennart Alftrén 4. Ottos Baby Food – Rolf Bjerndell 5- Aventure AB – Björn Öste 6. SFIN – Magnus Lagnevik 7. Coop Lomma 8. Aventure AB- Rikard Öste	1. Pastair – Johan Sjöholm 2. SFIN – Rolf Bjerndell 3. Lund University - Patrick Adlercreutz 4. Copenhagen University - Ylva Ardö 5. Skånemejerier – Kenneth Andersson 6. Aventure AB- Rikard Öste 7. Malmö Högskola –Lennart Ljunggren

4.1 Managing Sugar Spikes (MSS)

4.1.1 Abstract

This case describes the process of commercializing the innovation of the use of amino-acid mixture to regulate blood glucose or the glycaemic index. The innovation journey of this research-based microenterprise in managing their first patent may be a description familiar to those acquainted with university spin-off literature. Nonetheless, as the process of patent application for this innovation is followed through the identification of the sequence of events, the micro-perspective of the considerations of a microenterprise can be observed. The interactions and deliberations undertaken when dealing with the roadblocks encountered with their first patent filing for their invention and subsequently with the bid to secure funding to further expand their customer base lends insights into the complexity a small firm undergoes. The recognition of the network connections that enabled the innovation process to evolve for this microenterprise shows the effective utilization of their scientific collaborations to build new connections for required and potential resources from their existing network. This story highlights the difficulties in accessing resources beyond the comfort of their scientific domain, especially when it related to the commercialization of their innovation. This case also enlightens certain assumptions of university spin-offs having the advantage of proximity to accessible resources for innovation, which had projected the image of minimum barriers and of an ideal triple-helix setup envisioned by policy makers. *Figure 10* shows the focal network identified through the critical events for this case.

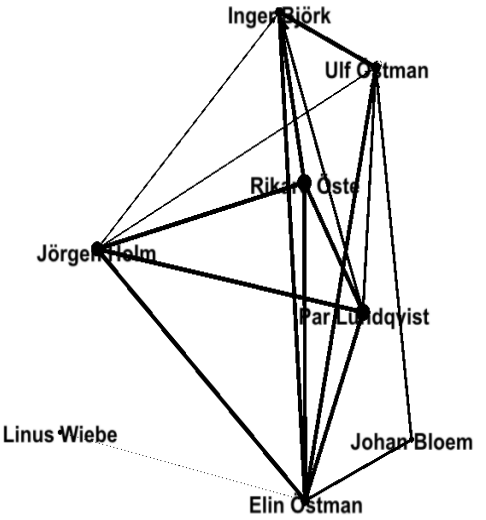

Figure 10
Focal Network of MSS

4.1.2 Background

Diabetes affects approximately 4% of Swedes, with 90% of the cases classified as Type 2 diabetes according to the Swedish National Diabetes Register Annual Report (Götaland, 2013). There has been a rise in those affected by diabetes; its implications can influence the quality of life for the patients, as it can lead to other health complications and increased health costs. Various centers throughout Sweden have been set up to research diabetes. The Anti-Diabetic Centre (AFC) under the Functional Food Science Centre (renamed Food for Health Science Centre in December 2014 after merging with two research groups from former Applied Nutrition and Food Chemistry) at Lund University in the south of Sweden is one example. Two researchers associated with the AFC founded the microenterprise InnovaFood AB.
The Functional Food Science Centre (FFSC) represents a multi-faculty organization under the vice chancellor of Lund University. FFSC acts as a

platform organization across faculties and its network includes 70 senior researchers from 40 departments across six faculties at Lund University. It focuses on interdisciplinary research within the area of food design for added health value. The idea is to link competencies across faculties that can be applied to food science with nutrition and medical oriented views. Its activities include the postgraduate research programs FUNCFOOD (PhD), FUNCFOOD II (Post-Doc), and the Anti-Diabetic Food Centre (AFC). Under FUNCFOOD, one supervisor from both the medical and technical faculties supervised a PhD student during the period of 2003-2009. Some of these PhDs continued with their research under the FUNCFOOD II program for the period of 2011-2014, which offered five post-doc positions. The Functional Food Science Centre obtained further funding from Vinnova, Sweden's Innovation Agency, and launched the AFC in 2007. The AFC is a joint venture between Lund University, Region Skåne, and industry partners. The aim of the AFC is to collaborate with the industry to jointly research innovative food concepts to prevent diabetes and to commercialize these concepts.

The two researchers in this innovation process were Inger Björk and Elin Östman. Professor Inger Björck is the managing director of the Centre. She is a professor in Food Related Nutrition and has great research experience in the field of design of foods with nutritional health benefits (Food for Health Science Centre, 2015). Elin Östman is an associate professor at Lund University and project leader at the AFC. Östman has been involved in research on glycaemic regulation since 1998. With a previous focus on the bioavailability of starch and its effects on postprandial blood glucose and hormonal responses, Östman's research has broadened to include how proteins and amino acids influence glucose and insulin responses. In addition, Östman has shown an increasing focus on the relation between postprandial glucose profile and appetite regulation. Both have collaborated on development of food concepts for facilitation of glycaemic control since the late 1990s.

In 1999, Björck and Östman found that dairy products in general resulted in low blood sugar responses and disproportionately high insulin response in healthy volunteers (Östman et al., 2001). The lactose component in milk did not show this inconsistency and in a follow-up study of various milk fractions, they concluded that the whey proteins in milk had strong insulinotropic effects. In the same study, they investigated which single amino acids increased in blood after a meal and identified them as leucine, isoleucine, valine, threonine, and lysine. The next step was to mix only these five amino acids in a beverage: The mixture was found to have the expected insulin-stimulating

effect in healthy subjects. This was beneficial for people having problems regulating their blood sugar level, but also for the general population that cares about future health. The amino acid mixture can be added to both solid and liquid foods. Inger Björck and Elin Östman, the two founders of InnovaFood AB believed that the uniqueness of their invention could carve out a new application area for specific food proteins and amino acids. The insulin-stimulating effect of their amino acid blend was synonymous with that which is commonly pursued with the use of sulfonylurea derivatives, a class of anti-diabetic drugs that are used in the management of Type 2 diabetes.

4.1.3 The Patent Story

The patent by Elin Östman and Inger Björk relating to the use of proteins and amino acids for improved glucose regulation was published under the international publication number WO 2007/084059 A1. The patent describes specific amino acids and the ratios of those acids by which insulin secretion is enhanced in individuals with a lowered ability to secrete insulin. This provided a new gateway for the treatment of Type 2 diabetes. As a potential tool for the preventive aspects of diabetes, this is in line with the development of specific foods based on the low glycaemic index concept. The existing patent is described as a "food additive" that can be added to all types of food, including addition to different protein bases, with the target groups being primarily persons with impaired glucose tolerance, metabolic syndrome, and type 2 diabetes. Their patented recipe of proteins and amino acids can be added to virtually all types of products, such as drinks, soups, powder-based foods, "bars," and composite meals.

> Which we now know there were things *(regarding the patent)* we should have been more careful at that time but we couldn't see them at the time because we didn't know. But now we, there were things happening that could have been dealt with in a better way, in the future.
>
> *Elin Östman, personal communication, December 2013*

With the invention, the two founders took steps to patent it during the period of 2006-2010. Swedish law exemption—*lärarundantaget*, or professor's privilege—meant that researchers and academics working for Swedish universities automatically own the right to inventions and copyright works that they produce. They first sought assistance from the university where they

worked. Östman shared that the process with filing the first patent by approaching the university for assistance was not always clear; the experience was not a totally smooth one. At that time of application in 2006, the innovation support from the university was assigned among various partners to help researchers who were interested to commercialize their findings. There were various stages to the filing and ownership of patents. The ownership of the patents was first maintained by the university for two years while the researchers retained the right to continue their research around the patent.

For Östman and Björk, they were interested in licensing their patents, and Forskarpatent I Syd AB, which was contracted by the university, helped them in filing and maintaining the patent for two years at that time. This was their first patent and they were unfamiliar with the procedures. They encountered various roadblocks along the way. They relied on the advice provided by the patent office in the beginning, but the patent application process did not progress as they had hoped. Each time they tried to speak with someone at the patent and innovation offices, there was always someone new, which meant that they had to reiterate what was communicated before. There was also a misalignment in the expectations between the two researchers and the patent office. There was an expectation from the patent office that they themselves should perform market research on their invention. As the researchers did not possess the competence, they had expected that assistance would be provided by the patent officer. At one point the patent officers did not fully understand what their innovation was about, as they wanted to take their findings and show it to a competitor. The evaluation of their invention was also not encouraging from the patent officers; contrary to what the researchers believed, the patent officer did not think the patent could lead to something.

This stage of maintaining their first patent lasted for two years before there were changes in the organization of patents filing and ownership at the university. The patent, which had originated from Östman and Björk, had belonged to the university during this first two-year period. To continue maintaining the patent meant further investments; however, both the university and Forskarpatent I Syd AB were not prepared to retain the patent in their portfolio. This implied that the patent would no longer be valid if it was not "owned" by anyone. These circumstances prompted Östman and Björk to "buy back" their own patent and set up InnovaFood AB in 2010 to house it. They now each own an equal percentage in the company.

The fact that InnovaFood have had a commercial partner (DoubleGood AB bought the licensing rights from InnovaFood AB to be used in table water products—natural mineral water or spring water that contains one or more

supplements) aided them when they were seeking further funding, for example from ALMI, a state-owned company that provides financing and counseling to businesses in Sweden. InnovaFood AB and DoubleGood subsequently collaborated on another follow-up patent with Rikard Öste as a coinventor.[12] Öste is the founder of Aventure AB (a research company in the field of food, nutrition, and biotechnology). As part of the licensing agreement, InnovaFood AB have also assisted DoubleGood to file the application on the health claim from EFSA in the functional drink product.

Jörgen Holm, then CEO of DoubleGood AB, was working with InnovaFood AB for about a year (he moved to head another Aventure AB subsidiary, Gluconova, in 2014). He shared that there was an interdependence of relationships between InnovaFood AB and Double Good. Öste, Östman, and Björk have been within the same network at the Chemical Centre at Lund University. The idea for the venture was to develop new ideas and to create new intellectual properties. With InnovaFood AB, although the patent was not developed at Aventure AB, Öste regarded it as a good idea. The initial idea was to incorporate the innovation into beer and it subsequently evolved to be some kind of functional drink. The subsequent idea was to apply it to table water, the most common drink with a meal. This product is seen as having a good market potential as it can be used as an ingredient in a drink that can control blood sugar level when consumed together with a meal. InnovaFood AB is not the right company to commercialize it, because they do not have the experience of Aventure AB. That was when the discussion began and Aventure AB bought the right to license the use of the patent in 2011. InnovaFood already had the first patent, which is licensed to Aventure AB. Together with Öste as the coinventor for the improved second patent, DoubleGood AB has used it as the basis for the product's health claim. Within the agreement, InnovaFood AB has assisted DoubleGood AB in the EFSA (European Food Safety Authority) application to market the product. There is thus very close collaboration between the two companies. They have also been conducting clinical studies at AFC.

Holm regarded the relationship between InnovaFood AB and Aventure AB not as a customer-supplier relationship, but more of a partnership. This is a closer form of collaboration, as each one of the people that participate from both companies experiences the same process but in different roles within the

[12] Publication No. WO/2012/177215 filed June 2012, issued June 2014. Title of the invention: "IMPROVED FOOD COMPOSITION."
https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2012177215)

network. For example, Öste acted as the scientific leader within DoubleGood but he was also assistant professor at the university. Östman and Björk are founders of InnovaFood but they also held roles in the department and AFC. So there are parallel roles held by each person. They walk between these different roles and it can be difficult to draw a line, especially for small companies like Aventure AB and InnovaFood AB. To someone from the outside looking at the organization structure, it seems that it is unclear and that each person has three or four different "homes." Holm compared this structure to that of a large company that is very structured and hierarchical but that might find it difficult to achieve what InnovaFood AB and Aventure AB have done.

> If I go to my former company, which is quite large, about 300,000 employees, this is very hierarchical, this is the guy who decides this and that in that department, it is a huge company. Those things we (InnovaFood AB and Aventure AB) are doing now, would be extremely difficult for a big company to achieve that. It's much more facilitated to work in an entrepreneurial, innovative and creative way and faster way in a small dynamic entity like this network. It's because it not just one or two companies but a network of people in different roles and they interact together and that creates a momentum. And that momentum, that facilitation you cannot find in a big company because you have a lot of roles and hierarchies that hinders the development of those ideas.
>
> *Jorgen Hölm, personal communication, March 2014*

From the perspective of the customer-supplier relationship, there is a dependency from both parties. InnovaFood AB, for instance, depends on certain cash flows to keep and protect the patent, and to enter into different countries and markets with the patent. DoubleGood AB has an agreement to provide funding to InnovaFood AB once certain milestones are reached. They go beyond being just customers because they also collaborate on developing something together. Although it is a partnership, which depends on quite a large amount of informal relationships, it is also governed by a contract (the licensing agreement), which will cause upset in the relationship if it is not adhered to. All are important, especially in a small (4-5 member) network, as in a family. As a small company, there is a need to interact all the time to meet the needs of resources required.

DoubleGood AB have received acknowledgement from EFSA about the application and they are pending the decision. After DoubleGood AB gets the

approval from EFSA and gets a good cash flow from the launch of the product, they will consider reinvesting in InnovaFood to further strengthen the patent and concept. They foresee that they will be deeply involved in any new research in that area with InnovaFood. The joint application is a strong joint effort to make this EFSA (another milestone) happen.

Elin's father, Ulf Östman, took over the business side of the company when it was setup in 2010. Ulf had experience working in both large and small companies. He has previously had a few companies of his own providing service management and has also worked for a large company before. He expressed concern when Östman and Björk started InnovaFood and wanted to help them to be independent scientists. When they first filed the patent in 2006, Ulf was not involved yet. He has been quite cautious when it comes to funding and ownership of the company and has been quite adamant that no investor owns something in the company, so they remained independent and Östman and Björk are the ones who own the company.

Ulf expressed his cautiousness when negotiating with big companies because there is some need to protect their own knowledge, but there is always a form of risk that is taken when trying to reach a deal or agreement with customers. For small companies, there are some disadvantages. For example, there are no insurances to help them if there is any disagreement about patent rights, while larger companies may be able to afford legal actions. Expenses such as travel costs need to be taken into consideration when they are in discussion with potential customers' inquiries. Ulf felt that even small companies need to set the stage for potential collaboration, instead of just adopting a seller's perspective and absorbing the traveling cost during the negotiation process.

Ulf negotiated and discussed with ALMI, together with Elin, to get some funding and loans in 2010. They obtained the money from ALMI and they got positive feedback from ALMI that they did a good job (in securing the customer). ALMI provided funding without a demand for an equity stake in the company. It was important that they had a free hand in research without worrying about business equity. There were some difficulties when they needed help with legal matters, as it involved quite a large sum of money, but with ALMI's funding, they were able to move ahead in that area. Ulf sees having a proper fundamental licensing agreement to be very important. The most important stage was when they got the first licensing agreement because they got an injection of funds. While they started in 2010, they only started getting royalties in 2014. The agreement gave them the financial resources that they needed during these years. This also becomes a testimony for the basis for

further talks with other partners. Ulf mentioned they met with Rolf Bjerndall and Mats Lönne around 2011 when they were exploring opportunities, but they have recently also obtained a patent for use in children's food. Ulf felt that the lawyer played an important part, as it was important to protect the patent. He emphasized that it was important that they were "free" from demands from investors and that the researchers would be able to concentrate on what they do best.

4.1.4 Gaining independence and maintaining interdependence

The tension between independence and interdependence is one frequently experienced by microenterprises. AFC, which was a project group set up in 2007, has played an important role in the innovation journey of InnovaFood AB. As a common platform where both Östman and Björk have worked, the AFC's activities and projects have helped expand InnovaFood AB's network and connect them to industrial partners. There are three main types of research that can be conducted at AFC. The first type is called the "Centre's projects," where the partners and researchers involved can collectively own the results. The second type applies to existing ideas that researchers can share with others, including industrial partners, without giving up any rights. The first opportunity is offered to industrial partners when the idea or findings becomes feasible. The third type is when researchers collaborate with the industrial partners to do confidential research on their products, with the industrial partners paying 60% of the course and AFC subsidizing the rest. Functional Food Centre changed their name to Food for Health Science in the beginning of 2015 to better reflect their goal of producing preventive solutions for health. This also reflects their goals for multidisciplinary aspects of nutrition and detaches themselves from the technical aspects.

This third kind of research arrangement was what made it possible for InnovaFood AB to collaborate with DoubleGood AB. Rikard Öste was supervising a PhD student under FUNCFOOD in 2004 when he and Björk got in touch again (they were formerly PhD colleagues). Öste is one of the original inventors of the oat milk Oatly (see also www.oatly.com), and founder as well as major owner of the company Ceba AB (1994) and its daughter companies Oatly AB and the research company Aventure AB. He has over 25 years of experience in senior research and development in both academic and commercial contexts. His work focuses on both basic and applied food chemistry and nutrition. Öste has been quite active in AFC; they have some

projects together where they look at further development of other products. Aventure AB expressed an interest in licensing the rights of the patent by Östman and Björk. This enabled them to have the confidence to register the company to take over the patent and maintain it themselves. During the initial setup, they also received some assistance from Öste and they subsequently collaborated to file a follow-up patent with him as a co-inventor.

> It is not just one or two companies but it's a network of people being in different roles and they interact together, and that created the momentum. And that momentum is very difficult to find in a big company because there is a lot of walls and bureaucracy that hinders the development of these ideas. That is why bigger companies are looking at small companies in terms of open innovation. Here (in the smaller company), everyone feels the ownership but the weakness is in terms of financing.
>
> *Jörgen Holm (then-CEO, DoubleGood AB), personal communication 2014*

The AFC project was a strategy from Björk to attract researchers to the project. AFC was not formed yet when they filed the first patent, but it was during the FuncFood period when they got more aware of the idea of innovation and patents. AFC provided them with the opportunity to further develop their research. AFC was designed to be attractive to researchers and to be able to work with an idea that they already had that was relevant within the scope of AFC or even patented with funding to support that. InnovaFood took this opportunity and it was there that they worked on the second patent with Öste as co-inventor. The AFC project had helped with them taking ideas that had been accumulating for years to develop new understandings so it could be "renewed" again. For example, the recent patent was in discussion at the same time with the patent with DoubleGood when they were in working with Forskarepatent I Syd around 2006, but it had not come to fulfillment until now when they could make a new study. They had talked even with Mats Lönne from Ottos Baby Food about it as it relates to baby food. AFC allowed them the exposure of their ideas to companies, which was in line with what Vinnova had expected. However, the partners who were involved in AFC could be still quite reluctant to take on new projects, though that has allowed them to pursue opportunities outside of the AFC network.

The very first patent that they had done with a PhD student and aided by Lund University for the first few years. The latest one in 2013 they did by themselves for the first stage of application with some help from a family friend who is a patent officer as a way to maintain low costs at that initial stage.

Östman commented that as a research finding is normally finalized at the end of a PhD, the finding needs to be filed as a patent quickly before the publication of the thesis or the patent would not meet filing requirements. This is a problem they have reflected on, but found it hard to overcome due to existing regulations. In the first 12 months after filing the patent, they have the opportunity to add in new data to the application. However, they are often not able to use that 12-month period as they are often lacking in resources to add in more data. This is something that Östman referred to as a system requirement that is not so conducive to the innovation environment when it comes to the filing of patents and patent requirements. This also made Östman more aware of the requirements of resources during the innovation process.

> We have learnt what is the format of a patent text, what to include etc. We needed to discuss with someone with the language, which was something we are not used to. But I did the uploading and it was also a much smaller cost. And we know when it comes to the next phase, you have to use a patent firm because there was too much paper work to do on your own. What I have learnt and reflected upon, which is a problem for us is when we make a finding, it is often at the end of someone's PhD work. So they are not supposed to continue and we need to file the patent very quickly before they go public with the thesis. That we know, and have known all the time. The problem is then when you have filed the patent, you have 12 months to put more information into the patent application and those 12 months run very quickly because normally it is in a project that is about to finish. We don't have any staff to put time for this crucial 12 months and time goes and then it's the end of the 12 months and there is no new data to add. You don't make use of those valuable time and possibility to insert or fine tune. That is something for the system, I think, to take into consideration. That's when you need where we need resources really, if we can get some kind of innovation scholarship for part-time during that period to really try to do your best of this patent that was filed. And later on see to evaluate if it was worth investing more in it. Once you go for a patent you should really give that 12 months and I think it would help when the decision is going to be made for the commercialization.
>
> *Elin Östman, personal communication, 2015*

With regard to the patent they were working on with Öste, it was something they already knew the outcome of, it was an ongoing project, and they had dedicated resources to it. They did not have ambition to be entrepreneurs, choosing instead to be a licensing company for the patents they own. They

want to stay in research and protect their findings, and to assist those who want to bring their findings further into the commercial market. The amount of ongoing research after the patent is licensed out depends on the type of markets that the patent is meant to be used when entering the market to determine the extent of their involvement and what roles they take on. For example, if the product to be developed using the patent involves more on health parameters, then they would be more involved in the quality certification aspects of it. They now have a new patent, which were findings that had been accumulated over quite a few years, and are currently in talks with one global distributor and another that has indicated interest in producing it. They are waiting for more confirmation before setting up a daughter company to house the new patent. Östman realizes that they have to be more involved into the business aspects to enable the patent to go into the commercial aspects with the partners.

From the perspective of the financing party, ALMI commented that InnovaFood were one of the few companies that exhibited business sense and managed to proceed with their product development through ongoing conversations with a confirmed customer. ALMI provides innovation counselors who meet companies or people intending to start companies with innovative ideas from all types of sectors within Sweden. With InnovaFood, they met up with Ulf and Elin, together with another colleague within ALMI who worked with financial notes in 2010. Ulf was curious about ALMI and had called ALMI up to understand the type of help they can obtain. They concluded that InnovaFood offered an innovation. Certain types of grants can only be used for external costs, such as the lawyer for licensing agreement in the case of InnovaFood. ALMI had a good impression of them when they first met, as InnovaFood AB have a solid background in science through Elin and business management skills that Ulf offers with his different backgrounds and perspective. In many cases, research-based microenterprises exhibit strengths only on the technological aspects of the business, not in their business skills. However, for THG the research strength was complemented by Ulf's experience and involvement.

ALMI kept in contact with Elin in terms of updates or new questions. In 2012, they got grants for applying for patent applications. There are no stipulated points of control that ALMI requires from the companies who receive the grants, but more natural ones, for example, receiving the invoice for patent application to be paid by ALMI. There is a certain level of openness and flexibility (i.e., no demands) when it comes to receiving affirmation from companies that they are progressing. However, the innovation loans ALMI provides are usually divided up into two or three stages that allow the release of

funds according to certain goals toward commercialization, for example getting a customer on board like a letter of intent, etc. Once this milestone is reached, the beneficiary microenterprise will get the next sum of money after that. Every end of the innovation loan aims at commercialization as the end destination. They do not perform operations but only provide advice, while the companies have to take their own action. Most projects fail or are closed for some reason even though they are good. There are always hurdles to be faced for new companies and they might only see a few hurdles at any point during their innovation process. They do a yearly follow-up with the projects or contacts they meet with.

InnovaFood initially received financing from ALMI in 2010 for feasibility studies or to use for the legal agreement for the licensing area, which was an area that required a large amount of funds. Once the licensing agreement was in place, there were payments provided after each milestone was reached. Ulf felt that they dealt with ALMI personnel who were good and supportive of what they were doing and who also provided good advice.

With regards to having external parties joining as board members in the company, they have a lawyer who has been working with them and would be interested to come on board. Currently it is just Östman, Björk, and Ulf. They are still consistently applying for grants, but have not been qualified for any. They find there are still difficult aspects when it comes to funding for innovation; in this case it was for clinical verification. They are often not told what they are lacking when they do not get the grants. In terms of having external people joining the company, Östman is open to having them participate in their daughter companies but still wants to maintain control of the main company, InnovaFood.

The driving force for Innovafood is to have money coming back so it can be used in other projects or patents to run the business instead of having them put in private money. For example, another daughter company they have, Ryefactor, is currently under consideration if they should maintain it or if it should be sold to ensure it is being kept in use. They had filed the patent without a clear idea of how they will be developing it. There were no partners they could work with in the first year although they managed to get some financing for it. They managed to sell and option to use it at an early stage, but the money is being used to run the company and the funds are running out. They have tried to formulate a project idea around the patent and provide an opportunity for them to take over the patent and also in a way so they can remain connected with the development of the patent for an eventual product.

4.1.5 Analysis

This case describes the process of commercializing two university researchers' innovation of the use of amino-acid mixture to regulate blood glucose or the glycaemic index. The critical events identified for this case were in relation to their patent filing and funding process. While they are considered university spin-offs and embedded within the University Innovation system, they went through various roadblocks with their first patents. This included having to setup a company to house their patent after the University Innovation system indicated no interest in maintaining the patent after the first two years. The navigation process from setting up their first patent and subsequently seeking funding for further development and commercialization of the patent may be a familiar story to most microenterprises. *Figure 11* shows a network diagram representation guided by the analytical framework based on the ARA model (Håkansson and Snehota, 1995). This facilitates the following analysis of the innovation process of how Innovafood AB was incepted and the interaction between the three substance layers: activity links, actor bonds, and resource ties plays a part in

4.1.5.1 Activity Links

> We have to be pragmatic and do what is suitable for each situation.
>
> *Rikard Öste, personal communications, March 2015*

Activities are tasks undertaken by actors, which can provide or create access to resources. Håkansson et al. (2009) recognized the relevant activities configurations to include all that surrounds the production of an end product. In this innovation process, activities are seen as those performed by both individual actors and between actors in the focal network with the purpose of accessing or creating resources to commercialize the innovation product/process.

One way in which activities are performed jointly in this innovation process case can be seen by the joint promotion and work performed to establish both the patent and DoubleGood AB's product in the marketplace. New products in the food sector need to be established in the right and successful way and there are many aspects that need to be considered. The legislative barriers can be frustrating, but can also help weed out any shallow claims and also legitimize their findings in terms of the medical field

perspective. These new products in the food sector can take a very long time to come out due to the layers of legislation and testing that are involved. This meant that before DoubleGood AB's product using their patent could be launched in the market, there was a lack of "testimony" to support the further application of InnovaFood AB's patent. The founders of InnovaFood AB are convinced that when the product is launched, it will be easy to communicate to the consumers what these products do because they have scientific research to support the claims. The association with the university based on their research also can help legitimize the research and the product.

While InnovaFood AB did not want to be involved in the marketing too much, there is a need perform this activity together with DoubleGood AB for future product applications. For instance, InnovaFood AB is going to conferences with DoubleGood AB to not just promote the product but the research, which they own, behind it. Another example is the continued work on supporting the claim that can be used for DoubleGood's product through further testings, as they were denied by EFSA in summer 2014 and they plan to do another study for a specific claim for the product to be able to sell in Europe. DoubleGood AB had planned to launch the product in the US market, as they fulfilled the FDA requirements. Their network in the US had a personal friend who was successful with another product that was focused on metabolic syndrome. The preliminary market survey found that due to the large amount of diabetes there was already recognition of the claims from the market; this can strengthen the potential of the table water product DoubleGood is launching. So they are preparing for the US market launch while still waiting for EFSA's approval. Innovafood will be involved to some extent in the upcoming study.

These collaborating activities are not just conducted based on the fact that the patent is being used for DoubleGood AB's product and the actors have a direct link with each other. Rikard Öste shared in an interview that besides trust and commitment for each other when working together, skills are another aspect he thought was important when working in a network. For him, the selection of good partners is aided by having good insights on how interesting or difficult to work with the potential actors in his network are. He screens whom they work with, and was guided by the saying: "You have to take people for what they are, not for what you want them to be."

> Besides trust, skills. We want to collaborate with the best ones. And I have good insights into my areas and my research and I know who is doing an excellent job and who are interesting. And who are difficult to collaborate with. Those I avoid. And those who want to collaborate and clever, we work with. We have to do that. We have to have those that I know who can collaborate, are generous, are helpful, generous, smart. I don't collaborate with those who don't fit into that criterion.
>
> *Rikard Öste, personal communication, March 2015*

For InnovaFood AB, the learning experience of working with DoubleGood AB on these activities has enabled them to subsequently apply those learning points when they worked with another patent with other actors under InnovaFood AB.

4.1.5.2 Resource Ties

For this innovation process case, resources are recognized as those that are being used or have the potential to be used in the case. In view of the critical events, the resource ties related to financial and advice are discussed for this case with connection to both critical events. As *Figure 11* shows, while the ties between the actors are relatively strong, it mostly relates to the particular event or project in time and does not assure a continuation of the flow of resources for the continuation of the microenterprise's existence. As such, this creates the situation where the microenterprise is constantly in a state of "hanging in there."

The first part of the discussion relates to the lack of or poorly organized support for researchers wanting to commercialize their findings, as detailed in section 4.1.3. The university later reorganized their support organization (now known as Lund University Innovation System) to help researchers commercialize their innovations and findings, such as helping with the patent application process and consultation. InnovaFood AB's experience with the university system has not been very effective. This was mainly due to the changes in personnel at the patent office and lack of documentation. This lack of continuity has affected their encounters of support from the university. They instead did everything and learned on their own during the process. This lack of resources in the innovation landscape of a university spin-off can also be considered to contribute to the accumulation of events that resulted in the eventual setup of InnovaFood AB to house the patent.

For InnovaFood AB, which is primarily research based, it is quite difficult to find research money. Moreover, when they try to apply for patents, it takes time away from publishing, which is what is considered when applying for money as researchers. This creates a tension between balancing the need to concentrate on research and the need to maintain the running of the company and patents. There are no active seekers for innovation in the food sector while the researchers are still doing their best to produce better research all the time. This indicates a need to better match those microenterprises that are seeking financial resources with the innovation landscape in general. One way in which this might be overcome, might entail microenterprises actively exposing themselves so they can be known and gain useful actors in their networks that could help act as intermediaries, thereby providing possibilities for accessing needed resources.

4.1.5.3 Actor bonds

The actor bonds that enabled InnovaFood AB to approach ALMI for funding, as presented in section 4.1.4, were an important consideration in their success in obtaining various sums of funding along the innovation process. This was because they were seen as a microenterprise with a ready customer, which increased their chances of success from the point of view of the financers. This financing allowed them to gain access to sound legal advice when they signed a well thought-through licensing agreement with DoubleGood AB.

The actor bonds manifest in various forms in this innovation process, in relation to section 4.1.3, with some bonds stronger than others (represented by the thickness of the line in *Figure 10* and *Figure 11*). As can be seen in this case, most of the ties were equal except the connection with the actor LUIS due to the working structure of LUIS where a business developer is assigned to each innovation case. In the case of the two founders, Elin Östman and Inger Björk, it can be said that they both held central positions in the network. Their bonds with the different actors were linked to their relationships, which could have been formed before the interaction process for this innovation case, or formed during the exchange process while innovating. For example, Östman and Björk have been colleagues since Östman's PhD studies in the early 2000s and were involved in co-publishing various papers. This helped establish the working relationship that would continue through the process of filing the patent and the setting up of InnovaFood AB. For instance, when they were faced with the decision to give up or continue the patent, they decided to set

up the company to own the patent themselves, as they believed in the potential of it.

This established relationship also had an influence to bring in Elin's father, Ulf Östman, who was an experienced business owner, to assist them in managing the business aspects of InnovaFood so they could focus on developing the scientific aspect of the innovation process. While Ulf was experienced in managing companies, having worked in large companies and also run his own services management firm, this involvement in InnovaFood AB might not have been likely if they were recruiting from an open market for an experienced business manager in the area they were working in. Due to the size and nature of operation of microenterprises, this was made possible due to the existence of such actor bonds.

Similarly, on the side of Björk's network, besides offering her expertise as an experienced researcher and also as managing director of AFC, her connection with Rikard Öste played an important part in the decision to take over the patent. As Öste, an old classmate of Björk and also a professor at Lund University with successful research spin-off companies, expressed interest in the patent and also assisted in providing advice when they were taking over the patent, these actor bonds helped turn the critical event around that would have otherwise spelled an end to the patent. This mutual "exchange" of connections also meant a strengthening of established relationships and expansion of network connections. For instance, the established actor bonds between Björk and Öste helped set the stage for the patent to be licensed by DoubleGood AB, a subsidiary of Aventure AB, which is headed by Öste. He is a professor in the same Nutrition and Food Chemistry department as Björk and had known her for over 30 years. Therefore, it felt natural to collaborate and he saw what everyone was doing. Björk has been working a lot with blood sugar and carbohydrates. They first collaborated when they decided to make a cholesterol-lowering beer: Fibeer. DoubleGood AB originally had a different patent in 1998 for Fibeer, which was first housed outside Oatly AB. It was then housed under Oatly in 2006 before eventually being placed under Aventure AB in 2008. In 2003, Fibeer was sold on the Internet. However, when they did a clinical study, it showed that Fibber had no effect on lowering cholesterol levels. They eventually dropped the idea after the second clinical studies also showed no effect. They still wanted to produce a health-effect drink. They knew about an organic acid that could lower GI, but it did not taste good. They went to Björk to screen other organic acids that could be made into a normal meal drink that could lower GI. They worked with some organic acids to make beer and water. They then got to know about the work

of Innovafood and bought the licensing rights to it. On the second patent they collaborated together with Öste as a co-inventor, which belongs to Innovafood but Öste has the right to use. They do see more collaboration as a practical way to work with Innovafood, with them having the rights, paying some royalty for the first patent, and all the rights for the second.

Aventure AB is involved as part of the collaboration model of AFC, which aimed to involve industry with university research. This allowed Öste to advise Östman and Björk when setting up InnovaFood and also paved the way for his involvement as a co-inventor in a subsequent patent with Östman and Björk. This helped shape the business model of InnovaFood AB as they continued to work with DoubleGood AB through the process of applying for EFSA approval in the table water by DoubleGood AB. As actors are intricately linked to access to resources and performance of network activities, this has a "spill-over" effect on other substance layers. This is in line with Håkansson and Johanson's (1992) notion of the substance layers being interconnected.

4.1.5.4 Continuing the journey

> That's the thing with innovation. Some of them fly and some won't. And you have to remove the ones that won't.
>
> *Elin Östman, personal communication, March 2015*

The critical events encountered as shown in *Figure 11* in this case highlight the need for microenterprises to possess a relevant network of actors to successfully carry out their innovation process. While the innovation itself began in the context of university research, this did not guarantee a linear progression of innovation as has been posited in some innovation studies. The empirical reality showed that microenterprises need to not only position themselves as owners of a patent, but also need to engage in the process of legitimation as they try to establish themselves in the market and also for funding opportunities. These processes of establishment involve reaching out to their networks and establishing new ones. The process of legitimation is twofold, first being activities linked to the establishment of a new company and second being the research supported by industry through the adoption of the patent findings. There are still reservations for small companies when utilizing actors in microenterprises' network, as they need to consider the context and future possible interactions. This is also an important consideration even when building up and using the networks.

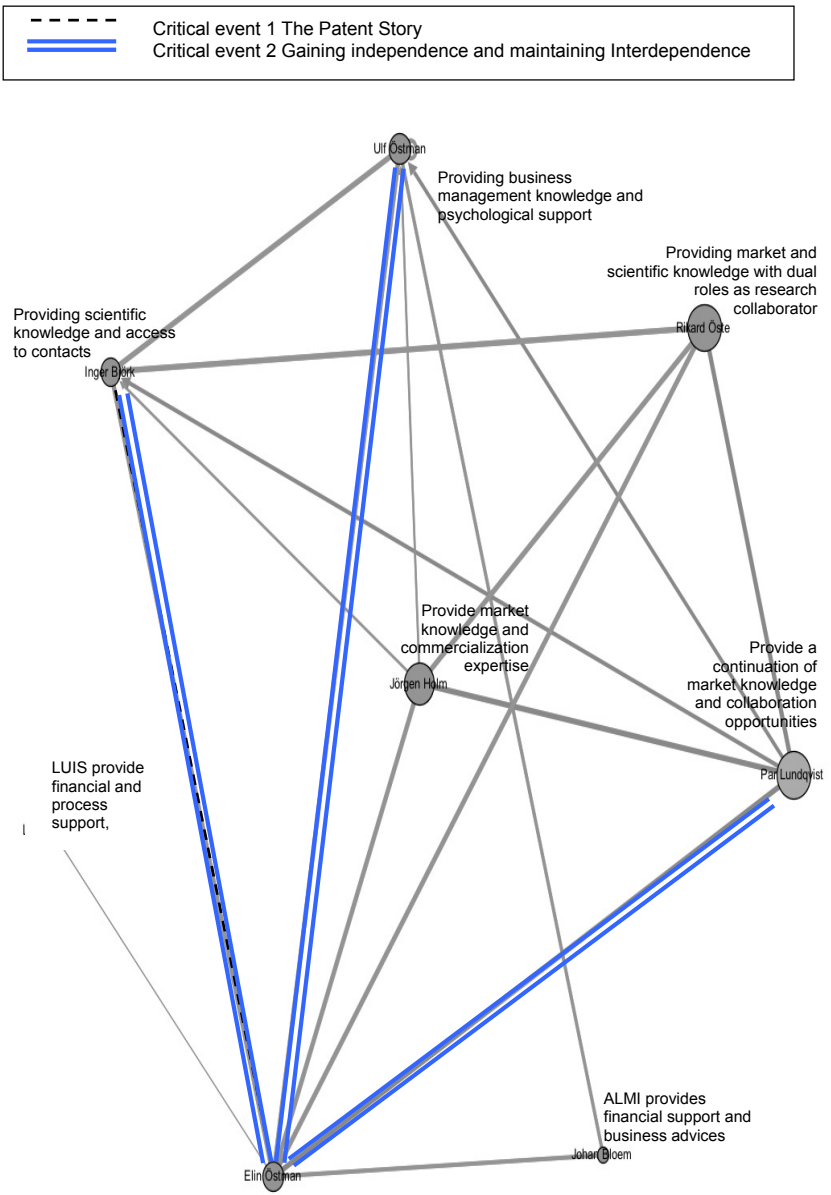

Figure 11
MSS ARA network.

The category of functional food was first devised and used in Japan in the 1980s due to the emergence of food products that were fortified with particular properties to improve physical well-being (Siro et al., 2008). There are no universally accepted definitions of functional food; legislation also varies according to country. According to the International Life Sciences Institute—ILSI Europe, functional food can be understood as:

> A food can be regarded as "functional" if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well being and/or reduction of risk of disease. Functional foods must remain foods and they must demonstrate their effects in amounts that can normally be expected to be consumed in the diet: they are not pills or capsules, but part of a normal food pattern. A functional food can be a natural food, a food to which a component has been added, or a food from which a component has been removed by technological or biotechnological means. It can also be a food where the nature of one or more components has been modified, or a food in which the bioavailability of one or more components has been modified, or any combination of these possibilities. A functional food might be functional for all members of a population or for particular groups of the population, which might be defined, for example, by age or by genetic constitution. (Action, 1999)

Siro et al. (2008) pointed out that the European legislation regarding functional food applies more as a concept and hence there are numerous regulations governing the food product, depending on its category. For example, a food product aimed at the diabetic population will have the General Food Law Regulation and legislation on dietetic food, genetically modified organisms (GMO), food supplements, etc. applied to it. The restrictions on health claims on packaging and marketing are specific and require the food product company to properly establish and fulfill the criteria before it can be used.

Innovating in the functional food segment of the food industry can be challenging. In addition to having to fulfill legislation criteria for health claims, microenterprises started by researchers pit their proprietary knowledge against larger, well-established companies from both food manufacturing and pharmaceutical industries. SMEs in the functional food market have often offered products for particular market niches and have not had a good survival rate due to their lack in R&D and marketing resources (Siro et al., 2008). While the functional food market presents itself as an attractive alternative to

conventional foods with the potential for higher profit margins, it is equally as resource-intensive, because the development and marketing of the products requires specific research efforts (for example, clinical trials, education of consumers). This implies a need for particular management skills for strategic purposes that are not traditionally common in the food sector (Siro et al., 2008).

There are still reservations for small companies when utilizing actors in microenterprises' networks, as they need to consider the context and future possible interactions. This is also an important consideration even when building up and using the networks. It is not uncommon to find actors holding multiple roles in the network; this is an indication of the tightness of the innovation process revolving around particular clusters or networks in the microenterprises' environment. This also indicates that the actors who hold access to more than one type of resources, may be more important at certain phase of the innovation process. The strength of the ties in this network has two main characteristics—namely the amount of time and the reciprocal services. In this case, the collaboration with another university spin-off company helped provide the edge for them to advance both in terms of commercialization of their patents and funding opportunities.

The observations from this case also seem to indicate that the innovation process for microenterprises has to do with their ability to adapt. This may help shed some light on the constant pondering of why some microenterprises innovate while others do not. The circumstances and conditions surrounding the microenterprise influences the opportunities available and opportunities that are acted upon to innovate rather than the characteristics of microenterprises alone. This case also illustrates that, due to the interrelatedness of the various actors, activities, and resources layers, it can be difficult to separate the actors/activities/resources required for the innovation process, indicating a need for a novel way at looking at the innovation process of microenterprises.

While remaining excited about the development of the new upcoming collaborations that InnovaFood AB recognized they would had to spend much effort on, they remained sober when reflecting on what they would have to do with the other patent under their daughter company, Ryefactor, which they have not managed to go very far with. This daughter company was subsequently set up for a similar patent but in the context of using the glucose-lowering potential of rye products, where they applied the lessons they learned from this first instance. They were able to sell an option to a company for them to evaluate the potential of the invention. They realized that they did not work

very strategically with it and it was quite difficult and vague when working on it. They have filed the patent in a few countries but have not gained much traction beyond that. Some potential customers have bought the options to purchase the patent but later turn out to have other priorities. Hence, it could be difficult to see which patents will eventually make it to the commercialization stage. Most of the time the innovation journey has to be traveled quite far before this decision can be made. Through the innovation process thus far, they have learned more about patent applications and the related procedures when filing patents, which can be quite costly. However, they have also realized the importance of filing for patents because it can help start the business process or commercialization. The new daughter company they are setting up to house another new patent is quite different and entails a need to further consider all aspects of the patent application and how to drive the innovation process along. One way in which they took lessons from this innovation process experience was that they now strive to have a good diversity in the competencies of the people whom will be involved in the company so they are ready to go into the next phase.

4.2 The Honey Group (THG)

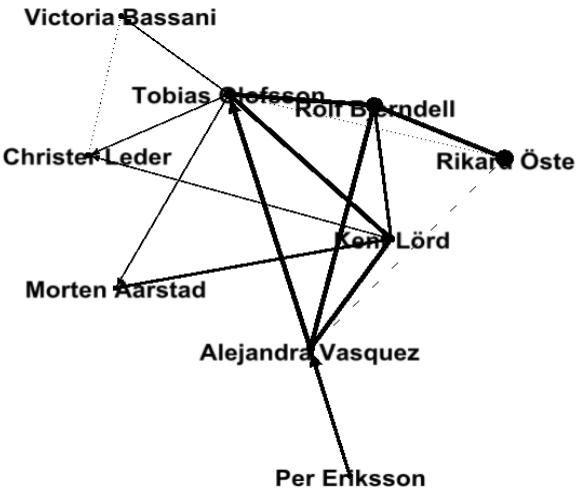

Figure 12
Focal network for THG.

4.2.1 Abstract

This case describes two researchers who had successfully patented their findings and their experience when trying to be researcher-entrepreneurs. Their company offers consultancy, licensing rights and a range of products based on their discovery of the use of lactic acid from bees as under the brand Doktor Honungs H13. The critical moments they experienced during the innovation process were many; for this thesis, two particular critical events are described related to the commercialization rights of their patent and the structure and operation of the company. *Figure 12* the focal network, mapped based on the two critical events in the case description. The thickness of the edges is an indication of the strength of the ties between the actors.

4.2.2 Background

The discovery of the lactic acid strains isolated from bees was made in 2004 when Tobias was doing a project with his grandfather. His grandfather had

been a beekeeper for over 78 years in Skåne and Tobias has grown up with in interest in honey and bees, and he is a beekeeper himself. Alejandra and Tobias, the two founders and also a married couple, started the company after rejecting a buy-out offer from a large ingredients company in Denmark with a view to commercialize the applications of their discovery and translate it into actual products in the areas of functional foods and veterinary and human medicine. Concellae AB was thus set up based on the research they did while they were doing their PhD.

The patent was based on an idea that Tobias came up and financed through grants to develop during his PhD studies. The company was registered in September 2007 and the patent was filed in April 2008. "The invention relates to new isolated Lactobacillus and Bifidobacterium strains which have been isolated from fresh honey having a water content above 18% by weight or from the honey producing tract of at least one bee. The bacterial strains have unique properties rendering them useful in many products such as in food and beverage products, feed products and medical products."[13]

In 2011, they were operating most aspects of the firm themselves and did not hire extra help. They launched their first product (Doctor Honey) in 2009, based on the 13 lactic acid bacteria they have isolated from the honey stomach of the honeybee species *Apis mellifera* (Olofsson et al., 2014). Currently, they work with innovation around biotechnology and the application of their discovery in different forms of products for both humans and animals. A daughter company ApiCellae AB was formed in 2012 to address the area of animal wound care but was later subsumed and developed into a veterinary wound care product ApiH, under the Doktor Honung Brand in 2015.

While initially funded by grants they obtained based on their research, they started forming a board with investments into Concellae AB with various actors. For example, SLU Holding (related to the Swedish Agriculture University in Uppsala, Sweden where there have been research collaborations) sat on the board and was also involved in ApiCellae AB. The main ownership remained with Tobias and Alejandra themselves, SLU Holdings, and Lund University. They have a few other investors owning minor stakes in the company, including Rolf Bjerndell, who sits on the board. Kent Lörd is the chairman of the oldest beekeeping association in Helsingborg and CEO of a packaging company, whom the pair got to know and who also invested and sat on the board of Concellae AB performing various functions.

[13] Patent description from WO2008136730A1 & CA 2684713 A1.

4.2.3 Frenemy

Alejandra and Tobias started working with some researchers from the USA whom they met during a conference in 2007. At that point, they had made it clear that the collaboration was just on a research level and that their patents protected the isolated bacteria strain they were working on. The American counterparts from the USDA (United States Department of Agriculture) were initially agreeable. After two to three years of collaboration, more researchers from the USDA joined in the research work. One of the researchers, Kurt Andersson, became interested in the commercialization aspect of the bacteria when they obtained results that confirmed what Tobias and Alejandra's research claimed and which showed good potential. The collaborative agreement, which was still in process of drafting while they were collaborating, had not been signed yet. The American researchers wanted to include clauses in the agreement that allowed for some level of commercialization of the bacteria, but Concellae was not agreeable to that. This proceeded to the American counterparts starting the negotiation process with their legal personnel, expressing an interest in future patent applications and in using the bacteria in their future products. Alejandra and Tobias were quite concerned as they only had e-mail conversations stating that collaboration was only to be continued on a research level and that the bacteria was protected by patent. Although it was not a formal agreement, they had expected that this would be adhered to. The pair understood that in America, one get points or incentives as researchers when one has a patent under their belt for career advancement, which is why they were interested in commercialization and future patents. The system in America also grants the rights of patents to the unit the researchers work for, instead of to the researchers themselves as in Sweden.

According to a blog entry on the Doktorhonung blogsite,[14] the collaboration took a turn for worse in 2010 when a research student who had been working with the pair for two years was offered a position there. The research student knew about Tobias and Alejandra's research and was supposed to return to Sweden to be a graduate student after spending a stint of 5-6 weeks with the US partners at the Department of Agriculture in Tucson, Arizona. Instead, this move of offering a position to the student and assigning more research staff to work on this area of research at the Department of Agriculture was perceived to be tantamount to "theft" of their work. They felt

[14] Blog entry can be found at http://doktorhonung.blogspot.se/2010_12_01_archive.html

helpless then, as they were small and had not received the support they had hoped to get from Lund University.

This matter was brought to the attention of Per Eriksson, the vice-chancellor of Lund University (2009-2014), when the pair was unable to come to an agreement with their American colleagues. Eriksson recalled that it was not so common for researchers to contact him directly. He remembered they met when Lennart Nilsson (a famous scientific photographer) took some pictures of their bacteria for Concellae AB. A press event took place at Helsingborg, where Concellae AB was based. This event involved the Helsingborg municipality, which sponsored a research project with Lennart Nilsson and also invited Per Eriksson who was then the vice-chancellor of Lund University, which had campus locations in Helsingborg. This event allowed the two founders and Eriksson to be acquainted with each other. He later understood that the pair had made some collaboration with American researchers and they were going to lose control of their ideas and innovation. Lund University then got involved together with SLU Holdings. They contacted the government, which helped by issuing an official letter regarding this matter. Eriksson, together with SLU holdings and the government's support, eventually reached an agreement when they had a meeting in Stockholm with the American research group in 2011 that prohibited them from commercialization related to the patent in the future. This also included no publishing of any related research without prior consent from Alejandra and Tobias. They broke up all forms of collaboration at that point of time; this resulted in an unpleasant parting.

> With these types of enemies, you don't need to have any friends.
>
> *Per Eriksson, personal communication, 2015*

Eriksson cited the case of Oatly, a successful innovative oat-based product manufacturer that had an encounter with Arla, which sued them because Oatly was marketing their product by citing reasons against milk products. Instead of being affected by what this "enemy" proposed against them, Oatly's market grew instead and now Oatley has business in China due to the problem with milk. This type of "frenemy" who incites strategies that "backfire" can sometime be beneficial to the innovation process of microenterprises, for instance in Concellae's case, which received much help and connections in establishing their research and products.

Eriksson further helped by proposing that LUIS (Lund University Innovation System) subsequently invest in the company too. He suggested that

SLU holding take the lead from Lund University and be the interface between Concellae AB and SLU, instead of Lund University directly. It worked quite well and they gained research support from professors at SLU as well. Tobias and Alejandra subsequently had to move out of their previous research department because their research was not relevant to the department anymore. Instead, they were to be hosted under the medical faculty as a research group; this meant that they would have their labs in Lund University locations in Lund and were also provided some financial aid so they could start a research group and hire PhD students.

4.2.4 Starting over, a clean slate

During the period of 2013-2014, Alejandra started devoting more time to taking care of company matters. They had received great help from the university through their connection with Per Eriksson in finding a new home for the research group, but she has gradually felt more and more that they are no longer suitable for the research and university environment.

The next critical incident surrounded the events occurring in the decision to sack their board members in February 2015. The reasons cited by the founders were differences in management opinions and disagreement with shareholders between Concellae AB and LUIS. Alejandra was burned out in 2014 and took a year of sick leave. Tobias took over the research group and company but soon also took sick leave. Together they were on leave for 1.5 years. During this time, and as previously, they tried to ask for help through the board for venture capital to keep the company running by hiring someone, as it was too much running the company with just Tobias and Alejandra. At the same time, they also tried asking for help from the university and they managed to get some help getting students through their research group (The Honey Group), which relieved their workload in some way. They felt that things needed to happen after six years of establishing the company since their first patent application in 2007. They were very good at coming up with products, but they did not have the skills and money to market them to the consumers.

> We are very good at taking out products all the time but we can't market them because we don't have the money in the company. And that is a huge need because you need to make research about the market because otherwise you will not reach the consumers. It has been quite a tough time and we thought from the board, we can get help.
>
> *Concellae AB, personal communications, 2015*

The founders thought they could get some help by including the Lund University Innovation System in 2007 with 5% of the company, and SLU holdings with another 5% of the company. It all happened at the same time as they were entangled in the issue with the American researchers. They were recommended to have LUIS and SLU holdings on the board and they also thought that by having both LUIS and SLU holdings, they would get some help from them in some respect. However, it was more in terms of financial help and not so much on the marketing aspects. They signed an agreement with LUIS without asking or reading too much into the contract, as they thought it was under Lund University and was recommended by the vice-chancellor.

When Tobias and Alejandra were sick, the board worked on the business plan for Concellae and did not involve Tobias and Alejandra on the business aspects so that they could concentrate on research, according to Alexjandra. The board wanted to raise capital to expand the company but to have the founders remain as researchers. During the time they were on sick leave, they only maintained communication with Kent Lörd. When Alejandra and Tobias returned from the sick leave in the autumn of 2014, they were surprised to learn the plans for the expansion of the company that had been made in their absence. The board could not carry out the plan, as Tobias and Alejandra were still the majority owners. Kent was to be the MD for Concellae, they wanted to raise capital for 25% of the company and they had arranged meetings with potential buyers. These buyers had contributed with money in Lund University and by selling to them; Lund University will be increasing their stake in Concellae. They also wanted only one of either Tobias or Alejandra on the board.

Tobias and Alejandra did not like the plans. Tobias and Alejandra went through the agreement they had signed at that time with LUIS to see where they stood regarding these plans. They had decided that Alejandra would be devoting more time to the company and could be the MD for Concellae and also meet the potential buyers, but some on the board did not like this plan.

For example, Kent Lörd (who was supposed to be the new MD), LUIS, and SLU Holdings were not pleased with the new directions that Tobias and Alejandra were proposing. The board had already presented a business plan to the potential buyers while they were on sick leave without consulting them. They realized that the agreement that they had signed with LUIS stated that decisions could only be made with two-thirds of the board's agreement, despite the share holdings of the particular members. They had consulted a lawyer regarding the agreement and came to the conclusion that it was a disadvantageous agreement for the two founders. This meant that Tobias and Alejandra were under the wrong impression that they would able to make the decisions since they held the majority of shares of the company. During the time they were on sick leave, Kent Lörd, who was the MD for the daughter company Concellae—Apicellae, did not have any concrete business activities carried out for the company, according to Alejandra. Lörd shared that he felt quite sad about their decisions made to remove the board members. When he joined them as chairman of the board in 2008, he worked to help include two other universities (SLU and Lund University) as board members in 2012. Together with Rolf Bjerndell, he thought they had a good mix of experience to help Concellae in the innovation process. However, when the pair took leave, as they were diagnosed as burned-out, Lörd considered it quite puzzling.

In Lörd's line of work and experience, being burned-out was not a common phenomenon and was one that was quite new for him. While they were on leave, he continued to manage the more practical aspects of the companies, but it was quite frustrating as the founders were quite important to the company. He also invested his time in helping to manage ApiCellae on the packaging aspects and in managing the Spanish and Swedish suppliers. The first was for SymBeeotic. This is a product that "could help protect against diseases behind bee colony collapse, another pressing concern within the scientific community" (Reuters, 2014) The second was using the product on treating wounds (such as Equine Pastern Dermatitis [EPD]) on horses. The former had shown promising results from the market while the latter produced very good results in initial trials. They had hoped to continue with human trials, which if successful "could help doctors overturn the growing threat of antibiotic resistant bacteria, in both First World countries, and also in the developing world where fresh honey is more readily accessible than antibiotics" (Reuters, 2014).

Lörd shared that they had tried to suggest investors who would take an interest in the company so that the founders could concentrate on research. However, he felt that the founders might have taken it in the wrong way and

acted impulsively. The H13 range of products that were manufactured based on their research were selling exclusively on the website (http://doktorhonung.se) and not on other types of channels, limiting the reach of the product. The board members felt that having professionals step in and run the business side of the company could help in the growth of the company. The founders instead felt that they had been provided bad advice by the board members and they felt trapped by the agreements and contracts they had with the board. Things got even more complicated when Tobias and Alejandra returned to work after their break. The plans that were formulated in their absence raised concerns for them. They tried to share with the board members 1) their opinion that Lörd was an ill fit for Concellae and should not be the MD, 2) their concerns regarding the clause in the agreement about two-third majority, and 3) that if they went below 75% ownership of the company, it would mean that the other members of the board could make a majority decision. Tobias and Alejandra also wanted to close down the daughter company to concentrate on the main company, Concellae AB, and also to get back their health and to work in a more manageable manner.

SLU holdings and Kent Lörd, who had shares in ApiCellae, wanted compensation in terms of more shares in Concellae AB, even though, according to legal obligations, they were not entitled to them, as the company was not performing well. The founders voiced these concerns to the board but were pointed to what they had signed on the agreement: that they needed a majority in the board to act on these concerns. The founders were also urged by others to act on moral grounds to compensate with more shares in Concellae to those who invested in ApiCellae if they closed down ApiCellae, even if they were not legally obliged to. However, Tobias and Alejandra were not happy about the agreement they had signed. When they approached the board in January 2015, they were still met with disagreement. That was when they made plans to dismiss the board and start over with just Tobias and Alejandra on the board before taking on investors again. They announced a meeting in February 2015, but no one from the board came except for one representative from Lund University. Since they still had the majority of the shares at this point, they could get rid of the board, and they planned to close down ApiCellae in February/March 2015. This was the only way they saw they could start off with a clean slate for Concellae without the burden of the biased agreement.

As the final board meeting was not attended by most of its members, Lörd claimed that they did not know why the pair wanted to close down ApiCellae. However, he felt that there should have been some form of "compensation,"

especially for SLU holdings that had invested money into ApiCellae. He maintained that Alejandra and Tobias were adamant not to offer them shares in Concellae in lieu of closing down ApiCellae and also that the products that were in storage were of no value. This created a conflict in the board. SLU holdings had checked with their legal department and the founders, who were the majority shareholders, had the legal right. They eventually stopped pursuing the matter, as the shares that would have been offered were not a significant amount.

LUIS also disappointed the two founders in terms of the help that they needed when they were applying for a patent in 2014, which the board members knew about. That was at the beginning of their sick leave: they had information and material for the patent and needed help to file it. They needed to file the patent as they had research articles that needed to be published. They were recommended to LUIS, as they had patent officers. However, LUIS called and told them that they could not help, as any new patents would belong to Concellae AB, which they were already part owners in. This was the point of contention that they raised at the board meeting and they had to file the patent while they were on sick leave without any help from the board. The overall impression was that they were not getting help from the board, but the board was holding the agreement over their head to comply with their business plans.

After the dismissal of the board and subsequently of ApiCellae, they planned to take stock of their products under Concellae and ApiCellae. Lörd mentioned that they wanted to keep in contact with him and Rolf Bjerndell, which they were willing to provide at a later stage, as they wanted the best for Concellae even though they did not understand where the pair was going with the company. They will try to raise capital for Concellae and those they need to take care of the administrative aspects of the companies before they can proceed with funding activities.

4.2.5 Analysis

This case describes the innovation process of the discovery of 13 lactic acids isolated from bees by two university researchers. In 2010, they launched their first product, H13, as a form of recovery drink. The product line has since expanded to cover H13 for use as a form of energy supplement for daily or training purposes. The company also offers consultancy and licensing rights based on their patents. They also set up a daughter company, ApiCellae AB,

which was concentrating on the application of their patents in the areas of animal feed and wound care. This daughter company, however, closed down in early 2015. The company is currently seeking crowd funding to continue funding their operations and research after changing out their major board members in early 2015. The team has experienced various critical moments in the innovation process.

For this analysis, two particular episodes are highlighted. The first, which was detailed in section 4.2.3, relates to their experience with the collaboration of their research findings. When they began collaboration with some American researchers, they met at a conference before a formal collaborative agreement was signed, and they encountered the risk of losing their research. The involvement of the university and the state subsequently helped resolve the issue in their favor and also attracted investment into the company. The second, described in section 4.2.4, relates to the recent reorganization of their company after a period of leave by the two researchers, who were also partners in their private life. The board members included investments from both private and public actors who had worked on attracting more investors into the company. This had meant that the two researchers who had held majority shares until then would have to part with their share in the company in order to accept new investments. There was disagreement on various levels between the parties. This resulted in the dissolution of the board members by the exercising the right of the two majority owners. Examining the critical incidents along the actors, activities, and resource layers of the ARA model offers a few observations.

4.2.5.1 Activities Links

As per the previous analysis, activities are tasks undertaken by actors that can provide or create access to resources. In the case of Concellae AB, the activities for analysis are focused on those related to the identified critical events. For the first critical event, as described in section 4.2.3, it can be seen that Tobias maintained contacts and network with other beekeepers. These included conducting research activities with SLU in Uppsala, which has apiaries for such purposes. This had an influence on building the actor bonds. For instance, the pair of researchers had been attending events and networking activities to build up their network. Per Eriksson felt that Concellae AB could be something great, but they had problems with support from the university, in part because the research required for Concellae AB does not belong clearly to a single department in Lund University. They were viewed as odd researchers, as they

were going their own way, they were young, and they did not have a professor backing and guarding them.

Kent Lörd was linked to them through a mentorship program called CONNECT because he has a private hobby in beekeeping. Lörd is the owner of a packaging company. He has been the MD for about ten companies over the years, which have been production-based. His background started at TetraPak as an engineer who developed into management positions. When he got into CONNECT, whose members have had industrial backgrounds and have been involved at management level of enterprises, he was more involved into packaging patents. One of the contacts called him and mentioned that he met Tobias and Alejandra, that they had discovered something interesting, and that he thought Lörd was the right person to connect them together. This was because Lörd himself kept bees as a hobby and was also involved in cases regarding honey. The CONNECT organization is where an expert goes in to help mentor for a few months, and then leaves the enterprise after that. That was how Lörd got involved with Concellae. They agreed that they had to start a corporation, and they asked Lörd if he was interested in continuing to work with them after those few months.

Kent Lörd became the chairman of the board at Concellae in about 2008. Most of his time, though, was still spent on the packaging company that he runs. Lörd was fascinated by the innovation that they found. The fact that they wanted to commercialize it was also interesting for him. He felt he could support them because of his background and interest. It was a combination of both sides: He liked the biology and felt that it was interesting, and his corporate background could help, so that was why he agreed to be part of it. He described Tobias and Alejandra as "working like a married couple even before they were married." They were very open about working with other universities and companies. For example, they worked with universities in the UK and the USA, as well as Uppsala (Ingmar Frys—bee professor). Lörd also mentioned how cooperation with others could be destructive too, for example because the cooperation with the US had gone sour with them publishing a paper based on the results that needed to be rewritten before it could be sent for publishing. As such, this also illustrates how activities may not produce positive results.

Another example of how activities helped formed actor bonds and resource ties was when Victoria from Bidrottningen, which was established in 2005, met Tobias around February 2009 at the Nordic Biotic Research Conference in Copenhagen. Then, in 2009, Tobias and Alejandra, who had shared what they were doing, approached the general beekeeper association at Trellbörg.

Victoria was also giving a presentation at Linköping on varietal honey—the thought process on establishing such a production and how to introduce it to the market. Tobias and Alejandra also gave a talk after that and traveled to the conference together. Tobias called and arranged a meeting at Christer Leder's event, where they met up with Rolf. They said that they wanted to form some sort of collaboration and asked if Victoria was interested in this pollen-gathering exercise for this specific activity. Victoria did not want to do large-scale beekeeping, as it affects how one can attend to the bees. She keeps bees near desired variety of crops so that the honey produced is associated with the crops (mostly flowers) as honey is produced near the source of the nectar. Hence, the collaboration with Concellae AB was one she was interested to explore when the founders approached her.

4.2.5.2 Resource Ties

> You can't have unrealistic expectations of how much money you are getting for how little of the company you are willing to give away.
>
> *Kent Lörd, personal communication, April 2015*

This observation on resource ties, illustrated by the case, shows the tension between dependence and independence of microenterprises. In the case of Concellae AB, there were various instances where it could be seen a tension between the search to access more resources versus the desire to maintain ownership and control over the company. While it is widely recognized that microenterprises lean on external resources, the characteristics of the entrepreneurial "spirit" does not diminish with this dependency. It can even be made more intense because of the increasing dependency on external resources. The innovation process may dictate the type of networks established around the microenterprises and "the view of networking as an action that makes a difference in resource acquisition and firm success" (La Rocca and Snehota, 2014). Through the perspective of examining the innovation process of these microenterprises through understanding the workings of the actors, the resource and activities layers via the identified critical events the complexity in this process is emphasized in a more structured manner.

> Always in a company you have a lot of critical moments that you have to solve the problem. If you don't solve them, then there is no business. You get killed.
>
> *Per Eriksson, personal communications, 2015*

The critical events that were described in section 4.2.3 also enabled their learning through these experiences. For instance, they were also able to enlarge their networks through these incidents, which has made them stronger. They expanded their network at Lund University by connecting to the vice chancellor, with the Innovation Centre at Lund, and with the Swedish government. The University, though, in her opinion, is still quite a conservative organization. Per Eriksson had experience in the industry (being a former director at Vinnova), was quite open, and understood the problems that entrepreneurs can encounter.

Concellae AB encountered critical moments, mostly at the juncture of the phase of developing the products commercially, which required large investment in financial resources. According to Per Eriksson, the problem they were running into was that on one hand they wanted to own it all, but also needed a lot of money. He was trying to negotiate with financing people and with Serendipity Innovations (a group of companies hosting technological breakthroughs). They have been in negotiations for about three months now, but he sees that they need to balance the need for control with the need for partners and financing. They need to have good marketing and to be quite aggressive with launching the products. The path to medical treatment still has some way to go. The food sector is also quite tough, with the big companies that are selling and with retailers trying to keep control of the products, such as producing in-house brands. There is also the way in which food products are being transacted or purchased. It becomes difficult to predict what will happen in the food sector for the application of Concellae's invention on food and beverage products for humans.

One access of external resources was formed due to the activity links described in section 4.2.3. LUIS invested in Concellae around the period of 2012-2013, when the conflict with their American colleagues was resolved. The role of LUIS was to support the students at Lund University in their innovation efforts to commercialize. There are a few ways in which the support given by LUIS is evaluated. First, is there any potential in the innovation? In the case of Concellae, there was huge potential in the three business areas of food supplements, animal health, and human health. Second, is there a team in place that can take the necessary steps? Both Tobias and Alejandra were driven, eager, and took actions. They also had people around them such as Rolf, Kent, and Christina to help balance the passion of the two founders with experience and a knowledge base. Third, could this investment (by Lund University) make a difference for the companies' chances to succeed? Yes, as the areas (food and health) Concellae was involved in could be beneficial to the company if

Lund University were behind them. They were trying to help build the company and take the next steps. From LUIS's perspective, Concellae needed more structure and human resources as they were balancing between setting up the company and conducting their research. This would mean having to attract investors in the company to recruit personnel. This implies giving up shares of the companies for these financial investments to be injected to the company. This was what LUIS had on their agenda from the beginning, but it would also involve agreement from the founders.

4.2.5.3 Actor Bonds

> Getting support at this level is great. The new co-ownership not only represents a stamp of quality for Concellae, but also brings us partners with great experience and understanding of both research and business", says Alejandra Vàsquez, a researcher in medical microbiology at Lund University and one of the two founders of Concellae.
>
> *Alejandra Vàsquez, online article[15], November 23, 2012*

This case highlights the evolvement of actor bonds to be part of the innovation process. These may differ greatly from case to case, due to the combination of actors, resources, and activities that makes each innovation process different. One of the ways these actor bonds developed along the innovation process is through the connection to key actors when building up microenterprises' network through such critical events. These connections not only provide access to resources, but also form an important partnership for the innovation process of microenterprises. While emphasis has normally been placed on seizing the opportunities to build up the scope of the network and build partnerships, this case illustrates the importance of the content aspects of the network and nature of contacts (Zhao and Aram, 1995).

> One of the traits you find in the entrepreneurs is that we have a good example in one of the professors who admire both of you, Rikard Öste. He says that, I'm a very good scientist and even an entrepreneur but I am totally worthless as a CEO. Listen to him; he's a wise guy.
>
> *Rolf Bjerndell, personal communication, 2015*

[15] Extracted from online article from SLU website, http://www.slu.se/en/sluholding/news-archive/2012/11/honey-to-fight-bacteria-new-business-idea/

There are a few key actors that can be observed in this case. For example, Rolf Bjerndell is an experienced businessman who has worked in large companies but remains passionate about start-ups and entrepreneurs. In this case, Bjerndell, has had much experience in interacting with entrepreneurs. Bjerndell, in his opinion, felt that Concellae AB was "killing their baby." He had heard about them when he was at MINC from a colleague who recommended that they talk to Bjerndell, as they had received an offer from Chr. Hansen, a Danish company that specialized in supplying bioscience-based ingredients to the food, health, and animal feed industries. Bjerndell knew Alejandra previously from Probi, as she was an industrial PhD. When he met up with them, they wanted to know what they should do with the offer. He was the acting CEO for Oatly at that point; he analyzed the situation for them and determined that they had two options. The first was to sell their invention and become a couple of million kroners richer—or they could walk the Probi way, starting a rough and tough journey that would take about seven years before they had their first paying customer. They took ten minutes and decided to start up their own company; that was how Bjerndell came to sit on the board. However, the pair worked too much and therefore eventually went on sick leave. He doubted that they had learned anything from it. He felt that they could not let go of the idea that they were entrepreneurs first, then researchers. However, he felt that they could make another attempt to refine their entreprenuerial ambitions.

Bjerndell knew how to handle large companies, which made him useful in the context of Concellae because the big companies could not easily fool him. He is kind of a paradoxical guy, because he has worked in big companies and is now working with small companies, so he knows the ground rules that are required if one is to work with a big company such as Arla. Therefore, he gets good insights in the industry that helps him to be the "spider in the web."

The next key actor in this focal network was Kent Lörd, who felt that the pair still lacked experience in the business aspects but maintained that it could be gained. In the beginning when he was involved with Concellae AB, Morten Aarstad's (Packarna) packaging got into the network of Concellae because he was a friend of Kent Lörd in both a private and professional sense. He knew Lörd many years ago, first in a strictly personal capacity. They subsequently worked together in a company called Inpack in 1986. He was the plant manager and left the company after a few years. Aarstad was in the sales department. They kept in contact over the years and it was Tobias who called him, through Lörd, around 2008 or 2009. Aarstad is a contract packer and there are not so many contract packers in Skåne. The products they pack come

mostly from Sweden and 30-40% from outside Sweden. Their biggest customers are Nestle, Unilever, etc., since they have production all over the world. The big companies need to make the packaging look more Scandinavian, so bigger packers do not wish to customize it. Therefore, the big companies purchase the ingredients and have it packed in Scandinavia. They are BRC certified. In the case of Concellae, they had a very specific idea about how the package should look. Although they did not have to make special adjustments concerning the packing, they did have to make some special arrangements for the storage after packing, to be placed in a cool area, to pack it in a fast manner, and then move to storage right away. They had to rent special cooler containers for the product.

Another actor bond that was created during the innovation process was Christer Leder (Lustgårdens Biodling), who has been in the honey business since 1991. He and his wife operate their company. The business has been a small hive production selling the honey to specialized food shops. He adds flavors to the honey through the flowers and also by adding flavoring. They started by going to town fairs and the competition has been tough. They saw honey mustard and got the inspiration to do something around that. The honey business is not very mature in Sweden, but there was still competition. They pride themselves on the quality of their product, which has enabled the business to grow. They have also tried to find cooperation or collaboration that is not so common, for example, with the distribution networks. Christer has some overseas distribution in Denmark and Germany through these networks. In early 2009, they got into contact with Tobias through Lörd's friend Gören Karlsson, from whom they buy their labels. Tobias may have known about them through other channels too, as Christer's company does something similar to Concellae AB in terms of adding flavors or ingredients to the honey products. Tobias came up to Christer's place with the H13 bacteria in its liquid form. It was difficult to find partners for the packaging of the H13-based products, as most packaging companies are interested in contract packing of a certain volume. Companies who are in starting phase normally do not want to or cannot afford the heavy investment in the packing machines. In this instance, Christer, who normally works with their own honey, may also choose to work with other products that are an easy fit with their current operations. In the case of Concellae AB, since it was aligned with Christer's competence in honey and the mixing of honey with other types of ingredients to produce unique honey-based products, Christer was open to the collaboration. The responsibility lays with Concellae to test the final product to be fit for consumption and to determine such items as "best before" dates for

example. As a company, they had quality certification and so they were used to working to maintain the standards and requirements, such as the list of ingredients, so they had good control over that. Honey is one product that does not require heavy checking, unlike other food products, meaning that a small beekeeper can just sell their honey without much quality control.

Lörd felt that they were still quite impulsive, and even though they had money from various sources from the beginning, they spent it on facilities, labs, and storage. The overhead for Concellae were quite high and Lörd ventured that was the reason for closing down ApiCellae AB: so that the money could be concentrated in paying the overheads for Concellae. The products under Dr Honey were not performing very well then, and because the results for the animal wound product were very good, he felt that they wanted to have product housed under Concellae. In the consideration of the ethical aspect to the board members who invested in Concellae AB, Lörd felt the closing down ApiCellae AB could have been further discussed. The actions the founders had taken have made the board members quite frustrated. They felt that this was not a fair treatment after the help they had given to them in those years. Lörd felt angry at first but that has changed to a sense of regret for the company. He mentioned there was some discussion they had with Bjerndell with a potential partner in the food sector that may not be continued. Lörd received e-mail from Tobias in March 2015, and while contact will be maintained, it is not likely that he will play a role in the company anymore. He felt that the way the founders had treated those around them was something he did not agree with. He will support them, but not in a formal way, unless the way they deal with things changes. He felt that they wanted to be entrepreneurs and the board members had given the founders their feedback on it. He would have preferred a professional to run the company, but they were not happy with that revelation as they felt they could be entrepreneurs. In some way, there was naïveté on the founders' side in his opinion, which may improve over time. However, some aspects of cost control may need to be taken, for example in terms of operating from a smaller scale (facilities expenses for rental alone were 10,000 kroners a month) since they had no substantial income from the products.

LUIS felt that it was not the way Concellae had wanted to close down ApiCellae or dissolve the board that was frustrating. Concellae had huge potential, but no one can say if it would have been successful in the end. LUIS felt that Concellae would need more people with different types of experiences to be involved in the daily routines and in an environment where trust and

respect could be built. Having key people may imply that it can be hard to build relationships.

> There is a team factor. Team is critical; because I think there was a right team on the board level but obviously we didn't built the trust in order make the decisions we would agree upon. Fine. From the outside perspective, the board was there. But on the operative level, we never finance in a way that they can bring on board enough people or enough competence or the right people in order to build a company.
>
> *LUIS, personal communications, April 2015*

In LUIS's opinion, to some extent the board members of start-ups may need to contribute more, but not to the extent that they can replace people who would be needed to run operations. In general, speed is lost in research-based companies because external financing and competence are not brought into the company early enough. While LUIS believed in the founder, it was of the opinion that there needed to be other people around to help in running the company. It can also be difficult to extract oneself from family-run companies as they live and breathe the same environment, company and private wise. Despite the exit from the board, they remain optimistic on the potential of the company and open to assist Concellae in other future circumstances.

While it is common to change board members, it is not so common to change the whole board's membership. LUIS felt that this indicated that there had been serious disagreements over some key issues and that the board was not working well. This can be attributed to certain actors or due to circumstances. The company act provides solutions for this type of situation. Concellae had chosen to dissolve the board in this instance. LUIS felt that this was a case where there was disagreement and they understood that it could be an emotional time for the owners and respected the decision made. In hindsight, LUIS felt that they could have been better at setting the expectations from the start and communicating those expectations. The case with Concellae was unique in the sense that they had decided to leave the board and let Concellae run it the way they saw fit. In general, Lund University owned 5% of Concellae (they normally own 20% of a company they invest in), so as minority shareholders they would not have been able to push for a way of running Concellae. The preferred way would have been driving Concellae harder toward growth and bringing in outside capital and external competence. Concellae also had outside investors not from the board members, comprising 25% of shareholdings. LUIS found that, generally, one of the challenges for

research-based spin-offs is for founders to let go of their company. LUIS's strategy is often to try to find marketing/sales people who can help them in the market they are targeting. For example, in Concellae's case, Bjerndell filled in that role at the board and investor levels. The removal of the board members meant that they had to find new people who could support them. Such impulsiveness, though, cannot really work in business in Bjerndell's opinion. They need to have a plan before reacting, and the pair was quite proud of being impulsive, according to the declarations they have made on various occasions. They would probably need some kind of advisor that can guide them on their future plans.

4.2.5.4 Continuing the journey

Figure 13 illustrates the two critical events and the related actors in the network. One of the issues that were behind the occurrence of critical events as described in section 4.2.4 was the shareholder agreement with LUIS that the pair felt was not fully explained to them. In general, the shareholder agreement that LUIS issues follows the standard company act guidelines in Sweden. While the majority can have a majority vote, there is a minority protection in some form. When the investment was agreed on, there may be, for example, an amount of money committed and also potential areas to work on. As an investor, the shareholder agreement is structured in such a way that some decisions need to be agreed on by the majority of the shareholders (for example, certain critical decisions), not just based on the number of shares one holds. For example, if new investors were to join, the original investors would have a discussion with the owners to renegotiate the original shareholder agreement. If there were a disagreement, then, for instance, a board meeting can be called and a shareholder's meeting after that. It is as LUIS explains:

> It is a way to make sure that to the fullest extent possible, you ensure that you go along the lines you decided, and when you don't agree, there is a process to handle it. It's a way to sort of slow down; make sure you don't make hasty decisions that deviate too much from what you have decided. That is typically what you do in a shareholders' agreement.

For LUIS's shareholder's agreement, certain articles may be negotiable but the set-up is the same for all the companies they invest in. This is to make sure that minority shareholders do have a say in certain decisions. LUIS deemed that the shareholder agreement they have was less "harsh" than a typical venture

capital's agreement. The board is to represent the company and help the company. For first time entrepreneurs, they typically have three roles. They can act as owner, part of the board, and in operative functions. It can be challenging to structure or separate these the right way for one who does not have experience. LUIS's aim has been to separate these roles over time so that each can perform their responsibilities without distractions from the responsibilities of other roles.

> For some founders, it can be something they can feel uncomfortable with. It's like someone getting involved with their baby, so to say and that can be tough.
>
> *LUIS, personal communication, 2015*

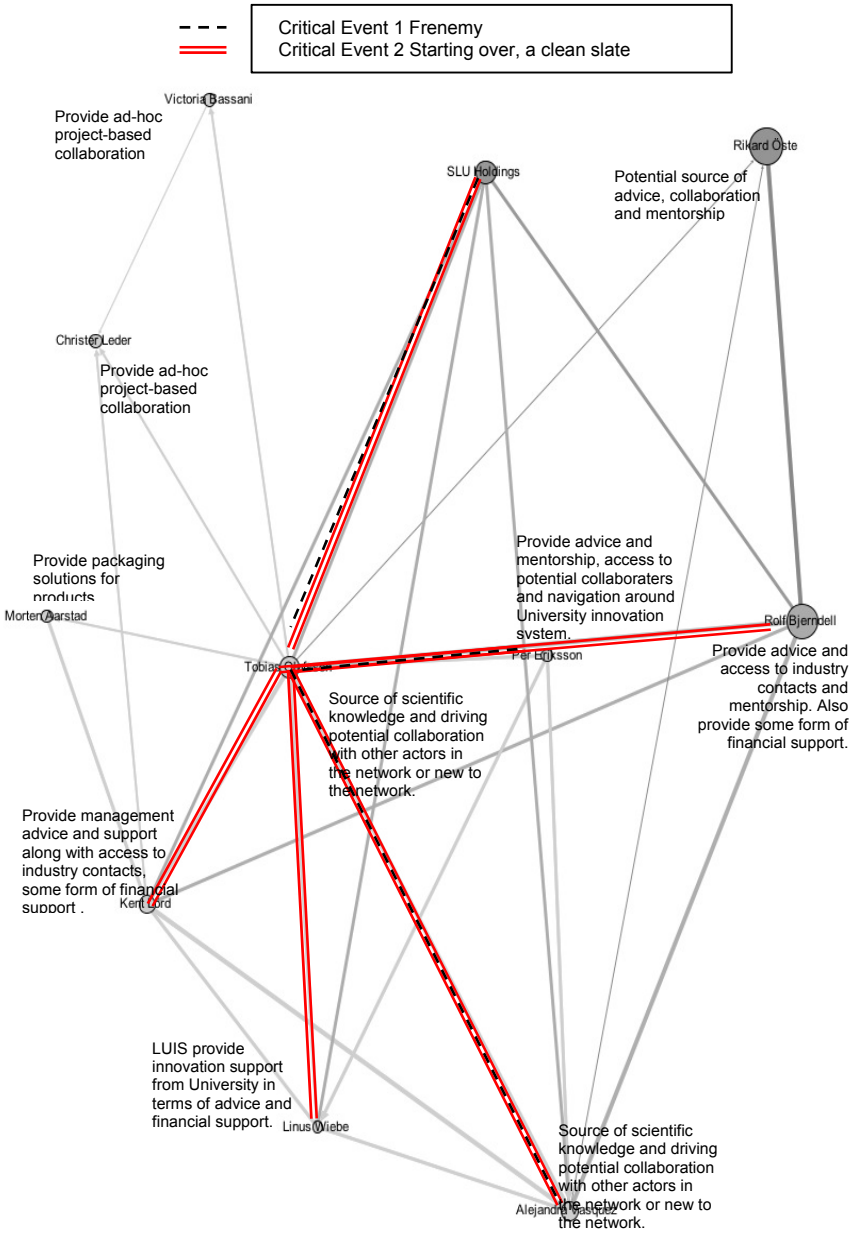

Figure 13
THG ARA network

Moving on with a new chapter in the innovation process of Concellae AB, some reflections were that the pair have learned the importance of knowing

and learning the terms of an agreement from these critical episodes. What has changed their outlook is that, in terms of decisions for the company, these will go through both Tobias and Alejandra first. This is part of their plan to be able to get back the right spirit for running the company. They also talked to LUIS recently and provided feedback on the help that they did not get from them even though they had signed the unfavorable agreement. They also talked more with lawyers and now have a better understanding of their rights. They are also more open to having less ownership in the company, but at the right time and once they are prepared and know about more about the buyer. Now they really would like to see with whom they would be working in the future. They had previously taken in board members without giving too much thought to it, based on recommendations from others. They want knowledge and money from the potential board members to bring the company forward, not just inactive members. It is akin to having these knowledge bases and network connections already existing with the new board members they will take on.

They also realize that the way they worked before was not bringing the company forward, both in terms of the lean operations and in terms of the thinking that existed in the board. They want to be recognized as entrepreneurs, not just researchers, and they have the desire to be good at managing the company at this stage of their journey. They have a more directed sense of passion for what they do now, instead of the blind enthusiasm they had in the beginning, which may have blinded them to the more important small details.

They have learned not to rush into things and to take their time in sourcing for the right partners to have with the company. They want to have investors who are more suitable for them and who are in it to help bring the company forward. They are more focused on what they want, and they want to make Concellae a lifelong project as a family business. All the things they have done wrong before, they want to do correctly this time. For example, they have signed an agreement with an online marketing company to sell Dr Honey and to take a percentage of the earnings so they are not doing everything themselves.

What they did in the past was to compromise their ownership of their company in hope of resources (financial, personnel), and they have now compromised after the realization that they will decrease their ownership of the company in exchange for new board members and investors that are more qualified for the vision of the company. They are also not shy to say what they want instead of being polite and accepting whatever is given to them. They know so much more now and they are striving for a fairer negotiation in all

aspects. A person who seems nice is not necessary the same when it comes to business. They want to see beyond the resources that are offered to get to know the heart of what the person really wants and to have a common goal for the company. The old board members were all going in different directions.

While this seems to protect the interests of researchers in Sweden by granting the right of the patent to the researcher, the Law of Jante, on the other hand, seems to work against them. Alejandra shared that while you can get help from the Lund University Innovation Centre, those who worked with researchers tended to stereotype researchers as only interested in research, and not as entrepreneurs. She recognized that some researchers might not have the skills to bring an innovation to the commercialization stage. However, there seems to exist an expectation that you should just concentrate on your research and not be entrepreneurs. Alejandra and Tobias, on the other hand, went against the unspoken Law of Jante by believing in the best of them and to strive to do more than just research. They encountered difficulties that come with being different, sometimes good but sometimes bad, especially at Lund University where their working in parallel as both entrepreneurs and research was considered odd. Per Eriksson shared one other way in which he helped Concellae by finding a "home" for them, as what they were working on was no longer considered relevant to the science department they had belonged to, which was concentrated more on basic research. At that period, Astra Zeneca was moving out of Lund and there were plans to make their old premises into research facilities for the medical faculty under Medicon Village. They then, with some financial help, set up a research group in 2012, which is affectionately known as the "Honey Group" within Medicon Village. However, there seems to be still a slight misfit as the research done at Medicon Village mostly concerns cancer, and they are looking forward to a possible move where research concentrates around functional food.

Nonetheless, these networks built up during this innovation process also made it possible for them to know about Aventure AB and Inger Björk, who were concentrating on food research. They were in some informal talks about working together with Aventure AB and Oatly AB, but there is nothing firm planned yet. They knew Björk and Rikard Öste while Alejandra was a PhD student in food technology. They had also known about Aventure through Rolf Bjerndell, who knew about Oatly AB and Adventure AB. They identify themselves with the work they do and have considered that they might move with them to their new premises in Medicon Village, as the research is more similar to what they do.

4.3 Baby Food Revolution (BFR)

4.3.1 Abstract

This case describes the efforts by Otto Baby Food (Ottos Barnmat AB) in carving out a new market segment for organic, fresh baby food in Sweden. As this is a relatively young company, it is still an ongoing journey. Otto's Barnmat AB was founded in 2009 and is currently part of the company cluster under Aventure AB. This might change as there are ongoing discussions of a realignment of the Aventures AB group of companies in 2015. Otto Baby Food produces organic, fresh, ready-to-drink baby gruel and baby smoothies which are based on milk and oats. Their aim is to provide fresh and organic alternatives to processed baby food. *Figure 14* shows the focal network of actors in BFR's innovation process and Appendix B depicts the sequence of events from the perspective of one of the main informers, Mats Lönne, who founded the company together with Rolf Bjerndell. This section is divided into different periods: Antecedents (1995-2001), Initiation (2002-2010), and Current Developments (2011-2014). The case ends with an analysis of the fresh baby food development process through the concepts of collective learning and distributed knowledge bases using the ARA model as a framework.

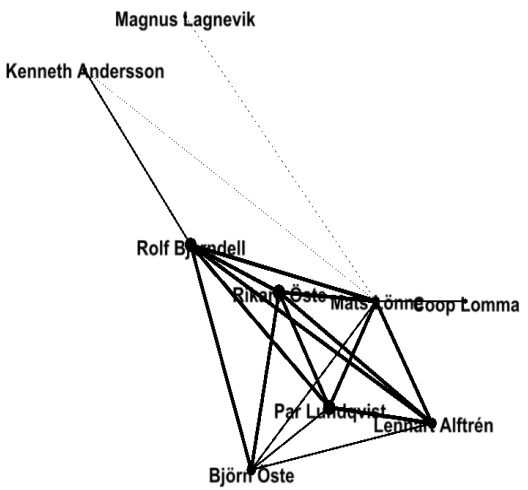

Figure 14
Focal Network Ottos Barnmat AB

4.3.2 Background

The baby food market in Sweden is about SEK 1 billion (Environment, 2013). It is considered a traditional market, as the baby food jars and baby formula powder have been around for quite a number of years without much change. After the Second World War, the baby powder and glass jar food were considered to be safe and this sense of assurance continued throughout generations. The big companies that manufacture baby food continue to give the impression that "it has always been done this way" and that food for babies is special and they are the only ones who know how to do it. The requirements on nutrition and preservatives in baby food are quite strict and act as a deterrent to new entrants, as parents rely on advice from other parents and healthcare professionals. The baby food manufacturers also have a strong hold on the industry and have not been too innovative about their products. Baby food products have remained mostly unchanged for the last sixty years. Two separate attempts to introduce new baby products were made by the actors involved in the innovation process of developing fresh, organic baby food in the late 1990s to early 2000s.

The two founders, Mats Lönne and Rolf Bjerndell, met around 1995 when Lönne was employed at Skånemmejerier (Scania dairy), where Bjerndell was then CEO (Bjerndell also subsequently held posts as chairman of Probi AB and then chairman at Oatly AB). Lönne's educational background is in marketing and brand management at Lund University. During that period, Lönne was consulting for the product Proviva (A functional fruit drink that contains the live bacteria culture Lactobacillus plantarum 299v [DSM 9843]) that was just launched and positioned as a product between the categories of medicine and food. He subsequently took on the position as brand manager for Proviva between 1995 and 2003 and worked closely with Bjerndell. During that period, they also tried to develop a new type of baby food using probiotics. This involved the addition of the bacteria culture, which is considered to be beneficial for the intestines. This project was called "Proviva Baby" and was designed to be a drink for babies that would help prevent allergies. The reaction of the expert opinions played an important part in halting the launch of Proviva Baby. When it comes to the baby food category, there is a lot of bureaucracy and it was quite important to have the support of the medical community, but they had not accepted probiotics at that time. Therefore, they expressed that they would not support giving bacteria to children while they were still young. Lönne and Bjerndell, under Skånemejerier, did not want to go against the doctors at that point in time. In addition, the market was not

ready for a product like Proviva Baby, and the product was eventually closed down. Lönne left the industry shortly thereafter and worked along the marketing and advertising lines for food companies and the like. However, Lönne continued to hold ideas about creating baby food, especially when his second child, Otto, was born in 2008.

There are three other actors who played a role in the antecedent phase of Otto's Baby Food's innovation journey: Rikard Öste, Lennart Alftrén, and Pär Lundqvist. Öste is a professor in food chemistry at Lund University and also the founder of Oatley and the CEO of Aventure AB. Alftrén and Lundqvist were former colleagues at Felix/Procordia AB for about 13 years before they set up the consulting company Potatisspecialisten. They were working on potato products in the product development and marketing departments at Felix.

Alftrén and Lundqvist have had over 30 years of extensive experience in producing dry food in general, and were private label producers for ICA and Axefood's potato products. The proliferation of private labels expanded in the late 1990s and ICA was eager to be part of it. However, ICA remained cautious and protective of their brand name. Baby food is considered an essential product assortment for a supermarket because it can attract families with small kids to patronize the store. This can increase the probability that the families will also buy other types of products in the store, thus helping benefit sales of other items for the supermarket. Upon the request of ICA, Potatisspecialisten, together with Öste, tried to develop baby food amid the heavy regulation. When it was launched, it was an immediate success, but the big baby food producers tried to make ICA stores stop and finally succeeded in finding hydrogenated fats in one of the fatty acid oils from a supplier who had not declared it. That was enough for ICA to stop the product due to possible adverse reactions and to stop the big baby food producers from going public with it. After rectifying the issue, they tried to re-launch it but ICA was not willing to take it up again. These "failed experiences" (ProViva Baby and ICA powdered baby gruel) provided an important background for the development of fresh, organic baby food for Otto's Baby Food.

4.3.3 The Dream Team

> We work as a company but six different person, different companies, depending on the persons of course. It's important to have the right kind of dynamics and no one is doing the same work. Everyone is a specialist in an area.
>
> *Lennart Alftrén, personal communication, 2014*

Lönne subsequently left Skånemejerier and moved to Stockholm in the late 1990s. He worked in a variety of large food companies, but the Proviva Baby project never left his mind. During this period of time, while working for Nestlé in Russia, he got acquainted with Rikard Öste, founder of Oatley AB and CEO of Aventure AB, when he was dealing with some oats-related products. He moved back to Stockholm later to continue his career within the field of communications and branding. He started having contact with Rolf Bjerndell (former CEO of Skånemejerier) again around late 2006.

Bjerndell had left Skånemejerier by then and was involved in various capacities in the area of innovation in the food industry. Bjerndell has been an acting chief executive officer at Oatly AB since October 30, 2007. He has served as the chief executive officer and president of Skånemejerier since 1994 and as the chief executive officer of Skånemejerier from 1994 to 2005. He has also held posts at different points of time at Probi AB, Brämhults Juice AB, Sydkraft Nät AB, Carl Bro Sverige AB, Ellco Foods AB, Malmö Incubator AB, Swedish Oat Fibre AB, Swedish Oat Fibre AB, Ideon Agro Food, and Aventure AB. He serves as chairman of the Chamber of Commerce and Industry in Southern Sweden. He is also currently acting as an advisor at the Innovation and Entrepreneurship activity area within Livsmedelsakademin (Skåne Food Innovation Network). With his long list of credentials and experience, he is of the opinion that the experience and leadership of the board members is critical to a company. He feels that food should be respected and especially those that are directed for children's consumption. Bjerndell had known and worked with Lönne from around 1994-2005 on other projects besides the time with Lönne as product manager of Proviva. Bjerndell considered himself as a "strange animal" in the diary business, as he has had quite a different background. He started with functional food from his beginnings in the food industry. He became acquainted with Inger Björk during his interactions with Rikard Öste at Aventure Ab and Oatly AB. She contributed to an interesting and important discussion with Bjerndell when

they debated the options of baby food that were available on the market then. The idea then came to him to start a baby food product.

Bjerndell had maintained informal contact with Lönne throughout the years after they left Skånemejerier. In 2008-2009, he discussed with Lönne the possibility of starting a baby food company again. They both knew the baby food industry was probably one of the most difficult within the food category because of all the regulations and safety and security concerns. There had not been much happening in the baby food category except for some minor changes in flavors, etc. The baby food section is an unattractive part of the assortment at the supermarket because it does not give them much profit, and sometimes are even sold at a loss so as to attract families with small children. Bjerndell discussed this topic with Lönne and Öste. They realized that they needed to focus on primarily two things: product and consumers—which is why they chose an open innovation approach. Lönne recalled the Proviva Baby project and that he thought it was a pity that it was not launched. His second child, Otto, was born in 2008 and it struck him as he was standing in the supermarket aisle at the baby food section that the products were all older than his child. He started thinking that it must be possible to produce baby food that was fresh and healthy for children in Sweden.

> The attitude and the personal there is the certain energy when we get together we are having fun. I guess its part of the pre-phase concept development-testing hypothesis. We gather feedback from parents in Stockholm itself and we developed our production philosophy based on a smooth processing, smooth heating, cooking down the product, and to be very careful with the raw material and having best organic material, cool chain and very quick and directly out to the final consumers. The product concept of Otto was set then and "fresh organic baby food directly to your door."
>
> *Mats Lönne, personal communication, November 2013*

The experiences of the actors (Dream Team: Lönne, Bjerndell, Öste, Lundqvist, Alftrén) behind Otto's Baby Food concept has been key to how they have strategized going into the baby food market over ten years later. Mats Lönne and Rolf Bjerndell were the first two founders, who came up with the concept behind Otto's Baby Food in 2009 and, together with a group of food industry enthusiasts, had a vision to change baby food forever. Otto's Baby Food AB's network consists of experienced experts in the food sector regarding the packaging and functional drinks industries. The group behind Otto's Baby Food is made up of veterans who have previously worked in the food industry

or are still working in the industry with a total of 150 years' experience that includes Oatley AB, Potato Specialist, and Skånemmejerier.

During this initial phase, they assembled a "dream team" among Rolf Bjerndell's network with Rikard Öste and Björn Öste from Oatley AB and Aventure AB, along with Lennart Alftrén and Pär Lundqvist, also entrepreneurs themselves from Potatisspecialisten (The Potato Specialists) with practical and strong product development experience. Lönne did not consider the fresh ecological baby gruel or smoothies product as radical innovation. However, it created a completely new category on the baby food market in Sweden and they are convinced that it will become an important category as they gather from the good insights they have obtained from consumers and potential customers. Large food manufacturing companies who have dictated the market have dominated the baby food industry and how baby food should look (with powder and jarred baby food). Lönne viewed it as a "hidden industry" with its stagnant products and market since the World Wars. With Bjerndell and the rest of the team, they saw the window of opportunity, since no one dared to try it. Between them, they had competence for liquid food and food processing. With the company, Lönne hopes to improve basic baby food and to start a change in the baby food category.

With funding and support provided by Livsmedelsakademin, Lönne conducted a worldwide feasibility study on baby food in 2009. Magnus Lagnevik, Professor at Lund University and also responsible for the finances at Livsmedelsakademin, knew about Lönne for quite some time as an entrepreneur/inventor working at Ideon with various projects. He got to know Lönne more formally when Lönne wanted to start with the fresh baby food concept. In Lagnevik's opinion, Lönne had great difficulty in starting with that concept because there were two major players that had an oligopoly on the market. This meant that they were stopping all kinds of new thinking and making it difficult for people to go to the market with something new. For example, there was a German variant of ecological baby food that was launched, but they have had no major success. The situation for Lönne was made doubly difficult, as the retailers were also resistant new ideas because it was more convenient to work with established companies and they had no incentives to take up new products since there was no demand for it.

Lönne took an alternative approach to launch the whole project because he did not get through the retailers. Having this fresh concept of baby food was something they believed consumers wanted and needed. The food trend has been to cook from scratch, going organic, and this inspired the innovation in baby food by Otto's Baby Food. In the period in 2008-2010 during which

they conducted worldwide feasibility studies, they also received feedback and interest from expectant parents and consumers who wanted to know how the food was produced and transported, as well as the contents of the baby food. Lönne traversed the main streets of Stockholm and talked to other parents, first about being parents, then about baby food for quite some time, together with his son Otto. They gathered information about the qualities they wanted to develop in the baby food and what they needed. Lönne also obtained e-mail addresses of about 300-400 parents who played an important part in the baby food community that Lönne had built up for consumers interested in fresh, healthy, and ecological baby food. They then used that list to ask them if they were interested in being part of this project of developing baby food products for the age of six months onwards.

> We don't like to call them as focus groups. We like to call them as members of open innovation community. It's not a focus group. Most of them, quite a lot of them ended up as customers. They were literally being participants in the way that we, we were eager to have them looking out for themselves not that having ideas and thoughts from a focus group but actually preparing themselves to be a customer of this for real.
>
> *Rolf Bjerndell, personal communication, 2015*

They started with surveys and focus groups with parents in Stockholm, which provided them with the opportunity to strengthen their product offering—that it is ready to drink and freshly made. Their research also highlighted the importance of the consistency of baby food, as small children are sensitive to how it feels in the mouth. The traditional powdered form of baby formula requires a lot of energy and resources to convert fresh milk to powder. This processing of powdered baby forumla meant that, while it has a long-shelf life, it is not exactly considered 'fresh' food for babies. Powdered formula for baby food to the team at BFR is considered at the opposite end of the spectrum from freshly made baby food. Their findings from the feasibility study showed that the baby food industry provides similar offerings throughout the world: powdered formula and prepared food in glass jars.

By having contact with a close community of users, they were able to adjust and tailor their product and service offerings more accurately, building a brand through community and spurning traditional advertising in favor of social media and closer customer contact. This is not just for product launches, but for keeping these groups of customers informed on their marketing activities and expansion of distribution outlets through Facebook, blogs,

Twitter, Instagram, etc. This was especially influential especially when they had famous personalities who endorsed the product through these public channels. For example, they involved the community of parents and children in the process of product development, such as feedback on packaging etc., to determine that it should be more serious and that they should avoid the use of cartoons to reflect the concentration on natural ingredients.

It was during this time that Livsmedelsakademin went in to sponsor Lönne because, according to Lagnevik, "nobody in their right mind in their company will spend money on an idea like that or a person like that." The reason Livsmedelsakademin sponsored Lönne was also due to the fact that among the projects that Livsmedelsakademin were involved in or knew about, there were quite a few that were stopped because of resistance from retailers to take on new products. This has been a problem for many years. The retailers also had their centralized purchasing policies, which discouraged any forms of discussion outside the normal procedures. One example that proved to be a success, though, was when Livsmedelsakademin had set up a retailer network with large ICA retailers and there was one retailer who was willing to try new things. They set up an innovation meeting in that shop in which the retailer expressed interest in having local products. They made arrangements and provided the retailer with contacts to local producers; he had tremendous success. Sales increased in the local food assortment by 23%, which impressed other ICA retailers. Now they have 40 major retailers who offer local produce as part of their stores' assortment. Thus, one of the ways Livsmedelsakademin succeeded in getting through the "Berlin wall" in the retail market was through network activities and subsequently continued efforts in that area through the brand Smaka på Skåne (Taste of Scania). That was one of the ways SFIN managed to have new, interesting products on the market—products that had a chance to be on the retail shelves to be tried and tested by consumers to see if they would sell, not based only on some central purchasing decision. The basic thinking was that "open innovation combined with transparency in the whole value-added chain will increase the innovative flow." Therefore, Lönne impressed them with his efforts. The fact that he started with the consumers' opinions showed him to be somebody who actually listened to the consumers, and the consumers were supporting him. The main resources that Livsmedelsakademin provided to him, besides financing certain parts of the process, were connecting him with people and organizations that could help Otto's Baby Food produce the product.

> The concept, product and design have been developed according to the principle of 'open innovation' in close collaboration with our customers.
>
> *Mats Lönne, extracted from article in Advantage Environment, 2013*

Lönne, through Öste and Bjerndell, got into contact with the people involved with Oatly (Oat-based functional drinks and products) and various others through contacts from the members of the team to develop and manufacture the products. One of the key philosophies about Otto's Baby Food products concerns the ingredients that go into it and the production and delivery processes. From the handling of raw materials and careful heat treatment during production, the baby gruels contain no preservatives or other additives. They also have a cold chain distribution that they handle themselves, and they have direct contact with their customers. This is not done for baby food in general, as they are often prepackaged or are presented in dried or preserved forms. As of 2014, Ottos Baby Food currently produce two types of välling and baby smoothies at Falköpings's dairy for babies aged six months and eight months onwards.

Öste and Bjerndell had been collaborating for a number of years while Bjerndell was on the board of Oatly. When they decided to separate Aventure from Oatly, Öste had asked Bjerndell to be the chairman of the board. While he is a chemist and not against additives or compounds in food, he could understand Lönne's interest in creating a fresh baby food category. The main contribution from Aventure was to create as much safety as possible for Otto's product. In this case, that meant being clean throughout every step and keeping the level of microorganisms low, from the raw ingredients to the processing and packaging. They pushed the levels of acceptance and also obtained the shops' cooperation to maintain the product at a low temperature. That is part of what Aventure does: bring science to the market and the market to science. Otto's Baby Food was different from other daughter companies of Aventure in that it had started from the market instead of from science. They felt that they could be helpful due to their knowledge of food processing to produce a fresh product for Otto's Baby Food. They have, however, reduced their ownership and sold it back to Lönne, and he is the main driving force for Otto's Baby Food in 2013, as it is not totally aligned with Aventure's main directions. They still support the company, which is starting to take off. Aventure's experience comes from all their years in research, basic food chemistry, experience with Oatly, and even Olöf Böök's (current Vice CEO of Aventure AB) past experience with quality management in Oatly. It was also

due to their earlier experience that Öste, together with Alftrén and Lundqvist, developed the baby gruel for ICA.

The product development took three years to develop and to ensure safe production. When it comes to product development and commercialization, Olof Böök, who first joined Aventure AB in mid-90s as a PhD student, is the one at Aventure AB who helps Otto's Baby Food during the process. Böök has had 20 years of experience in food science and product development. He joined the company at the phase when Oatley had only about three people, which in 2008 become a 45-employee strong company. By the time they shifted Aventure AB out of Oatley AB, they had become quite experienced in commercialization and industrialization of research on a large scale. Technology and ideas were the drivers in Aventure AB, a company they formed from a group around Rikard Öste's network and moved out of Oatley AB to Active Biotech, where Lund University is. Aventure AB is a family-owned company headed by Rikard and Björn Öste. Böök considered this to be good because they operate business based on a long-term basis and try to do things that big companies do not dare to do in the food industry. They are trained in biochemistry, food nutrition, and chemistry, and try to commercialize concepts and ideas. Aventure AB has become more of a holding company, spinning off companies where each one is focused on certain concepts and brands and where external money and venture capital can invest, such as Gluconova, Oatley, etc. As such, Aventure AB sees themselves as a new form of marketing company; they look at the market and see how they can develop the market by new research results and new concepts, and Otto's Baby Food is a typical example of that. Böök met Bjerndell in late 90s when Böök was working in Proviva and Oatley. Öste was his mentor and knew Bjerndell. They started to work with Bjerndell when he was CEO of Skånemejerier (and Skånemejerier later also became part owner in Oatley), which created the natural connection when he approached them about Otto's Baby Food. When Bjerndell left Skånemejerier to have more freedom, he become very important to the company cluster in this part of the region. They (Öste and Bjerndell) shared the same perspective about why true innovation seldom comes from big companies, and wanted to change this. Böök's role in the innovation journey of Otto's Baby Food was mainly in terms of experience and his training in commercializing ideas from pilot plans to factory and to the consumers in the market.

Their first product was a milk and oat concoction commonly known as "välling," or gruel, in the Swedish baby food market. It is traditionally produced as a dried powder that is mixed with water or milk, and given to

babies who have recently been weaned. For Otto's välling, they used ecological ingredients—oats and milk—that came from farms in Varaslätten in Västergötland in Sweden. Production took place in their own production line at Falköpings dairies in the same province. Their manufacturing process differed from traditional manufacturing of ready-to-drink baby formula as they used careful heat treatment and no additives. The texture is also significant, as their research showed that how the välling feels in the mouth is important to the baby. The children and grandchildren of the management team also tested the products while they were developing the baby gruel.

Otto's Baby Food started to sell only to the community with their own delivery trucks in the Stockholm area. They decided to collaborate to come up with something unique and look at different partnerships and production, and also to circumvent the retailers because they were "holding them back" in terms of demands that might be made on the retailers by the bigger companies. They got some inspiration from the grocery bag deliveries that were becoming successful; they studied the delivery companies and studies from Livemedelsakademin on these grocery bag concepts in terms of cost and operations. They also consulted with experts who look at software for traffic control and route planning. Eventually they came up with a distribution system of two weeks and of delivering it to parents at home during the daytime because they would be home. This is similar to the concept of "Matkasse" (grocery bag deliveries), where selected groceries are delivered to the customers' homes weekly. So the idea was to change the incumbent baby food industry and to revolutionize it with new fresh products. This would make it hard for traditional baby food manufacturers to compete since they could not use their own existing products to make direct comparisons. The other aspect was to get the direct delivery to the customers and to establish that as a business in its own right to build a distribution chain.

Customers choose to subscribe to the delivery service, which is available in Stockholm, and they receive the chilled baby gruel at their doorsteps fortnightly. Gradually, demand for buying single packs started coming and they found out from the parents that they were giving single packs of the baby gruel from their own stock (since they did not sell it in normal stores then) to their friends and relatives. The feedback was that the parents would also like to buy it in stores. Some specialty stores also contacted them with the feedback that their customers wanted to buy it in their specialty stores, which meant Otto's Baby Food products would be on retail shelves instead of through subscription. They reconsidered the distribution channels and concluded that selling them in individual packs instead of just through subscription would be

a good way for potential customers to sample the product. They were, however, quite selective in choosing the stores (shop owners should be the owner, or have the ability to decide at the store location) that would carry the product line and started supplying select, premium organic stores that could fulfill their cold chain requirements for storage of the product too. Kajsa Waj, a specialty store in Stockholm, was one of the first to stock Otto's Baby Food products. This arrangement was only on the condition that Otto's Baby Food deliver and invoice the stores directly to control the quality and sell it to the right people. Interestingly, this demand prompted ICA to contact Otto's Baby Food. This was considered an abnormality, as ICA normally did not contact suppliers to ask to sell their products, but they made an exception to that practice and asked if Otto's Baby Food would sell through them. Otto's Baby Food rejected initially, as they did not want their products to be distributed centrally because it would mean the loss of control over the cold chain process. ICA then offered to let Otto's Baby Food select some ICA retailers that they thought would be suitable to work with instead, much like the arrangement they had with the specialized food stores. The latest update on the distribution agreement in February 2016 allowed any ICA franchise stores to order Otto's Välling to be part of their retail offering.

4.3.4 Maintaining the Freshness

> Nothing had happened to the baby food area since the Second World War.
>
> *Lennart Alftren, personal communications, 2014*

Alftrén and Lundqvist thought that Otto's Baby Food was still considered small scale, but they do have big producers watching their moves. Mats Lönne and his wife have been putting a lot of work into the company and represent the main working team (except for Björn and Rikard Öste) together with Olof Böök and the Potato specialist team. There is still a challenge in terms of manufacturing, as the actual production of the baby food is only done in Falköping now. Björn Öste's experience in the US in terms of co-packer operations, in his view, is very efficient, and many small food companies focus on their product and buy services for all other components of their operation such as packaging and packing services. The food industry in Europe is quite interesting in Björn Öste's view because the big companies have been stagnant for a long time. There are plenty of opportunities to innovate in the industry,

not just in the food, but also around food, such as packaging and logistics. The network and experience of the team had played an important part in securing the packaging contacts with Falköping. Aventure AB had experience in working with them for another liquid batter product. The key to getting Otto's Baby Food products to be produced was resolved through networking. Rolf Bjerndell knew the co-packers in Falköping quite well and together Rolf and Björn convinced them to work with Otto's Baby Food.

The management team for Otto's Baby Food had initially planned for the business model to be subscription-based; however, it did not grow fast enough. Lennart Alftrén remarked that it was good that ICA and the other supermarkets were very interested to have the product in their store assortment, so the company was "lucky in a way." They had thought that the interest from the shop would take a few years, but it actually only took three months. Their other goal had been to create a consumer response that would pressure the retailers to want the product in their stores. The responses from the stores were very rapid (less than a month), which was when ICA from central purchasing called and wanted to be part of the distribution outlets. It was faster than they had expected. They have attributed part of it to influence and buzz created by social media channels (Facebook, blog, Twitter) with famous and loyal subscribers giving good testimonials and supporting what Otto's Baby Food stands for (fresh, ecological baby food). At the start of the project, they had scouted for 50-60 possible parents, and these parents had followed them from the beginning, acting as customers, helpers, and advocates for the brand. Otto's Baby Food subsequently handpicked the ICA stores to ensure the delivery and storage of the product met their standards. About 20 stores (large ICA stores and organic stores) in the Stockholm and Uppsala region started carrying the products in 2014. Toward the end of 2014, more ICA and COOP retailers at selected locations in other locations in Sweden in the Skåne and Göteborg regions began selling the product. The aim was that, since they have direct production and delivery, Otto's Baby Food products could be on retail shelves in fewer than 20 hours from production.

After lots of tests, they started out deliveries to a couple of places in Stockholm. The reason why they did not start out in the direct retail market such as physical shelf space in supermarkets was because they thought the retail-supplier system would crush them even before they could start. Retailers were known to demand terms that might be hard for small suppliers to fulfill, especially new start-ups. Instead, BFR went directly to the consumer, who would be directly influencing the product.

> Working 30 years with retailers in Sweden I have never, ever experienced the fact that you come into a store, you talk about a concept, and they said, "Hey, that's great, can I have it tomorrow?" Or even through clients calling their retail outlets, "Hey, we need to have Otto's välling, please make sure you can find it somewhere." And they call us and said, "We want the product." Nothing I have experienced in my whole life earlier. And this is because of the fact two facts I think: first of all, baby food is very crucial for retailers and also it is fresh and ecological and its very right for the moment, it's very trendy for the moment.
>
> *Pär and Lennart, personal communication, 2014*

According to Olof Böök, the novelty of Otto's Baby Food lies partly with the distribution model and how they have approached the market. The innovation lies in the concept (single brand delivery), how it is promoted, how social media strategy is used, and how it is being distributed. They developed a category in the retail market that had not been developing so much (nothing happened much in 30-40 years, as compared to the dairy category). The original distribution model based on focus groups they had was a good basis to begin operation with 150 families in the Stockholm area. That was the platform to get further venture capital and investors, especially since they already had customers who signed up. The company's first product, a milk and oat-based baby gruel, contained ingredients sourced from 20 farms close to the company's base in Stockholm and produced in Falköping. From there, Otto's Baby Food takes full responsibility for every step in the chain, through manufacture to final delivery to parents in their homes. They started by providing a subscription-based delivery system to guarantee high quality and freshness of their product directly to the customers' homes. However, they soon found out that it was very hard and because of the erratic ordering schedule, they needed to refine their strategy to be able to expand the retail market. They still wanted to control the distribution and increase sales. When the opportunity came with the big retailers, they met up with a team from ICA and BFR informed the retailers that they would carefully select stores and would promote and educate those stores because they wanted to change this category. However, it would not be sold centrally so as not to lose control of the distribution. They are currently ready for the next phase (with about 35 stores in the Stockholm, Uppsala, Malmö, Lund, etc. as of April 2014) and have begun selling at selected retail outlets and specialty stores in these regions. They are always checking how the places and products are displayed and how it fits with the concept, and are embarking on further discussion with other dairy

packers to see how this can be further organized in good premium stores under their control. Business is growing fast and plans to expand to other urban centers across Sweden are already being developed, while new products are being planned and launched.

The future is also looking different, with a new generation of retailers embracing this concept. Magnus Lagnevik shared how Coop, as one of the larger retailers in Sweden, has been stopping innovation for years and was extremely difficult to work with. However, in 2013 a new managing director, who was previously with ICA, took over the reins and has a new strategy. The new Coop management wanted to only concentrate on premium retailers, and sold off the rest of the business. Coop headquarters gave the local stores some freedom to act more independently, since managers in a Coop store are employed as opposed to owning a franchise, unlike ICA. It was through this change in policies at the same time that allowed the opportunity for Otto's Baby Food. For example, the Coop branch in Lomma had their aim set on positioning their store as having local food produce and an organic assortment. They also wanted to be an ecological provider in an area where the clientele had the preference to care about their health and to buy organic food. The staff found out about Otto's Baby Food, and the staff in charge of the organic products section contacted Otto's Baby Food to indicate their interest in selling the product even though they were not on the "approved list" according to the direct distribution criteria of Otto's Baby Food. They had heard about the product from other people and their customers. Initially, they were told that because Coop had a long process when it came to new products through central buying, that created problem for new products, and therefore Coop was not on the approved list. The staff managed to persuade Otto's Baby Food that they were a new store and could take advantage of that to get in the new product. Lomma Coop's staff member who was in charge of the baby food assortment at the branch convinced Lönne that if there were any problems, the staff would be responsible for dealing with it. The products are delivered directly to their store every two weeks. It has had a good response so far and the customers like that they can buy fresh baby food. The staff in charge also shared that because Lomma Coop is dealing directly with Otto's Baby Food instead of going through the central purchasing at Coop, it was not a problem getting the product to the store. They are open to new products and to the fact that this product is not like the other ones, and their local clientele are willing to pay more than average to enjoy organic products. Other Coop branches, for example the one in Lund near Lomma, have also requested to be able to carry the product line. Therefore, it was a major achievement that Coop stores

started selling Otto's Baby Food products. That was how Livsmedelsakademin viewed Otto's Baby Food and why they financed them—as the hammer that could break down these barriers. Lagnevik considered what Otto's Baby Food had done to be brave, because they did something that nobody had done before in Sweden, especially through e-tailing (electronic retailing—selling through the Internet). The retailers have been mostly following each other in terms of product assortment and had been following a quite safe strategy.

The plan for Otto's Baby Food is to grow in volume in the coming year or two and to maintain contact with the consumers. Quite a few subscribers are famous people who have been giving good testimonials about the product, but they need the volume for a sustainable production for the product. Their aim to change the baby food industry in Sweden includes the plan to expand the food assortment for baby food. One of the toughest challenges has been financial resources when in a new field, and in terms of logistics, with doing direct home delivery. The founders and their dream team's mindset has allowed them to meet whatever challenges have come their way, and that has been the single most important thing with all their knowledge. It is their view that they have passed so many thresholds in this journey to create this platform that can be expanded with new products assortment.

The customers have been very satisfied and they still have an extraordinary customer base because they have spent almost nothing on marketing, as everything works through the Internet and social media. Lönne handles the Otto's online presence, and the blogger customers are doing it of their own accord. The customers are thankful for this product, and Bjerndell felt that there was another element—sympathy—that led the customers to align themselves with Otto's as a small company in opposition to bigger baby food conglomerates. This is similar to the phenomenon with Oatly. This is something quite different from the products that the big companies try to push to the consumers. They also have a lot of direct communication, especially when they make the deliveries directly. Lönne's wife, who used to be an event manager at TV4 in Stockholm, also aided in the proliferation of the product to the parents' market with her network contacts. However, the favorable response to the product continues to be an important aspect of the marketing message of the company.

4.3.5 Analysis

This case described the innovation process of the introduction of fresh ecological baby food to the Swedish market and a new marketing approach to the retail sector. The two critical events are described in section 4.3.3 and section 4.3.4. These two critical events helped pave the initial phase of the innovation journey of Otto's Baby food. The first took the experiences of the Dream Team in the lesson with ICA private brand powdered baby gruel in mind and the Proviva Baby Project to launch the new product to the baby food category in the Swedish retail market. This enabled them to re-approach the market in a more intuitive way, as seen in critical event 2.

4.3.5.1 Activities Links

Due to the actor bonds, the activities conducted even before the product was launched can be considered extensive. This was seen, for example, in undertaking a worldwide scan of the baby food market and drawing references from other types of studies for the business model as a whole. They also approached it with a new way of branding by establishing direct contact and transparency all the way from delivery back to the source. It was an incredibly important lesson about how food retailers work, especially when it comes to protecting their sources of income, and when it comes to baby food, one really needs to do all the homework.

Another way in which activity links transformed into a form of resource can be seen through the development of these scans and surveys. In this case, what started out as a survey directly to parents in the streets of Stockholm to find out what they wanted from baby food subsequently developed into a channel where it helped fulfilled various purposes. This initial customer base transformed into a distributed knowledge base during the interaction between the resource and activity substance layers. This knowledge base also performed another function in the analysis framework—as a resource from which Otto's Baby Food draws to develop its product and marketing channels. This resource is strategically integrated into their overall marketing capabilities as part of their product offering, i.e., as a product that is known, promoted, and trusted by actual parents who are customers of the product. It also helped in that some customers had their own "pulling power" as celebrities. These activity links subsequently developed through activity patterns with their customers into a form of knowledge base. Besides being used as testimonials when marketing their products, they also served as a sounding board for product improvements

and new product ideas. In this instance with Otto's Baby Food, their interaction with customers via social media is considered an informal but powerful channel.

Further activities in this channel can be seen through the support by testimonials from parents who are currently subscribers to their delivery service: real parents and even some celebrities who have helped to provide more weightage to the product. Consider, for instance, the transformation of an actor that first played a role as a resource into part of the knowledge base for Otto's Baby Food through these activity links. When Lönne received funding from SFIN to conduct a worldwide market scan, SFIN viewed them as being aligned with their goal to potentially influence the retail landscape in Sweden. Although SFIN acted as a resource (financial) at this time, it subsequently transformed into a knowledge base to which Otto's Baby Food turns for understanding the Swedish retail market through the advice and contacts provided by Livsmedelakademin.

One can also view how the concept of Otto's Baby Food can be seen as a repackaging of how milk was delivered by milkmen in earlier times but in a renewed urban concept, providing an urban product to these parents. Parents give high priority to their kids and the direct contact to them in this case provided Otto's Baby Food with very good feedback, for example when they were choosing the design of the packaging. The parents have been an important group for Otto's Baby Food as the feedback channel becomes more direct. Otto's Baby Food has employed social media as one of the tools to ask their clients for feedback or testimonials. These have proven to have quite a big influence for the company as a marketing channel, as the buzz created by celebrity testimonials has been very positive. These actor bonds between the customer and producer can be seen as a new type of social media bonding that may not have been studied much in the area of network studies. In addition, due to the presentation of the product as one that is personal, communication manners are also updated in a personal manner through Twitter, Facebook, Instagram, etc.

> We want to have new interesting products on to the market and tried by the consumers and see if they sell and behind that is a kind of basic thinking that open innovation combined with transparency in the whole value added chain will increase the innovative flow. And that means we need much more of interactivity and we need much more of consumer influx in decision making on what to do. And here was a guy who actually got consumers…he started from the consumers and that impressed us on a conceptual level. Somebody who actually listens to the consumers! That's important!
>
> *Magnus Lagnevik, personal communication, 2014*

4.3.5.2 Resource Ties

As pointed out in previous literature, how knowledge has been distributed has been neglected due to SMEs in low-tech industries interacting in an informal manner to exchange knowledge, which can be hard to captured. In this case, the interaction with external actors in order to access external knowledge sources, such as via customers (through social media, Facebook, Blogs, etc.), has meant the building up of knowledge bases to aid in developing innovation strategies for SMEs. First, the main management team of actors who have amassed experience from working at their own industries or companies comes together as a resource constellation during the innovation process. This creates a distributed knowledge base when interaction within the network of actors happens. For example, when sourcing for a way to manufacture the ecological gruel, the management team at BFR utilized the knowledge gained from experiences with Oatley, an oat-based functional beverage company founded by Rikard Öste, to find contract packaging companies that would be willing to produce a small consignment of products in the beginning. The knowledge that is utilized at the network level activates the web of actors and resource constellation to create a collective knowledge base that can be drawn from.

Otto's Baby Food integrated and reconfigured resources in order to carve out a new category of baby food in the Swedish retail market. This was a sequence of episodes that cumulated to form the critical event wherein customers' demand actually spurred retailers to approach Otto's Baby Food so that they could carry their products. This is something that was, according to Pär Lundqvist, unheard of in his years of working with Swedish retailers. This view was echoed when Magnus Lagnevik also found the development where the big retailers who were normally resistant to being offered new product types actually took the first step in approaching Otto's Baby Food so that they

could get a share of this fresh and ecological baby gruel market. Otto's Baby Food's access to knowledge and opportunities has allowed them to adapt these unexpected turns of events to their advantage. They were approached first by specialty stores, then subsequently by large traditional retailers who stepped out of their comfort zone. This happened for both ICA and also Coop (both currently have stores carrying Otto's Baby Food products in Malmö, Lund, Stockholm, Uppsala, etc.). In this sense, they have not only carved out a new category of baby food, but also a new way in which retailer-suppliers work in a traditional Swedish retail landscape.

Proviva Baby was designed to be baby gruel with an added probiotic for those aged six months and above. One of the gurus in the baby doctor hierarchy who was sponsored by Semper reacted because they were not in support of giving bacteria to kids. They did not want to take on that fight at that point of time, as Proviva was just gaining more impact. Semper has become like a "legislator" in the baby food market. In hindsight, they may also have underestimated the influence of these stakeholders, who are often already associated with recommendation of other more established brands of baby food. Kenneth Andersson, the R&D manager of Skånemejerier, then knew about Lönne, who had worked at the marketing department as product manager for Proviva, and he had also followed the progress with Otto's Baby Food. He recalled that the Proviva Baby project was a gruel product in a ready-to-eat package:

> At that time, we had a project called Proviva Baby in 2001. It was never launched despite after having made all the studies both clinical and security. Our challenge, our purpose was to prevent allergies and promote a new defence, which is a big problem in the Western world especially. One person made his PhD thesis just on this. Before the launch, we called the leading paediatricians, and they came down to them and we asked their opinions on this and all we have done. "You are going to change the whole industry for baby food in Sweden." Do more research they say, but they were heavily connected to the baby food companies. But we did not dare to launch it at the risk of jeopardizing the brand name of Proviva (it was worth a lot of money and increasing in sales)—so it was not launched.
>
> *Mats Lönne, personal communication, November 2013*

The whole incident enabled the Dream Team to be very much aware of how high-profile the baby food category was and how the media could be quite sensitive to any developments in this area. This made them even more cautious

about having everything checked thoroughly. They have had the bad experience of the supplier not being totally upfront on what the ingredients were. They subsequently began screening the ingredients even more and took more precautions than the rules required, and they kept themselves updated on the legislation aspect, especially when it came to baby food. This cautionary awareness of the available resource constraints or competitors allowed them to be in a better position to approach the market launch of the product.

Another important resource to consider is the experience of the Dream Team themselves in relation to the adjustment of business strategies. For example, while BFR started out with the subscription model for the baby gruel, this method of operation sparked the interest of the retailers as the consumers were asking for the products to be sold at normal retail outlets. Due to the combined experience of the Dream Team, including Rikard Öste, Pär Lundqvist, Lennart Alftrén, Rolf Bjerndell, and Mats Lönne, they were more in tune with how the market was reacting and adjusted their business model accordingly. Currently, consumers are able to indicate their interest to purchase Otto's product at a retail outlet near them on Otto's social media page. With this "demand," Otto Baby Food is then able to understand and advise the retailers on the stocking of their products at their retail stores.

4.3.5.3 Actor Bonds

When this team of actors came together in 2011, they pooled together their experience and learned as a team to avoid similar pitfalls when developing the product for Otto's Baby Food. Both events also made them realize the value of establishing direct contact with the consumers and thus they did not want to sell the product in the normal, central way, instead going the other way round to the consumers by distributing it directly. Their combined experience has informed them as to the power of the retailers, the influence of expert opinions, and major competitors, and in this attempt to enter the baby food market, they did it in a different way. It was a successful retail concept to the extent that it had prompted the large retailers to knock on their doors to ask to be able to sell it.

The web of actors (consisting of Lönne, Bjerndell, Öste, Alftrén, and Lundqvist) bore the experience with the powdered baby gruel and Proviva Baby in mind. Lönne prepared thoroughly before the product development process by undertaking a worldwide scan of the baby food market and drawing references from other types of studies for the business model as a whole (for example, using studies conducted by SFIN and the concept of Grocery Bags

Deliveries—Matkasse). In addition, Björn Öste also provided knowledge about contract packing and both he and Bjerndell utilized their network contacts to secure manufacturing possibilities for the production of the ecological fresh baby gruel. By riding on the proven success of Oatly, which Rikard Öste founded, they reconfigured resources within the firm to provide a drink that met the criteria of what their customers wanted. This shared experienced implies that the learning that had occurred from this "failed" event ensured that these basic grounds were covered during the product development phase itself. Even before that, the critical event where their experience with producing dried baby gruel for the supermarket chain provided critical actor bonds that endured through the years, even while they were working for other types of companies. All this would not have been possible if not for the already established ties between each dyad based on previous projects. For instance the two actors from the current management team tried to execute the project Proviva Baby in the period 1998-2000. This dyadic relationship between Lönne and Bjerndell was built during Lönne's time with Skånemejerier and during the Proviva Baby project. Although the project did not become commercialized, the actor bonds established then were key to the establishment of Otto's Baby Food. Similarly, the ICA private-label powdered baby gruel project formed bonds between actors from Aventure AB (Rikard Öste) and Potato Specialists (Alftrén and Lundqvist).

Lönne, the main informant, had referred to the current management team as having both the industry experience (both skills and knowledge) and the right attitude when they were developing the product and strategy for the company. In this early stage of Otto's Baby Food's innovation journey, the willingness to work together and having access to knowledge from different sources was also observed when the actors reaffirmed each other as being the "dream team." When actors interact together, bonds are established wherein opinions and viewpoints are shared. At that point, the actors themselves are considered to be a form of resource with their unique experience and skills. These dual roles that the actors play as nodes within the web of actors extends beyond that which is related to resources, especially when they engage in activities to coordinate the processes of production, operation, and management with other actors (both current, new, or potential).

The changing society with constantly "upgraded" knowledge about baby food meant that there was a cyclical interaction process that was particular to that of the consumer and food manufacturer. This implies that the interaction is no longer purely based on the product, but on a combination of product and services. In such cyclical interaction, early users are seen as playing an

important role in the success of the innovation process. In this instance, it can be seen that in this innovation process of fresh, organic baby food, the creativity of the customers was being harnessed for the support process of Otto's Baby Food.

These two critical events as shown in *Figure 15* helped pave the initial phase of the innovation journey of Otto's Baby Food. For instance, the events, including the encounter between Inger Björk and Rolf Bjerndell where they discussed baby food in the market, motivated and allowed the strengthening of actor bonds through the development of the project but were even more important when the project failed. The group (comprising Rikard Öste, Alftrén, and Lundqvist) bore the lesson of ICA private brand powdered baby gruel in mind and this enabled them to re-approach the market in a more intuitive way. This was seen, for example, in undertaking a worldwide scan of the baby food market and drawing references from other types of studies for the business model as a whole. They also approached it with a new way of branding by establishing direct contact and transparency all the way from delivery back to the source. It was an incredibly important lesson about how the food retailers worked, especially when it came to protecting their sources of income.

4.3.5.4 Continuing the journey

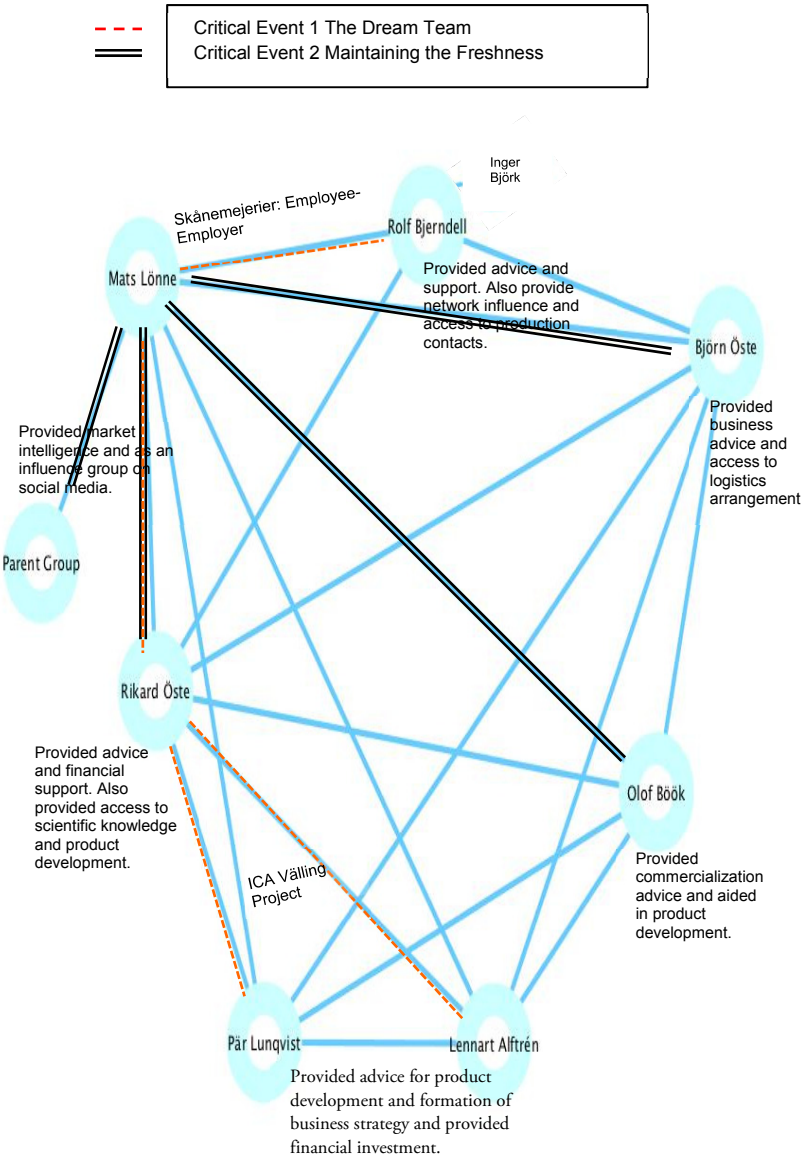

Figure 15
BFR ARA network

When this team of actors came together in 2011, they pooled together their establishing direct contact with the consumers and thus they did not want to sell the product the normal, central way, instead going the other way round to the consumers by distributing it directly. Their combined experience has informed them as to the power of the retailers, the influence of expert opinions, and major competitors, and so in this attempt to enter the baby food market, they did it in a different way. It was a successful retail concept to the extent that it had prompted the large retailers to knock on their doors to ask to be able to sell it.

It was their failures that provided the incentive and opportunity to learn. This is seen quite clearly even as the knowledge about developing baby food products had emerged from two separate critical events. Similar threads can be seen from both the "failed" projects, which was completed or near completion but was later pulled out because of the "objection" of other major players in the market.

Key actors are also deemed to be important in the innovation of microenterprises. These actors have been described as "spiders in the web" and play critical role(s) in the innovation process. While microenterprises have been described as lacking in resources and hence are on a constant quest for external resources, the empirical data have indicated that by including key actors in the board or as part of the microenterprise's network, access to such resources are "inherited." The selection of such key actors is an important factor to the success of microenterprises' innovation journey.

Mats Lönne, the main informant, had referred to the current management team as having both the industry experience (both skills and knowledge) and the right attitude when they were developing the product and strategy for the company. In this early stage of Otto's Baby Food's innovation journey, the willingness to work together and having access to knowledge from different sources was also observed when the actors reaffirmed each other as being the "dream team." The critical events allowed the strengthening of actor bonds through the development of the project, but even more importantly through the project's failure.

The retail landscape has been quite rigid and Bjerndell felt that they would run into problems if they were not open to new ways of doing things. The thing to start with is that Otto is an urban product targeted at customers who are concerned parents with financial resources, good purchasing power, and insight into nutrition for kids. Those were the demographics that they had chosen to focus on, and thus the Greater Goteborg area, Stockholm area and the western part of Skåne were chosen because these areas have a good

concentration of target families with small children. There has been strong demand from other areas of Sweden that want to buy the product. This has in part been built up by one of the marketing techniques of potential customer being able to put a store on a wish list for Otto's Baby Food to distribute their products there. Consumers are now more in control of the information they choose to receive or find out. And Bjerndell's thought is that products should be aimed at more prevention. Probiotics, in Bjenrdell's view, are one of the key ingredients in the new nutrition trend. Now consumers need to have good stuff and to enhance it further. Baby food companies such as Semper have reacted to the Otto's Baby Food products by examining their ingredients in detail. The conclusion has been that the product itself has nothing that they can find fault on. The way in which they have approached the market is by establishing direct contact with their customers through direct delivery. This direct interaction with customers also acts as a form of knowledge bases. Their relation with the customers had started from a company-customer interaction to evolve into one of collaborating to develop the product, marketing channel, and positioning as they utilize the feedback from their customers to improving their products further.

This form of "discontinuous innovation" can be viewed from another perspective: The experiences are connected to present events and actors over time, and there is no discontinuity in that way. They are able to connect, and, in some cases, it was good that the management team's past experience with trying to introduce new baby food products to the market enabled them to apply a combination of old and new knowledge bases to the present approach to the baby food market.

This case also aligns with what Storbacka and Nenonen (2015) suggested on social networks as an important strategy when establishing a firm, in that relations can be used to mobilize complementary resources, garner support, and build business relations. These relationships can act as bridges to connect to other resource nodes in the network.

4.4 The Cold O_3 Treatment (CO_3)

4.4.1 Abstract

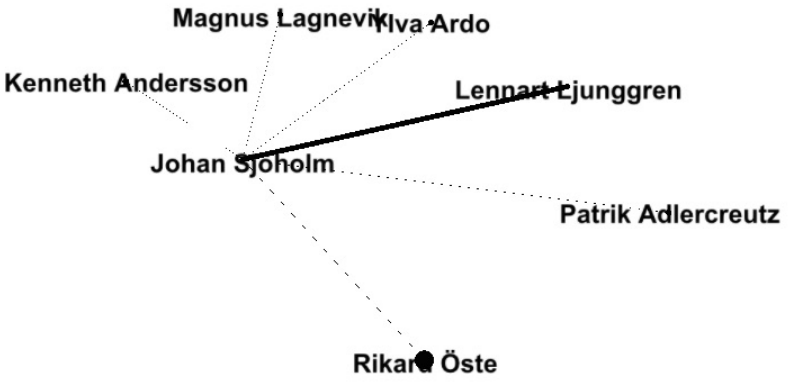

Figure 16.
Focal Network for Pastair AB

The founder of Pastair AB, Johan Sjöholm, is a serial entrepreneur who has had extensive experience in innovation. He has worked for Tetra Pak, a Swedish packaging company, and has successfully invented a packaging solution bought by Ecolean. Like many other entrepreneurs, however, Sjöholm has also had his fair share of setbacks with his inventions. This case is a description of one of his innovations and *Figure 16* shows the focal network for Pastair during this innovation process: Pastair AB. Pastair uses a new type of pasteurization using ozone. During the period of 2008-2009, there were frequent reports in the media on their field-testing of the technology with Skånemejerier, a dairy company, on their juice product and with other potential customers. However, since 2010, there has been an absence of updates on this collaboration. A news update from the Swedish Energy Agency (2014) one of the organizations that had funded Pastair in the past, notified the public that while Pastair had reached the initial commercial phase, they lacked the "muscles and organization to bring the system to the market globally." The technology/patent is currently for sale.

4.4.2 Background

Pasteurization is traditionally a heat-treatment process that destroys microorganisms that can cause diseases in certain foods and beverages. Through this process, it is also expected to help improve the shelf life of the product. This process, while effective, has more demands on energy and may also destroy enzymes, vitamins, and other healthy properties of the food and beverages.

There have been explorations of other ways of pasteurizing, both on an experimental and a commercial scale. For example, one type of cold pasteurization that is more common now is used on processes using pressure (pascalization or HPP—high pressure pasteurization). Some other forms of cold pasteurization include using ultraviolet laser light or irradiation to achieve the same purposes as traditional pasteurization but without using heat.

Pastair is engaged in developing and marketing new technology for removing microorganisms in liquid food. Pastair AB's technology, also known as a cold pasteurization technique, was designed to be more environmental friendly (saving up to 70% of energy usage) as it uses active oxygen instead of heating up water to kill the harmful microorganisms. Through this method, food such as milk, juices, soups, and sauces can retain both their flavors and healthy properties.

Sjöholm has been working on the pasteurizing technique since 1997 to find a way to provide healthier, better tasting food. The idea first originated with a discussion with the research and development head at Skånemejerier who was looking for a way to prolong the shelf life of milk without affecting the taste. During his time working on AromPak, Sjöholm had experimented with injecting carbon dioxide in food, and that had been an effective method. However, it would have meant a total change in packaging that would make it too expensive for the final cost of milk. This got Sjöholm thinking about other ways of using this method. The technique worked on the principle that microorganisms are killed with the help of active oxygen, which in other applications has been used for cleaning drinking water and thus may be applicable to other food and beverages too. Initial tests were conducted by injecting various gases in liquid products with the cold pasteurizing project launched in 2005. In 2006, they managed to obtain positive results from their test with an energy savings of up to 50%. While the food industry has been trying to find an alternative for cold pasteurization for many years, the methods were either too hard to be built up or too expensive.

They refined the technology further in 2007, and Pastair AB was initially set up with the help of a financial partner and additionally in June 2007 by the venture capital company GLG Partners. Subsequent grants from other institutes allowed further research and testing to establish a reduction rate of 99.9% of the pathogenic bacteria. Sjöholm has his background in mechanical engineering and is a serial entrepreneur, always doing or inventing something related to food, having had past experience setting up innovative companies. He had worked for Tetra Pak for 17 years in various positions around machinery. He learned mostly by working with the company and he felt that for food applications (like machines etc.), it would take at least ten years to learn something, especially for a product that is as complex as Tetra Pak. He first started in Tetra Pak as a development engineer and worked in the department that handled feeding machines for cartons. He went on to take on the role of product manager for machinery after three years. However, there is still much about raw materials handling that he did not know during that time, as he was more concentrated on the machines themselves. It was after 15 years that he got interested in the product itself.

Sjöholm was working for TetraPak in the United States for three years. He was first production manager and then was quickly promoted to plant manager at 32 years old. However, they had a Swedish MD (managing director) for the United States with whom Sjöholm did not get along well. The MD had wanted to change and close things in the plant while Sjöholm was in charge. When the MD became the CEO, Sjöholm was transferred to the TetraPak plant facilities in Lund: "I was placed in the barracks in Lund, with nothing to do."

He met Hans Rausing during one of the factory visits for top management. It was a delegation of about fifteen people, and it made their department personnel quite nervous, but the visit went well. After everyone left, however, Rausing called Sjöholm and asked to return to visit the plant by himself the next day. Sjöholm spent the next day with Rausing examining and discussing the machines. One of his first jobs was to take an American machine to adapt for the Russian market. However, due to the different metric measurements of the American and Europe market, they needed to translate it so that the machines could be produced in Russia. After that Sjöholm became project leader for big projects that TetraPak were producing in Germany. That was the project-predecessor to Ecolean. In 1995, Rausing sold his TetraPak shares to his brother, but he wanted to keep this project. The family did not allow it and Rausing decided to start working on Ecolean with Sjöholm in tow. One of the conditions that Sjöholm stipulated in return for leaving a secure job at

TetraPak was that he would receive financial help for developing another idea that he had for aseptic filling machines.

Sjöholm received money to develop AromPak, a dosing machine, for both aromas and for producing low lactose milk. He did not realize how big the market for low-lactose products would become, but he worked on this concept with two other people he knew from TetraPak. Sjöholm carried it through with the money from Rausing, and they built up the machine. They placed one machine at Arla for orange juice; what it did was to help inject a precise dosage of heat-sensitive functional ingredients (such as orange juice aromas, colors, lipids, probiotic bacteria, etc.) after the heat treatment of the product. Arla was pleased with the results and continued using that technology for their product line. In 1998, Sjöholm had a sales meeting at Unilever at Helsingborg to introduce them to AromPak. They were originally planning to meet just one person to explain about AromPak when the company had just started about two years ago, but the contact informed the R&D department about the product and they were interested and joined in the meeting. There were about 20 people of high-ranks from Unilever who gave them 20 minutes to present. One of the R&D directors asked the question: "Johan, this is very interesting, but how do you secure the transportation?" Lactose-based products need to be delivered in chilled conditions. Sjöholm admitted that he never thought about that and it was new for him, but suggested that there could be time/temperature electronic packs placed in the pallet. Out of this experience at Unilever came two tracks of innovation. The first was another of his innovations—a product called PamPak—and the other was Pastair. AromPak was doing well with juice, but it was a small market and he had wanted AromPak to be able to deliver lactose milk, but there was a problem with the time/temperature concerns.

He started exploring other ways of pasteurizing, such as through gas injection. He was thinking more about how to make the product better, in addition to aiding the transportation of the products. He was reading the Swedish newspaper about Cornell University, where the Swedish Chamber of Commerce in New York said that you could increase the shelf life of cottage cheese by injecting it with a small amount of carbon dioxide. That gave him the idea to think about using carbon dioxide in milk. He had talked with Kenneth Andersson when they were discussing that they wanted extra shelf life for normal milk. There was an interest from ICA, who wanted to push out their brand of milk. However, the local dairies wanted to maintain their own branding and did not want to sell ICA. Skånemejerier at that time was quite small and wanted to have something that stood out from their product range.

They were thinking of working from ICA to produce such milk with extra shelf life (about 20 or 25 days). Therefore, Andersson asked Sjöholm if he could find a way to do it, because they would be interested if so. Sjöholm was intrigued and started experimenting with the idea. He had good relations with Andersson due to their previous experience of working on the juice packages with Skånemejerier. This request and the news he read clicked in Sjöholm's head. He sold off AromPak to TetraPak in 2003. However, they were not interested in the gas component and he got to keep that component during the negotiation process. This was the birth of Pastair.

He continued as an MD for two years and as a senior advisor for the last year. He was quite unhappy during that time, as people came to him with criticisms about his AromPak invention. That was when he got the call from Andersson again about the ICA milk project. In 2005-2006, Skånemejerier came to Sjöholm again, as they had found his idea about using carbon dioxide quite interesting. However, he realized that the packaging for carbon dioxide-treated products would need to be in a package that had aluminum foil, but that would entail a rise in the price of packaging material, and also machines would need to be changed. It was unrealistic to expect this to happen in the industry, so he dropped the idea.

During that time, he also got a call from an old TetraPak contact that was working for Procordia in Eslöv. They asked him for assistance in filling the ketchup bags for McDonald's for their plant outside Kalmar. This was using hot filling, so the food ingredient was filled while at 90 degrees so there was no concern for bacteria. "Bellywash" juices are normally hot-filled as they are cheaper and do not hold much taste. Procordia wanted him to help speed up the machines by filling it in an aseptic manner, without needing to heat up the ketchup to 90 degrees. He went down to look at their machines and discovered that the cap that was used to seal the final ketchup container was from a separate supplier and needed to be cleaned. He experimented with disinfecting using ozone and the test came out very clean; this made him appreciate the properties of ozone more. The Procordia project did not come to fulfillment, as it was going to cost quite a lot in R&D. He recently heard from them that they did finally do it this way through a Japanese solution via an aseptic cold filled machine.

He used this principal to address Andersson's query on using carbon dioxide to extend the shelf life of milk, as the packaging would need to change. He started experimenting with ozone with a contact from Air Liquid and Lennart Lindell from Ideon Agrofood, together with Andersson who brought the raw milk. The first trial did not kill the bacteria in the milk, despite their

using a lot of ozone. They did the trials again when Sjöholm redesigned the whole machine in 2006. The trial then enabled the milk to be pasteurized, but it did not taste good. That made them realizes that they would have to do it in the middle dosages. They filed for a patent for this refined method and continued testing at the plant in Lunnar. This filing of patent allowed CO3 to get some money from venture capital firms.

Upon reflection, he realized that the market was not ready for such a machine. During the period of 2007-2008, people were afraid of the word ozone. There was a dramatic change in attitude after the vice president of United States talked about the ozone layer and this made people more aware of what ozone was, and more positive on the concept of ozone.

> Without venture capital, we would not have been able to establish the contacts needed to conduct global business. In the past, it was enough to have a customer in Eslöv—today we're talking about the whole world. Sweden is simply too small.
>
> *Johan Sjöholm, online article Tillväxtverket, 2009*

Rolf Bjerndell was in banking and management consultancy before he became CEO at Skånemejerier in 1994 until 2005. According to Bjerndell, Johan Sjöholm used to be known as "Tetraman" and was one of the innovators around Hans Rausing, one of the founders of Tetrapak. Rausing got to know about Sjöholm when he was a plant manager in the USA for Tetrapak and brought him to the development team in Lund. Sjöholm has been involved in lot of new projects over the years, like Proviva for example. During those times at Skånemejerier, they were interested in prolonging the life of cow's milk through pasteurizing with different kinds of gases. However, the Tetrapak packaging could not handle it and the taste was not good. Bjerndell, then CEO of Skånemejerier, thought that it was quite fascinating because a majority of drinking water is cleaned by air around the world. Bjerndell became an investor in Pastair AB because he knew Sjöholm to be a fantastic entrepreneur.

> You have to have luck. I have said that. You have to have luck. You have to come on the market at the right time. You have to have the luck of getting investors. Without hitting the market at the right time and getting funding? So luck is very important.
>
> *Johan Sjöholm, personal communication, 2015*

Sjöholm worked around networks and outsourced the services that were required during the development process as much as possible. His funding sources came from various organizations but they also remained as sources for other types of resources. For example, he had received aid from Livsmedelsakademi and also maintained contact with the entrepreneur advisors at the institute. Sjöholm viewed the economic support from the academy as important, but even more so the contact with the Entrepreneurship Council, which gave them access to knowledge and experience that they lacked. It helped to reduce the mistakes and expedite the development process. Through the academy, they received help with a concrete solution through a student project and PhD work that compared the cold pasteurization process of Pastair AB to conventional pasteurization techniques. In Sjöholm's view, this was a cost-effective way to work for a small firm that gave important feedback in the process.

Sjöholm had obtained financing from other sources, such as SEK 8 million in 2011 from Sydsvensk Entreprenörfond, Augmenta, and Sparbanken Skånes Riskkapitalstiftelse when they were in the process of developing the system and product concept together with close cooperation with potential customers. He also obtained some financing from Vinnova in 2008 for 500,000 SEK for the development of microbial and 991,000 kr from Energimyndigheten in 2011. In an interview with Tillväxtverket, Sjöholm emphasized the importance of venture capital in the long process from research to final product for innovating microenterprises. He would "rent in services," for example, from an engineering company for six months when it was needed, acting like a consultant company for external clients and also for Pastair itself.

Professor Patrick Adlercreutz from LTH at Lund University was one of these resources that existed in Sjöholm's network. He was first contacted by Sjöholm to ask if he was interested in taking part in activities with him. Adlercreutz brought with him his knowledge of his academic and applied projects in the lipids area studying liquid oxidization through the years. Sjöholm was developing a sensor (RFID) for food packaging for another of his innovations during that time, and part of it was using enzymes; Adlercreutz helped construct the enzyme for it. They were quite happy with the results and Sjöholm wanted to apply it to another use within elderly care, which had omitted the enzyme portion. For the collaboration with Pastair AB, Adlercreutz examined the enzymes used to tailor-make lipids or fats. This process was important to avoid the oxidation of health-promoting fatty acids. Adlercreutz was interested in oxidation and the area around that. In addition, oxidation is something that could cause problems for Pastair's process.

Adlercreutz was mainly checking now for undesired effects of the process during the cold pasteurization process. Sjöholm came to Adlercreutz with the idea to help check the integrity of the product's lipid component, an important part of the milk product after the pasteurizing process. What they found out was that if the process was not done properly, it could cause a bad taste in the final product, which might be caused by oxidation, which they were exploring. In Adlercreutz's opinion, it could be a very promising product if applied in the appropriate areas.

Another professor Sjöholm worked with was Professor Ylva Ardö from the department of Food Science, dairy technology at Copenhagen University, where they educate master's students in dairy technology. It was important for Ardö to keep up-to-date on the different kinds of technology that were emerging, and Ardö had heard about Sjöholm at a large conference. He met up with some of her students during the conference and she had read about him before. They subsequently discussed possible collaboration as she was interested and had worked with the process of cheese ripening. For her, the aspects of the Pastair process were interesting from a biochemical point of view. She had had some projects where she tested the milk and made cheese out of milk that was treated with Pastair AB's technology. It was more of a small study, and a larger scale of this program would have required financing. This was subsequently made possible with Vinnova funding that Pastair AB obtained for a project to test the new "pasteurizing" technology on the cheese milk in cheese production in 2011. Vinnova funded approximately EUR 100,000. Professor Ylva Ardö at Copenhagen University had carried out preliminary tests of the application and Pastair was in the midst of a capital-raising round to fund the launch of the technology in 2011.

4.4.3 More second chances

> It takes time to understand something you don't know anything about. Because if you are being the first in doing, there's more things that has never been researched. When it comes to food, people are very conservative also. That is also when you come to patience, you can think about it as time. Time, patience and time. Because lots of time people forget about the factor of time. The food industry is very conservative; it's like the pharmaceutical industry.
>
> *Johan Sjöholm, personal communication, 2011*

When Sjöholm started Pastair in 2007 and had the first machine in 2008, they were quite proud of that. News of his patent for a new method of pasteurizing using active ozone was first reported in 2007. It spread around quite quickly due to a journalist who had published it on an English-speaking website. Sjöholm received inquiries from Vancouver, Africa, and New Zealand. However, due to limited resources and also as the technique was still at a development stage, he was not able to handle the entire initial buzz. During his time with Tetrapak while he was developing the packages for Ecolean, they were already doing testing with juices. He got a lot of money during that time due to the success of the packaging for Ecolean. Sjöholm built up his network at Skånemejerier and also with Kenneth Andersson, who was the R&D manager for Skånemejerier. Andersson was open-minded and had worked with both researchers and entreprenuers before. Andersson encouraged Sjöholm to develop his own machine. When it was time for testing Pastair's machine, through these connections back from the Tetrapak/Ecolea days, they conducted testing for Bravo juice, one of Skånemejerier's products. Sjöholm was quite well known in Skånemejerier and they believed and trusted in him. The results looked favorable toward the end of 2008, with them producing a juice that tasted better and that was more environmental friendly. However, they were not able to replicate the results all the time and they ended up contaminating more products than they pasteurized because the machines were not ready. During the time when testing was conducted at Skånemejerier, the champions for conducting the trials, both Bjerndell and Andersson left before the results were concluded. This was detrimental to them not having more time to do the trials further.

> I think the marketing was not bought in and I have also left the company. When Danone bought Proviva, they "bought" me too. It was a pity, because it was a solvable problem.
>
> *Kenneth Andersson, personal communication, March 2015*

In 2009-2010, Pastair went back to the laboratories to do further research. They discovered the exposure time to the active ozone needed to be as short as possible, and needed an effective release for the gas. With economic help from SFIN, they managed to test various ways to achieve that result. Eventually it was solved with the help of a simple plate heat exchanger and the use of nitrogen to take away the active gas before it could give any negative effect. However, the interest from Skånemejerier was not there to continue with the testing. In hindsight, it was too early to have conducted the pilot test. The

technique was not ready, but the experience was useful to help refine the equipment.

There had been great interest subsequently expressed, from dairy farms in Sweden to potential international clients from South Africa, Japan, etc. There were also collaborations in the field with another cheese related company: Jürss Mejeri in Flen, Sweden. They had seen the potential advantage of Pastair's technology as it eliminated clostridium spores, which normally survive traditional pasteurization. This had meant there was wastage of cheese and the new method could imply less wastage without compromising on safety. However, they did not work out in one way or another. There was interest from a small dairy in Greece, but the financial crisis in Greece made it not feasible to sell it to them. In Ireland, there was a slightly bigger dairy that was making cheese and whey protein and they were very interested. However, because they were using whey protein, which was quite concentrated, what they wanted to achieve with ozone given their production volume was not possible with the current machines. In the end they were not able to come to an agreement because CO3 needed more money to develop the machine to the level the Irish wanted, but Sjöholm had lack of funding then.

In Bjerndell's opinion, what happened to Pastair just shows the enormous conservative forces existing in the food industry and the food processing industry. The food industry's conservativeness is a hurdle to innovation in the industry. It is clean tech machinery with potential and the only problem for his invention is that it would take some guts from a customer to implement it. No one was willing to take the risk. It is not commercially successful at this point in time, but this type of product takes quite a number of years before it can be considered "successful" by the industry's standard.

4.4.4 Changing Partners

In an update on Energimyndigheten's website dated 2014, they stated:

> The founders and initial investors have managed to bring Pastair to the initial commercial phase. However, it is believed today that Pastair lacks the muscles and organization to bring the system to the market globally. Therefore, the technology/patent is for sale.

As Pastair AB had very little resources in house, including scientific knowledge in house, Sjöholm maintained closed contacts with universities, such as

through research reports from the universities. Contacts were established through events and meetings, which lead to collaboration with professors from the universities in Copenhagen and Lund. The closeness and sharing of skills with the universities and the closeness with customers and market knowledge were equally important. Sjöholm felt that the ability to speak and have contact with the customers was important because one will not meet their real needs if one just sits in the laboratory and remains far from the market. However, when it comes to dealing with food ingredients and products, there remains much to take into consideration: it has to taste good, it should be healthy, it has to be packed in a certain way, it should take into consideration the perspectives of consumers, and it should be sensitive to the waste handling of product packaging in terms of environmental issues etc.

When it comes to finances, the uncertainties were more apparent. Though Pastair had received funding and grants for certain stages of the innovation process, it still depended largely on Sjöholm's own investment. The years 2008 and 2009 were difficult years as his capital diminished rapidly. It reminded him of the period when he was working for Hans Rausing under Tetrapak to develop a package for Ecolean, a lightweight packaging company based in Helsingborg. They grew from two people to 40 people in one year, and then to 105 people. He sold it off and suddenly he had a terrible situation where he lost 10 million in a company. He had the debt collector at his back at one point in 2006 and he was alone because the rest of the employees had left the company. When he came up on his feet again, he was very careful about money from then on. He emphasized the universities as a key part to his innovation, more specifically the skilled people and knowledge that he did not possess himself, like microbiology, etc. He felt that he had an advantage in being so close to the University.

Sjöholm updated that while he had run out of money to keep the patent going, which is why the patent was up for sale, he also mentioned that he had met a professor who sparked in him the idea to change the application of the innovation. He had shared with him the issues he had when pasteurizing milk, but this problem was actually a good solution for application in the medical field.

> You always have to be open minded and look at opportunities. And I met Lennart, this professor. He talked about blood and certain things in a way that I didn't. But you know I listen and I go back home and I think about it what he said. Can this be used in one way or another? In the beginning, you know a lot of people are not so open-minded. Lennart was not open-minded at first.
>
> *Johan Sjöholm, personal communication, March 2015*

The industry chosen to launch the innovation is also something that Sjöholm is realizing now. He has shifted the application of Pastair's technology to be used in the medical field. When Sjöholm approached the venture capitalist again regarding this new direction, they were quite positive. The medical area is one where people are more enthusiastic to do something, because there is more money in it. There is a saying according to Sjöholm that, "If it's a medical project, it costs at least 50 million, whereas a food project is one or two million."

Lennart Ljunggren was connected to Sjöhom through his fellow colleague who is the CEO (and an old friend of Sjöholm) where Ljunggren is part owner in the business venture Vitrasorb AB at Medon Science Park in Malmö. Vitrosorb AB is a Swedish medical device company that develops, produces, and markets immunoadsorption columns aimed to eliminate the blood group barrier of organ transplantation. Sjöholm was discussing the problems for asepsis processing with the CEO, as Pastair did pasteurization for milk, and Sjöholm felt this could be used for human application. Sjöholm had shared during the interviews that one of the ways he got knowledge was through reading the news a lot, and that was where he frequently got his ideas for his inventions. The CEO colleague connected Ljunggren and Sjöholm together, as Ljunggren was a professor in analytic chemistry at Malmö Högskolan. Ljunggren knew more about chemistry than the CEO colleague, but when he first heard about the technology for Pastair that uses ozone, he did not think too much about it. He thought using ozone in the medical area was a "crazy" idea in the beginning. Then Ljunggren did some research on the use of ozone on humans and found various interesting articles, especially from the Eastern countries and South European countries that have used ozone for certain human diseases, especially in spa treatments. Applications of ozone for human treatments include uses for intestinal diseases and where treatment of blood transfusion is required in countries like Ukraine and Italy. There are also companies that have been working with ozone. This, then, did not make Sjöholm's idea so "crazy" after all, although using ozone to kill the bacteria in

the blood was not the application that Sjöholm had initially thought about. This is due to the fact that bacteria in the human blood seldom ran in the blood stream in a circulation that made it possible to be processed like pasteurization of milk. Bacteria more often reside in a fixed spot in the body, which causes problems for the humans. Nonetheless, it was a project that was interesting to start and they got some funding to start thinking about how the technology from Pastair could be transformed into an application to be used in the medical area. The challenge was different for the food industry and the medical fields, because food ingredients may be heated up and cooled down without many side effects, but not so in the medical industry. It is not easy to cool down people, and to "reheat" them has not been done before. That was the biggest challenge. Another challenge was to adapt to the low flow rate in the medical application as compared to the food industry that normally processed liquid products or ingredients in large volumes (e.g., 20 liters per minute). The low flow rate is also important for the treatment of blood since it can be problematic in humans if gas bubbles are formed in circulating blood.

Their progress thus far (as of May 2015) was a redesign of the Pastair machine. They have so far tested with a water solution, which seemed to work fine, and plan to proceed to further testing with blood as Sjöholm has managed to secure funding for the next phase of testing. The machine is able to handle adjustable temperature and the flow rate of 50ml per minute, and also the gas flow that is tolerated in the recirculation system using water for testing. The next stage is to use blood plasma for testing and subsequently some form of real blood, such as from pigs, to detect mechanical problems, if any. Thus far, the system seems good, and Ljunggren has found some publication that is using ozone as a form of aseptic treatment. Ozone, while still having somewhat of a dubious reputation due to its inherent properties, in Ljunggren's opinion still holds biological effects and potential that may not have been explored. He felt that innovation in the medical field tended to concentrate on the latest technology instead of basing on what (still) works:

> I think people in research fields; they are running like for clothing, they ran for the latest models of everything. The same is for the research, they are running for the new technique and forgetting old things, which are still working.
>
> *Lennart Ljunggren, personal communication, 2015*

Ljunggren is also an entrepreneur himself. Vitrasorb AB is about four years old and has previously provided solutions for the preservation of stem cells. It has changed to the current business model in which they are improving the

product and aim to enter the market again after withdrawing the products following some patient reactions to the product. Ljunggren is a professor but he has experience working in the medical device industry for 20 years (Gambro AB) before. He entered the university in 2002 when an ex-colleague in the medical device industry contacted him to explore setting up a company together. That company, Alteco Medical, deals with asepsis treatment and is on the stock market. Ljunggren had some ideas after the company went public and spoke to the chairman of Alteco Medical about them. The chairman suggested that he should approach the doctors to discuss his ideas, which he chose not to due to his experiences of the discussion of ideas with others in the industry. He has had unpleasant experiences both personally and from observation in a private and academic context on the loss of ownership of one's idea to others. That was why he had started Vitrasorb AB to develop his own ideas further.

Ljunggren found it relatively easy to work with Sjöholm and that they had a somewhat similar style. He knew about the history of Pastair AB, and being an entrepreneur, he saw that he could work with something and contribute in some way to Pastair's evolution. In this manner, he has appreciated the initiative and enthusiasm of Sjöholm in driving this project forward, because they had only just met a few times but things have moved fast. He is also working with Sjöholm on his other innovation, PamPad, which Sjöholm had gone to Malmö Högskola for use in biomolecule sensors for sweat and urine. Having the financing for an interesting project with a novel technological application was what made him commit to this project with Sjöholm. Ljunggren brought with him market knowledge of the medical device industry and the medical field, as he had experience both working in the industry and also setting up companies that were part of this industry, where Pastair is evolving to be in too. The funding will come at different phases of their progress; as they currently have funding for the proof of concept and for the upcoming stages, it is envisioned that a new company might be formed with funding from LUIS and Malmö Högskola, and owned by the inventors of these concepts, etc.

4.4.5 Analysis

This case differs from the other cases in this thesis in that it was mainly based on the account of the main informant. As such, two main critical events identified are described in section 4.4.3 and section 4.4.4, mainly concerning

the period when Pastair went through a period of testing before the financial crisis and the recent event where there was a possible change of application for the technology. The innovation process of this case be said to have begun from another invention or what can be said to be an architectural innovation in that it has its roots in another innovation that was successfully sold to TetraPak, a packaging company. While developing this innovation, the entrepreneur encountered various critical events that eventually shaped the innovation to its current state. The first relates to the series of testing with customers, which came to naught when it coincided with the financial crisis. This had led to the sale of the patent in 2014. The second relates to a more recent encounter with an academic entrepreneur, which opened up the possibility for a different application of the innovation.

This case shows an entrepreneur experienced in navigating the innovation process. In some ways it can be seen as a typical innovation story. Through the ARA model, though, this case places a larger emphasis on the activities surrounding the resources accessed. The role of the actors played a lesser part than other components, but the interaction aspect is still emphasized.

4.4.5.1 Activities Links

As an experienced inventor and entrepreneur, Sjöholm has his own experiences under his belt. Nonetheless, these experiences have worked against him at some points. For example, in this instance, he was too early to introduce the machine to the market. On hindsight, he realized that the machines were built too big from the beginning and he should have scaled them down. His experience in Tetrapak had influenced him to build big machines and he had funding from his success with Ecolean. The machine was, however, not successful because they ended up having more bacteria than before they began the pasteurizing process. After refining it, they managed to get the bacteria level to be at the acceptable levels but it was too late and Skånemejerier was no longer interested in conducting trials. He subsequently sold the machine to Tetrapak, which made two trials and decided they would not continue in the prime juice market.

Mayonnaise/liquid egg, milk, cheese, and juice were four potential food-processing areas Sjöholm thought would enable Pastair to explore after a successful exhibition at Argura Food in early 2011. There were talks of potential trials from visitors of the show. However, that same year, the financial crisis came in April/May 2011 and the interest died because of the financial tightening of their potential customers. Investors in Pastair were

squeezed and they had little money left at the end of 2011. The investors put up another sum of money with the task for the board to sell Pastair. Sjöholm left as MD of the company and Patrik Fogelström took over in 2011. In this instance, these activities were not within the control of the entrepreneur.

The activities links were established when Sjöholm participated in conferences and meetings for networking and utilizing the contacts made at these events for further discussions around a certain theme or problems. This was useful during the second application of Pastair's technology, as evident from the ongoing connections Sjöholm maintains with the industry and the academic field.

4.4.5.2 Resource Ties

For small companies, Kenneth Andersson felt that the entrepreneur cannot do everything themselves, as big companies can. The only tool for a small company with limited resources is to remain open to opportunities. However, one must prove that they are open when they meet researchers, who tend to be suspicious of big companies. The win-win situation needs to be shown and proven to all parties involved, while building up trust and commitment. For example, when Skånemejerier as a larger company drafted the agreement, they based it on a royalty basis, instead of buying outright the patent or invention. Doing it this way helped to ensure their interest and gain their commitment to the whole process. Small companies in some ways have no choice due to the lack of resources to work simultaneously across departments.

The innovation process in this case also indicated the construction or building up of networks—that was it not the networks that shaped the knowledge bases, but the knowledge base of the individual firms that shaped their networks, the channels, the actors, and activities that they moved around in. This is the type of modus operandi that Sjöholm engages in. As *Figure 17* shows, though the network was not as complex as previous cases, the type of actors within his network involved actors who possessed certain types of scientific knowledge that Sjöholm did not have. These actors were also within the Oresund region and normally from the university. Sjöholm viewed the university as a great source of knowledge bases and resources that he regularly drew from. In this sense, his activity links also surrounded events and conferences, which he attended to regularly network and to know what was happening in the industry on the academic front.

4.4.5.3 Actor Bonds

The impression given by this case is the main informant tends to have more collaborative forms of interactions with the actors named in his critical events. His network seems to be wide but each tie is as strong as the duration of the project. This can be seen as more applicable to actor bonds with scientific knowledge as a type of resource.

In this sense, one can surmise that entrepreneurs build actor bonds according to the type of resources they are seeking or are being offered. The strength of the bonds is very much dependent on the longevity of the resource accessed. In this case, for instance, Rolf Bjerndell also sat on the board of Pastair and had interactions with Sjöholm while he was still with TetraPak and Bjerndell was at Skånemejerier. As a subsequent investor in Pastair, they remain in touch and informed on the relevant activities. This is in contrast to Kenneth Andersson, whom Sjöholm named as one of the inspirations to develop Pastair's technology. Andersson later left Skånemejerier when he was hired by Danone and had not remained in touch with Sjöholm. This was apparent when Andersson was contacted for an interview and the account relating to Pastair was not as strong as from the perspective of Sjöholm.

For Pastair, there are still on-going trials, for example with Arla, where they have tested cheese since 2013 and moved the machines to their facilities in May 2014. The trials have ended and it will be June 2015 before the results are known, as the cheese needs to mature. Sjöholm heard that results from the pasteurized cheese tasted good, but there were no real champions within Arla to help push this trial.

> I think the food industry is very difficult to change methods. That's how you do changes things in the food industry. You change the packaging; you change a little bit of the (marketing) message. But changing the process is very difficult. I didn't realize it.
>
> *Johan Sjöholm, personal communication, March 2015*

4.4.5.4 Continuing the journey

While the relationship with Lennart Ljunggren is still relatively new, the dyad is interacting on a regular basis as it is the development phase. The chance of using Pastair's technology in the blood treatment application successfully is probably 1 in 20, in Sjöholm's opinion. Experience and luck are both required in the innovation process. For example, when he first came across the idea of

developing a heat exchanger for the specific purpose of blood processing, he understood that it would have cost around five million kroners. He talked to Ljunggren again after some initial testings and the new prototype seems to have worked fine, though some refining needs to be done. For him now, developing the new prototype to apply the technology to a new use is being done more to have fun and to have something to do. In this dyad between Sjöholm and Ljunggren where there is a common interest and also background as entrepreneurs, the actor bonds are stronger and formed faster than those between others who are more on a project or assignment basis.

The lesson that Sjöholm has taken from the years of participating in networks is that formal networks work well in terms that they can generate businesses leads, which is good. However, it does not encourage innovation in such a way. Innovations need a starting point from a knowledge base, which then can be expanded. However, there is a need to have a certain knowledge base, otherwise you have to start from the beginning. In that way, he had learned to see organizations not as a company but as a place where there are a lot of people with knowledge. Innovative firms create their own knowledge bases and then their networks start to form new capacities.

Firms screen multiple external sources of information for ideas for innovation. The more generally accessible channels are through the Internet, exhibitions, trade shows, etc. As Varis and Littunen (2010) pointed out, the utilization of information from the type of sources is also dependent on the entrepreneur's awareness of these sources, their background, education, and existing knowledge. In this case, Sjöholm was aware of the accessible sources and has also made an effort to seek out more. His reliance on keeping himself updated through the news and also maintaining contacts with both the academic institutions and industry sector (diverse ones) has allowed him to "introduce" a new type of innovation for the existing technology that faced an obstacle in penetrating the existing pasteurization process market.

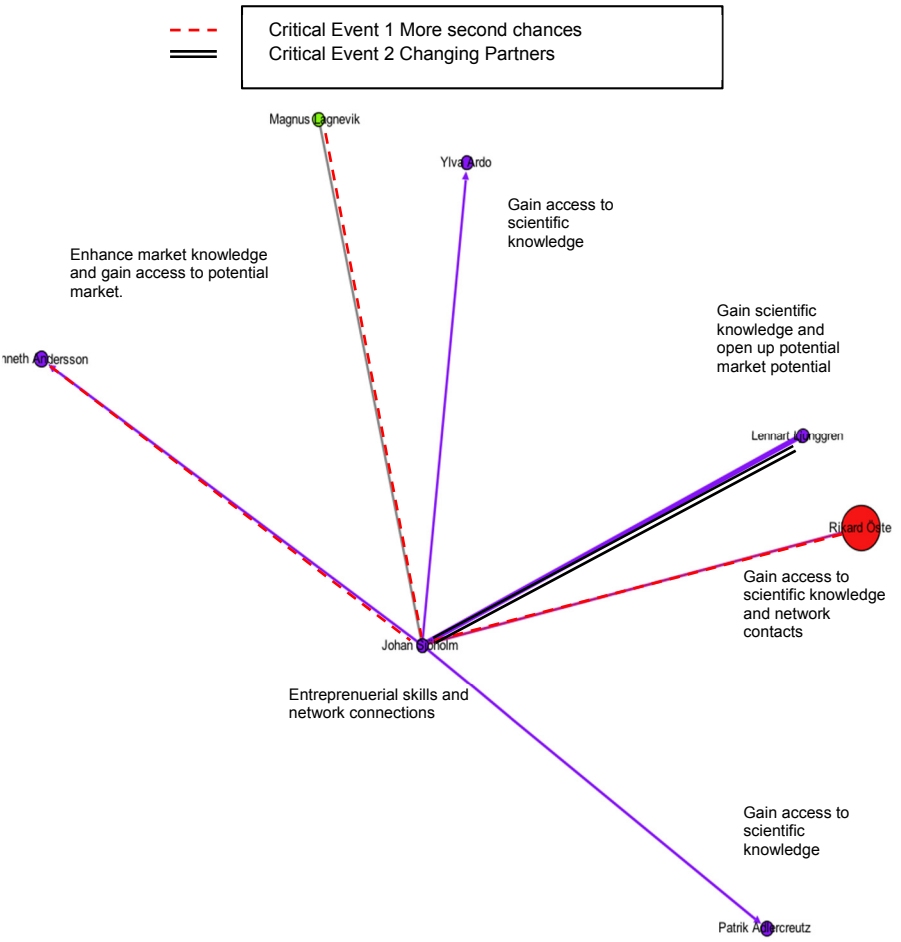

Figure 17
Pastair's ARA network

This case also highlighted the criticalness of failure. Failures experienced during the innovation process can provide the companies with an awareness of future critical events that can aid them in achieving further milestones along the innovation process. In most innovation studies, factors for failures are examined and listed. This paper proposed to examine failures as an impetus for innovation and that it is a necessary path for the creation and development of the innovation process for microenterprises. In the case of Pastair, this is very much driven by the not-giving-up spirit of the entrepreneur coupled with the openness to change and to embrace new developments.

5 Comparative Analysis

The previous chapter described the cases in detail followed by individual case analysis for each innovation process. As a complement to the individual case analysis, this chapter serves to provide a cross comparison across the four innovation process cases and synthesize the findings to address the research question. This thesis seeks to increase the understanding of the innovation process in microenterprises and how relations established with external actors and accessing external resources can help develop capacities that address the barriers encountered during the innovation process. Table 3 presents a summary of the two critical events and the associated barriers of the four cases.

Table 3
Overview of Critical Events and Barriers

Innovation Process Cases	1st Critical Event	Category of barrier	2nd Critical Event	Category of barrier
Managing Sugar Spike (MSS)	The Patent Story	Cost, Knowledge, and Regulation Factors	Gaining independence and maintaining interdependence	Cost Factors
The Honey Group (THG)	Frenemy	Knowledge and Regulation Factors	Starting over, a clean slate	Knowledge and Regulations Factors
Baby Food Revolution (BFR)	The Dream Team	Market and Knowledge Factors	Maintaining the Freshness	Market Factors
The Cold O3 Treatment (CO3)	More Second Chances	Cost and Knowledge Factors	Changing Partners	Cost and Market Factors

The interviews collected for the innovation process have provided ideas and illustrations of microenterprises' innovation journeys thus far. As described in the methodology chapter, follow-up interviews engaged the interviewees to "investigate how things hang together and what alternative social arrangements are possible…as an analyst aiding the researcher in explanations for the current

state of affairs and in exploring potentials" (Alvesson, 2010). This chapter hopes to extend the potentials of the individual case analyses by viewing them as a "critical dialogue partner" (Alvesson, 2010).

Three themes are identified and discussed in this chapter to address the research question—to increase the understanding of the innovation process of microenterprises, in particular how relations established with external actors and the access to these external resources can help address the barriers encountered. The three themes (critical interactions, developing and enhancing capacities, and management of relationships) are discussed around the central idea of the critical interactions among the actors, resources, and activities, the development of capabilities through interactions in network, and the management of these relationships, taken in the context of the innovation process of these cases.

The individual case analysis in Chapter 4 also aided in the discussion of the sub-questions from the microenterprises' perspective. The case comparisons aim to extend this discussion from a macro perspective to allow a further understanding of the microenterprises' innovation process in the context of their innovation environment.

5.1 Critical Elements of Interactions During Innovation

In this section, the analysis seeks to understand the substratum of how these interactions had an impact on the innovation journey of these enterprises during critical phases in the innovation process. This can be related to the important and critical interactions that occurr when external resources are introduced or utilized in the innovation process. The focus is thus on understanding not just the fit of these resources based on the value they bring to the innovation process, but the elements of these critical interactions that enabled the access and integration of the external resources during the innovation process. These interactions can occur during important phases in the innovation process and make it more challenging, or can enable the innovation to progress smoothly ahead, influencing future trajectory of the innovation process for microenterprises.

5.1.1 Failure as the foundation to innovation

The experience gained from failures and how it is handled can be an important element in driving an innovation process forward. The interactions that continued even after failure occurred may add to the strength of the relationship and aid in subsequent innovation processes. Drawing from Table 3 that shows an overview of the two critical events highlighted for each innovation process cases, a common point that stood out among them was the experience of "failures" (in one form or another) along the innovation process. They have all "picked" themselves up in different ways and some showed signs of learning and development of new skills. This "picking up" process can be seen to enable both learning from past experience and a way to introduce external resources into the innovation process. For example, MSS learned from their first patent experience as described in the patent story critical event in Chapter 4. They applied improved knowledge of being aware of the different aspects of the patent application process that need to be taken into consideration and applied it when they subsequently filed for patents when setting up daughter companies or collaborating with their customers. In terms of management of their own resources, they learned to weigh and balance cost factor considerations with integrating with external resources, such as engaging the patent office's services at the appropriate time when they knew they were not able to handle the paper load. These management skills are developed in the process of managing the critical events. Similarly, THG also had critical events from which they picked themselves up through seeking external resources in the innovation process. The learning that THG gleaned from these critical events may be helpful if the same type of events are encountered again. However, their innovation process differed from MSS in that the critical events THG experienced contained new sets of challenges (and different types of actors). For instance, while THG also engaged in patent application activities, their critical events revolved more around the balance of the ideal that they held about how to manage the innovation process versus the trade-off expected from external resources that were integrated into the innovation process. Hence, while "failures" might be said to build the foundation for innovation, this thesis suggests that it is also dependent on the type of barriers that can surface that allowed the use of what was learned or developed from previous failure or critical events to pave the way forward for the innovation.

The topic of failure is gaining more traction among researchers examining business relationships (Halinen and Tähtinen, 2002, Tahtinen and Halinen, 2002). There are various ways in which one can interpret this. First, the

consensus of what constitutes "failure" is not a topic that has been discussed much in the literature. The timing of the failure has an impact on determining the impact of these failures for each case. The trial CO3 was conducting with Skånemejerier was interrupted by both environmental and internal factors. When there were no internal champions within Skånemejerier after Kenneth Andersson left, it meant that what had been a "solvable problem" had no follow-up to drive the innovation process along with the potential client. When CO3 repositioned its technology from producing pasteurized products with better taste to being a more environmentally friendly way of pasteurizing, this attracted the investors. However, this was once again interrupted by the financial crisis that followed. The fact that CO3 was designed with large-volume processing in mind also meant that larger companies were targeted as potential clients—this implied that microenterprises have to deal with more bureaucratic and large companies that would need strong external pressure to change the way they pasteurized, which were all lacking in the circumstances for CO3. In this case, ending the relationships with what were potential clients had to be managed in a tactful way for a serial entrepreneur. Halinen and Tähtinen (2002) proposed that different factors accumulate to bring an end to a relationship and this process is both temporal and contextually embedded. Management-board relationships can vary from being a negative to a positive influence; behavioral factors can limit the ability or the amount of "outsider" control that is allowed in the board (Gulati, 2007). The present nature of the relationship is analyzed in relation to the past events and past actions of the actors involved (Tahtinen and Halinen, 2002). In some cases, instead of these factors contributing to an end to the relationship, they can also hinder the ending process and contribute to the maintenance of a business relationship due to the dynamic nature of actor bonds (Halinen and Tähtinen, 2002, Skaates, 2000)

As Eisenhardt and Martin (2000) stated, "major failures raise defenses that block learning. In contrast, small failures provide the greatest motivation to learn, as such failures cause individuals to pay greater attention to the process but do not create defensiveness that impedes learning." This implies that while the critical events might not have caused the innovation process to fail, they served to motivate microenterprises to learn from mistakes, to seek and to integrate external sources that could build the microenterprises' foundation for their innovation process. The critical events encountered by the four cases are related to the barriers to innovation as shown in Table 3, previously discussed in Chapter 2. For both MSS and THG, which can be considered University spin-offs, the critical events they experienced were mostly related to the

knowledge and regulation factors. The challenges faced may be attributed to the newness and smallness of these microenterprises. Inexperienced in the business aspects of the innovation process, the founders of MSS and THG may not have been able to manage these challenges at the initial stage of their innovation process and thus external resources and advice can be especially useful. With recurring events, knowledge gained from the first critical events instance help to equip them to better handle similar circumstances. This knowledge can help build the foundation for future events and enable them to classify what used to be a critical event as something manageable instead. Failures that happened in the past can also be an aid to current innovation processes, as was the case for BFR and CO3. Being serial entrepreneurs, both Mats and Johan have had their share of encountering both small and large failures. For BFR, the past "failure" of the dream team was critical in ensuring that they addressed aspects of the innovation process that they did not foresee in their respective innovation experiences with baby food. For CO3, the collation of failure experiences just meant a different application of what Johan had learned in his other innovation attempts to a new innovation context. While it is often only in hindsight that one can judge if these critical events were overcome with success or failure, the process of introducing new external resources can help build up their coping mechanisms.

5.1.2 The strength of old ties

All four cases exhibited another type of critical interaction that can be described as the utilization or renewal of old ties during the innovation process of these microenterprises. This section examines how the quality of ties that may be found in past relationships can help microenterprises overcome barriers in the innovation process. The empirical data have suggested that for the innovation process cases that utilized old ties to gain access to external resources, the historical aspects of the renewed relationships could influence not just the formation of linkages to external resources but also the microenterprises' position in the industry's network, which can aid in overcoming the barriers to innovation. Elfring and Hulsink (2007) suggested that the initial and post-founding conditions of a network were different for new firms, and that the difference in initial network connections could make a difference in how the network development progressed later. The strength of these renewed ties represents qualities that are useful for innovating microenterprises. Discussion on the strength of ties (Granovetter, 1973) has

been carried out in various dimensions, such as how they provide access to resources beyond the network or in terms of social networks (Berrou and Combarnous, 2012), etc.

The focus in this section is placed instead on understanding how old ties that are being utilized again is a type of strong tie that can aid the microenterprise in their innovation process. As can be shown with MSS and THG versus CO3 and BFR, their initial network connections differed greatly due to them being "insiders" or "outsiders" to the industry (Elfring and Hulsink, 2007). Hence, one of the motivations for using old ties or the renewal of old ties is to help reduce uncertainty and ensure partner reliability (Shipilov et al., 2006), but also to become "insiders" to the industry through ties with actors who are already in the network. These "old" ties, as seen from the empirical data, showed that the actors involved were often senior experts in the industry. These actors often hold multiple roles (such as Rolf Bjerndell, Rikard Öste, Per Eriksson, Inger Björk, etc.) that have proved to be helpful in lifting up the microenterprises' capabilities when critical events are encountered. This may be related to the professional and social status they hold and have developed during their career, but is also dependent on expert actors' commitment and willingness to connect the microenterprises to the experienced actors' existing networks. These connections are commonly achieved through networking activities (both informal and formal), adopting roles such as mentors and business advisors, or by engaging in establishing the ties to resources or contacts that would normally be out-of-reach for the microenterprises. The key is to have a diverse group of actors, not just a centralized one, to help provide relevant connections to the external environment. While these critical interactions may not be motivated by monetary benefits, they can testify to the endurance of ties that can help microenterprises when critical events are encountered during the innovation process.

Another characteristic of old ties may be having similar history or experience in similar organizational contexts that can aid in the interactions during the innovation process. For instance, the time spent by actors interacting with actors in the network differ, as in the example of BFR, where there were regular board meetings while Mats handled the marketing and operations, delegating the research and product development matters to other members in the team. For CO3, regular meetings were conducted between Johan and a wide variety of potential collaborators, with limited participation by the management team, and Johan also participated in understanding the research aspects of the innovation process where possible. While these

interactions may be dictated by the nature of the end products, it is also a reflection of the interaction style of the microenterprise owner/managers. This meant adjusting the perspectives from individual attributes to a more holistic approach in which not only the actors but also their embedded contexts were considered when trying to understand the innovation process environment for microenterprises. Even though these ties started out local (working in the same organization), they can transcend time and geographical distance, as seen in the case of BFR. Even through Mats held a different role in different countries over the years, the connection to Rolf while they were working with Proviva and Proviva Baby was maintained through informal contacts. These historical ties are thus important conduits of information that help inform actors in the network about each other, developing characteristics such as trust and helping to overcome cost, knowledge, and even market factor barriers. This sort of network resource formed through these critical interactions is dynamic and can help microenterprises respond quicker to changes in market conditions.

The relevance of these old ties may not be immediately relevant at times, but can prove to be crucial when it come to a critical phase in the innovation process, as was the case of BFR when there were concerns for entering the retail market with the new product. The case of BFR illustrated this when two groups of the founders (Rikard Öste, Par and Lennart, Rolf and Mats) drew on their previous baby food product development experience to apply to the innovation process of Otto's Baby Food's products. They developed better market acumen and preparation to understand the market and devise a different strategy to circumvent the "power" of the retailers and traditional baby food manufacturers, which had previously posed the greatest obstacles. As actors are familiar with each other, the exchange of services, advices, and reciprocity or having common third party contacts in the network can enable the relationship to be stronger and to better handle external pressures (Powell and Grodal, 2005, Gargiulo and Benassi, 2000). Having prior interaction with partners can point to the significance of relationships and how trust and cognitive understandings require time to build, develop, and maintained (Powell and Grodal, 2005). For instance, both MSS and BFR exhibited ongoing communication and trust that was established based on relationships that went back more than 10 years. The ties might have started out in a professional capacity, but have developed over the years to be either more personal or a mixture of both personal and professional relationships. Similarly, CO3 and THG also referred back to old ties from former projects they have had contact with for new innovation projects. These commonalities in their history can also aid in the development of knowledge and trust that can act as a

mediating factor in helping to deal with uncertain events during the innovation. The opportunity for the owners/managers to "pick the brain" or learn from the experienced industry veterans is an important knowledge base for innovating microenterprises. This type of knowledge resource gained from learning from renewed ties (from old or past ties) is an interesting phenomenon that might have received less attention.

The effect of old ties cannot be foreseen and is often only observed when an uncertain environment arises. For example, one benefit of renewing old ties during the innovation process relates to the speed of trust creation. (Nilsson and Mattes, 2015). Nilsson and Mattes (2015) noted that interaction was an important part of the trust creation process, but for resilient trust to be established, the direct interaction between the actors can be kept at a low level for a long period of time. Having trust and prior historical ties can enable a task to be executed fairly quickly based on "loose contracting terms," acting as "lubricant" to facilitate new alliances (Gulati, 2007). This trust can also be swiftly established due to the "combination of antecedents of initial trust, perhaps most notably the situational factors (e.g. the fact that both actors had attempted but failed in their independent ventures in the past and that their ideas were mutually supporting and not in competition with each other" (Nilsson and Mattes, 2015).

This parallel to having failed in independent venture in the past can be related to the case of BFR, where the two groups of actors in the dream team had similar ventures into baby food in the past. Their experiences complemented each other in the innovation process of BFR. For the other three cases, while there were previously established relationships to be found, the trust tended to be more gradual in nature and the nature of interactions were based on social exchanges, which may not always lead to positive outcomes (Nilsson and Mattes, 2015). Bjerke and Johansson (2015) pointed out that despite the benefits of close relationships, they might be a disadvantage as interactions during the innovation process may be blocked by the lack of new perspectives. This can be illustrated by the example of the development of Pastair's machines being targeted at building machines that could handle large volumes. This decision, in hindsight as admitted by Johan, could have been scaled down to address the actual needs of the market, as large companies may need to overcome more bureaucratic issues before adopting a new way of food processing. Having strong and experienced actors can cause certain issues to be overlooked in an innovation process due to familiarity.

5.2 Development and enhancement of capacities

The second theme of the cross case analysis relates to understanding how the behavioral aspects of four innovation process cases influenced their capabilities to overcome barriers to innovation for the microenterprises. As described in the previous section, critical interactions have aided the innovation process of these microenterprises at different phases and in different ways. The first type of critical interaction, discussed in section 5.1.1, was more contextual, focusing on critical events that created the conditions to build upon the foundations of certain capacities that the microenterprises needed for the innovation process. The second type of critical interactions, in section 5.1.2, referred more to the relationship aspect of the actors. Both of these types of critical interactions highlighted that the behavioral aspects of the microenterprises can have an impact on how these interactions are being conducted, especially at the intersection where owners/managers interact with external actors or resources.

The behavioral consideration of the microenterprises are examined in this section, firstly through the discussion of interactive styles of each microenterprise in relation to Håkansson and Ford (2016) typology of different types of interaction in business relationships in section 5.2.1. Secondly, the three types of capacities as discussed in Section 2.4 are examined from the perspective of the microenterprises in terms of how the capacities were utilized and enhanced during the innovation process.

5.2.1 Behavioral Considerations of Microenterprises

As the interaction or networking style differed in the four cases, they are characterized as serial spin-off connector, entreprenuer spin-off connector, homophilous connector, and sentient connector which are discussed in this section. Table 4 expands on the descriptions of the four interaction styles of the four empirical cases discussed in this thesis and also relates to Håkansson and Ford (2016) six types of interaction. As both MSS and THG are research-based spin-offs from the univeristy, they are described as serial (to reflect on the style of how they connect in the network based on the series of patent-based innovations) and entreprenuerial (to reflect on the style where the founders connect to fulfill their entreprenuerial ambitions to grow a company by concentrating on particular patent-based products). For BFR and CO3, they are described according to the way they connect in the network: homophilous

when connecting with members of the network with similar backgrounds and sentient when making connections with the network based on responsiveness to changes in the innovation environment. Each style is then related to Håkansson and Ford (2016) discussion on the challenges faced by managers in business interactions.

The aims of interaction in the network are combining, adapting, developing, and exploiting "diverse and widely distributed economic resources" (Håkansson and Ford, 2016). This is related to the discussion on microenterprises' interactions in networks for conducting innovation-related activities and assessing external resources for this thesis. As Gulati (2007) explained, microenterprises' owners/managers "can be proactive in designing their networks and in considering the ramifications of each new tie on their future choices because network resources are based in part on the location of firms in the network." By relating the interaction styles to how they connect to others in the network, the aim is to understand not just how, but why firms are unique in their innovation, as these interaction styles are considered a facet of the behavioral advantage (Hewitt-Dundas, 2006, Rothwell, 1989, Santamaría et al., 2009) exhibited during the innovation process. Powell and Grodal (2005) suggested that diversity in the portfolio of partners allowed enterprises to learn from a spread of knowledge bases. The distinctions made between the interaction styles of these four microenterprises highlights the empirical patterns observed in these microenterprises and may be inferred as contributing to the characteristics of innovating microenterprises in the food sector.

Table 4
Description of Microenterprise's Interaction Style in Relation to Håkansson and Ford (2016) Typology of Interactions (Author's Own)

Description of innovation process of microenterprises	Characteristics of interaction style	Main types of interaction in the context of critical events of each case (adapted from Håkansson and Ford (2016) 16
MSS as Serial Spin-Off Connector	Focus on R&D and licensing or selling off patents. Interactions are limited to those with a research and/or business interests.	Offering-oriented duets Long-term duets Network interaction
THG as Entrepreneur Spin-Off Connector	Higher interest in developing business around own R&D findings, while simultaneously developing other patents that can be commercialized. Interaction is purposeful for the development of the business.	Evolving duels Offering-oriented duets Network interaction
BFR as Homophilous-Connector	Tendency to form connections with actors of similar attributes, experience, or similar positions in networks. Interaction is based on having similar knowledge bases or experiences.	Close-cooperation duets Offering-oriented duets Network interaction
CO3 as Sentient Connector	Remaining conscious of all types of possible opportunities, seeking out and connecting relevant functional actors, activities, and resources. Interactions extend over a large scope of actors and knowledge bases.	Pure business duels Evolving duels Network interaction

5.2.1.1 Serial Spin-off Connector

The scope of interactions that microenterprises with university linkages and strong research focus may be limited to what is considered necessary for the immediate project. For instance, in the case of MSS, they mostly conduct innovation activities in their immediate R&D environment (such as with collaboration in AFC and the related partners). They possess a high level of absorptive capacity when it comes to research-related knowledge and connections to other actors within the research field. This capacity means they have the ability to recognize and collaborate with other researchers in the field. Their business model also reflects their focus on producing good research in

[16] For a full description of the six typologies, please refer to HÅKANSSON, H. & FORD, D. 2016. The managerial challenge of business interaction: behind the market façade. *IMP Journal,* 10**,** 154-71.

their patent-licensing business model. This type of interaction builds upon familiar ties, as MSS adapted their existing resources to separate the business and research aspects of the innovation. This adaptive capacity is developed by involving an actor already within their network. This shows the type of purpose-focused interaction style aimed to address the business aspect of the innovation process. This interaction type may be referred to as offering-oriented duets and long-term duets.

As explained by Håkansson and Ford (2016) these types of interaction may occur simultaneously in different degrees. The offering-oriented duet type of interaction is described as involving adaptations are embedded in one or both of the parties' offerings that involves personal contact. This may be related mostly to the patent story critical event where small adaptations were made to fit the bureaucratic requirements of the patent application process. The long-term duet type of interaction requires substantial investments or adaptations to the resources for one or both of the parties involved and affects how resources are being developed and used in the interaction. This applies to to the second critical event of balancing dependence and independence where there were substantial investments in research efforts and adaptations to the requirements of the customer (DoubleGood AB) to enable the approval process from EFSA for the table water product to be produced. This type of interaction can evolve to be part of a long-term process of specialization and the development of specific interdependencies and unique relationships between the two parties. This type of interaction may have helped shape the business model of InnovaFood AB. Network interaction is described as the extension beyond dyad relationship to trio or even a quartet of significant counterparts and involves the adaption of both tangible and intangible resources in different companies and relationships (Håkansson and Ford, 2016). This can also be seen as a type of interaction necessary for MSS when they are developing deeper and further collaboration with the customer. Ulf also used network interaction in the search for us funding during the innovation process.

5.2.1.2 Entrepreneur Spin-Off Connector

THG established contacts with a wide variety of actors. THG's strategy was to combine both research and business expertise which entailed doubling up in their owner/manager roles to address those research/business areas in which they were both specialists/novice. THG could be viewed as having a stronger interest in commercializing their research with an entrepreneurial mindset, and they exhibited strong absorptive and innovative capacities. They were active in

seeking out external partners and collaborations through network interactions to publicize their work through numerous talks, workshops and seminars. They also sought interactions that could help bring their innovation process to a commercialization stage. In terms of adaptive capacities, THG utilized the experienced actors as board members so they gained access to advice on different business aspects (marketing, regulatory etc.) and also scientific aspects of the innovation process. These activities are reminiscent of the interactive style of an entrepreneur who has an aim of having a large reach and diverse network (Lechner and Dowling, 2003), hence the term entrepreneur spin-off connector.

Evolving duel and offering-oriented duets are terms used to describe the main types of interactions for THG's innovation process. The interaction with the American research colleagues and also the board members resembled some aspects of an evolving duel where participants "learn from their experience" and this might cause preference for interaction with particular counterparts (Håkansson and Ford, 2016). Although the interaction with the American counterparts did not work out, this enabled the interaction with Lund University and the then vice-chancellor that aided THG to search for more suitable counterparts and other opportunities for interactions with other actors in the network. Examples of the offering oriented duets type of interactions can be observed when THG mobilized the connections and expertise of the board members for their manufacturing needs of the products and also when the network was expanded to facilitate the move to a new department within the University.

5.2.1.3 Homophilous-Connector

There is a phenomenon studied in networks called homophily: "the tendency or preference of individuals to interact with and form certain kinds of positive ties with people similar to themselves on socially significant attributes such as gender, race, religion, values, beliefs etc." (Borgatti et al., 2014). This was identified the strongest in the case of BFR, whose management team came from similar backgrounds and whose working style was described as a dream team. This may show a different type of adaptive capacity in that the team dynamics may be deliberately chosen to create a positive environment for the innovation process. This interactive style displayed by BFR was enhanced by the owner/manager's own innovative capability that provide a balance to the absorptive capacity of the group, which was more concentrated in product

development through overcoming market factor barriers by chosing not to work directly with retailers from the onset of the innovation process.

Close-cooperation duet and offering-oriented duet are used to describe the interactions for the critical events BFR encountered during the innovation process. Close-cooperation duet refers to changes that can affect both sides of the dyad when resources, activities, and specific actors are mobilized (Håkansson and Ford, 2016). The operation of the dream team in BFR, for instance, saw the dedicated delegation of tasks among the team. Each task involves commitment, trust, and cooperative intent by the actors. Networking and close-cooperation interaction can also be used to describe the customer's focal group that continued to provide support and feedback during the innovation process of BFR. The suggestions provided by them in terms of packaging and remain an important part of the marketing process not just when the product was commercialized, but also by acting as consumers in creating a demand for the product to eventually be available on the shelves of major retailers. Offering-oriented duets can then be used to describe the interesting interaction between BFR and the retailers who had to make adaptations with the store display and storage of the products in the store in accordance with the requirements of BFR. BFR's innovation process can be perceived as a unique phenomenon that illustrates a reshaping of how interactions are normally conducted between retailers and suppliers in Sweden.

5.2.1.4 Sentient Connector

For CO3, being described as a sentient connector meant that the interactive style had a strong element of perspective and the ability to sense subjectively. This can be seen in CO3's interaction strategy that was deliberately chosen to commercialize the innovation but also to gain knowledge as part of innovation process. The adaptive and innovative capacities are strongest in this type of interactive style, shown through the ability to work across companies and to provide channels of communication and other resources required for the cooperation—essential for a successful innovation strategy. The owner/manager also needs to be professional in harmonizing and regulating the competencies and interests of the related partners to ensure the transfer of required knowledge. Absorptive capacity is mostly integrated through engaging in collaboration with external partners. The effectiveness of owners/managers of microenterprises may be determined by their ability to take on and manage multiple roles. The interactive style of sentient connectors can be seen as being open to both new and experienced contacts in the network, as the innovative

capability would help to adapt and integrate external resources where applicable.

Pure business duels, evolving duets, and network interactions are being used to describe the types of interactions in the critical events of CO3. Pure business deals are single episodes of interaction in which the price (in its broadest sense) is the currency enabling the exchange (Håkansson and Ford, 2016). In such interactions, the collaborater is chosen based on the price with limited involvement. In the case of CO3 who needed to engage with the scientific community to gain access for testing, there were partnerships and collaborations that existed as single episodes of pure business duels for tasks such as testing by research institutes for level of bacteria for the pasteurization done by Pastair's machines and that have no visible impact on the resource ties of the counterparts. Examples of evolving duets in the innovation process of CO3 include collaborations with professors that were secured based on innovation fundings and also customer trials for the machines. While network interaction can be observed in some degree in all the four cases, it is observed as an active type of interaction utilized CO3 in the search in external resources to as a manifestation fo adaptive and innovative capacities..

5.2.2 Utilizing and enhancing capacities

The greatest advantage of networking for microenterprises can be said to be the accessibility of resources to drive the innovation process. Nonetheless, Hewitt-Dundas (2006) suggested that the probability of a firm undertaking innovation is affected by the initial level of capacities. This section suggests that this initial level of capacities is enhanced through the interactions during the innovation process. Describing the interaction style of each innovation process aided in the understanding of the existing capacities for each microenterprises. This understanding, together with taking stock of the capacities each microenterprise possesses or uses in the innovation process, can help in the understanding of the intricacies of the interactions that occur during critical events. Certain capacities that the microenterprises do not possess initially can also be developed or enhanced through the interactions of the different substance layers during this process, which can help address barriers to innovation encountered by microenterprises.

This section examines how adaptive, absorptive, and innovative capabilities were utilized during the innovation process. This is linked to what scholars have described as the behavioral advantage of microenterprises during the

innovation process (Demirbas, 2010, Hoffman et al., 1998). However, these behaviors may require modification to suit new situations (Lundberg, 2002). Hence, the development of these capacities in the face of change, such as during critical events, can show the organizational flexibility, strategic routines, and ability to adapt (Cohen and Levinthal, 1990, Hewitt-Dundas, 2006, Eisenhardt and Martin, 2000) for these microenterprises. This also suggests that the presence of effective interaction may be observed or motivated by these new or unexpected circumstances. Table 5 shows the author's own appraisal of the existing capacities and enhanced areas of capacities of the four microenterprises' cases based on empirical data and analysis.

Table 5
Appraisal of Existing Versus Enhanced Areas of Capacities (Author's own)

	MSS	**THG**	**BFR**	**CO3**
Barriers Encountered	Cost, Knowledge, Regulation	Knowledge, Regulation	Market, Knowledge	Cost, Knowledge, Market
Existing capacities	R&D expertise University resources	R&D expertise	Experienced entrepreneurship Marketing experience Industrial experience	Experienced entrepreneurship International working experience
Enhanced areas of capacities	Industry experience Business experience	Business operations	Manufacturing expertise	Industrial network Distribution network Funding resource connections

5.2.2.1 Utilizing capacities to overcome barriers to innovation

In the four cases, there were some similarities when cost factor barriers were encountered during the innovation process, as they mostly related to capital investments in the initial phases of starting out an innovation (Hewitt-Dundas, 2006). There is a limit to a microenterprise's self-funding (or funding from family) and difficulty in accessing finances can spell an early end for some microenterprises. Referring to Table 3 which shows an overview of the type of critical events and the related barriers it encountered, MSS encountered three types of barrier factors in their first critical event. These events are described in detail in Chapter 4; the critical events help to illustrate the capacities that MSS utilized to overcome cost, knowledge, and regulation factor barriers. The first critical event illustrates the reliance on seeking assistance both financially and

in terms of regulatory procedures when the founders first patented their invention. Their familiarity with the academic environment but unfamiliarity with patent and business process meant that these cost and knowledge factor barriers were first overcome utilizing current absorptive capacity by obtaining the university's assistance in starting the patenting process, which aided in overcoming the cost factor barrier at this initial stage. MSS did not choose the route of financing through taking on board members, like the other three cases. Hence, in the process of overcoming cost factor barriers, the process of seeking external resources also aided in enhancing their knowledge on the process of patenting and commercializing an invention. Based on the analysis framework, this suggests that the first critical event that MSS encountered displayed the utilizing of adaptive capability, in which Ulf relied on his business connections and skills to seek external funding for MSS. One observation noted on the development of adaptive capacity is that there is often a conflict between two polarized objectives, such as in the case of MSS where there was a high desire to maintain the two founders' control of their company over restricting dependence on external resources that may demand the surrender of some aspect of control. The manifestation of adaptive capabilities (Wang and Ahmed, 2007) helped balance the need to access resources to aid in "weathering the cost" factor challenges while maintaining control over the intellectual property rights for their invention.

The other three cases adopted a slightly different approach to overcome cost factor barriers. For THG, BFR, and CO3, their main strategy was to have investors and board members to overcome cost and knowledge factor barriers. Utilizing past actor bonds and connections through board members meant that connections could be made to local and regional actors through establishing investor/collaborator bonds and resource ties by way of accessing expertise from board members. This can include activities such as financing sources, access to manufacturing facilities and contacts, market and industry knowledge, and innovation activities such as seeking funding from individuals, local and regional organizations, connecting to university research projects, and knowledge and partner scanning. For THG and BFR, cost barriers were addressed through key actors, who provided advice on the board and helped attract new investors. These actors also helped provide resource ties to aid in the manufacturing stage of THG (packaging) and BFR's (manufacturing) products in a later phase of the innovation process when faced with market and knowledge barriers, as described previously in Chapter 4. All these interactions can help enhance the three types of capacities to various degrees for the microenterprise during the innovation process.

5.2.2.2 Developing capacities

The concept of dynamic capabilities has been highlighted on some innovation activities like product development, which actively integrates resources (Eisenhardt and Martin, 2000). Since dynamic capabilities suggests a momentum of change, the development of capacities during the interaction when critical events occur is examined through the application of the analysis framework. During the process of taking over the patent, absorptive capacity is being developed for MSS as new knowledge about the patent process and the necessary contextual knowledge was being established. This paved the way for future collaborations to further develop the collaboration for MSS and other partners. This can be seen during the phase when the agreement was to be signed with the potential customer. Care was taken to engage a legal professional, which helped ensure that while the interest of the firm was protected, there were possibilities to engage in further collaborations. The founder recognized and acknowledged that the legal agreement was well drafted. Based on their improved absorptive capacities in the business aspects, they not only continued with the licensing model of the business but also added the research and development aspect to aid customers in providing further testing for the approval by authorities governing food.

The development of capacities when the maintenance of the patent was at risk of expiring (in the case of MSS, for instance) was observed when the founders were prompted to undertake financing the patents themselves through setting up a company to house the expiring patent. The existing level of absorptive capacity was enhanced when they activated the ARA substance layers around their network. For instance, the substance layers relating to Inger's past actor bond with Rikard as colleagues meant that they were able to utilize the resource ties to Aventure AB's expertise in commercializing research, and could also be a customer with their daughter company, DoubleGoodAB, by utilizing the patent through a licensing agreement. Further activity links show innovative capacity that connected university and industry under AFC's program and also helped develop the business model for the microenterprise by providing further research-related services for DoubleGood to bring their product to market. This suggests that there is a positive correlation between the capabilities developed with barriers to innovation. Having a strong alignment between the three substance layers (actor bonds, resource ties, activities links) can aid the development of these capacities when microenterprises encounter barriers to innovation. The benefits gained through integrating external resources is manifested through the enhancement of existing absorptive

capacity, particularly when actors bring with them past experiences that allow them to recognize the value of new knowledge or potential opportunities. These different capacities that were distributed in the network of the microenterprises among different actors were synthesized at the intersection with critical events.

For the case of THG, the development of adaptive capacity can be seen in situations where indirect connections were introduced through the board members (such as from Kent Lörd to his packaging contacts for the production of their H13 lactic-acid based products). Through the benefit of an established actor bond, THG was able to obtain the knowledge necessary for their innovation that would otherwise not be easily available to the microenterprise that is new to the industry. This was also observed for BFR in the development of their cold-chain process that enabled their product to be delivered in a safe manner to the households of the consumers. Through the connection of the board members, manufacturing expertise gained from their previous ventures meant that Rikard and Rolf were able to advise and connect the necessary nodes to enable the product manufacturing process to manifest. These weak ties can often aid microenterprises into progressing to new types of alliances along the innovation journey, promoting innovative capacity.

THG, BFR, and CO3 adopted an organizational structure in which they took on board members that had both the abilities they felt were needed to grow the microenterprise in a certain direction (overcoming cost, knowledge, and market factor barriers) and also an interest in investing in the company. These board members brought with them industrial experience in complementary fields (experience in food industry, experience in academic fields, experience in setting up new companies, manufacturing connections) and interest in investment in the enterprise. These actors' abilities were integrated and refocused to help drive the innovation process of the microenterprises, through identifying opportunities and also connecting to manufacturing industrial contacts that the young microenterprise would not necessary have accesses to (Escribano et al., 2009). For instance, while getting the board members on board helped the enterprise to address cost factor barriers for BFR, THG, and CO3, it also helped enhance the existing absorptive capacities of the enterprise through mentoring and advisory from the veteran industry actors. The selection of board members also played a part in potentially helping to develop the capacities of the microenterprises if they were selected to address gaps in the microenterprises' existing resource portfolios—i.e., weaknesses that prevented the progression of the innovation process. For example, THG engaged in addressing the scientific, business, and

manufacturing aspects of their portfolio through engaging key actors that could aid them in these aspects during the innovation process. At the same time, through introduction to external connections, this can help develop adaptive and innovative capacities, as interactions can provide opportunities for mutual synergy and learning to happen and subsequently be integrated where applicable (Dennis, 2000).

The development of capacities for the innovation process cases that have faced market factor barriers and knowledge factor barriers can be observed particularly in the area of innovative capacity. THG and BFR also displayed innovative capability when they developed new products through adopting innovative orientation when it came to approaching their target market (Wang and Ahmed, 2007). For BFR, they had a novel approach to the market to be customer-focused instead of trying to establish their niche from the retailer's end, fighting for the same space with other retail products. In this respect, the combined "failed" experience of previously trying to launch their baby food product came into play from product development to market strategy during the innovation process (Cohen and Levinthal, 1990). BFR's adaptive capacity gleaned from past experience of the management's team meant they were able to avoid the pitfalls that they encountered previously and were more prepared to understand the target market in terms of market feasibility studies through surveys and focus groups. Another example is strategic decision making, which can be observed in the case of BFR when deciding on how to first enter the baby food market through a "reverse-engineering" method. This was also evident in the case of THG, who managed to reconfigure their resources through seeking crowd funding after the dissolution of the board and actively revamping and approaching the market in a new, social-media manner.

5.2.2.3 Integrating new capacities

One can examine the strategy of MSS and CO3 in harnessing the benefits of regional innovation systems through the connections to universities and regional innovation grants and initiatives. CO3 probably recognized that in the long run, it "cannot rely exclusively on informal localized learning but must also gain access to wider pools of both analytical and synthetic knowledge on a national and global basis"(Asheim and Coenen, 2005). As such, microenterprises that recognize and incorporate such cooperation with local universities and research institutions may be able to access knowledge competence through networks without engaging in long-term relationship commitments. BFR also benefited from this strategy for accessing analytic

knowledge with financial backing for feasibility study of the baby food market from a regional food intermediary and synthetic knowledge for understanding and approaching the retail industry with its "dream team." These practices can improve the innovative capacity of the microenterprises and also prevent "lock-in" situations where they are unable to depart from resource commitments (Asheim and Coenen, 2005).

The level of independence from external resource interactions can be seen as an important aspect that depended on a strong vision when utilizing adaptive capacity for MSS. THG had an equally strong vision of independence, exhibited in a different manner. While the board members provided the needed contacts for packaging their products and also for understanding the industry, THG continued to build up their absorptive capabilities through research collaborations through research groups and collaborations in the academic realm. As researchers, business capabilities were hoped to be enhanced through the addition of experienced board members. However, this transfer of business knowledge to enhance their capabilities did not effectively happen. The interactions of the board members were conducted along the style of delegation according to each board member's forte with the founders. There was not much interaction between the board members, unlike those of BFR. The objectives of the board seemed more to realize returns from their investment, as interpreted by the founders through their desire to engage with investors for the companies and to concentrate on existing business, which had shown good potential for the market. This was also observed in the case of CO3, as it seemed to be a deliberate strategy to rely on external resources without integrating new knowledge. This may be observed in terms of the actor bonds and resource ties of CO3 that can be more varied but on a short-term basis. These observations point to potential areas for future studies in examining the "negative" consequences of the development of capacities, which is not often discussed in literature when external knowledge is integrated with the firm. This is an area of empirical contribution to show how external resources are introduced through interaction but failed to integrate for a firm in developing or enhancing capabilities in the innovation process.

5.3 Management of Relationships in Networks

Business relationships can be viewed from different perspectives. For instance, business relationships can be viewed as being made up of four aspects, such as mutual orientation, mutual dependence, bonds, and relationship investment (Easton, 1992). Business relationships can also be seen as having structural, economical, and social dimensions (Skaates, 2000). The management of business relationships for microenterprises can be seen as a complex task, requiring the consideration of how the relationship is perceived from various aspects or how the actors in the network can interpret it via different dimensions. Gulati (2007) suggested that interaction can show "interesting dynamics between interdependence, network resources and alliance formation." This section focuses on two aspects of the management of relationships for microenterprises during the innovation process: the management of relationships that are based on potentially fragile links between actors, activities, and resources in the network structure and management of relationship toward its end or when a relationship progresses in a state of discontinuity (Halinen and Tähtinen, 2002, Tahtinen and Halinen, 2002, Hocutt, 1998).

5.3.1 Sharing and calibrating ambitions and visions

The theoretical perspectives suggest that at the intersection of critical events, the alignment of capabilities and interactions influences the readiness of the microenterprises when dealing with these critical events. In the case of BFR and THG, the board members of both microenterprises can be seen as aiming to drive the innovation process along for a successful outcome. For BFR, there was an alignment of motivations by both board members and the owner/manager to overcome the barriers encountered in the innovation process. Having a common vision and similar synthetic knowledge bases enabled the running of a management team that was already set out to interact and work together as a team. There was a clear division and expectations of the tasks to be performed by the management team. On the other hand, the board members and management team of THG were made up of industry veterans with diverse but complementary knowledge bases (science, business, packaging etc.) perceived as beneficial for the innovation process. This mixture of analytical and synthetic knowledge bases emphasized the differences in the

fortes of the board members. It was not aided by what seemed to be limited communication, mostly between the founders and individual board members. This type of interaction could have influenced the lack of common vision and mission with distrust among the board members. There was also a divide between the board interest and the expectation of the founders, as revealed in follow-up interviews, especially when the board members met while the two founders were on sick leave in an attempt to continue driving the innovation process. For THG case, the founders viewed it as a cut-off from business concerns as the board members may have felt they were in a better position to the handle business aspects of the microenterprise than the founders themselves, who had a strong research background.

The complexity of managing relationships in a network implies that it is not always possible to manage the expectations and reactions of the actors involved in the innovation process. For instance, the level of trade-off for access to external resource ties was viewed differently by the four cases. For instance, CO3 showed a clear understanding of the trade-offs between ambitions and business visions in his dealing with the board members, many of who held more of an investment role than operational roles in the innovation process. Even though there have been ups and downs in the innovation process, Sjöholm displayed an understanding of the limit to the support investors could contribute, even toward a seeming end to the system and company in 2014 when the technology and patent were put up for sale. For MSS, which had a clear vision of being a research-based company offering research services, the company has not set up any board and prefers to have control over their own business activities without over-reliance on any particular stakeholder. The maintenance of ownership plays an important role for the visions held by most microenterprises, but this is a tricky balance to achieve in view of the need for resources to continue developing the innovation process. For MSS, since they planned to pursue a licensing business model, their strategy was still to place the focus on research and to maintain ownership of the patent. THG, on the other hand, having had an offer from the private sector, had a different vision of commercializing their research and running a company. Through pursuing a dual strategy of running a business and maintaining their involvement in research through continued work with research groups in the university, they have continued to experience different sets of challenges in each phase of the innovation process. For business relationships formed out of the motivation of accessing or utilizing external resources during the innovation process, the actions and reactions of all stakeholders in the innovation process can affect the outcome; the interaction can have both short and long-term impacts. Decisions

made during this process may not just be operationally crucial for the innovation process, but also for the fulfillment of visions for the microenterprises. However, implementation of these dreams into business visions requires managing the resources in the innovation process that may run contrary to the completion of innovation processes (Earle, 1997) from the perspective of different actors. In the case of THG, one can sense the strong ambitions the founders held, but this ran into conflict with the business visions that the board members hoped to strive toward.

Boards are a unique type of formal mechanism (Gulati, 2007) whose main purpose is usually to provide network resources and potential alliances. Hence, actor bonds between board members and actors external to the enterprise can represent a big jump from having no access to exerting a strong influence on the progressing of the innovation process in terms of availability of network resources. Moreover, the management of relationships in networks can have invisible aspects that might arise in unexpected occasions.

In the four cases, almost all the informants held two roles or more in their professional capacity. This may be a phenomenon characteristic of the Swedish labor market. Previous studies have often discussed the multiple hats owner-founders of small firms have to wear, and lack of time was one of the reasons cited for the non-participation in business skills workshops offered by authorities. However, this duality or multiplicity of roles is not restricted to the owner-founder but also applies to the actors in the network. These present both benefits and potential conflicts in the innovation process for microenterprises. In formal interaction in business relationships, reliability, trust, and commitment are often cited to be what help establish and maintain relationships (Lowe et al., 2012). The language or discourse used in each role can provide clues to the identity held at the point of interaction. For example, there were various actors in the networks of the microenterprises that held roles both as investors and also advisors in the firm. While one may see these roles as being complementary and beneficial, under extraordinary circumstances this type of duality can be unpleasant to handle, especially in face of potential conflicts. This can also be related to the expectation of reciprocity in a network consisting mostly of dyad relationships. This may be a characteristic of microenterprises' limited network, as seen from the illustrations of networks in Chapter 4. The network figures showed connections to the owner/manager of the innovation process that meant it is a fundamental mechanism of formation, maintenance, or deletion of relationships. A key actor can be recognized through repeated activity links in the network (Gulati, 2007). Members within innovation networks understand the collective power of the network and

provide mutual support for each other. Having a shared vision and trust is considered necessary in these networks for maintaining long-term relationships; this can be reinforced through successful interactions of its members (Miller et al., 2007). Trust, willingness to coordinate activities, ability to convey a sense of commitment to relationship, communication strategies used by trading partners, joint planning, and joint problem resolution are some of the characteristics of successful partnerships (Mohr and Spekman, 1994).

5.3.2 Saying goodbyes

The ending of relationships have spiked the interest of researchers, as it is increasingly recognized to be relevant to the management of the company and its performance (Tahtinen and Halinen, 2002). Tahtinen and Halinen (2002) pointed out that attention needed to be paid to the interactive nature of these exchange relationships, as they involve more than one party and the actions and reactions need to be taken into consideration through reviewing data from both parties. In the case of THG, even after the dissolution of the board, there were different accounts that led to the dissolution. This implies that there might have been potential weaknesses in the interactions that led up to the dissolution itself and certain tendencies might have been overlooked (such as the strong desire of the founder to maintain business control over the company even though they had taken external investors on board). Another characteristic of members of an innovation network can be seen in the strategic focus of its members—i.e., they are searching for competitive advantages from a resource-based point of view (Miller et al., 2007). While it may reduce the cost of ties (in terms of time, emotional investment, and self-disclosure), the dissolution of a reciprocal tie may be perceived as more "costly" than the break of a non-reciprocal one. For example, THG, who dissolved their ties with existing board members, risked the cost of reestablishing these ties again. In the view of some board members, the founders of THG were perceived as not "reciprocating" when they decided to close down one of the subsidiaries that was seen as more profitable, and had good potential in the short term residual effects of this action among the board members. However, the cost of maintaining this reciprocal tie was perceived to be too costly from the perspective of the founders. Nonetheless, the updates when interviews were conducted with the concerned actors revealed a potential recurrence of these relationships, but probably in different roles and contexts as compared to the previous set-up. Still, it should be noted that they are currently seeking other

type of actors in the network through crowd funding instead of just through formal organizational investments, as of May 2015.

The importance of reciprocity in business relationships for microenterprises warrants further research. For THG, the split was not regarded as a mutual decision by all parties involved and was considered as being initiated by the two founders. In this situation, the existence of an in-group and out-group (Gulati, 2007) within the board members and the management could be seen. This has a negative effect on the relationships between the two groups as it can break down the communication channels. There were some attempts at negotiation to restore the relationships, but it evolved to be a critical event in the innovation process of THG. Alajoutsijärvi et al. (2000) would describe that THG used a revocable exit strategy where the founders "explicitly states its intentions concerning dissolution, but still having a desire to discuss the reasons and the problems related to the relationship (mutual state-of-the-relationship talk)." In such a scenario, the views of the actors involved can be so different that it would entail one or both sides to "change their views and reduce self-orientation" (Alajoutsijärvi et al., 2000). For the case of THG, there was no opportunity for the parties involved to adjust their views, and soon after the dissolution of the board, the founders embarked on a crowd funding campaign in 2015. In the follow-up interview, they did not dismiss the possibility of setting up a board again but will remain cautious and more stringent on their requirements on board members and their areas of contribution.

The ending of a relationship can imply resources being freed from earlier commitments for use in other aspects (Alajoutsijärvi et al., 2000). This implies that when a relationship ends, actor bonds, resource ties, and activity links may disconnect the parties in the innovation process (Halinen and Tähtinen, 2002). Tahtinen and Halinen (2002) found that the nature of the relationship had a role to play when relationships end, whether one or both parties initiated it or because there was decreasing need for continuing the relationship. For BFR, the ambient management board relationships can be seen not only in the account of the innovation process, but also in how Aventure AB subsequently exited the management team through selling the shares to Mats. The reason Rikard cited was that, Otto's products are good, their overall business direction did not fit in with Aventure's AB. The parting was on good terms, as with the case of CO3 when the sale of the company was inquired in the course of the interview. This was an agreed exit strategy reached by the board, but they did not prevent Johan from pursuing other application of CO3's innovation. Halinen and Tähtinen (2002) pointed out that the ending of relationships can

occur at any point of time and endings can be varied, so it is not enough to consider only the strength of commitment or level of satisfaction. They suggested that besides categorizing relationships as continuous, terminal, or episodic, there can be five different types of ending: chosen, forced, natural, desired, and predetermined. These endings can be affected by the state of the relationship just right before the relationship ends, related to factors connected to actors themselves, relationships, and the business networks. There is a reduction of activity links, resource ties, and actor bonds during the process of ending relationships (Halinen and Tähtinen, 2002). For these critical events, it is taken as comprising mostly continuous relationships and some episodic relationships. In the case of CO3, it was reported that the patent was up for sale in 2014; this also signaled a type of relationship ending. In the case of THG, even when business relationships might have ended, personal relationships between individuals (like the founders and Rolf) still remained. What is certain is that there may be external reasons that were not known from the data collection or that were outside the actors' influence that might have affected the continuation of the relationships for THG and its board members. This means that with relationships ending, the connections of the previous relationship still have other influences on other connected actors, and may also have rippling change effects in the network. The influence of networks for microenterprises after dissolution of boards or alliances should also be considered for future studies.

The choice of partners can help better prepare microenterprises for dealing with unexpected barriers in the innovation process. As Larsen and Lewis (2007) observed, small business management has "lurched from one crisis to another, which if they had been more aware of the "cause and effect" of the actions taken, could have prevented some of the barriers to innovation occurring." The prevention of barriers to innovation and obtaining support to overcome these barriers during the innovation process may not always be in the control of microenterprises, as uncertain environmental conditions can arise when least expected, as can be seen in the case of CO3 (market condition changes) and THG (health and board members' concerns). However, the microenterprises can benefit from having actors in their network who have extensive experiences and discernment (Eisenhardt and Martin, 2000) on advising on the right steps to move forward. This means the choosing of partners should not only consider the types of resources they can bring on board for the microenterprises, but also the experiences, positions held by actors in the network (Gulati, 2007), and commitment that these actors can provide to the microenterprises' innovation process. For CO3's case with the

trials with Skånemejerier, the lack of champions within Skånemejerier to follow-through this phase of the innovation process meant the end of the trial period with the potential customer, even though it would have been a solvable issue. Similarly the choice of board members was designed to be complementary to provide a holistic set of knowledge bases for the innovation process. However, the health concerns that arose for the founders of THG was not expected nor could it have been handled by the board, creating a situation that was challenging to resolve between the parties who had different ideas of how to drive the innovation process forward. In these two cases, the microenterprises chose to "rebuild" the foundation of actors, resources, and activities that they had been working on. Having key actors in microenterprises' networks who act as sources of important information can also mean that a lean and strong network structure can be equally, if not more, useful than a large network for innovating microenterprises—for instance, the exclusive relationship that the owner/manager of the CO3 case had with Hans Rausing, a prominent businessman who provided him with both financial aid and mentorship at the initial development of the cold pasteurization machines. This was similar to the case of MSS, which saw prior collaborations for Elin, Inger, and Rikard paving the way for the collaboration first as customers-suppliers, then later as co-inventors and further expanding their research collaborations. This may be a characteristic of an innovating microenterprise that combined the strength of old ties with a limited but quality network that can allow an understanding on the formation of networks and alliance for microenterprises.

5.4 Reflections and Insights

This section summarizes the insights identified above and presents the three main themes in Table 6. The insights are derived from the narratives of the innovation process of microenterprises, providing deeper understanding into how different aspects of the interaction have an effect on the interaction process of microenterprises. This can extend our understanding of how the innovation processes are conducted by the microenterprises, in particular challenges that might be unique to microenterprises innovating in a mature sector. These insights, organized by the three themes, serve as a catalyst for reflections on the understanding of the innovation process in microenterprises and how relations established with external actors and accessing external

resources can help develop capacities that address the barriers encountered during the innovation process. This section also acts as a roadmap for the concluding chapter to link this thesis to the contributions for theory, practice, and policy when it comes to understanding the innovation process of microenterprises in a mature sector.

Table 6
Summary of Insights

Themes	Summary of Insights
5.1 Critical Elements of Interactions During Innovation	
5.1.1 Failure as the Foundation to Innovation	Experiencing failures and learning how to handle failed outcomes can prepare microenterprises for similar events along the innovation process Small failures provide motivation to learn and build on their resource and knowledge foundation The magnitude of failure can imply either an opportunity to learn and improve or a way in which defenses might be put up
5.1.2 The Strength of Old Ties	Renewal of old ties can enable an innovating enterprise to be an "insider" to the industry Having similar contextual backgrounds can aid in the exchange of knowledge and conduction of activities Old ties can speed up the creation of certain conditions such as trust that enable the development of capacities
5.2 Development and Enhancement of Capacities	
5.2.1 Behavioral Considerations of Microenterprises	Understanding the microenterprises' interaction styles to aid in the management of diverse types of interactions
5.2.2 Utilizing and Enhancing Capacities	Existing capacities are important to help overcome barriers encountered at the initial phase of the innovation process Developing capacities can link actors bonds, resource and activities together Integrating external resources is not always a smooth process and may fail
5.3 Management of Relationships in Networks	
5.3.1 Sharing and Calibrating Ambitions and Visions	Having the same understanding of the ambitions and visions between founders of microenterprises and external resources needs to be established and communicated Due to the complexity in network, it may not always be possible to manage the actions and reactions of all stakeholders For actors that hold multiple roles, they may contribute both benefits and conflicts during the innovation process
5.3.2 Saying Goodbyes	The ending of relationships may not be mutual but remains important to be managed as part of the ongoing innovation process The ending of relationships during the innovation process may be necessary for progression of the innovation development, and can free up resources that were otherwise tied up Choice of partners in the innovation process matters not just in access to resources but to build up foundations to handle barriers encountered in the innovation process

Two main aspects of the interactions that occurred during the innovation process are identified as critical elements that can help microenterprises overcome barriers. The first refers to the experience of failure, which is not uncommon in any innovation process, although the way that it is handled can help prepare the microenterprise for further journey along the innovation process. The process of learning, or seeking external resources while resolving the barriers encountered, aids in building the foundation for future encounters. If the failure is not so detrimental to the innovation process, this can be a form of motivation instead for microenterprises to enhance their capacities through learning. The second aspect refers to the utilization of old ties that take advantage of the connections, positions, and experiences of the actors that were reconnected. In cases where the relationship spans a period of time, these actors have a developed network of connections that may prove invaluable for a microenterprise that has newly started up. This is a way in which the innovating microenterprise may overcome the liability of smallness and newness.

Table 4 suggests four interaction styles when considering how each of these microenterprises interacted during their innovation process when seeking external resources. These interaction styles may be considered beyond observations of empirical patterns in the cases. This thesis suggests that it may be applicable for understanding other innovating microenterprises and how their interaction styles may influence how diverse relationships are managed during the innovation process. The management of relationships has been a topic that has been discussed in various fields (Corsaro and Snehota, 2012, Axelsson, 2010, Håkansson. and Snehota., 1998, Håkansson and Snehota, 1995). This can be an area further developed to understand how the motivations driving each innovation of microenterprises can be understood in terms of how they network and how effective these acquired resources are when faced with barriers in the innovation process. For instance, the four cases showed that diverging expectations and understandings was an area that should be managed to prevent disruption to the innovation process. While diverse knowledge bases are helpful for the innovation process of microenterprises to help address the "shortcomings" of being small by introducing new insights, diverse opinions—if not managed constructively—can break down the synergy intended to drive the innovation process. Another way that interactions during the innovation process help microenterprises overcome barriers is in the development and enhancement of capacities. It may be observed that capacities that are first sought during the innovation process are those that allow microenterprises to address cost-related types of barriers. This has normally

occurred at the initial phase of the innovation process for practical reasons, as financing is required to undertake market research, register for patents, and to conduct further testing. These types of capacities are often tied to a short-term or immediate motivation of "exploiting" the expertise and connections of these actors. This is not to say that microenterprises are shortsighted in their innovation strategy, but rather that due to the liability of smallness and newness, they may be forced to choose to concentrate their resources on developing capacities that can address more immediate concerns. Short-term collaborations may also evolve through the development of capacities that can allow microenterprises to cope in the innovation process.

The innovation process cases actuate a few considerations on the type of competencies and the capacities that can be developed and that can also be dependent on the dual or multiple roles these external resource ties have on the overall innovation process. For resources ties that are established exclusively for the purpose of overcoming factors influencing cost-related barriers, it is likely to be short term and not integrated into the overall innovation process. However, if these resource ties are established by actors holding dual roles (such as investor-cum-advisor), the capacity can be further developed and integrated in the innovation process of microenterprises. These actors who have financial commitments in the microenterprises can be further motivated to aid the microenterprise to succeed in its innovation effort.

Being able to effectively manage relationships has to do with both "growing and declining relationships" (Alajoutsijärvi et al., 2000). While the research has revolved around the establishment and maintenance of business relationships between suppliers and customers in networks, in this analysis an attempt is made to understand the value of renewed relationships and also when relationships end in networks. In some cases it is more feasible to embark on new ventures and establish new relationships in new networks than to continue in the current ones. In other circumstances, the revival of old, familiar ties can provide an advantage over the investment needed to build up new ties. One way in which this can be explained is that antecedents of working performance or characteristics are already known with actors connected by old ties and the partners are on familiar terms and know what to expect from each other. The control of the flows of information and power are also established in these types of relationships. The question then to be asked is if these actors are perceived to be holding positions of power or centrality in the network. This can be analyzed by understanding the roles held by these actors; the ability to substitute these actors is also an indication of the centrality and power of these actors in the network. Quite often these needs ought to be

considered together with the experience in the industry or sector the microenterprises operates in to determine if the experiences of the actors are useful or needed in the innovation process. Having a reputable partner in microenterprises' collaboration networks offers better "ratings" when it comes to evaluation for loans or grants, as in the case of MSS. However, this can also be viewed as a disadvantage when a "weakness" is revealed. In the four cases studied, one individual for instance was identified as an investor in three of the cases, and also a member of the board for two of the cases. While this might not be surprising given that these cases are drawn from the same sector within close geographical proximity, the actor has developed a reputation as a supporter of new potential start-ups and his involvement can be seen as a stamp of approval for other actors to join or invest in the company. Having dual roles can give rise to different motivations, which can be both beneficial for the innovation process, but also can give rise to conflict of interests at unexpected points of the innovation journey when self-interest needs to be weighed against collective interests. To illustrate, most of the actors in the cases were experts and veterans in their field of work. Hence, opinions and expectations were often backed with years of experience and may not have been taken lightly. However, the dual role as investors-advisors might be appropriate in most instances where business decisions regarding market, regulation, and knowledge-related barriers are in focus. For cost-related barriers, however, this might challenge the balance between the dual roles held, suggesting that the choice of external actors or establishment of external resource ties should be considered with heavier weightage when taking on board collaborators or engaging in alliances during the innovation process.

6 Conclusions

The purpose of this thesis is to increase the understanding of the innovation processes in microenterprises and how external relationships influence the development of microenterprises' capabilities in relation to the barriers encountered in the innovation process. The discussion from preceding chapters and insights from previous studies have helped shape the analysis framework. This framework is applied to the empirical data which are constructed as case narratives for an individual case analysis. A comparative case analysis is further conducted, organized under three themes to identify how these microenterprises sought and introduced external resources into their innovation process and how this could influence the development of microenterprises' capacities that aided in the addressing of barriers encountered during innovation. The final chapter serves both as a reflection and summary of insights that can contribute theoretically and practically to the research community, microenterprise managers, and actors related to policy making.

6.1 Theoretical Contributions

The importance of interactions in networks has been emphasized by various schools of studies and elaborated through the narratives of the four innovation process cases. Narratives help provide insights to what actors are reproducing from practices at different times, what is familiar to them from their culture and experiences (Pentland, 1999). The individual and comparative analyses illustrated how the different aspects of the interaction of the different substance layers engage with the capacities of each microenterprise in the innovation process. This section sums up the contribution to literature on innovative microenterprises and on barriers to innovation from a theoretical aspect. These contributions provide a deeper understanding on how effective management of interactions and relationships at different stages can help in enhancing the

capacities of microenterprises to address the barriers encountered during innovation.

6.1.1 Critical Interactions during innovation

This analysis highlighted two characteristics of critical interactions during the innovation process of microenterprises that can help prepare microenterprises to handle barriers and challenges during the innovation process. This refers beyond the immediate benefit of gaining access to an external resource through interaction and instead points to the experience of failed innovation-related interactions and interactions with key actors providing access or building access to resources (Radas and Božić, 2009, Hoffman et al., 1998) through renewal of old ties. These two types of interactions are pointed out to be critical for innovating microenterprises because they aid microenterprises in the preparation of facing barriers to innovation during the process. The former prepares the microenterprises through motivation to learn and increase capacities to help deal with similar events along the innovation process, while the latter provides speedier access to resources that can help overcome barriers to entry. This is in line with Corradi (2013) positioning of critical events as important to the development path of start-ups through the introduction of new resources, services, and routines. This thesis identified the two critical interactions as an examination of the relationships between critical learning episodes suggested by Corradi (2013) for future research. This finding also supports Clusel et al. (2012) in their study that pointed out that not all small business fail in the same way. While they pointed out two types of failures (caused by a particular incident or caused by consequences of a particular event), the vulnerability of firms was seen as the inability to anticipate and respond to the problem. This thesis then suggests that the magnitude of failure can instead prepare microenterprises to anticipate and respond to future similar types of circumstances of their failed experience.

6.1.2 "Knowing thyself" for microenterprises in the innovation process

Past literature has pointed to and discussed the types of scenarios small firms can engage in to survive in the innovation process, such as through gaining access to a larger network (Bjerke and Johansson, 2015) or the formation of

alliances (Aldrich and Auster, 1986, Jones et al., 2014). This thesis takes the lead from Bassayannis and Cronin's (2009) suggestion that interaction in networks exhibit the different ways of combining external resources, and it is a search for resources that are complementary to microenterprises (Bjerke and Johansson, 2015). To find complementary external resources implies that there should be a process of "self-evaluation" of the microenterprises' own capacities in the innovation process, which have not been discussed at length in the present literature. This thesis suggests that through a process of examining the interaction styles and types of interactions (Håkansson and Ford, 2016), this can help microenterprises better plan for the types of external resources that they require to continue in the innovation process. Nieto and Santamaría (2010) pointed out that the level of dependence small firms have on external collaborations is larger than that larger firms have on external collaborations. As such, the process of calibration of existing capacities of microenterprises can aid in managing the period of tension for the microenterprises that are caught between having to be dependent and trying to maintain their independence.

Taking a deliberate effort to align microenterprises' own visions, resources, and capacities between current actors and new actors in the innovation process can help in the creation and combination, and in some instances, prevent the dissolution, of collaborations. The theoretical contribution that this thesis points out is that from the study of the four innovation process cases, experienced actors who held multiple roles both in their professional capacities and in the network included in the innovation process may be valued for their industry experience and contribution in terms of knowledge and advice in the innovation process for microenterprises. However, conflicting visions and goals may subsequently arise during the innovation process with the microenterprises' owner/managers, such as when taking on investors that involve trading off ownership of the company. The calibration of expectations and ambitions should be an ongoing exercise between microenterprises and their collaborators and should not be assumed to remain the same throughout the innovation process.

6.1.3 The multi-facet management of interactions in networks for microenterprises

As Blomqvist and Levy (2006) pointed out, the ability to manage collaboration can help in the management of quality and expectations held in the relationships. From this thesis, one observation was that while the network of

actors surrounding the microenterprises were few, microenterprises were more dependent on each link. This has been described in various literature on the discussion on the strength of ties (Berrou and Combarnous, 2012, Bian, 1997), for example. What this thesis implies theoretically is that network selection is important for microenterprises especially in the choice of actors with multiple network linkages or strong positions in the network, which can be influential in impacting capacities and resources during the innovation process of microenterprises. As the cases have shown, however, the dual roles or interaction style and motivation need to be managed effectively for a successful outcome. This aspect on the multiple roles of actors in the network of microenterprises during the innovation process has not been given much attention in the literature. This thesis has provided motivation to examine this empirical phenonomenon on how and when actors connect during the innovation process of the microenterprises and how actors who hold multiple roles in the network can be both a driving force and a barrier during the innovation process.

The theme of paradoxes (Håkansson and Ford, 2002) inherent in the management of business networks is examined through the study of the dialectical process of interaction between actors in the network. The theoretical understanding of the cases showed how the management of paradoxical relationships in the innovation process could influence the combination of different capacities of the actor bonds, resources ties, and activity links to produce a complex phenomenon. The current theoretical understanding utilized the approach of a critical event to identify these paradoxical aspects of the relationships. Further improvement of the analysis framework can and should explore how these paradoxical aspects can be identified in non-critical event conditions that can provide a wider perspective of this dimension. These tensions can reveal the strength of actor bonds and resources ties, for instance, and can either guide the innovation to the next phase or produce unexpected barriers to innovations. These types of barriers that arise may be termed as interaction-related factors and highlight the "embeddedness" of how the structure of the network (formed by actors bonds and resource ties) is continuously tested by the innovation activities as the actors make sense and interpret the critical events and interactions. This has been illustrated in different ways by the four cases, such as by the interpretation of the introduction of business investors to the microenterprise. This can be seen from one perspective as a way to drive the innovation process forward and pave the way for a return of investment. On the other hand, it can be perceived as a

threat to ownership and decision-making by the founders of the microenterprise.

6.2 Practical Implications for Managers

6.2.1 Maintaining a resource-motivated network

Identifying the type of network a microenterprise is building up or trying to get embedded in can be challenging for new and small firms. However, the scope type of the network may not be as important as the interaction, density, and strength of ties of the actors, resources, and activities in the network. The relational investment should be viewed not just as the time spent but also as putting in the necessary effort when building up relationships in a network motivated by external resource-seeking.

The ability to interact between resources (Bizzi and Langley, 2012), actors, and activities is key to driving a successful innovation process for microenterprises. Bizzi and Langley (2012) highlighted that the main difference between "awesome innovation networks" and "vulnerable innovation networks" that have similar attributes is that one is able to encourage interaction between the resources more than the other. The empirical data provided in this research highlighted the fragility in getting in this alignment right for microenterprises. That is, managers need to trigger the right combination of resources and their interactions in the network. Similarly, this thesis contributes theoretically to the conditions in which microenterprises may have at times an easier or more difficult time in getting this combination right due to the multi-faceted nature of not just the relationship but the actor node itself.

As suggested by Bizzi and Langley (2012), the focus on "key changes or transformation sharpens the potential for developing valuable insights into network processes that will be of interest to practitioners." Ylinenpaa (1998), in his study of barriers specific to Swedish SMEs, noted that there was a general positive attitude toward small businesses and innovation, such as education in entrepreneurship and creativity being encouraged in the society as a whole. In addition, the importance SMEs play in creating jobs and economic well-being has also been generally acknowledged. There remains, however, a paradoxical situation in which Swedish small firms still perceived significant

barriers to innovation due to the lack of government support. One reason that Ylinenpaa (1998) suggested for this was that small firms, contrary to popular belief, are not "innovative" in the sense that small firms may remain satisfied in maintaining their status quo to ensure the survival of the firm instead of taking further risks that might jeopardize what they have achieved thus far. The gap between ideal and practice can also mean that while there are intentions to promote innovation efforts in small firms, the support from relevant authorities is not manifested and existing practices and bureaucracy still pose obstacles that may discourage innovating microenterprises.

6.2.2 Calibrating capabilities

Wang and Ahmed (2007) suggested that managers might consider charting their firm's dynamic capabilities and comparing those to peers in the industry. This should take into consideration both historical and current strengths and weakness to allow efficient deployment of resources for enhancing the three categories of capacities as discussed in this thesis. These developments may take time to be realized and therefore behoove a long-term vision to implement. Moilanen et al. (2014) findings indicated that small firms could influence their innovation performance through the management of their networks. This can also aid in improving their absorptive capacities, as relationships built up during the interaction throughout the innovation process can increase or decrease the access to external resources or development of internal competencies. To be able to do this implies that there is a need for further research for a better understanding of how to develop and measure these competencies of microenterprises that are innovating in mature industries.

The changing roles of owner/managers (for instance from being a researcher to a business manager) during the innovation process entailed new sets of skills that need to be developed, either on the job, through mentorship, or formal training and education. For example, those microenterprises with a strong research background often have an established network within the university environment, but limited industry experience or dealing with industry actors. The industry experience is helpful when researchers wish to commercialize their research; this limitation is often addressed by bringing in industry experts at the management level (Storbacka and Nenonen, 2015) via mentorship. These actors with whom microenterprises have established business relationships are often seen as "carriers of knowledge, transferring expertise and know-how from one place to another by means of their mobility"

(Trippl et al., 2015). Lagnevik (2008) and Trippl et al. (2015) point to these professional actors as sources with which an industry can develop new directions; this manner of transferring knowledge through mentoring can equip microenterprises with capacities to transform the mature industry. The same can be said of entrepreneurs who require research input for their innovation. Although research skills may not be possible to develop in this short time, outsourcing is usually the mode of incorporating research into the innovation process. That implies that contextual knowledge is often required to be able to identify the correct investigative R&D route and to be able to apply this knowledge. This requires having an open mindset and practicing knowledge scanning to enhance absorptive capacities. The outsourcing of research can also be seen when user-driven innovation is pursued. The establishment of user communities means that sharing knowledge and trust should be included in the motivation for understanding these user communities. This aspect of being aware of existing capacities and accessing and being receptive to external resources to enhance capacities should be a more conscious effort and part of the innovation strategy for microenterprises.

6.3 For Policy Makers

6.3.1 Requirements for grants and applications

A fundamental change of mindset needs to take place before the requirements for funding grants or similar aid for supporting innovation at the systems level can be adjusted for microenterprises. The four cases have encountered barriers to innovations that have varying impacts on their innovation process. As discussed in in Chapter 2 on the four types of factors influencing innovation for microenterprises, they may be accompanied by unique conditions that can influence the innovation journey in either a positive or negative way. In the case of MSS, cost and regulatory factors were encountered when they applied to governmental institutions providing grants or loans by banks. These barrier factors posed by these stakeholders showed that these authorities adopted low-risk profiles. Thus, the requirements that were asked from microenterprises (that are mostly new or start-ups) were to provide track records or an assurance of a good innovative outcome in order to secure funding. This requirement can often mean that microenterprises may chose not to take up these funding

opportunities or they may be investing precious time and resources to ensure an alignment with the criteria required by these stakeholders. Gibb and Li (2003) suggested that through supporting entrepreneurial behavior, key stakeholders could act together to find mutually beneficial solutions to allow progression in the innovation process. This is especially so in conditions of ambiguity and uncertainty, such as during critical phases, to aid in the fostering of trust and mutual favors. This entails the parties involved developing new ways of thinking, of doing things and changing behavior deemed necessary to allow new markets to be shaped by these microenterprises (Gibb and Li, 2003).

According to Lennart Ljunggren (CO3 interviewee), one of the hindrances microenterprises have encountered is the presence and operation of what he referred to as "authorized bodies." Basically, these are regulatory bodies that have the ability to provide the external resources required by microenterprises during the innovation process. Lennart reflected that these regulatory bodies, while designed to ensure certain levels of quality and adherence to rules and regulations, were not always very effective or clear about the requirements when it came to certification or grant applications. For example, one of requirements that accompanied a grant application that he was involved in was a literature review about technology that was ten years old, when the actual technology in question involved much more recent knowledge. The inconsistency in the staff that is involved in the progress due to the changes in the person in charge of the case was a matter that concerned not only Lennart, but also resonated with other informants in the four cases. This is a concern that can arise during the innovation process that may not have prevented the actual innovation process but can definitely be made better to improve the overall experience of innovating microenterprises due to their limited personnel resources. For one, the funding application process for microenterprises' innovation efforts can be improved, mainly through the communication of the requirements; this can be made part of the process for applications. The information provided for each case can perhaps be shared in a common data system so new innovation officers who take over the case could have the common information about the microenterprises or the innovation cases. Nonetheless, for such long-term collaborations, relationships need to be cultivated and maintained, and it is perhaps unavoidable that microenterprises might lack the expertise or time to go through the whole lengthy process.

There has been literature observing that small firms have not been taking up government initiative innovation activities and grants. This matching of resources and innovation initiatives has not always been greatly utilized by

small firms, due partly to the abovementioned reasons. Another aspect may be the lack of feedback that policy makers can obtain or channels though which microenterprises can provide feedback. For example, questions have been raised by microenterprises about the requirement of funding grants when the application failed to go through. However, as there are no formal channels or routines that can allow microenterprises to understand the motivations behind the approval of grants, it may contribute to the overall impression that while there is funding available, it is not matched in a transparent manner that motivates these microenterprises to continue supporting such innovation initiatives. When the requirements of the applications are unclear, factors such as the reputation of the applicants who had a good track record with the regulatory body due to previous approved grant history can seem discouraging for new microenterprises. This is a type of "discrimination" that has not always surfaced in innovation studies for microenterprises or even governmental reports for these grant applications.

6.3.2 Renewal of mature industry

Literature about path renewal for mature industrial sectors resurged in the form of discussion on how the role of agglomeration is increasingly seen as availability of diversified related expertise instead of a concentration of specialization in a given region. In their study of path renewals in regional policy, Coenen et al. (2015) explored how policies could help facilitate industrial renewal in locked-in regions. This was built on the observation of new industrial sectors forming based on "recombination of different but related knowledge, skills and competencies found in existing industries in the region" (Coenen et al., 2015). It is not the intention of this study to go into detail about the literature for path renewals, only to point out that there are some linkages in conceptualizing how microenterprises play a part in renewing these sectors through their innovation efforts. In Sweden, for example, under a coordinated market economy, having a strong policy player (such as VINNOVA—Swedish Governmental Agency for Innovation Systems) can help influence and build up the regional innovation system (Trippl et al., 2015). The mature industry in this study focused on the Swedish food industry, particularly in the Oresund region. The challenge for innovation in regions such as the Oresund area often lies in how to revitalize the clusters and look for new opportunities for future growth and development. Firms and organizations in mature industries may be "locked-in" to previous or current

investments to react in the appropriate time and manner when the market changes. These reactions often require some form of codified and tacit knowledge exchange. This is where proximity and "learning-through-interacting" plays an important part in the areas concerning tacit knowledge (Dannenberg and Kulke, 2015).

The renewal of a mature industry like the food sector requires not just a one-size-fits-all model but also perhaps a multi-faceted one that can allow the uniqueness of each microenterprise to be taken into consideration. One way in which the cases in this thesis have alluded to this was the presence of "natural" systems of innovation by existing companies and key actors in the system. Recognizing the innovativeness of the sector and aligning policy efforts with the role microenterprises play in "re-scaping" the food sector means being aware of these key actor bonds and promoting innovation activity links between them and the new microenterprises. As Lagnevik (2008) pointed out regarding the influx of professionals moving to setup or join microenterprises introducing new niches to the food sector, this requirement of academic justification should be tapered by including practical experiences that these professionals bring to the sector. The case of Aventure AB and its linkage with both the research institution and business organization was a good example of an organic form of local innovation systems that can be promoted and supported by governmental initiatives.

Recent research concerning the renewal of mature industries has highlighted the role of exogenous sources, capacities to attract and absorb knowledge as drivers of new path development in regional innovation systems (Trippl et al., 2015). This thesis examined the innovation process of four microenterprises, which can be positioned as players in the renewal of the Swedish food sector through their innovative products and processes that are carving out new niches in the food industry. These microenterprises also actively sought out external resources and networks, establishing new combinations of actor bonds that can bring about innovative food products or processes, as illustrated in the cases. The four in-depth case studies allowed a glimpse of how microenterprises, both university spin-offs and new firms set up by experienced entrepreneurs, managed the barriers they encountered during the innovation process. Although each innovation process is unique, inferences can be drawn from the cases' contexts to provide a point of reference that future studies can draw from in terms of renewal of mature industries through innovation activities by microenterprises.

6.3.3 To intervene or let nature takes its course

Although the need for public intervention is both legitimate and necessary according to Coenen et al. (2015), this is a complex phenomenon that may take place among different actors, and a difficult task if regional innovation measures and initiatives are not aligned among the key system players. System failures can be seen in some of the cases when resources for innovations are not appropriate or are incomplete, or when there is not enough interactions between actors. This "failure" can also be observed in instances where non-policy actors succeeded in building up an informal cluster. Drawing from the four cases, there were a few key players that had a role to play in the four innovation process cases. For instance, key actors like Rikard Öste (Aventure AB), Rolf Bjerndall, and Inger Björk were key actors in two or more of the four cases. With their connections and network, these actors orchestrated an innovation landscape themselves around the cluster or organization they worked with (companies, customers, manufacturers, universities etc.). This innovative ecosystem sustained these actors from these microenterprises that aimed to commercialize potential research and integrate support from the network and environment. Although policy instruments such as aids and grants were utilized in the process, it was not coordinated by policy actors, but rather by individual actors and organizations of the microenterprises themselves.

For policy makers, there often exist various methods in different countries to assist these microenterprises. One of the more common forms of assistance is through offering financial grants, but this paper wishes to highlight that this needs to be combined with the right delivery (through combination of actors and activities for example) to be made more effective. In these two cases (InnovaFood AB and Concellae AB), even though they can be recognized as university spin-offs and may be embedded within the university network, they have encountered difficulty when seeking assistance from university resources. What this implies for microenterprises is that they need to assess the network in which they are positioned, not just based on where the point of origin comes from. For example, Bizzi and Langley (2012) suggested that one aspect of how they could determine the network microenterprises are in was to examine the interaction between financial resources and the building of knowledge. This proposes evaluating what financial resources in the network is aimed toward and if they are achieving those goals for knowledge building or development. The state of knowledge building development can indicate if the network is at exploratory stage in the innovation process. The provision of business services

and the requirement of information from microenterprises by policy-related organizations such as innovation offices or innovation authorities during the innovation process may contribute to increasing the barriers to innovation, particularly in the area of finance and regulatory factors. For instance, when working with innovation officers or patent officers, the knowledge displayed for the innovation and the industry may not always be a good fit. This can cause misunderstandings and frustrations, as have been described in the innovation process cases where officers in charge of the innovation cases showed insufficient knowledge about the area of innovation. In some cases, the innovation authorities instead required more skills and effort from microenterprises that were seeking assistance, as they were originally lacking in marketing skills, for instance.

The barriers faced in the food sector by microenterprises are not confined only to local constraints, but to the industry as a region and on a global scale. As seen from ongoing efforts by MSS clients on getting approval for their product from the European Union, so are barriers to microenterprises "up scaled." For a wider adoption of innovation by these microenterprises, policy makers can consider the wider context in which these barriers can be aided in terms of deliberate intervention for microenterprises to "deviate from their (the industry's) established way of doing things" (Coenen et al., 2015).

The practice of picking winners for policy makers and governments based on track records may be a good way to ensure governmental investment is channeled to a good innovation project. However, it must be asked if the potential of microenterprises can be assessed early on the innovation process. Nonetheless, Hoffman et al. (1998) pointed out that the literature has shown that support should be provided through small firms who have shown growth potential as the method of picking winners. For public regional players, this implies designing complementary policies that can aid in evaluating and developing microenterprises' capacities in the overall innovation plan. Microenterprises may, in the simultaneous process as they built their competencies by "acquiring" experienced actors and resource links during the initial innovation phase, improve their capacities for innovation. Having an awareness of the actors and resources that may exist in the microenterprise's network may be included as one of the criteria for evaluating grant applications, instead of previous track records, for instance

As these key players of these microenterprises operate around the Oresund region, known for its innovative landscape, the overall network diagram also shows the interconnectedness of these actors. The contribution of this research lies in highlighting that while interaction during the innovation process is

important, this is made more effective when they are bundled with effective actor bonds that tie access to resources with relevant activity links. Networking in the social sense might not provide much to a microenterprise, but when conducted along the ARA substance layers, it can have a more relevant effect on the expected outcome. This is in line with Steier and Greenwood (2000) findings on how resources were bundled with the type of knowledge and how this changed along with the network performance.

6.4 Limitations and Future Studies

There are a few aspects of this study that can provide inspiration for future studies even as some limitations are acknowledged. This thesis hopes to provide analytical generalization, through providing rich accounts that can provide a better understanding of a complex phenomenon. Nonetheless, there are a few areas that have posed some challenges in the course of data collection. The first relates to the number of cases studied in the context of microenterprises innovating in the mature industry. The four cases provided s "depth" in terms of the content and linking the actors involved in the innovation process and also through the use of case comparisons aimed to address concerns of quantity versus quality. Another limitation relates to the small size of the firms (all fewer than 10 employees, and in three cases, core work was performed by a single or two members of the firm). There was thus a limit to how far snowball sampling could extend the network. However, it can also be viewed as a reflection of the reality of microenterprises' networks. The thesis has sought to strengthen the depth through understanding the cases from micro-level perspectives and analyzing them based on the narratives of each innovation process case, instead of having the broad ambition of having a large sample which might cause the nuances of the interactions and reverberations in the innovation process to be neglected in the aim of providing numerical support. The third limitation in relation to data collection is associated with the collection of secondary data from archives of print material and web pages. There is a dependence on the quality, accuracy and availability of information for these microenterprises. As these were microenterprises, most archives were concerned with the certain types of local news at some period of the microenterprises' innovation process. This implies that media attention may not be constant as it required some form of "interesting" event as a focus for reporting on the innovation activities of the microenterprises. This limits the

constant availability of updated information since the innovation process is a discontinous one. Nonetheless, the archives helped in the triangulation of the data at that period of time.

While process research on networks is typically conducted over time to perceive the evolution of the network better, this research adopted the IMP group's perspective in viewing networks as "flows of activity, resources and interaction in the continual state of becoming" (Purchase et al., 2014). This required the capturing of empirical data in terms of the actions taken by the actors or as indicated by the activities undertaken, a need to establish the context of study, and a need to redefine outcomes of a process. This was addressed by retrospective insights and follow-up interviews that have allowed the collection of rich accounts of the four cases of innovation process. As the cases prominently relied on recounting historical events in the innovation process through focal actors, the bias of the retrospective approach is acknowledged. The status of current relationships between focal actors can also have a bearing on the accounts of events that may have happened quite a while ago which may be influenced by one that had occurred not too long ago. Retrospective accounts of events are one way of understanding the changes during a development process (Halinen et al., 2012). As retrospective research often adopts the format of working backward from an outcome, one need to recognize that such accounts can be biased as interviewees undergo a process of rationalization and at times even justification. These "hindsight biases" can present past events as "more linear than they really were" (Bizzi and Langley, 2012). Having to identify events some time after occurrence is also an explanation of how rationalization can cause a biased projection of what really happened. Steps can be taken to minimize such effects. Halinen et al. (2012) suggested a few ways, such as follow-up studies, making interpretations at certain time intervals, or choosing specific events under the study to understand what and why. This is especially appropriate since processes can be discontinuous so there is a higher probability of receiving insights through events that trigger changes in the network. Bizzi and Langley (2012) suggested that comparing cases (incidents or time period) or data with theory could stimulate theoretical discussion on the subject. In the network context, the innovation process is seen as being composed in different ways through activities and resources ties established by various actors. Having a series of critical events that is being used as a tool for analysis helps to draw attention to the activities that are most relevant to the process concerned. This, however, presents a certain limit to the number of focal actors that were deemed important in the critical events identified. Research on network interactions

also implies the data were subject to the dynamics and volatility of relationship changes. This research views such volatility as providing richness to the data and not just a simple description of relationship patterns. As the microenterprises were small and relatively new, the findings may have been limited if the typical method of data collection was executed. However, by adopting the critical events approach that has been used for network studies, it was hoped that significant elements of the innovation process in this period of disruption could provide a novel way of understanding the innovation process of microenterprises.

The use of narratives as a representation of each innovation process is a method that may be questioned by the informants' comments and questions. This research has chosen to respect the respondent's anonymity where requested, but has chosen to present the actual informant as this has been a study of relationships (Borgatti and Molina, 2005). It is recognized that there was a duty to be responsible in these narratives but also to provide a novel reading of the events and it is hoped that this has been done in a sufficient manner, quoting from Czarniawska (2010) where "agreement is not always the best way of expressing respect." It is acknowledged that the positioning of this thesis has involved detailed examination of innovation process cases of microenterprises. This means that the contingent nature of these types of innovation processes may imply a limitation to the generalizability of this study. Future studies can address, for example, the reconstruction bias based on identified key actors in the cases. The study could also be continued over a longer period of time, as the innovation process is ongoing for these microenterprises that do not have more than seven years of operation. Networks are not easy to select, define, or describe. There is also a potential to investigate the interaction orientation between the substance layers based on the ARA model and capacities development or erosion to provide interesting insights to how innovation is practiced in microenterprises' business networks. This thesis hopes to encourage future research on the role of innovating microenterprises in the renewal of other types of mature industries.

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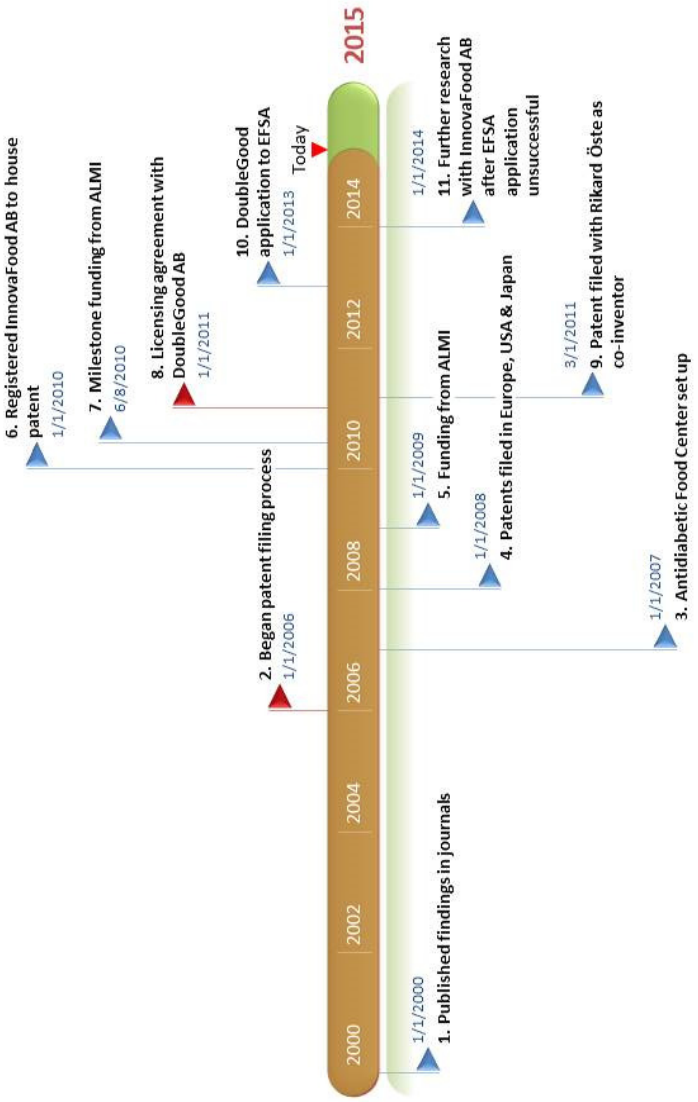
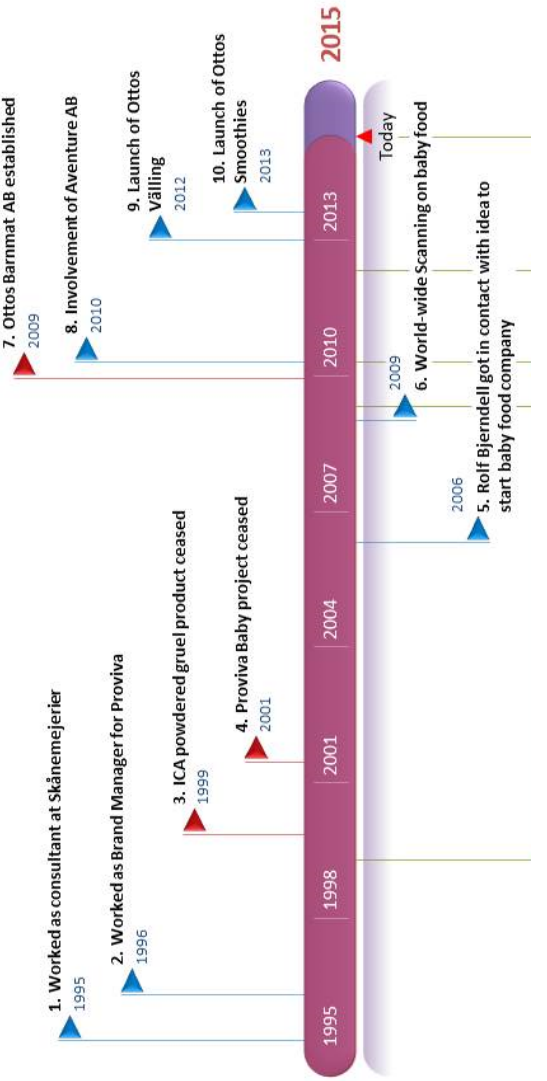
Appendix A Events Timeline of InnovaFood AB



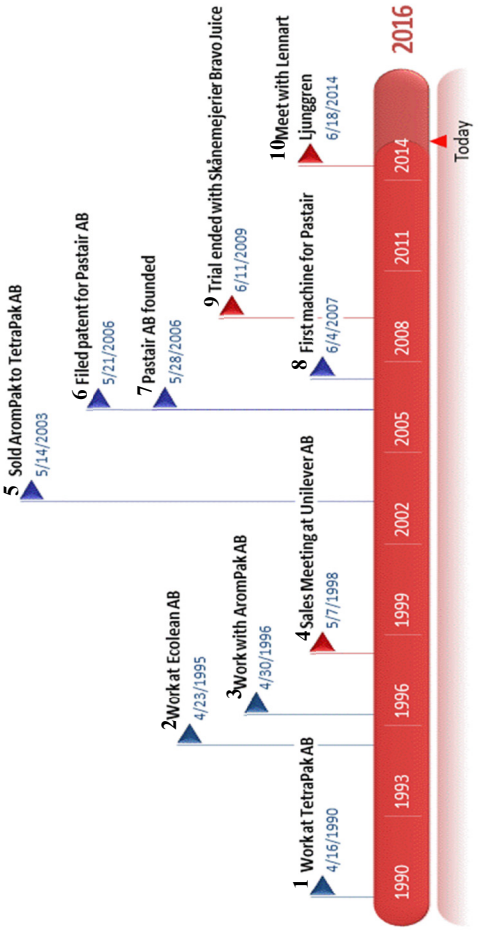
Legend and references to events for InnovaFood Events Timeline (Appendix A)	
1.	Darwiche et al. (2001), Östman et al. (2001)
2.	Working with Lund University, Forskarepatent I Syd
3.	http://www.ffsc.lu.se/en/afc
4.	A food composition comprising amino acids WO 2007084059 A1
5.	Funding from ALMI for external costs
6.	InnovaFood AB Registration number: 556799-7936
7.	Milestone payment from ALMI
8.	Licensing agreement to use the recipe in the production of table water under DoubleGood
9.	Improved food composition EP 2723198 A1
10.	DoubleGood AB, submitted for authorization of a health claim pursuant to Article 13(5) of Regulation (EC) No 1924/2006 via the Competent Authority of Sweden
11.	EFSA NDA Panel (EFSA Panel on Dietetic Products, Nutrition and Allergies), 2014. Scientific Opinion on the substantiation of a health claim related to a combination of L-threonine, L-valine, L-leucine, L-isoleucine, L-lysine plus chromium picolinate and reduction of post-prandial glycaemic responses pursuant to Article 13(5) of Regulation (EC) No 1924/2006.EFSA Journal 2014;12(7):3752, 8 pp. doi:10.2903/j.efsa.2014.3752

Appendix B Events Timeline of Otto's Baby Food



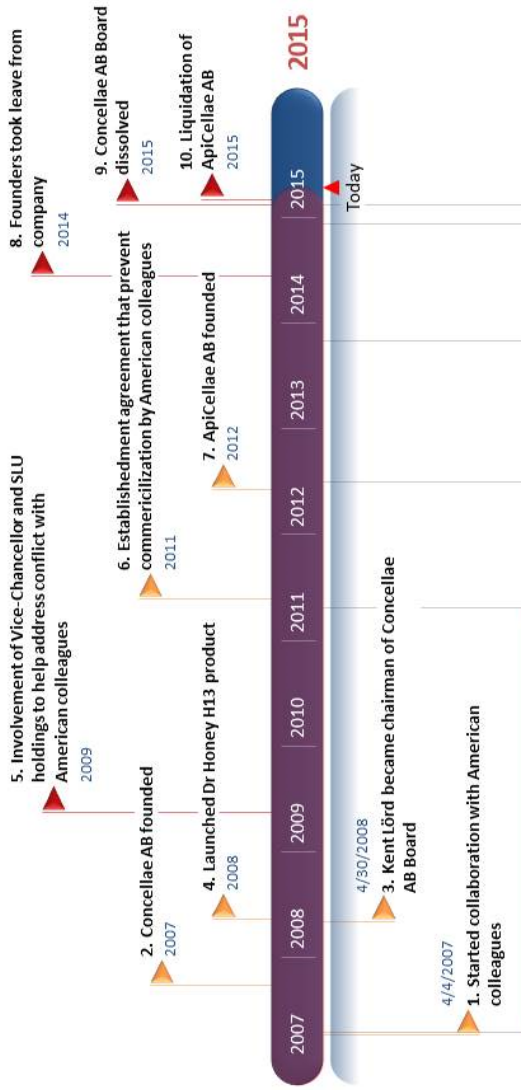
Legend and references to events for Otto's Barnmat AB Events Timeline (Appendix B)	
1.	Mats consulted for Skånemejerier and met Rolf Bjerndell (CEO of Skånemejerier)
2.	Mats worked closely with Rolf during launch of Proviva
3.	Lennart, Per, and Rikard produced powdered baby gruel but had to cease production
4.	Proviva Baby project was also halted due to market not ready for probiotic baby food
5.	Rolf contacted Mats to start up a baby food company
6.	Market feasibility study funded by SFIN
7.	Otto's Barnmat (Otto's Baby Food) company founded
8.	Rikard connected to Otto's Barnmat through Rolf (who was also chairman at Oatly AB)
9.	First subscription-based offer of fresh baby gruel started in Stockholm
10.	New line of fresh baby food launched

Appendix C Events Timeline for Pastair AB



Legend and references to events for Pastair AB Events Timeline (Appendix C)	
1.	Started work at TetraPak as engineer, then became plant manager in Lund in the 1990s
2.	Transferred to work with Hans Rausing on Ecolean, received funding to further pursue innovation
3.	Developed AromPak AB for dosing aromas and producing low lactose milk
4.	Was posed question during sales meeting at Unilever on transportation and sparked the start of Pastair's technology
5.	AromPak was sold to TetraPak and Johan continued as MD and senior advisor until transition was done for AromPak to TetraPak
6.	Patent filed with Lennart Lindell from Agrofood, which allowed further funding to be applied based on patent application
7.	Pastair founded
8.	First machine for Pastair ready for trial
9.	Trial ended with Skånemejerier without favorable results for potential client
10.	New path of development for Pastair's technology

Appendix D Events Timeline for Concellae AB



Legend and references to events for Concellae AB Events Timeline (Appendix D)	
1.	Started collaborating with American colleagues whom they met at the conference on research level
2.	Concellae AB founded
3.	Recruited Kent Lörd to be chairman of board
4.	First product launched
5.	Conflict of interest involving Lund University vice chancellor and governmental aid to resolve agreement with American colleagues
6.	Agreement reached with American researchers
7.	Daughter company Apicellae AB founded, targeting animal feed and wound care
8.	Leave of absence from company by both founders
9.	Dissolution of Concellae AB's board members
10.	Liquidation of Apicellae AB to concentrate effort on developing business of Concellae AB

Appendix E Interview Guide

Sample of Preliminary round of interview

Introduction

Good afternoon, my name is……, and I will conduct this interview on behalf of … . Together with other universities and research institutions throughout Europe, the … will conduct a European project of 4 years, called NetGrow, which seeks to enhance the network behavior of food SMEs and the performance of networks.

This case study investigation is the first step of the NetGrow project. It aims at identifying the nature of exchanges in networks and the success factors and barriers of network learning with a special focus on food SMEs.

Your individual case study report will be sent to you, individually. General results will be communicated through the NetGrow website (www.netgrow.eu).

This copy can only be used for research purposes; everything said here will be kept confidential. The information will remain anonymous.

There are no good or bad, right or wrong answers; we are interested in your own view.

The interview guide includes different parts. They will be questions about the network general profile, network inception and evolution, network configuration and memberships, network activities and governance and finally performance.

The interview will last 1 hour to 1 hour and a half.

Section 1	General profile of the network

1.1. What is the geographic location of your network?
1.2. What is its orientation (i.e., regional, national, international, European, global)?
1.3. What is the nature/legal status of your network (e.g., representative association, partnership, contracts, etc.)?
1.4. Does your network have any employees? Bank account? Logo? Regular meetings?

Section 2	Network inception

Network coordinator/founder perspective

2.1. How did the network originate? *(prompts: impetus, e.g., crisis, reactive vs. proactive, bottom-up i.e. voluntary vs. top-down, i.e., mandated)*
2.2. Who took the initiative to develop the network *(i.e., opinion leaders, companies/institutions)* and what were their respective roles?
2.3. To what extent were intermediaries (e.g., consultants) involved in the setting up phase of the network? Who were these intermediaries?
2.4. How were SMEs included in the network and encouraged to become involved?
2.5. Was there any financial aid to support the establishment of the network? And if so, from where?
2.6. What resources *(i.e., assets, skills, and knowledge)*, if any, did members bring into the network?
2.7. What were the network's key objectives at outset *(e.g., extent to which learning and innovation was important; whether a long-term view was prevailed; was sustainability envisaged)*?
2.8. Can you describe the process by which shared goals and objectives were defined, if applicable?
2.9. What benefits were envisaged for different actors?

Section 3	Network evolution

General questions

3.1. What impact did formalization *(e.g., constitution, legal status, defined membership)* have on the network and on the network members? What advantages/disadvantages this formalization brought?

3.2. How has membership evolved (*e.g., open vs. closed, static vs. dynamic, fee based vs. free, membership selection criteria, and exclusion through sanctions for opportunistic/individualistic behavior)*? Why?

3.3. Have the objectives and goals of the network changed since its outset? How? Who triggered this change?

3.4. How did the number of network members evolve? How do you think it will evolve in the future?

Network coordinator/founder perspective

3.5. What were the key dates in the development of the network *(e.g., start, formalization, etc.)*?

3.6. How is the network financed today *(i.e., public vs. private contributions)*? Have there been changes in financing sources? If applicable, have these changes had an impact on the network? To what extent?

3.7. Has the network become financially sustainable *(or is it still highly dependent on public support)*?

3.8. Has there been a change in the nature of the participants *(e.g., it started as a network of food researchers but now it has developed into a network of biotech. entrepreneurial companies)*? Why?

3.9. Has the number of SMEs in the network evolved? How and why?

Section 4	Network membership

Network coordinator perspective

4.1. How many participants are there in the network today? Were there in the past? And do you expect in the future?
4.2. How long do participants stay in the network (short term or long term participation)? Are there still new members joining?
4.3. How are the members divided between research organizations, large companies, and SMEs? Is there any distribution between different industries?

Company perspective: General

4.4. In which sector is your company involved?
4.5. What is the geographical situation of your company?
4.6. What is the number of employees in your company? What is your turnover?
If respondents are not eager to answer on the turnover question, you can use scales (see definition of EU for SMEs).
4.7. What strategy does your company follow? Does the company have a vision/specific focus on innovation?
4.8. Can you say your company is entrepreneurially oriented as regard to managerially oriented? In another word, do the employees have an entrepreneurial spirit?
4.9. In your opinion, how is your level of **technical competence** related to the other network members *(i.e., better/worse)*? Why?
4.10. How is your level of **commercial competence** related to the other network members *(i.e., better/worse)*? Why?
4.11. Has your company ever developed any kinds of innovation? What kinds *(i.e., product, process, organizational and market innovations)*?
4.12. How have innovations emerged so far within your company? Which actors are usually involved regarding innovation development? Do you have a lot of employees working in R&D? Do you have an R&D department? What is the size of your R&D department?
4.13. Do you think your company is more innovative than your competitors?
4.14. Does your company have international business contacts? Do you often work with foreign partners?
4.15. Is your company export oriented? To what extent?

4.16. Is your company vertically and/or horizontally integrated *(e.g., mergers and acquisitions)*?
4.17. Have you worked with research institutions? If applicable, in what scope?
4.18. Do you have any **resources** within your company that play an important role in your company's competitiveness? What are they?
4.19. In your opinion, what does your company add to the network *(e.g., office space, knowledge, personnel)*?
4.20. For what reasons did your company become part of the network? What were the **objectives** of joining? Are the objectives today still the same? If not, why did they change?
4.21. Who, from your company, actively participates in the network (*prompts: CEO, R&D personnel, department/division*)? Have you developed a structured way to deal with network participation *(e.g., same responsible for networking activities)*?
4.22. Which **other networks** are/were you part of? Why did you choose these networks and why not others? Which network is/was for you the most important one to be part of? For what reasons?

Company perspective: Relationship management

4.23. In general, how do you manage your **relationships with other organizations** *(e.g., evaluating the relationship, organizing meetings, contributing efforts, monitoring the relations)*?
4.24. How do you **manage the relationships** with the members of the network?
4.25. How would you characterize the relationships you have developed with the other members of the network? *(e.g., do you have good contacts with the majority of them? Are there any friends in the network or do you see them more as business contacts?)*
4.26. In your opinion, what risks *(i.e., relational and performance risks)* did your company take when it decided to participate in the network *(e.g., opportunistic behavior resulting in, e.g., knowledge loss)*? How were these risks dealt with?
4.27. Do you trust/not trust the other network members? For what reasons?

4.28. Do you make use of confidentiality agreements or other methods to protect IP?
4.29. Are the benefits fairly shared between the network members? Why do you think this is possible/not possible?
4.30. Have you noticed opportunism among the network members? How do you deal with that?
4.31. How did the relationships with the other network members evolve over time? Why?
4.32. In your opinion, do you think you are more efficient in networking than your competitors (more output)? Why?

Section 5	Network configuration and network ties

General

5.1. Can you describe the shape of the network (e.g., small vs. big, tight vs. large, loose/open vs. dense/closed, centralized vs. decentralized)?
Use of visual prompts to assist the interviewee
5.2. What is the nature of the ties between the different network members, i.e., nodes *(e.g., strength, joint ventures, cross-shareholdings, contracts)*?
5.3. Do network members usually have multiple relationships with other network members *(i.e., network multiplexity)*?
5.4. Does the network have defined/fixed boundaries or loose boundaries? Do these boundaries overlap with other networks and if applicable to what extent? What are the characteristics of these networks *(i.e., national, international, global network, networks in other sectors)*? What is the nature of the links with these networks?

SNA at network level

5.5. What is the network density?
Network density explores the degree of network wholeness and is the proportion of ties present relative to the number of possible ties; it gives a good idea about how quickly information moves in the network and is also a proxy for network governance structure.

5.6. What is the pattern of direct ties, i.e., ties that an organization has with its network partners, and indirect ties, i.e., ties that an organization has with the partners of its network partners?
The pattern of direct and indirect ties gives information about the extent to which an organization within the network has access to network knowledge

SNA at firm level

5.7. How centrally positioned is your company in the network?
Network centrality is evaluated through formal and informal measures

Section 6	Network activity

Network coordinator perspective

6.1. What **formal activities** does the network offer? Which activities targeting innovation are offered by the network? Which activities targeting learning are offered by the network?
6.2. Who drives **these activities**? Who takes the initiative?
6.3. Who *(i.e., types of actors)* participates in these activities? Why/why not?
6.4. Do **SMEs participate** in innovation activities?

Company perspective

6.5. In which **network** activities do you **take part in**? Why/why not? What role do you have in these activities (founder, coordinator, participant)?
6.6. Did you **change your participation** in some activities over time? Why?

Section 7	Network management and governance

Network coordinator perspective

7.1. What flows exist within your network and how is this managed and by whom *(prompts: tacit and codified knowledge, money, IP, people)*? Do you make use of ICT to manage these flows? How?

7.2. What are the risks (i.e., relational and performance risks) encountered at the network level *(e.g., opportunistic behavior resulting, e.g., in conflicts and eventually in firms dropping out of the network)*?

7.3. How are these risks managed? Has a (collaborative) risk management process been developed *(e.g., risk identification, risk assessment, decision and implementation of risk management actions, risk monitoring)*? How? What are the characteristics of this process?

7.4. How are issues such a confidentiality, fairness and opportunism/conflict dealt with (*prompts: trust and reputation, behavior/process control, output control, incentives to encourage transparency and discourage free-riding)*?

7.5. How are quality relationships developed and maintained within the network *(prompts: trust, shared goals, network culture, commitment, ethical decision making, satisfaction, power)*?

7.6. How are learning and innovation encouraged within the network?

7.7. What mechanisms are in place to encourage/discourage links/relationships with other networks?

7.8. What is the governance structure of the network (e.g., participant-governed network,[17] lead organization governed networks,[18] network administrative organization governed network[19])?

7.9. What are the characteristics of the network board, if applicable *(i.e., size, rate of renewal of network members, competence diversity, frequency of meetings)*?

Company perspective

7.10. How would you describe the **network culture**?

7.11. Is there a process to define **shared goals** among network members?

7.12. Do you notice as a network member any **encouragement** from the network towards innovation/learning?

7.13. What is your opinion about the **competence of the network coordinator**?

[17] Network governed by the network members themselves with no separate governance entity

[18] Network managed by one single organization participating in the network

[19] Network governed by an external and separate administrative entity

Section 8	Performance

Network coordinator perspective

8.1. To what extent did the network contribute to the development of different forms of innovations (*i.e., incremental vs. radical; product, process, organizational and market innovations*) since it started *(N.B.: consider also "failures")*?

8.2. Has the number of innovations changed over time? To what extent? Why?

8.3. At the level of the network members, how did the network impact on aspects of innovation such as

- ◊ development costs,
- ◊ access to resources/information (tacit and implicit),
- ◊ interpretation of information,
- ◊ social capital (contacts, referrals, etc.),
- ◊ nature of innovation,
- ◊ time to market,
- ◊ success rates,
- ◊ balance between exploiting knowledge within the network vs. generated internally,
- ◊ balance of distribution costs and benefits of successful/failed innovation?

8.4. In your opinion, has the network had any impact on the innovation capacity and competitiveness of the network members? To what extent?

8.5. Has the network had any impact on the sector/industry *(e.g., competitiveness, structure, performance)*? To what extent?

8.6. What difficulties have you encountered since the beginning of the network (*prompts: social liabilities, conflicts of interests, asymmetric access to information*)? How have these difficulties impacted the network performance?

8.7. Is the performance of the network assessed? How? What type of performance is considered *(e.g., effectiveness, economic performance, innovation performance, learning performance, sustainability, success-failure, etc.)*?

8.8. To what extent have the network goals been reached so far? Why?
8.9. To what extent have the goals of network members toward their participation in the network been reached? Why?
8.10. In your opinion, to what extent have the network goals and goals of individual network members been **aligned** so far? Why?
8.11. In your opinion, how satisfied are the network members about the networks?
8.12. How important are external formal/informal networks/relationships to the network and its own performance?

Firm perspective

8.13. To what extent do you think the network has helped your company to innovate (including incremental vs. radical; product, process, organizational and market innovations)?
8.14. How did the network impact on aspects of innovation such as
- ◊ development costs,
- ◊ access to resources/information (tacit and implicit),
- ◊ interpretation of information,
- ◊ social capital (contacts, referrals, etc.),
- ◊ nature of innovation,
- ◊ time to market,
- ◊ success rates,
- ◊ balance between exploiting knowledge within the network vs. generated internally,
- ◊ balance of distribution costs and benefits of successful/failed innovation?

8.15. What was the role of the network at various stages of the innovation process?
8.16. Innovation aside, what other benefits did you get from the network (prompts: profitability, costs, consumer confidence, structure, processes, etc.)? Has the network also had negative impacts on your company?
8.17. In your opinion, have you noticed an increased acquirement of new knowledge since you are part of the network? Why/why not?
8.18. To what extent have your objectives toward your participation in the network been reached? Why?

8.19. To what extent do you think is your position in the network related to the benefits/negative effects your company receives from the network? Why?
8.20. Is it important for your company and its performance that the network offers link to external formal/informal networks? Why?
8.21. What difficulties have you encountered since the beginning of the network (*prompts: social liabilities, conflicts of interests, asymmetric access to information*)? How have these difficulties impacted the network performance?
8.22. In general, how satisfied are you with the network and with being a part of the network? Do you use any methods to measure your satisfaction towards the network or the benefits you get from the network? What type of methods?
8.23. To what extent did your participation within the network change over time? Why?
8.24. From the experience you gained within this network, do you acknowledge the importance of networking more or less than before? Is your firm now more open toward networking than before?

Closing

Thank you for your time and your participation in this study. As mentioned at the beginning of the interview, the transcript of this interview will be sent to you in the coming weeks on which you will be able to make comments if you wish. We hope that through this report you will acquire interesting insights into the functioning and performance of different types of networks.

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Connecting the Nodes

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