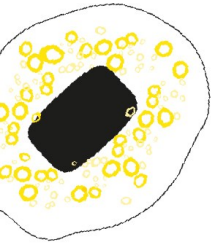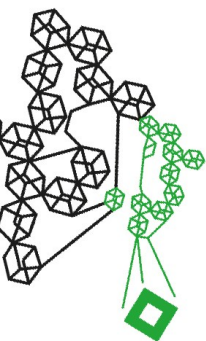# UNIVERSITY OF TWENTE.

How can Dutch small and medium enterprises in the ICT service sector pursue radical innovation?

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Abstract

Innovation in the ICT service industry, as it is mediated by the internet, remains understudied despite unique industry characteristics. Current theoretical frames suggest strong incentives, and low technological boundaries, to support co-innovation among small and medium enterprises. However, there is indication about a disconnect between the theoretical frames and reality.

Six interviews with C-suite decision makers were conducted to research how SMEs in the information communication technology service industry pursue radical innovation. Additionally, four sub questions in relation to resources and partnerships for resources were researched.

Findings suggest that many different resources are mentioned to be needed for innovation. Financial resources stand out as being mentioned the most, however financial resources are said to be not a resource for innovation but a resource that enables innovation. Furthermore, two patterns emerge in relation to the resource position. Firstly, respondents that lack a certain resource will value it highly. Secondly, respondents that have a strong resource position single out their strongest resource as the most significant resource for innovation.

Partnerships to access resources may be explored. When an organization looks for partnerships, they will use their professional and industry networks. The selection of partners in the ICT service industry is not influenced by geographical distance, but is by institutional distance (e.g., culture, rules, norms, networks). Globalization may turn the world more homogenic and thus institutional distance may reduce over time. In judgements of legitimacy, cultural proximity shows through judgements about actors taking precedent over evaluating technical aspects of radical innovations. Market creation as a legitimacy influencing technique finds broad support and may be the same routine a SME needs to pursue to find partners.

The sample size, and cultural context, limits generalization beyond the context of the research. However, this study does create a theoretical framework to reference for future research in this understudied domain.

Contents

1. Introduction

Small and medium enterprises (SMEs) are challenged through limited skills and resources, and thus need to collaborate to compete at the level of multinational enterprises (MNEs) (Camarinha-Matos et al., 2009; Guimarães et al., 2021). Therefore, SMEs need to look outside the firm for complementary resources to innovate. Indeed, resource-dependency theory suggests that companies are motivated to interact by accessing other's resources to develop of their own business activity (Baraldi & Strömsten, 2006).

It is through strategic marketing activities, networking, that companies access complementary information, markets, and technologies they require to innovate (Corsaro et al., 2012). In fact, the emphasis of conceptualizing innovation as a firm-centric activity has shifted to the ability to engage in external networks for value creation (Romero & Molina, 2011). Accordingly, network specific innovation capabilities are used to maintain competitiveness, and have become a lifeline for companies (Valkokari et al., 2017).

Innovation, in the context of cooperation, should not be interpreted from a single point of view since a value constellation is implied through the interplay of network partners (Normann & Ramirez, 1993). Thus, cooperative innovation is equal to value co-creation (Corsaro et al., 2012). Hence, partners may cooperate for different motivations and only through understanding what is valued by whom can it be understood.

Knowledge is a key input for innovation. Furthermore, knowledge as a key input to innovation tends to be fragmented, specialized, and dispersed (Capaldo & Petruzzelli, 2014). As such, the use of external knowledge may be a way to explain the innovativeness of resources limited companies (Fudickar & Hottenrott, 2018).

Information exchange between suppliers and customers is an important routine to get market information (Salavisa et al., 2012). Hence, if market information influences innovation decisions, than these routine influences innovation decisions. For example, if customers face the same or a similar challenge this may be suggestive of a market opportunity.

A market needs to be developed for radical technological innovation, while for incremental innovation a market exists (Davis & Sun, 2005). Thus, if the pattern above between customers and suppliers is an important routine to inform innovation decisions, this routine cannot be explored for radical technological innovation. For example, the customers may not communicate the desire to solve a problem since they cannot imagine it as a problem, or do not see it as solvable

The internet has had tremendous influence on information exchange in society; how we gather and share information. Through the process of codifying tacit knowledge ICT service industry companies compete in a global market that may be less spatially bound than other markets because of the internet (Quah, 2001). Actually, Quah (2001) argues, that for ICT services access to the internet as a delivery mechanism makes transportation cost effectively zero.

While geographic distances may be mediated by the internet, institutional and cultural distances may impact the opportunities organizations have to interact across boundaries. Hence, this limits generalization of international contexts. Indeed, Bolivar-Ramos (2019) says the following: "the institutional context of a country may play a key role in explaining pattern of innovation".

Research has focused on ICTs enabling of business model innovation and collaboration (Baden-Fuller & Haefliger, 2013) rather than collaborative business models within the ICT industry (Eurich et al., 2014). Indeed, collaborative business models within the ICT industry remain understudied (Eurich et al., 2014). However, the patterns collaborative innovation follows in the ICT service industry may differ from other industries. For example, since the nature of services being such that the internet allows for virtually unobstructed transfer of knowledge.

In summary, strong incentives, and low technical barriers, for collaborative innovation (co-innovation) in the ICT service industry exist. As such, it is expected that co-innovation is an important routine SMEs in the ICT service industry use. However, the catalyst for this research is the opposite experience by a Dutch SME in the ICT service industry that was unable to find co-innovation opportunities for a radical technological innovation. Therefore, this research explores how Dutch SMEs in the ICT service industry pursue radical innovation.

1.1. Research goal

The goal of this research is to investigate how small and medium enterprises within the information communication technology service industry in the Netherlands would try and gain external resources, cooperate, for radical innovation. Through this, the experiences that initiated the research is investigated.

To elaborate on the precursor to the research. Little Rocket is a data engineering and software company located in Enschede, the Netherlands. With about 25 employees it is classified as a SME. Over the past few years, the company changed names and the business' positioning from the marketing communication industry to the software industry. This included organizational reorganization. However, software and data engineering were already part of the business before the name change, so some customers and insight in the market already existed. Little Rocket has, in the three years it operates under this new name, found industry acclaim ranking first within the Netherlands according to an industry media platform (Emerce, 2022). Hence, within this industry Little Rocket is performing at a high level. Because of this, they are looking towards the future and see an opportunity for semantic web technology in the upcoming years to change markets. Indeed, the management consulting company Gartner included semantic web technology in their foresight reports too, estimating that the technology will mature and become productive in 5 to 10 years (Panetta, 2019). As such, Little Rocket and Gartner agree. However, as a SME Little Rocket looks to partner and create an ecosphere of companies to develop and iterate on the technology application. The experience of Little Rocket trying to partner with external actors is unfruitful. Thus, this experience is the antecedent to this research as Little Rocket tries to understand how to navigate this challenge. Which in turn leads to the research question in the next paragraph.

1.2. Central research question

As stated, the goal is to investigate how small and medium enterprises within the information communication technology service industry in the Netherlands can pursue radical innovation. To this end the following central research question has been developed:

"How can Dutch small and medium enterprises in the ICT service sector pursue radical innovation?"

The following sub questions are addressed to answer the central research question.

- What resources are considered important for radical innovation?
- What is the priority of the resources that are considered important for radical innovation?
- Which networks would SMEs in the ICT service industry in the Netherlands explore to find partners for radical innovation?
- Which factors influence partner selection for radical innovation?

Through answering these questions this research will explore the behaviours, and assessments of behaviours, within the ICT service industry.

1.3. Theoretical and practical contribution

The theoretical contribution of this explorative study is to inform theory development for this context that, as previously established, is understudied. As stated before, the ICT service industry can compete globally, and this may be seen as a dual edged sword. On the one hand, actors can theoretically scale fast as frictional costs associated with transportation are negligible. On the other hand, because of this you are also threatened by this global network. In other words, it potentially gives and takes. Hence, the forces and pressures within the ICT service industry are noteworthily different to other industries and asks for specific investigation. Therefore, the theoretical contribution of this research is that it adds to these insights. While generalization may be limited across countries because of institutional and cultural differences, despite the technological affordance of a globalized world, it starts to create a body of research to further discussion and insights in the characteristics of this industry.

The practical contribution of this study is that the focal company that was challenged finding partnership for co-innovation may glean insights about the perspectives of similar actors. Thus, the information gained from this may be three-fold. In the first place, whether there is indication that other SMEs work with SMEs cooperatively for innovation. Secondly, whether SMEs are open and ready to look for cooperative innovation opportunities. Third and lastly, how other SMEs explore innovation opportunities through networks in general. Thus, this provides some insight into the routines that may be valuable to explore to find cooperative innovation opportunities for semantic web technology.

This research spurs along the discussion and insight into cooperative innovation at the SME level within a limited context. As Little Rocket navigates the challenges with insights from this research, they may be able to develop the cooperative innovation relations they are looking for. As such, the experience then becomes a source for future case research.

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2. Theoretical framework

To introduce the theoretical framework chapter the process used is first described. This is important since the specific context of this research is understudied and as such involves many tangentially related fields. Therefore, to establish the theoretical framework to contextualize the research question this research went through iterative cycles of induction and deduction. As such, through describing the process the thoroughness of the theoretical research is illustrated.

2.1. Development process of theoretical framework

To describe the process chronologically: initial scoping led to more fundamental research, which led to a structured literature review, which in turn led to expert reflections, and to further research using the same loop. As such, a thorough understanding of different perspectives and research domains lead to a rich and diverse insight. Software was used to mediate the challenge of navigating this complex network of information and perspectives.

Based on the insights from the information networks that were created discussions with domain and field experts lead to a selection of theories and models to limit the scope of the research. As such, while the domain may be understudied and fragmented, through leveraging expertise a process of contextualization of scope took place that improves the understanding of the topic at hand. Indeed, discussions with domain experts lead to a descriptive frame that was previously undiscovered through research but matched the elements of the research.

This chapter follows a roughly chronological order starting with the structured literature review, some illustration of the insights which derived from the structured literature review, insights from domain experts, and finally the culmination: the theoretical frame. This reflective cycle may be observed in the research, as the reader will notice that elements that were initially used morphed over-time based on more thorough understanding. Indeed, this shows in the systematic literature review to include keywords focused on clustering, which were no longer included in later cycles as clustering per se was not relevant to the question but rather clustering effects.

2.1.1. Literature research

A Systematic Literature Review (SLR) was performed to find the current state of research related to innovation clusters in the ICT sector. In other words, peer reviewed and published research was gathered and analysed to find the current standing of the research domain (Wolfswinkel et al., 2017). Hence, this SLR helps to understand what conditions other researchers see to innovation clusters. To this end, the SLR goes through three chronological steps; define, search & select, and analysis.

2.1.1.1. Define

Initially research included innovation cluster literature. Hence, this shows in the query keywords referenced in table 1. For example, the keywords 'cluster' and 'hub' are present. However, this is represented in the theoretical framework as geographic and institutional distance and proximity.

Table 1. thematic grouping of search terms

Query keywords	Innovation	Clustering	Collaboration	Networking
innovation cluster	●	●	●	
collaboration cluster		●		
innovation hub	●	●		
collaboration hub		●	●	
collaborative network			●	●
innovation network	●			●
interorganizational collaboration			●	
interorganizational network				●
interorganizational innovation	●			
innovation between organizations	●			
collaboration between organizations			●	
network between organizations				●
interorganizational cluster		●		
interorganizational hub		●		
service innovation	●			
service dominant logic AND innovation	●			
entrepreneurial ecosystem AND innovation	●			●
entrepreneurial ecosystem AND collaboration		●		●
community of practice		●		●
community of practice AND innovation	●	●		●
establishing innovation cluster	●	●		

Initial scoping of literature resulted in the insight that ICT is referenced frequently as a means that allows for innovation. Thus, this means that ICT surfaces a lot of results that are of less relevance as they addressed it as a subject of research, but not the object of research. Indeed, as part of the initial scoping with research experts ICTs were mentioned as resources but the industry not as the object of study.

Search operators were used to filter and increase the relevance of the results. Through this, a tighter selection of papers was found to reduce tangentially related papers. Indeed, through iterative cycles and reflections the filter options in table 2 were used.

Table 2. Search operators

Search operator	Function	Objective
W/100 ICT	Limits results to include the term ICT within 100 words of the main search term	Proximity can be suggestive of relevance, although the opposite cannot be said. Thus, this operator can increase the relevance of results
AND	Limits results to include multiple conditions	Reduction through conditional filtering
SUBJAREA(BUSI)	Limits results to only show papers in subject area 'business, management and accounting'	Reduction through conditional filtering
(LIMIT-TO (DOCTYPE , "ar")	Limits results to peer reviewed journal papers	Reduction through conditional filtering

The combination of keywords and search filter operators lead to the list of search operators. As such, the results described in the following subchapters are based on the results of these queries. Therefore, the list of search queries can be found in appendix table A1.

2.1.1.2. Search & Select

Not every paper is considered equally relevant to answer the research question. Through filtering the most relevant papers surface. As such, three steps were taken. First, queries with more than twenty results were limited to only the top twenty results based on quantity of references. Secondly, the selection was reduced based on details such as title, abstract and author keywords. Lastly, the duplicates were removed from the results for a result of 22 papers.

Figure 1. selection visualization

Search results	474
First selection	108
Second selection	32
Deduplicate	22
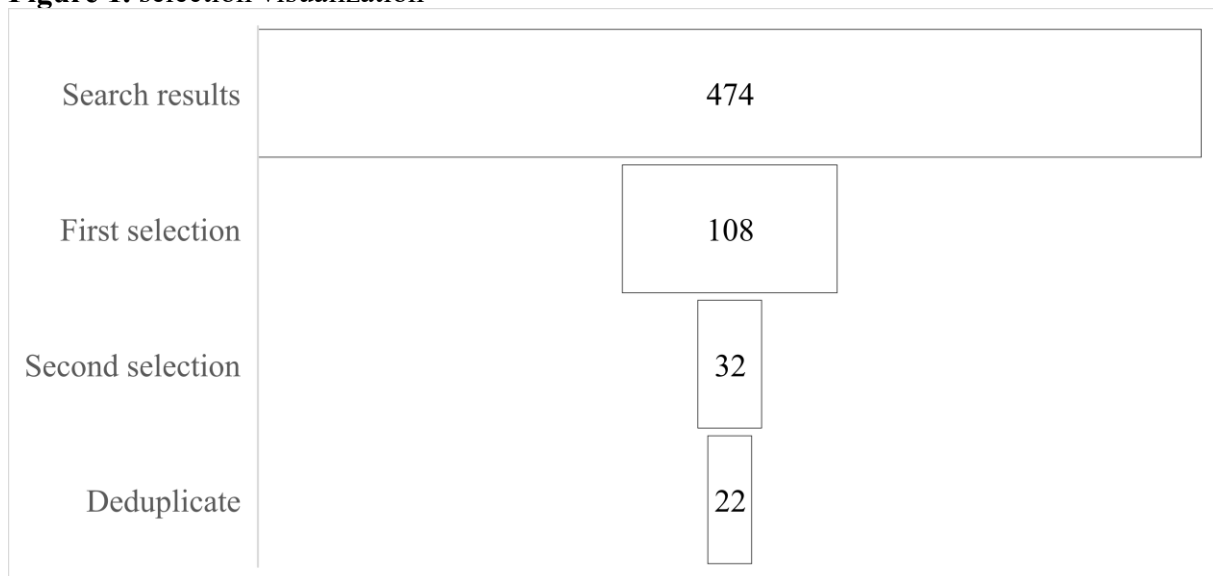
2.1.1.3. Analysis

The final 22 papers were analyzed more in depth. Through this, insight in trends of the research domain surfaces. Indeed, the year of publication, as visualized in figure 3, illustrates that the research domain is trending upwards.

It may be pointed out that there is a lack of papers since 2019, although this SLR was performed in 2021. Indeed, this may be important as the process of peer reviewing and research takes time. In other words, research published in 2019 may be considered already quite old.

Therefore, the same analysis was performed for papers after the first selection (see figure 2). Thus, this step tries to reduce the risk of missing on recent research that did not meet the initial filtering conditions. While the following years (2020 and 2021) do show fewer publications, it can be said that that the underrepresentation is due to the filter of 'top 20 by quantity of references' and is controlled for accordingly.

Looking at the subject typology of the journal in figure 4 the research is spread over several domains. Thus, it can be said there is a broad interest in topic across different research domains. Indeed, domains include marketing, human resources, management of technology, business, and international management.

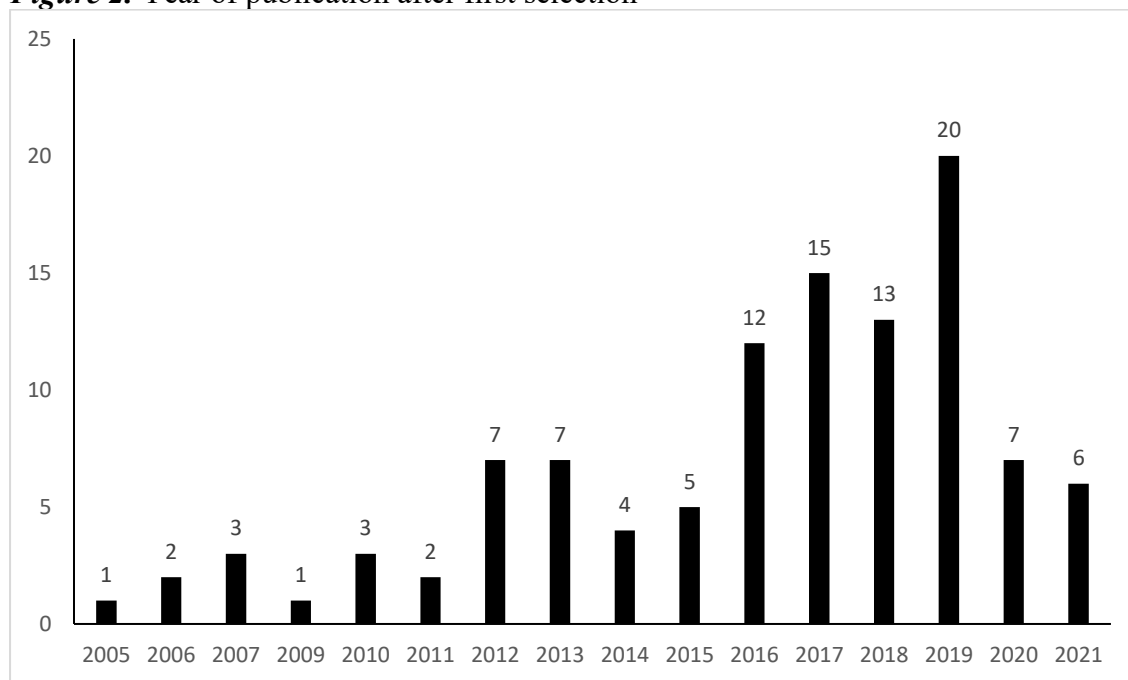*Figure 2.* Year of publication after first selection

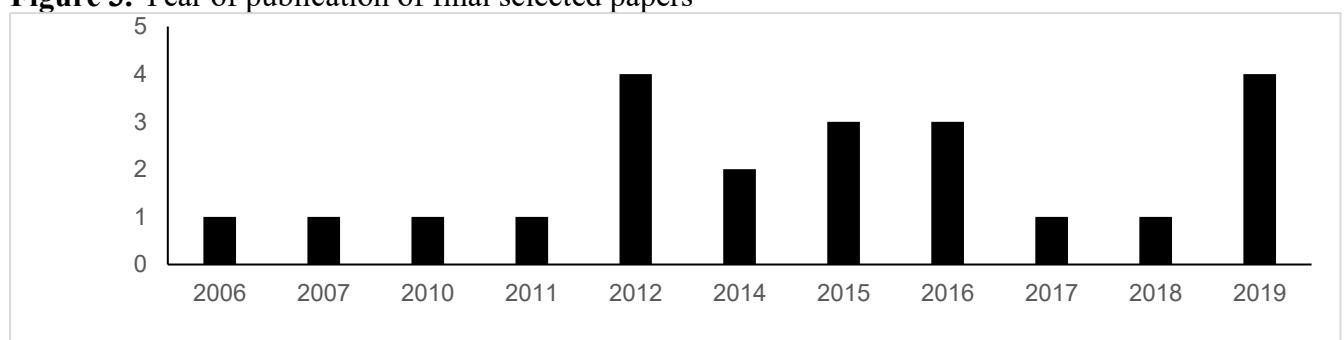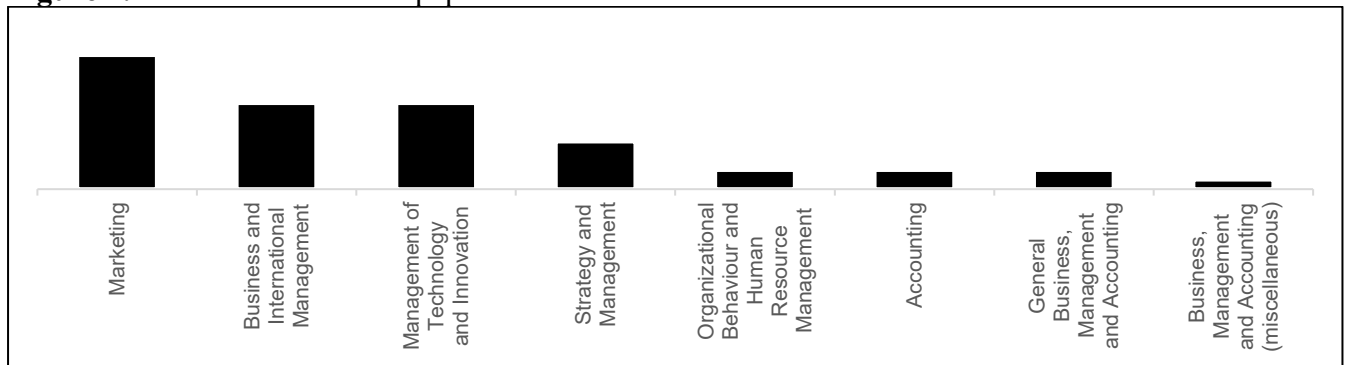**Figure 3.** Year of publication of final selected papers

Figure 4. Research domains of papers

2.1.1.3.1. Descriptives
An overview was created (see appendix table A3) of eight different descriptive factors. Through this, insight about the research that is included is gained. Indeed, the descriptives are separated in three categorical dimensions; author, methodology and sample descriptives.

2.1.1.3.1.1. Authors
The papers were reviewed to find out whether the background of the authors were academics and/or practitioners. As such, this may inform how theoretical or practical the described research is. Since all papers were published by academics, of which three together with practitioners, this is suggestive of the academic nature of the research findings.

2.1.1.3.1.2. Methodology
The methodology of the papers was reviewed. Through this, insight about the nature of the research results is gained. While appendix table A3 gives a complete overview, in the following paragraphs the findings are broken down.

Seven papers were based on qualitative research methods. Four were based on quantitative. Another three on mixed methods of qualitative and quantitative approaches and lastly, three papers were literature reviews (see table 3).

Table 3. methodological approach

Research method	Count
Qualitative	7
Quantitative	4
Literature review	3
Mixed	3

The most prominent quantitative research method was data analysis of various databases. However, the remaining researchers performed surveys. Structural equation modeling, factor analysis and regression type models are mentioned as techniques.

Interviews was the most used qualitative method, followed by literature analysis, case studies, and action research.

2.1.1.3.1.3. Sample
The samples on which the research findings were based was also reviewed. Since samples may inform the generalizability of research findings this is important to analyze. Indeed, the following paragraphs describe some clustering.

The geographic distribution (see appendix figure B2) highlights that Europe, and more specifically the Iberian Peninsula represented by Spain and Portugal, as well as Finland were

prominent among the samples. However, the continents of North America, Europe, Oceania, and Asia are all represented in some of the papers. Thus, the subject is studied globally although some peripheral countries in the European union are stronger represented in the sample data.

Industries that were most represented in the samples are biotechnology and ICT. Furthermore, the medicine industry is also specifically mentioned by some. A unifying factor between these industries may be knowledge intensity, as all authors that referenced knowledge intensity labeled it as 'high' for the industry domains.

Lastly, the size of companies is not frequently mentioned. Some papers specifically focus on small and medium size enterprises (SMEs) whereas a few authors mentioning a mix of larger and smaller firms. Furthermore, some research focuses on the roles of smaller and larger firms in relation to each other in such instances, by the nature of the research, it represents a mix of firm sizes.

To summarize sample characteristics, researchers used samples which are globally distributed although with the weight of the samples in Europe. Furthermore, findings are either considered generalizable to different firm sizes or focus on specific sizes always including SMEs. Lastly, all industries for which their knowledge characteristics are mentioned are said to be highly knowledge intensive. As such, this highly knowledge intensive characteristic matches with ICT service industries.

2.1.1.3.1.4. Summary
The descriptives of the papers included in the structured literature review shows that, qualitative research methods are more represented. As such, this is suggestive of the relative weight of interpretation-based, and descriptive nature of the research domain.

The geographic distribution of samples shows it being mostly researched based on samples of European data which is prominently represented through the Iberian Peninsula and Finland. As such, while this coincides with this research, generalization to other geographical areas may be limited.

2.1.2. Networks of meaning
The papers included in the SLR were analyzed more in-depth to understand the meaning, and context. As such, this adds to the mental model of the research domain and to come to an understanding of themes across papers. For example, a cluster may be interpreted as a network within a defined geographical space and by doing so related one other research that does not define geographic boundaries clearly, which leads to reflections about (dis)similarities and contextualization factors.

2.1.2.1. Labelling
While reading the papers sentences and paragraphs were marked and labeled based on the understanding of the context factors that appeared important. As such, meta-information, information about information, is created. Indeed, table 4. shows an example of sentence that is labeled.

Table 4. Example of labelling

Quote	Labels
to engage in business development, managers must be familiar with the range of firm competences (Gosselin and Heene, 2000)	Attribute: competences Concept: business development Context: firm Role: manager

This process of labeling allows to use the software to bring up all results for a certain label. Through this, an overview of all quotes that are related to a certain label can be created. For example, a query to show all the quotes that are labeled with 'Role: manager' results in showing 9 quotes across 7 different papers.

In summary, through selecting parts of papers that are potentially relevant to the topic of research and labelling them the labels can be explored across papers drawing up all relevant information when queried for a certain label. Thus, this supports the researcher in not missing potentially crucial details that may be lost through generalization otherwise.

Table 5. descriptives of labelling

Quotes	369
Labels	1041
Papers	22

2.1.2.2. Relations

The measures referenced in the previous paragraph about labelling can be related to other similar measures. This allows to contextualize labels to each other and create meaningful networks of information. For example, 'Role: manager' may be related to 'context: organization' as 'is part of'. Hence, this means that managers are part of organizations.

Quotes can also be related to other quotes. Hence, through this a narrative argument through quotes can emerge across different papers. As an example, the following quote "*investigated whether collaboration with different types of actors (not only the actors located in the value chain of the product/service but also public or commercial knowledge institutions and consultants) influences organizational absorptive capacity, and found that broad collaborations were positively related*" (Ferreras-Méndez et al., 2015) supports *"clusters with a wide array of institutional and inter-organizational arrangements for knowledge diffusion will have a more developed absorptive capacity"* (Valdaliso et al., 2011).

Through relations between labels and quotes a network of meaning develops. Thus, disparate subjects and observations across papers are captured and related in a network to make sense out of them. For example, "Role: manager" was given to nine statements and is linked to eleven other labels as illustrated in appendix figure B3.

Through networks of meaning the connectedness of various labels and topics can be explored. To some extent everything is related to everything, since all come from research domains researching related topics. Indeed, 5121 relations were mapped between and across the 369 quotes and 1041 labels. However, some thematic areas are more intricately connected and integrated. Thus, this leads to the option to look for more encompassing names and categories to address the emerging patterns.

2.1.2.3. Grounded categories

Through a process of grounding three thematic headings emerged. Grounding is the process by which categories are selected for fit, and therefore meaningfully relevant categories emerge (Cutcliffe, 2000). Indeed, it for example emerged from literature that resources are important, of which knowledge is said to be the most important (Bolívar–Ramos, 2019). It then follows logically that while knowledge is a resource, not all resources are knowledge, so the most descriptive category is resources despite prominence of knowledge as a resource.

The three themes that emerged are resources, distance, and relational constructs. As such, through the defining of themes the more specific underlying statements can be contextualized to each other through building the theme and relating the themes to each other. For example, the relational constructs may mediate resource exchange regardless of distance and by doing so defines the relation between underlying theories through thematic relation.

These patterns develop through a process of learning and delineating information gained through the research to condense insights. As such, this informs the theoretical framework and indirectly this research. To illustrate, the density and complexity of information is high and can be illustrated through covering the themes: resources (appendix B4), distance (appendix B5), and relational constructs (appendix B6). While it may be self-evident to consider an integrated network of all these themes is an order of magnitude more complex, to illustrate the complexity appendix B7 shows the complexity of only the labels for information based on the SLR papers.

The papers were mapped in relation to the themes to create the table 6.

Table 6 Themes covered in the selected literature

	Resources	Distance	Relational constructs
Bolívar–Ramos, 2019	●	●	●
Nambisan et al., 2019	●	●	●
Ketonen-Oksi & Valkokari, 2019			●
Fudickar & Hottenrott, 2018	●	●	●
De Noni et al., 2018	●	●	●
Kuratko et al., 2017	●		●
Reypens et al., 2016	●		●
Dhewanto et al., 2015	●	●	
Ferreras-Méndez et al., 2015	●		●
Vaz et al., 2014	●	●	●
Partanen & Möller, 2012			●
Salavisa et al., 2012	●	●	●
Corsaro et al., 2012	●		●
Valdaliso et al., 2011	●	●	●
Rampersad et al., 2010	●		●
Gago & Rubalcaba, 2006		●	●
Davis & Sun, 2005	●	●	●

2.1.3. Expert interviews

Throughout the research at various moment experts were consulted on their interpretation of preliminary findings. Hence, through this approach, disparate research domains that were not found through the SLR are included. For example, upon reflection about the thematic areas that surfaced an expert reflected it showing parallels with the elements of Manuel Castells network society theory as a descriptive frame.

Through consulting several experts (see table 7), which were selected based relevance to questions and availability, a depth and breadth of understanding was created. Hence, as such through contextualizing within domains and across domains it was attempted to hedge against to narrow an understanding of theories and the state of research. Indeed, the various specialties and perspectives contextualized findings and supported the iterative scoping process.

Table 7 descriptives of consulted experts, and domains

Occupation	Specialty
Associate professor	System Leadership & Ecosystems
Assistant professor	Digital strategies
Assistant professor	E-leadership
Phd	Innovation & Entrepreneurship

2.2. Literature findings

To understand the theoretical frame, in line with the research question, theories are explored that relate to innovation, resources for innovation, industry characteristics, and company size characteristics. Through this, the current state of research in relation to the research question is explored.

Manuel Castells network society is referenced in multiple contexts throughout the theoretical frame. Since the network society theory has descriptive and narrative qualities that helps contextualizing more specific findings in a broader frame. For example, Manuel Castells (2011) describes diverse sources of power to balance and influence network relationships. As such, even though the specific sources of power may vary, they may all be connected through the generalization that they are sources of power.

2.2.1. Resources

Resources are required to pursue the development of innovations. Davis and Sun (2005) describe that firms control assets and production factors; these are referred to as resources. Characteristics of resources are that they can be tangible, for example technology or financial resources, but they can also be intangible such as routines, relationships, reputation, and skills (Nunes & Franco, 2015; Zulu-Chisanga et al., 2021). Furthermore, knowledge is one of the most valuable intangible resources of organizations (R. Boschma, 2005). In addition, intangible resources have the characteristic that they are not as easily tradeable as tangible resources (Davis & Sun, 2005; Nunes & Franco, 2015). Hence, knowledge creation, learning and knowledge diffusion are critical competitive advantages (Asheim & Gertler, 2006; R. A. Boschma, 2010; Lawson & Lorenz, 2010). In a comparison to the biotechnology industries it is noted that for the software industry tacit knowledge appears to be more relevant (Salavisa et al., 2012).

In the resource-based view strategic resources are rare, costly to intimidate and valuable (Guimarães et al., 2021). As such they provide a key source for competitive advantage (Barney et al., 2001). Specifying further, the knowledge based view (KBV) of firms highlights knowledge as the most strategical resource of firms for competitive advantage (Eisenhardt & Santos, 2012; Grant, 1996). Furthermore, knowledge as a key input to innovation tends to be fragmented, specialized, and dispersed (Capaldo & Petruzzelli, 2014). Hence, this perspective aligns with the importance of tacit knowledge in the software industry.

2.2.2. Partnerships for resources

The resource-dependency theory suggests that companies are motivated to interact by accessing other's resources to develop of their own business activity (Baraldi & Strömsten, 2006; Brache & Felzensztein, 2019). As such, networks need to be leveraged to access resources outside the firm. To be able to do this is mediated by power dynamics (Castells, 2011). Therefore, we need to understand power. Power, together with knowledge, derives from networks (Castells, 2011). Hence, it is through strategic marketing activities, or in other words networking, that companies access complementary information, markets, and technologies they require to innovate (Brache & Felzensztein, 2019; Corsaro et al., 2012; Vlachos & Gutnik, 2016).

Specific benefits from networking are (Pittaway et al., 2004):
"Risk sharing; obtaining access to new markets and technologies; speeding products to market; pooling complementary skills; safeguarding property rights when complete or contingent contracts are not possible; and acting as a key vehicle for obtaining access to external knowledge" (p. 137).

2.2.3. Networking for knowledge

There are various kinds of complementarities that businesses can have (Guimarães et al., 2021). According to Heidenreich (2008) economic agents' have two distinct types of complementarities there were it relates to technology industry SMEs: (i) complementarities based on traded interdependencies facilitating the diffusion of codified knowledge and (ii) complementarities based on untraded interdependencies such as conventions, informal rules or habits, which have a coordinating effect in the context of uncertainty and facilitate the diffusion of tacit knowledge (Heidenreich, 2008; Nunes & Franco, 2015). Furthermore, Fudickar and Hottenrott (2018) state that explicit or codified knowledge is straight forward for knowledge users to access since ICT technologies are facilitating cross-border knowledge management, and this makes the world more homogeneous. However, this process is limited by the tacit nature of local knowledge (Berry et al., 2010). This is substantiated by the observation that the marginal costs of informational and capital flows have changed due to globalization (Audretsch et al., 2007). As such, the relative advantage shifted from a capital base to a knowledge base, which reinforces the relevance of geographical proximity in context of transference of tacit knowledge (Nunes & Franco, 2015; Vaz et al., 2014).

In the KBV of alliances the larger the spatial distance the more difficult the transfer of knowledge for innovation is, as physical proximity positively impacts coordination, reduces uncertainty, and supports knowledge combination, transfer, and creation (Capaldo & Petruzzelli, 2014; Patel et al., 2014; Phene et al., 2006). Similarly, collective knowledge is embedded in relational structures as it is a form of knowledge that is embedded in socially complex, path dependent, systems such as social communities and organizational routines. As such, they are hard to imitate (Valdaliso et al., 2011). Therefore, a sustainable competitive advantage can be developed based on knowledge that cannot easily be transferred or imitated (R. A. Boschma, 2010; Lawson & Lorenz, 2010; Porter & Sölvell, 2003) . Furthermore, since tacit knowledge is hard to transfer by means of formalization and verbalization, as it is typically transferred through interaction between a provider and user, it may provide a greater advantage than codified information (Fudickar & Hottenrott, 2018). Hence, deep interaction is required if companies need to transfer tacit knowledge (Chen et al., 2011).

Acquisition of external knowledge does not imply successful application (Janssen & Abbasiharofteh, 2022; Lane et al., 2006; Zahra & George, 2002). Rather, as Lane et al. (2006) puts it, to make use of external knowledge firms need to develop processes to explore, transform and exploit that knowledge.

Absorptive capacity is a dynamic capability following three sequential processes to utilize external knowledge:

(i) recognizing and understanding potentially valuable new knowledge outside the firm through exploratory learning; (ii) combining existing knowledge with externally acquired knowledge trough transformative learning; and (ii) using the assimilated knowledge to create new knowledge and commercial outputs through exploitative learning. (Lane et al., p856, 2006)

Explorative learning stands out in the research domain as being more researched and developed. Similar cognitive structures, skills and shared language benefit the efficient acquisition of external knowledge. Hence, firms may try to develop deep connections with external actors to transfer information from external sources and increase exploratory learnings (Laursen & Salter, 2006). Furthermore, this is also referred to as the depth of openness. Openness facilitates the renewal of the stock of knowledge, which is a condition to learn from external partners (Cohen & Levinthal, 1990).

According to Nambisan et al. (2019) the nature and degree of openness that is facilitated by digital technologies creates affordances. These affordances are in terms of the actors that can participate, the inputs that the actors can contribute, through which processes they can contribute, and the outcomes to which the actors contribute (Nambisan et al., 2019).

Furthermore, there are two distinct notions of openness: depth and breadth of openness. The breadth of openness refers to the types of partners firms associate with to sustain and increase performance (Chen et al., 2011). Ferreras-Méndez et al. (2015) refers to eight types of partners: organizations within the business group; competitors and enterprises from the same industry; suppliers of equipment, materials, components, or software; clients or customers; consultants; laboratories or R&D companies; universities or higher education institutes; and government. The depth of openness then refers to the extent with which a firm draws from different search channels through the same partner types (Ferreras-Méndez et al., 2015). Furthermore, it is suggested that openness in external knowledge search is a routine that allows firms to improve their absorptive capacity (Ferreras-Méndez et al., 2015). It is suggested that depth of openness facilitates access to technological and market knowledge sources that can be used to renew the knowledge base of a firm, which in turn allows for knowledge spillover effects and absorptive capacity impact (Cohen & Levinthal, 1990).

2.2.4. Distance in networks

Information communication technology, in the form of the internet, has made it possible to communicate with people across the globe with access to the internet. This is a change in basic assumptions compared to previous era's (Castells, 2011). The ICT industry created this technology and uses this technology. As such, the role of geographic distance is to be explored in the context of technological affordances of communication options through the internet.

More recently studies have been conducted looking into contextual factors related to situational conditions. Such as, institutional setting (Ellis, 2006), the landscape in geographical and technological terms (Rosenkopf & Almeida, 2003), and the distance between partners in international transactions (Dellestrand & Kappen, 2012). These conditions may impact the benefits organizations obtain from collaborative innovation processes (Rosenkopf & Almeida, 2003). As such, distance has geographical aspects such as separation in physical space, but also institutional aspects such as diversity in economic, political, technological, legal, and socio-cultural frameworks (Brache et al., 2022). Hence, this tests the commonly presumed close relationship between functional, relational, and geographical proximities (Giuliani & Bell, 2005).

Audretsch and Lehmann (2006) argue for the increased importance of geographical proximity as the relative cost of tacit knowledge and the shift towards a knowledge base increase localization advantages. Furthermore, it holds up that when geographical and institutional distance are low, due to face-to-face contacts and common schemes, it is easier to transfer knowledge (Ponds et al., 2007). Indeed, research into the internationalization of SMEs finds the importance of preceding social relationships as pathways for business relationships (Keeble et al., 1998). Additional cost and complexities for business development and learning are associated with geographic distance although co-location with partners may also not be feasible (Davis & Sun, 2005).

Geographic distance can reduce communication, mutual understanding, and trust (Castellani et al., 2013) but its negative effects can be partially mitigated by complementary that facilitate closeness (Ben Letaifa & Rabeau, 2013). While geographic distance complicates the transfer of knowledge, in comparison to institutional distance it is more easily overcome (Bolívar–Ramos, 2019). Hence, it is noted that the higher value added segments of the IT industry require co-production, as such the ability to interact closely despite the location of the firm is crucial (Davis & Sun, 2005). However, the distance on the informal dimension of institutional distance, such as ideology, societal values, and the formal dimension, such as the norms that regulate business transactions, make collaborating with very dissimilar partners more risky (Gaur & Lu, 2007). Risk is presented in the form of requiring complex coordination and communication mechanisms (Colombo et al., 2009), moral hazard with dissimilar partners

through adverse selection, and constraints related to knowledge sharing practices in distant domains (Patel et al., 2014).

Networks in the ICT service industry are subject to centripetal and centrifugal forces. Quah (2001) notes there are three centrifugal forces. Firstly, outputs need to be transported from place of production to place of consumption. Furthermore, costs and value destruction through deterioration are associated with this transportation. Secondly, overserviced areas will see greater price competition, thus reducing margins and profitability. Lastly, concentration creates congestion in multiple dimensions: rents and wages go up, the environment becomes worse (Quah, 2001). In summary, the first two dimensions are related to transportation costs. Hence, without transportation costs the strength of centrifugal forces diminishes in relation to centripetal forces. As such, noted earlier through trading efficiencies of codified knowledge the ICT industry would be encouraged to centralize. In fact, Quah (2001) argues that access to the internet as a delivery mechanism makes transportation cost effectively zero, whereas customers not connected to the internet are effectively out of reach and have a transportation cost of infinite.

Dividing the IT industry into segments, the centrifugal force is associated with custom software and IT services which are usually provided by local or regional suppliers (Bresnahan & Richards, 1999). As such, the expansion of producers in the custom software and IT services segment happens through establishment of physical presence. Hence, the success condition for this type of expansion is the ability to control project costs due to use of expensive talent (Davis & Sun, 2005) which relates to the transportation cost force.

Firms have three sources of centripetal forces (Quah, 2001). Firstly, pooling of skilled workers. Secondly, the availability of physical and immaterial resources. Lastly, knowledge spillovers (Quah, 2001). Quah (2001) mentions that to ask the question of where a company should locate places the implicit assumption of the goal to increase returns. Since, under constant returns to scale, firms do not need to locate anywhere specific and can spread operations. As such, the implication that increasing returns can be gained by operational concentration rather than many small ones is the driving force (Quah, 2001).

New firms are more prone to the benefits of centralization. Firms that compete in knowledge-intensive industries with rapid technological change require ongoing investment in human resources (You et al., 2021) and equipment that tends to have high specificity (Fudickar & Hottenrott, 2018) . However, these firms tend to be constrained in their ability to finance R&D (Storey & Tether, 1998). As such, cost saving potential through sharing expenses for resources is a driver for co-operation (Eurich et al., 2014; Guimarães et al., 2021).

The hardware and packaged software segments are globally competitive in the IT industry (Davis & Sun, 2005). Thus, this would imply that these business segments benefit from concentration effects if they are not outweighed by congestion effects.

In the IT industry centripetal forces are associated with complementation competitive strategies, and the inverse, centrifugal forces, are associated with customizations competitive strategies (Davis & Sun, 2005). However, SMEs can combine these strategies since the IT industry is vertically co-opetitive (Bresnahan & Richards, 1999; Guimarães et al., 2021). As such, customization can be offered around products that are created by complementors and partners. Therefore, companies pursuing this strategy must spot business opportunities. To this end, they need to have an active role in industry networks to determine value adding partnerships. As such, this is suggestive of learning patterns for risk reduction and reduction of institutional distance. Partnership roles in these configurations can be: systems integrator, solution provider, value-added reseller, value distributors, volume distributor, retailer, sales agent, independent software vendor, influencer, consultant, and OEM (Rönkkö & Peltonen, 2010).

2.2.5. Legitimacy for network access

As the previous paragraphs have elaborated on, it is desirable to network to get access to resources. As mentioned earlier, to access resources requires power (Castells, 2011). Castells (2011) describes that an inherent nature of networks are patterns of inclusion and exclusion. Two distinct roles in networks are observed: programmers, and switchers. A programmer is an actor in a network that has the power to set the rules and goals of a network, the power to program, while a switcher has the power to access a network. An inherent quality is that networks have actors that are included, and parties that are excluded. However, while a party might be excluded from one network, it may have the power to constitute a new network as a programmer, or access the network through an actor that acts as a switcher (Castells, 2011). Furthermore, networks may overlap, and actors can be part of multiple networks in parallel for distinct reasons (Kock et al., 2010). In such capacity, an actor is a switcher and may explore their power to influence networks to leverage the network for resources (Franco et al., 2020). Hence, networks influence each other and are a pattern of uncoordinated sense making (Castells, 2011; Fischer et al., 2022; Hietala et al., 2019). To be included in networks switchers need to make the assessment that an actor that wants to be part of a specific network has legitimacy to be part of it under the programmed context of the network.

For innovation outcomes, the arrangement of networks is important (Torkkeli et al., 2019). Previous research investigated; patterns, intensity and tightness of relationships for diffusion of and access to innovation, focal companies and their access and control, the relation of networks to outcomes of product and process innovation, the types of innovation such as exploratory, radical, and incremental innovation to partner characteristics (Corsaro et al., 2012). The complexity of a network, and structural aspects of networks, impact innovation and thus it is important to understand managers influencing strategic nets to understand innovation outcomes (Corsaro et al., 2012; Torkkeli et al., 2019).

New entrepreneurial ventures, such as radical technological innovation, may be poorly understood within an ecosystem because of their newness, which causes a lack of legitimacy (Kuratko et al., 2017). When ventures lack legitimacy they are challenged in getting access to resources and support, partnerships and strategic alliances, media attention, and risk not being considered for contracts (Kuratko et al., 2017). The diffusion of legitimacy is a required precursor to growth of a venture, therefore venture legitimacy is a principal issue (Kuratko et al., 2017). Legitimacy can be established by changing elements of a venture, materially and symbolically (Navis & Glynn, 2011). For example, organizational legitimacy may be influenced by adhering to established rules and norms, selecting favorable context, changing the cultural environment, and establishing new social contexts (Zimmerman & Zeitz, 2002). As such, legitimacy assessments are social judgements, and are therefore depending on the eye of the beholder (Bitektine, 2011). Indeed, individual members part of entrepreneurial ecosystems assess component parts as they are exposed to new ventures, and pass judgement based on the venture fits with their expectations to validate the ventures' legitimacy (Kuratko et al., 2017). As such, venture legitimization usually involves satisfying expectations of the immediate audience (Kuratko et al., 2017). Furthermore, this cognitive effort can be passive or active; unconscious and intuitive, or with effort (Tost, 2011). Indeed, through partnering with high-status actors within an ecosystem may function as venture legitimation through signaling (Elfring & Hulsink, 2003).

2.2.6. Radical technological innovation

Radical technological innovation is challenging since the audience is unfamiliar with, and uncertain about, the new technology (Kuratko et al., 2017). In other words, the audience may lack knowledge about the new technology. Furthermore, organizational newness and size may strengthen the uncertainty when judging legitimacy (Kuratko et al., 2017; Zimmerman & Zeitz, 2002). Since, as mentioned before, SMEs lack the money or power to influence the environment this is an important challenge. Indeed, as mentioned in the previous chapter about legitimacy the position in and relation to the network influences innovation outcomes (Corsaro et al., 2012; Torkkeli et al., 2019).

Organizations may attempt to link aspect to existing institutional infrastructure (Navis & Glynn, 2011). Thus, this relates to the legitimacy for network access. Since, actors may try and use switchers to get access to networks (Castells, 2011).

The costs to develop an ecosystem, like a programmer (Castells, 2011), will only be taken if linking to existing ecosystems is not feasible (Kuratko et al., 2017). Thus, this suggests a general preference based on a resource cost evaluation. However, the creation of an ecosystem is especially evident in introductory stages of new industries (Zimmerman & Zeitz, 2002).

To construct a market for a new technology, ventures draw on characteristics from other fields to support the message of the entrepreneur (Stringfellow et al., 2014). Thus, this suggests an influencing pattern to reduce unfamiliarity and uncertainty. To message during market emergence, and through this educate the public and stakeholders, media can play a significant role (Rindova et al., 2016).

Innovation, in the context of cooperation, should not be interpreted from a single point of view since a value constellation is implied through the interplay of network partners (Normann & Ramirez, 1993). Thus, cooperative innovation is equal to value co-creation (Corsaro et al., 2012). Hence, partners may cooperate for different motivations and only through understanding what is valued by whom can it be understood.

For radical technological innovation, the intensity and sustainedness of interaction between firms and external sources of information increases the likelihood of the information being used (Nieto & Santamaría, 2007). Furthermore, high quality innovations are the result of intimate and prolonged interaction (Godoe, 2000). Thus, this is suggestive of a correlation in the context of radical innovation that deep, broad, intimate, and prolonged interaction influence innovation outcomes. Indeed, firms introducing innovation which are judged as having a greater degree of novelty are more likely to use a wider range of information sources to develop or improve their products (Amara & Landry, 2005).

2.2.7. Model

Based on the understanding of the theoretical framework a model (figure 5) was created to visually contextualize the literature. As such, this shows the interrelatedness of several concepts. Indeed, if the objective of cooperative innovation is framed as SMEs trying to access resources external to the organization, then networks are a precondition to access the resources and to enter networks you need to possess the perception of legitimacy.

All elements in the model are constructs. Thus, several more specific elements underly these labels. For example, tacit knowledge is a resource but not all resources are tacit knowledge. The model is intended to be used as a lens to look at cooperation for radical innovation. It can assist in two ways. Firstly, an organization can use the model to analyze their situation and through that define scope for innovation. Secondly, by defining what is necessary for a specific innovation goal in combination with the model challenges can be foreseen. Thus, this can assist in the development of a plan of action through defining the gap between current and desired situation.

Figure 5. Model of theoretical framework for radical innovation
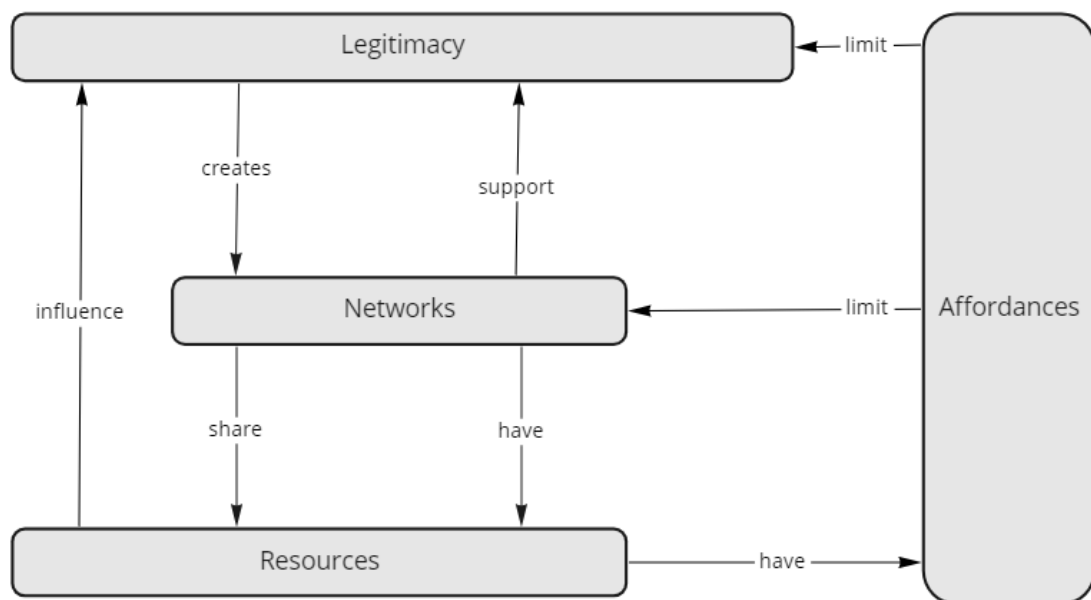
2.3. Summary

Detail is lost in a summary. Thus, this chapter does not intend to replace the more in-depth description above, but through summarizing the centrality or importance of constructs can be accentuated. Hence, this is how the summary should be interpreted.

Information exchange between suppliers and customers is an important routine to get market information. Hence, if market information influences innovation decisions, than these routines influences innovation decisions. For example, if customers face the same or a similar challenge this may be suggestive of a market opportunity.

A market needs to be developed for radical technological innovation, while for incremental innovation a market exists. Thus, if the pattern above between customers and suppliers is an important routine to inform innovation decisions, this routine cannot be explored for radical technological innovation. For example, the customers may not communicate the desire to solve a problem since they cannot imagine it as a problem, or do not see it as solvable.

When a market needs to be developed potential customers need to make a judgement about the desirability of an innovation. Thus, there is an implicit or explicit judgement. For example, just because password management software or two-factor authentication exists does not mean it will automatically be adopted.

SMEs can partner to access resources external to the firm for innovation. Thus, this suggests incentives for cooperation. For example, a financially strained firm may look for financial resources outside the firm.

Networks are how partners are found. Geographic and institutional distance may mediate the partner search, and selection process. Thus, it is relevant how far and open search behavior is performed. For example, while ICT software may make it possible to connect with people all over the world, cultural differences may negatively impact cooperation. However, if the resources are critical to the innovation more friction may be acceptable if the outcome justifies it.

To work only with closely related partners, geographically and/or institutionally, not enough new information may enter the network and a 'lock-in' effect is created that results in semi optimal outcomes. Thus, theoretically there needs to be a balance between exploitation and business renewal. Hence, research networks are described to have the effect that they diffuse extra regional knowledge resources regionally through the exchange of knowledge across research networks.

Legitimacy is a construct for all the judgements that are made, and acts as a precondition. A precondition being a requirement to have to proceed. Furthermore, legitimacy as a construct relates strongly to three of the previously mentioned statements. Firstly, legitimacy in relation to market development means whether an actor is judged of having the capacity to develop the market, and whether the technology is promising enough that the third party can imagine a market being able to be developed. Secondly, to access resources actors are judged by third parties whether they are worthwhile to invest resources into. Lastly, and thirdly, to network with external parties requires a time/energy investment from both parties, which is mediated by a judgement whether there is a potential worthwhile outcome to it. Hence, legitimacy as a construct includes these three parts, and the implicit and explicit relations and judgements based on them. For example, a domain authority may lend legitimacy to a technology through supporting it, and by doing so signals to lower authority actors in the domain of their valuation of the technology.

For radical technological innovation broad, open, intimate, and prolonged interaction and information gathering is correlated with the uncertainty of and risk associated with the innovation. Thus, cooperation in various forms influences outcomes. Furthermore, ecosystem and market development, which is necessary for radical technological innovation due to uncertainty, is mediated by resource investment.

3. Methods

In this section the method is discussed on the process of data gathering to answer the central research question.

3.1. Research design

The previously described constructs of resources, distance, networks, and legitimacy for co-innovation and the relations between them need to be researched. Indeed, while theory may suggest incentives, the question is why this is not realized in practice, suggesting there are judgements based on perceptions of opportunities and barriers. Through investigation the theory will be contextualized and an answer to the research question may be found.

To answer the research question an expert interview study design is chosen. Expert interviews allows for real-life phenomena to be analyzed in-depth, which can result in new insights (Eisenhardt & Graebner, 2007). Furthermore, this research aims to get insights into underlying judgements for co-innovation which is mediated by the perceptions, understandings, and feelings of participants.

Using interviews to investigate the co-innovation decisions, based on the understanding of the relative importance of factors, is an appropriate research method. As such, an expert interview approach is considered suitable for this research question (Denscombe, 2003).

3.1.1. Theory building

Interviews are best used for exploration of complex and subtle phenomena (Denscombe, 2003). As such, they are well suited to research the in-depth meaning of problems with a complex nature (Denscombe, 2003). It is considered self-evident that co-innovation considerations have a complex nature, based on the theoretical framework including juxta-positioned forces. As such, considering the strength of expert interviews to delve into things in detail, and find patterns that are less apparent, it is a very suitable tool (Denscombe, 2003).

The objective of searching for patterns is to inform theories. The purpose of this research is not to answer how to co-innovate, but find the variables behind the decisions to enter in a relationship. As such, this research is the preamble to theory building. As suggested by the theoretical framework there are various successful innovation patterns that co-exist, and none is considered more valid than another. Furthermore, the practical contribution of this research to inform decisions of industry actors to navigate the market will create a plurality of research opportunities for future research.

3.1.2. Expert interviews

There are two reasons to use a multiple expert interview design (Yin, 2008). Firstly, it is used to find indication of contrasting results. Secondly, the opposite, to find indication of comparable results. Through these effects it is easier for researchers to clarify the worth of the results (Eisenhardt, 1991). Furthermore, multiple expert interviews are reliable and strong measures (Baxter & Jack, 2008). As such, multiple expert interviews allow researchers to explore cases broadly, to research a plurality of hypotheses and theories, to add to knowledge, or to develop theories (Baxter & Jack, 2008; Eisenhardt, 1991; Yin, 2008).

3.2. Characteristics

It is important to select experts that will illuminate the research question (Yin, 2008). The research is performed to benefit the understanding of co-innovation decision within the ICT service industry. The catalyst for this research was a proposal to this end by an organization, which is interested in developing insight how to co-innovate with similar parties. As such, this comes from an intrinsic driver to develop this capacity while lacking the capacity. Hence, this instance, or an exact duplicate of this organization, is not illuminative to the research question as they would have the same struggle. Furthermore, two identical parties would naturally be direct competitors. The theoretical framework indicates horizontal competition and vertical co-opetition to be an innovation pattern in this industry (Bresnahan & Richards, 1999), as such for this research the expert characteristics need to be a level of abstraction removed from the exact case to be informative. As such, to select relevant experts, based on which a generalization can be made, certain characteristics are required. These characteristics, from broader to more narrow abstractions, are geographic, industry, age of organization, size of organization, and product type. These characteristics are explained more in-depth.

3.2.1. Geographic characteristics

The literature research surfaced that institutional proximity could mediate geographic distance effects. Since institutional proximity is based on cultural aspects, and cultural variation is limited within the Netherlands, and the focal company is Dutch, the logical geographic limitation is to limit it to the Netherlands.

If there are co-innovation patterns across national boundaries a study within national boundaries can still surface this pattern though inference. This follows the logic that relationships require a minimum of two parties, to know of one is to know of the existence of another. Hence, even while limited to national boundaries the research can be sensitive to cross border relations. However, even if such relations are not found, this does not give any conclusive evidence considering the small sample size.

While this research, by limiting it to the Netherlands, may have limited generalization options across national boundaries, the generalization within the national boundaries improves through it.

3.2.2. Industry characteristics

In previous chapters the unique characteristics of the ICT industry have been noted. Noteworthy are for example the geographic extremes, the cost of transportation when connected to the internet is virtually zero, while the cost of transportation in absence of internet is virtually infinite (Quah, 2001). Other examples are the balance between codified and tacit knowledge, and their relative value, as well as how institutional proximity and distance interact with knowledge characteristics are to varying degrees unique. Therefore, to make it more generalizable to ICT service industry cases the companies should match this industry closely. As such, the core activity is to take place within the ICT service industry.

3.2.3. Age of organization characteristics

The age of an organization may impact the legitimacy. Because of this, they may not have the same opportunities as organizations that are less challenged this way. Since, new entrepreneurial ventures are may be poorly understood within an ecosystem because of their newness, which causes a lack of legitimacy (Kuratko et al., 2017)

Following the definition of new technology-based firm, the upper limit in terms of age of an organization is no more than 25 years old.

3.2.4. Size of organization characteristics

The focal company is an instance of a small and medium enterprise (SME), which is a categorization of size between 0 and 250 employees. A further subdivision can be made to micro enterprises (<10), small enterprises (10 to 49) and medium-sized enterprises (50-249) (OECD, 2022). Since literature references differences in opportunities based on company sizes the sample will be limited to SME enterprises.

3.2.5. Product type characteristics

Literature shows that the level of tacitness of the product that organization offers impacts affordances. Since, codified knowledge and products have virtually no transportation cost in the IT industry (Quah, 2001). Furthermore, Bresnahan & Richards (1999) describe different competitive patterns based on the ease of trading certain goods or services. The focal company performs mostly services. As mentioned in the literature, patterns for competition include the codification of tacit knowledge to commodify them and make them tradeable (Quah, 2001). However, not all commodities are traded. Instead, they may be used for internal gain. As such, considering that services must naturally be a spectrum of commodification vs tacitness, a clean distinction is hard to make. Furthermore, this distinction can only be made in retrospect once details of the case are known.

However, productization is associated with codification and commodification (Lehtonen et al., 2015). Thus, the absence of products implies service dominance.

3.2.6. Summary

Relevant expert for the research is found through a sampling of C-suite decision makers within IT service industry in the Netherlands of companies that have no more than 250 and no less than 10 employees. As such, through this selection the generalization for theory building to the focal company and similar industry actors can be made.

3.3. Sampling strategy

An adequate number of interviews need to be investigated to understand motives of market actors. Multiple industrial and technological networks were leveraged to select suitable representatives and reduce sampling bias. Representatives were selected based on availability (Table 8.).

Table 8 Respondent characteristics

| | | Company description | |
	Job title	SBI description	# Employees
Respondent 1	CEO	Information technology consultancy and support	21
Respondent 2	CEO	other information technology service activities	43
Respondent 3	CTO	Developing, producing, and publishing software	29
Respondent 4	CEO	Information technology consultancy and support	72
Respondent 5	CEO	other information technology service activities	33
Respondent 6	CEO	Developing, producing, and publishing software	54

3.4. Interview procedure and protocol

To get insight in the underlying drivers and considerations a semi-structured interview was conducted. Since semi-structured interviews allow for in-depth interviewing. Furthermore, this interview style allows to pursue follow up questions when participants raise relevant and interesting issues.

Semi-structured interviews also have a downside. Since the research output may be influenced by steps in the research process. Credibility may be impacted if care is not taken to avoid errors as much as possible (Brink, 1989). An interview guide was used to reduce the error as much as possible.

The interview guide contained three stages: introduction, the questions, and the conclusion. In the introduction participants were briefed on the shape of the interview: the number of questions, general style, note taking, follow up questions, as well as a short brief of the objective of the research, and its exploratory nature. Furthermore, informed consent was acquired, and participants were asked whether they had any questions before starting the interview.

The question stage of the interview was to investigate the central research question, sub questions, and model. The interview consisted out of 15 questions, subdivided over subjects labeled: innovation, radical innovation, resources, networks, legitimacy (see table 9.). Eventhough the number of questions is spread out quite evenly over the subjects, the complexity of themes and answers increases as the interview progresses. Indeed, this is illustrated by the interview script in Appendix C.

Table 9. Question in relation to the theme

	Innovation process	Radical innovation	Resources	Networks	Legitimacy
Question 1	●				
Question 2	●				
Question 3	●				
Question 4		●			
Question 5		●			
Question 6			●		
Question 7			●		
Question 8			●		
Question 9				●	
Question 10				●	
Question 11				●	
Question 12					●
Question 13					●
Question 14					●
Question 15					●

In the conclusion stage of the interview participants were thanked for their participation and were asked if they had any questions. When applicable, answers were given to the raised questions. Hence, all participants were debriefed, and time was taken to address any questions or concerns. Various mediums were used to interviews (see table 10).

Table 10 interview medium

	Respondent					
	1	2	3	4	5	6
Video call	●		●		●	
In person		●				●
Phone				●		

3.5. Summary

Expert interviews are used as the methodology to answer the research question. Since, expert interviews are well suited to research the in-depth meaning of problems with a complex nature (Denscombe, 2003). For instance, through follow up questions a deeper understanding of the answer in relation to the question may be gained.

Considerable care is taken in selecting experts to interview. Since the opinion of experts is relevant as far as they are relevant to answering the research question. Hence, a summary description of the expert characteristics is as follows: C-suite decision makers, operating in IT service industry, within the Netherlands, companies with no more than 250 and no less than 10 employees.

Six experts were found, of which five are chief executive officer and one chief technology officer. Thus, information from a relevant strategic observation level was gained. The findings, analysis and reflections are found in subsequent chapters.

4. Results

In this chapter the results of the interviews are described thematically. The themes covered in the interviews are developed chronologically in the order of the interview, covering the depth and width of the answers per theme through noting the patterns and sharing highlights.

4.1. Information inputs for innovation

Respondents were asked the importance of the routine of information exchange between customers and suppliers. Hence, to weigh the importance of the routine in practice to compare it to literature. The opinions that emerged suggest that a distinction is made between information about customers and market information. Furthermore, other routines may also influence innovation decisions. Thus, respondents were asked what actions they undertake that guide their innovation decisions. To which the answers are more examples of market information gathering routines. Hence, customer information and market information will be addressed in their own chapters.

4.1.1. Information exchange between customer and supplier

The customer may be incompetent. Thus, their input is not that relevant. For example, respondent 5 said: "The customer is sometimes very unaware of their incompetence what is possible with new or even existing forms of ICT". Indeed, respondent 3 describes it in more detail:

"What you see a lot in companies like ours that do traditional customization work that they ask customers, what would you like? As such, the customer is asked about the solution but then we need to build it. [...] You ask the customer to do something that they are 9 out of 10 times unfamiliar with and they will come with solutions that they have seen before based on their limited knowledge of how software could work".

Respondent 6, in contrast, values their customer input. Thus, opinions as to the value of customer information varies. Since respondent 6 said the following:
"We do not have an intensive sales flow because we have two hundred fifty thousand small entrepreneurs. We say that they can decide on a Sunday that they want to work with us, and they do so on Monday. A very short sales cycle. But at the same time if they do not find a solution in [company name] ... they cannot find it in the software... or they are looking for something else... then we want to hear that and be accessible. From the start of [company name], and continuing now still, our support team is very accessible. You can always mail."

Respondent 2 uses qualified customer input. Thus, not all customer input is weighed equally. In fact, respondent 2 uses two parallel information patterns. Firstly, customer satisfaction research among all customers. Secondly, they use a customer council of important customers to evaluate innovation decisions and directions.

The difference in opinion suggested above may be indicative of the size of the customer base, since both respondents 2 and 6 have a larger customer base to interact with. Thus, a more representative sample of the market may be gathered among customers, and as such more trust in the opinions may be had.

4.1.2. Market information gathering

All respondents use forms of aggregate market information. Thus, they gather information to get insight in the market to reduce uncertainty around technological innovations. To this end, the respondents may ask customers for information about their customers, processing information about customers, or use market information gained through news sources, industry events, industry lobbies, or trendwatchers.

Market information can also be gathered through suppliers. Thus, the supply chain is investigated in both directions for market information. Indeed, respondent 2 mentions that they are part of a council of one of their suppliers through which they gain information from the supplier and peer on the same sounding board.

In summary, while some respondents value customer input, all respondents value market information. Interactions with customers are appreciated as far as they provide market information for insight.

4.2. Radical innovation vs incremental innovation

Following the general questions about innovation, and routines for innovation decisions, a narrower frame is adopted by focusing on radical innovation. Thus, the questionnaire gets more specificity henceforth, resulting in more informative input to answer the central research question.

4.2.1. Information process

Respondents were asked whether they agreed to the distinction that radical innovation creates markets. To this all respondents answered "yes". However, respondent 3 qualified the yes by mentioning that it is hard to label anything as radical, or rather... in a way nothing is radical.

Market information cannot be gathered when there is no market to investigate. Thus, for radical innovation, where there is no market, respondents were asked how they gather information about the potential market for innovation decisions. Through which may be gathered how they navigate such uncertainty. Respondent 2 answered referring to the previous routines of asking information from and/or observing movements in business networks, trend watchers, and business events. Indeed, respondent 6 too refers to adjacent markets that offer similar, or the same, value as a source of insight for market development.

4.2.2. Risks

According to theory, the absence of markets in the context of radical innovation creates higher risks and greater uncertainty. Respondents were asked to what extend they agree with this proposition. A consensus in agreement across respondents was found, however the strength of recognition varied.

Respondent 5 offered the insight that if one out of every ten start-ups succeed it is a remarkably high success rate. Indeed, according to respondent 5 the European union subsidizes some innovation processes up to 90% because of the risk profile.

In contrast, respondents 3 and 6 refer to risk mitigation techniques such as minimum viable product (MVP). To explain this, a MVP is the strategy to develop the most stripped-down version of a product to test the market and limit upfront cost.

Respondent 2 agrees with the statement of greater uncertainty and makes the analogy of seeing it as a compass. One may put a dot at the horizon to set a direction, but while moving towards the dot you may course correct while you are navigating.

4.3. Resources for radical innovation

Without resources investment there is no market development and no innovation. Thus, respondents were asked what resources they would need to develop a market for a radical technological innovation, and the relative priority of resources to each other.

4.3.1. Resources and relative priority

On the question what the resources are to develop a market for a radical innovation, a variety of resources was mentioned (see table 11).

Table 11. *Resources for market development*

	Respondent					
	1	2	3	4	5	6
Time	●			●		
Energy	●					
Financial resources/ Money	●	●		●	●	●
Knowledge		●			●	
Marketing / User experience			●	●		
Confiction/ drive				●	●	
Publicity / network partners / customer base				●		●
People					●	●
Lobbying					●	

Financial resources, while enabling market development, are not crucial, according to respondents 4 and 6. Thus, despite financial resources being mentioned across all respondents, only respondent 1 suggests that financial resources can buy the other resources needed for market development.

The other resources referenced are fragmented. Therefore, there may be no specific resource or combination of resources crucial for market development. However, it can be observed that there are two thought patterns that derive from the interview context. Firstly, if an actor lacks a certain resource, the relative value of that resource is high. Secondly, if an actor has a lot of a certain resource, they may suggest that that resource is crucial for market development.

4.3.2. partnerships for resource access

Resources for innovation can be within a company, or companies can look for partnerships in which partners contribute resources. Respondents were asked what they think of partnerships for the purpose of access to resources for innovation. All respondents are open to partnerships to varying degrees, though also see problems.

According to respondent 5 it is hard to partner in the context of radical innovation because of the uncertainty. Indeed, respondent 5 knows of no successful example. However, respondent 2 suggests a consortium by the name of NBIP being an example of a partnership to facilitate a radical innovation. Indeed, NBIP manages a DDOS solution that no cloud supplier independently can facilitate. However, DDOS attacks are an existential threat to the cloud industry, and as such the incentive to partner is extremely high.

Less strategic resources, like financial resources, are acceptable resources to partner for according to respondent 1 and 4. Thus, this may satisfy the definition of cooperation in the narrowest sense. However, respondents 3 and 4 also reference access to markets and market development as motives to partner.

To summarize, theoretically the respondents' express interests in partnerships to develop radical technological innovation. However, this comes with strings attached, since some respondents may only wish to partner over exchange of certain resources.

4.4. Networking

If partnerships are to be developed, finding partners is done through networks. Therefore, it is interesting to know what networks or types of networks companies use to find innovation partners.

4.4.1. Network selection

Formal and information professional networks may be leveraged for partner selection. These networks may be built through hosting events to connect with like minded people, and through business activities. Indeed, respondents 3 and 4 say they use their professional network. Furthermore, respondent 2 suggests using national industry lobby organizations to network.

The scope of a network may also play a role for financial resource gathering. According to respondent 1, in relation to accessing financial resources, small investments may be gained locally, but for larger increments of investments one needs to explore national or even international networks.

Networking may also be mediated through a third party, as described by respondent 5 that refers to a routine used in Germany. As per the explanation of respondent 5, regional governments facilitate networking through brokering connections over shared interests. These shared interests are discovered through regional industry surveys.

4.4.2. Balancing proximity in networks

Proximity, or the antonym: distance, may play a role in networks. Literature describes a geographical and institutional context for distance. The geographical context measures distance in units of distance, meters and kilometres, and time. Whereas institutional distance relates to the culture, rules and norms, overlapping as proximity and diverging as distance.

Geographical distance was qualified as 'playing no role', 'shouldn't play a role', 'doesn't have to play a role' and 'unimportant' and were restated in different forms during the answer on this question as illustrated by table 12.

Table 12 mentions of important of geographical dimension

	Respondent					
	1	2	3	4	5	6
Plays no role		●	●		●	●
Shouldn't play a role				●	●	●
Does not have to play a role				●		

The answer from the respondents suggests that geographic distance does not matter if there is shared understanding and interest. However, while geographic distance may correlate with institutional distance, it is the institutional proximity that is important according to

multiple respondents. As such, this becomes easier based on respondent 1's assertion that business operations become more rational, and as a result institutional distance becomes lower.

Technology may mediate geographic distance; thus, companies can network globally. However, there may be a limit to this. Respondent 2 states that at distinct levels of management geographic distance is experienced differently. Digital technologies like Microsoft Teams may be used for 'to the point meetings', managing boards within and across companies come together. Hence, in the context of managing boards geographical distance does play a role.

Situations with high proximity on geographical and institution dimensions may have greater communication and coordination, although this can also create lock-in effects. Respondents were asked how they navigate this dilemma. Various routines were shared for exploration. Indeed, some respondents by virtue of their business say they are not at risk of lock-in effects, while variation in demographics among employees is also referenced several times. Respondent 4 reflected critically through mentioning that 'whether you realize it I do not know. I think you will not even recognize it', suggesting that one may be unaware of being locked in.

4.5. Legitimacy judgement

The concept of legitimacy is a union of technological components and actor components in judgements of innovation desirability. As such, it includes some previous concepts. A substantial portion of the interview covers elements and aspects to investigate heuristics that lead to decisions.

4.5.1. Hypotheticals

When an external actor approaches another actor to get access to their resources through networking, the actor may judge it as a precondition. In other words, a precondition in this context means that a specific element needs to be judged positively before another element may be judged. Indeed, as illustrated by table 13. there is a variety of patterns whether the radical technology or institutional context of the actor is judged first or not at all. Indeed, the 'only partner evaluation' appears to be an extreme just to drive the point down how important the desirability of a partner is as respondents still referenced general judgement of technological aspects.

Table 13. patterns of judgement for being pitched radical innovation

	Precondition		Non-precondition
	Technology before actor	Actor before technology	Only actor evaluation
Respondent 1			●
Respondent 2		●	
Respondent 3			●
Respondent 4	●		
Respondent 5		●	
Respondent 6	●		

After introducing the concept of legitimacy, respondents were asked to imagine an external actor coming to them with a radical innovation and explain how they would judge the technology of the innovation and judge the actor pitching it. Respondent 5 suggest to first evaluate the actor, and use contract contingencies for certain events, like takeover by an

investment company, to protect against downstream negative effects when cooperating with an external actor. Furthermore, third party validation is relevant for judgement of an actor, according to respondent 1.

In the same vein, respondents were asked how they evaluate legitimacy in the context of an incremental innovation. To this, respondent 1,3,4 and 5 are less apprehensive. Since incremental innovation is easier to relate to current technological reality. Therefore, legitimacy judgements are easier. In contrast, respondent 6 suggests that incremental innovation is uninteresting. Indeed, respondent 6 refers to partnerships as being colloquially called 'partnershits'. This is informed by the overhead costs that partnerships bring in technological maintenance of API's and documentation. As such, it is suggested that it is not interesting to cooperate for incremental innovations. Indeed, respondent 2 suggests the same pattern in relation to open-source software in relation to which they only cooperate with mature software that sells accompanying business services. Lastly, respondent 4 suggests that judgement of actors for incremental innovation may be a 'underbelly' level judgement.

4.5.2. pursuing judgements of being legitimate

Theory suggests, since legitimacy judgements are in the eye of the beholder and subjective in nature, that legitimacy judgements can be influenced. Five influencing techniques are mentioned in literature. However, before these techniques were introduced respondents were asked how they would convince an imaginary actor that their radical innovation and them as the actor to develop the market have legitimacy.

Respondents gave suggestions how they would try and influence legitimacy judgements. The responses at this point in the research were unaided. An effort was made to relate the techniques described in literature (see table 14) and are mapped to respondents (see table 15.)

Table 14. influencing techniques related to categorical techniques from literature. The number indicates the count of unique respondents that mentioned it.

	adhering to established rules and norms	selecting favourable context	changing the cultural environment	establishing new social contexts	legitimation through high-status actor signalling
Focus on outcomes		1			
Whitepapers		1			
Mirroring		1			
Rationalizing of future		1			
Proof of concept		1			
Video infographics		1			
Show & tell		4		4	
Networking			4	4	
Lead by example			1		
Prototype development			3		
Hack sessions				1	
Using high-status actors					3

Table 15. influencing techniques as referend by respondents

	Respondent					
	1	2	3	4	5	6
Focus on outcomes					●	
Whitepapers		●				
Mirroring		●				
Rationalizing of future					●	
Proof of concept			●			
Video infographics		●				
Show & tell			●	●	●	●
Networking	●	●		●		●
Lead by example			●			
Prototype development				●	●	●
Hack sessions			●			
Using high-status actors	●	●		●		

Respondents were asked whether they, to influence legitimacy judgement, would gravitate towards conformity or nonconformity for adhering to rules and norms. All but one respondent suggests gravitating to conformity. `Respondent 3 suggested that, from a technological perspective, the IT is like the wild west and standards need to be pushed forward. As such, since the respondent references standards the frame of the answer is still within the context of rules and norms. Hence, the respondent does not place themselves outside of the frame of rules but to push up to the edges. Indeed, respondent 4 suggests the same. Whereas other respondents do not indicate to entertain the notion.

Selecting favorable contexts is a technique that respondents would use, although there is some hesitation since respondents qualify what they find acceptable. For example, lying is not acceptable. A pattern that is mentioned by multiple parties is the notion that it needs to be defendable if it comes out that information might have been withheld.

Changing the cultural environment finds more acceptance again. Respondents refer to ethics and what they interpret as being acceptable or give examples of what others may do that they find undesirable. Variation in what is acceptable is noticed across actors. Furthermore, there are indications that there are norms they hold up to other actors that may be different than norms they themselves uphold, in which they themselves adhere to stricter or higher norms.

Respondents were also asked if they would create new networks, or in other words, if they would establish new social contexts. Out of the list of techniques, this technique finds the highest level of acceptance across respondents. As such, this can be interpreted as an inclination to develop networks in which they can function as a programmer and thus set the rules of the network.

Lastly, respondents were asked to mention which of the techniques seemed most favorable to them. Two respondents indicated to consider conformity to rules and norms to be the most important, while the other four respondents suggested that creating new networks is the technique, they would pursue out of the ones listed (see table 16).

Table 16 Most favoured technique out of reference list

	Respondent					
	1	2	3	4	5	6
Conformity / incongruence		●		●		
Selective information for context						
Stretching existing networks						
Developing networks	●		●		●	●

In summary, leveraging existing networks for legitimacy through forms of manipulation is evaluated through the heuristic of 'is it socially and legally defendable if called out on it'. Indeed, a strong preference for conformity is expressed. As such, the influencing technique of developing networks is the most preferred option, and it avoids manipulating existing networks. However, when asked prior, uninformed about techniques derived from literature, the described techniques are suggestive of matching more to 'selecting favourable context' and 'changing the cultural environment' which are characterized by some level of what might be called manipulation.

5. Analysis

In this chapter thematic observations across the results are related to theories that were mentioned to relate, and delineate, the research findings to the theoretical framework.

5.1. Resources

The theoretical framework suggests that knowledge, through information gathering and processing, is especially important for innovation. Since, tacit knowledge is hard to observe and requires deep interaction (Godoe, 2000). As such, knowledge creation, learning and knowledge diffusions are critical competitive advantages (Asheim & Gertler, 2006; R. A. Boschma, 2010; Lawson & Lorenz, 2010). The findings support this in several ways.

Several respondents suggest needing to understand the problem behind the problem when interacting with customers. As such, this suggests a deep interaction. Furthermore, this may go a layer deeper through the suggestion that not only themes of customers but also themes of customers of customers are sometimes discussed to understand the context. Lastly, even in international networks effort is undertaken to periodically bring relevant stakeholders physically together to exchange knowledge. Indeed, this is contrasted with online meetings which are suggested to be to the point and serve little to no such goal despite it having been used to this end during the covid pandemic. To continue, despite it having taken place in online meetings it is said that this is undesirable and does not lead to the same exchange of knowledge.

Knowledge as a key input to innovation tends to be fragmented, specialized, and dispersed (Capaldo & Petruzzelli, 2014). Thus, we expect broad knowledge search processes. Indeed, general sources of market information are referenced for innovation by the respondents. For example, trade conventions, industry lobby organizations, etc.. Furthermore, some respondents suggest physically travelling to acquire market information that is outside the direct network.

Sources of codified knowledge, in the form of trendwatchers and media for example, are referenced as well as a source of market information. The literature suggests that codified information is less valuable than tacit information as it is easy to observe and copy (R. A. Boschma, 2010). Indeed, Fudickar and Hottenrott (2018) state that codified knowledge is straight forward for knowledge through ICT technologies, which make the world more homogeneous. Thus, this suggests that codified information has a coordinating effect. Notably, respondent 1 supports this by saying that business operation is becoming more rational.

Financial resources were mentioned by nearly all respondents for innovation. However, the same respondents also said that it would be too simple to focus on financial resources. Thus, despite being mentioned frequently, it is not qualified as being centrally important. Therefore, it may be stated that financial resources are a common denominator among resources, but more unique resources may be valued higher.

To summarize, the need for deep interaction to develop knowledge finds support among the respondents. To support this deep interaction, a preference for physical interaction is mentioned by some respondents. Sources of codified knowledge are reference for market information too and may support the observation that the world is becoming more homogeneous through ICT technologies. Lastly, financial resources are commonly referenced but are said to not be the most crucial resource.

5.2. Partnerships for resources

Companies are interested in partnerships to use external resources to develop their own business activities, according to literature. Therefore, it is expected that the respondents are interested in partnerships for innovation. Indeed, that partnerships find broad support, and the answers are qualified. To contextualize the qualifications, Pittaway et al. (2004) said, the benefits of networking are the following:

"Risk sharing; obtaining access to new markets and technologies; speeding products to market; pooling complementary skills; safeguarding property rights when complete or contingent contracts are not possible; and acting as a key vehicle for obtaining access to external knowledge" (p. 137).

Indeed, several of the benefits of networking are referenced by the respondents as reasons to pursue partnerships as is illustrated in table 17.

Table 17. motivations for consideration partnerships

	Financial resources	Access to markets	Access to technologies	Speeding products to market	Pooling complementary skills	Access to 'other resources'
Respondent 1	●					
Respondent 2			●			
Respondent 3				●		
Respondent 4	●	●				●
Respondent 5						
Respondent 6					●	

Respondent 5 suggests that partnerships for radical innovation is too uncertain, and therefore knows of no successful examples. As such, a point is raised about the strength of the motivation to cooperate in a partnership. Indeed, while respondent 2 gave an example of a successful cooperation for radical innovation, the cooperation was founded on an existential threat. Since, the example is about NBIP, an industry partnership to protect, through a technology solution, against the existential threat of DDOS attacks threatening the Dutch cloud market. As such, this may suggest high barriers for partnerships. Indeed, respondent 6 suggest that preferably they would operate independently.

5.3. Distance in networks

As per Giuliani & Bell (2005), the commonly presumed relationship between functional, relational, and geographical proximities is tested under ICT technology. Thus, what may be assumed to be correlated may not be so. Notably, respondent 4 mentions that geographic distance should not play a role, and that a cultural fit is more important. However, respondent 4 qualifies this with the observation that there might be correlation between cultural and geographic distance, but if that is the case the geographic distance is not the challenge.

Institutional distance is harder to overcome than geographic distance according to Bolívar-Ramos (2019). Thus, geographic distance is expected to be of lower importance. Indeed, this is vehemently supported by this research sample.

5.4. Legitimacy for network access

Castells (2011) describes that inclusion and exclusion are inherent patterns of networks. Furthermore, to access a network and its resources requires power (Castells, 2011). As such, it is expected that those with access will leverage this access. Indeed, this is what shows in the research at multiple levels.

Firstly, those with access and centrality to networks use this for value creation. Thus, networking power may explain the options organizations have to pursue radical innovation. For example, respondent 2 leverages the relations with the main supplier for strategic coordination. Next, respondent 4 uses their personal network to reach out to other networks depending on the resource need and said, 'while others may struggle with accessing resources, which is not my experience', suggesting a level of networking power. Furthermore, those with the desirable network may leverage and defend it, as per respondent 6, which does not need third parties to innovate due to their market dominance and sees no reason to cooperate.

Secondly, through focusing on evaluating the qualities of actors rather than the technology the power of an actor is in effect evaluated for access. Indeed, Castells (2011) says that power and knowledge comes from networks. As such, it makes sense to evaluate the actor as the networks an actor is part of will mediate the outcome. Accordingly, as illustrated by table 4.5.1, the qualities of an actor are frequently evaluated before technology, or even only.

In continuance, Elfring & Hulsink (2013) say that through partnering with a high-status actor within an ecosystem a venture may receive legitimacy through signaling. Thus, again, the network access is contingent on a third parties' power over the network. In fact, this is mentioned explicitly by respondent 1 who said, 'trust depends on third party validation'.

The judgement of legitimacy may be passive or active, or in other words, unconscious and intuitive or consciously with effort. So, the judgement may be processed differently and may not be conscious at all in some cases. Support for the different judgement patterns was found in the responses regarding incremental innovation as compared to radical innovation. Indeed, respondent 1 through 5 all suggest that judgement of technological innovation becomes easier, and respondent 4 suggests that judgement may resort to a 'gut feeling'. In contrast, respondent 6 suggests the opposite response, as their threshold for partnership and access to their network is high, an incremental innovation may not be valuable enough to be considered at all. While the judgement of the actor remains the same, the judgement of the innovation that is proposed becomes easier as the technology can be easier related to the status quo of technology and the technology is more likely, or closer by, being 'enterprise ready'.

In summary, for legitimacy judgement it appears to be that the qualifications of an actor are judged more intensely than the technological innovation that the actor may try to develop. Hence, this suggests a sensitivity to the governing effect of networks in shaping innovation outcomes.

5.5. Radical technological innovation

The audience is unfamiliar with, and uncertain about, radical technological innovation (Kuratko et al., 2017). Indeed, unequivocally all respondents agree that radical innovations have this characteristic. However, respondent 3 said that it may be hard to say that any technological innovation is radical. Indeed, as Stringfellow et al. (2014) suggest constructing a market through drawing on characteristics of other fields to support the venture to reduce unfamiliarity and uncertainty. Notably, respondents 2,3 and 5 also suggest activities to link to and draw from other fields to influence the perception of uncertainty of a radical innovation.

Linking to existing institutional infrastructure is a way to influence legitimacy (Navis & Glynn, 2011), through using switchers to access the networks (Castells, 2011). Indeed, in the context of covering distance respondent 1 references using brokers. Additionally, respondent 5 also leverages brokering through switchers, and references extra-national innovation patterns that actively use brokering to bring together parties through mutual trust and incentives.

The resource cost to develop an ecosystem will only be taken if linking to existing ecosystems is not feasible (Kuratko et al., 2017). Thus, this suggests a general preference to not develop an ecosystem. However, the results of the legitimacy influencing techniques suggests that developing an ecosystem is always accepted and mostly preferred. Indeed, Zimmerman & Zeitz (2002) mention that the creation of an ecosystem is especially evident in the introductory stages of new industries. Thus, with greater novelty it may be imperative that an ecosystem is developed. In this emergence media can play a significant role in educating the public and stakeholders (Rindova et al., 2016). In fact, the power of the media was referenced by respondent 1 in the emergence of innovation.

As stated, for radical technological innovations a market needs to be created, while for incremental innovation a market exists. In fact, this is widely agreed upon by the respondents in this research.

5.6. Influencing legitimacy judgements

Organizational legitimacy may be influenced by adhering to established rules and norms, selecting favorable context, changing the cultural environment, and establishing new social contexts (Zimmerman & Zeitz, 2002). Thus, the respondents were asked about these techniques. Zimmerman & Zeitz (2002) mention 'adhering to established rules and norms' as an influencing technique, while in this research it was introduced as a spectrum with conformity on the one end and deviation from established rules and norms on the other. Hence, respondents were not led to this valuation. However, all but one respondent strongly preferred conforming to established rules and norms. Indeed, only respondent 3, from a technology centric perspective, suggests that norms should be pushed to innovate. As an example, respondent 3 suggested that automated testing became a norm because of deviations from the preceding norms.

5.7 Model
The model presented in chapter 2.2.7. can be analyzed and related to the findings. Two relations between constructs of the model stand out as being less represented, these links are marked in red in figure 6. However, first the relation between the findings and constructs that are supported will be discussed.

Figure 6. Analysis of model of theoretical framework for radical innovation
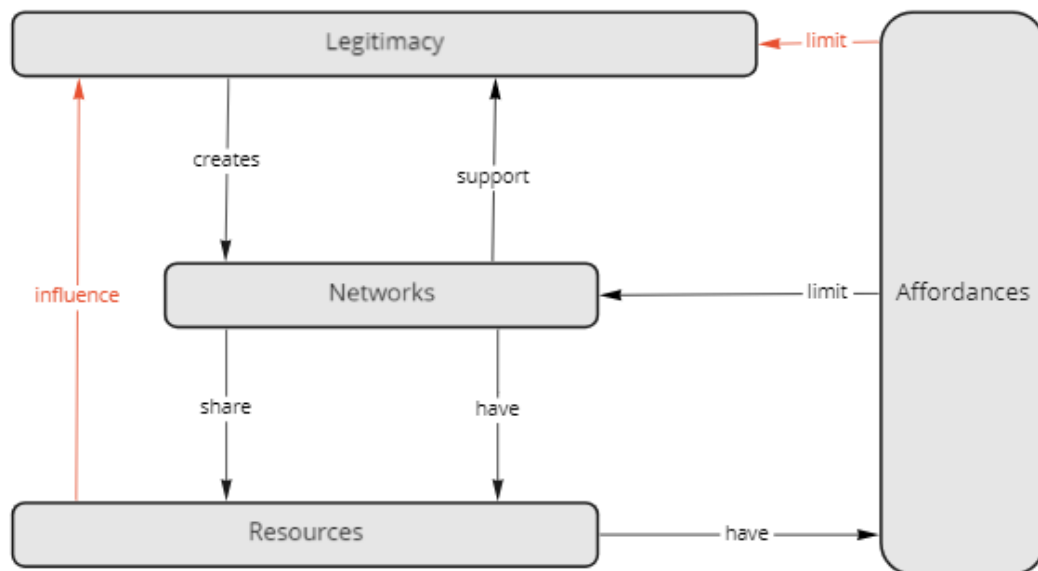
"Legitimacy creates networks" shows in the findings through interviewees supporting that if an actor is judged as legitimate that they will consider partnering. Thus, legitimacy creates networks. Furthermore, "networks support legitimacy" finds support too because high-status third party actors can be a shortcut to legitimacy judgement. Since high-status actors, even when individuals, lend their status from networks it has access to and thus represents a network.

Partnership for resources, partnerships being miniature networks, finds support. Thus, this implies that not only do "networks have resources" but also "networks share resources". The construct of resources covers a lot of resources (such as knowledge) so the threshold is low to find support. However, no examples of resources that would not be potentially shared surfaced either. This research can thus support that networks share resources, but can not qualify which resources nor what preconditions sharing or not-sharing would be based on.

'Resources have affordances' finds support among technological resources which have limitations. For example, knowledge exchange was said to be harder through digital means than through face-to-face. Thus, digital means have limitations, also called affordances in this context. Thus, 'affordances limit networks'.

'Affordances limit legitimacy' is a logical presupposition deriving from the observation that technology always has affordances. Thus, any new technology must have limitations, and these limitations will be judged as part of legitimacy judgements. When a technology is judged as not legitimate because of the affordances than the affordances limit the legitimacy. The findings don't support this. However, the interviews were explorative and did not cover specific radical innovation cases to explore the technological affordances of. Thus, the absence of proof is not unexpected.

'Resources influence legitimacy' is a logical presupposition based on the observation that knowledge, which is a resource, may influence legitimacy judgements. For example, if an

innovation is too technologically advanced for an actor to judge, because they lack the knowledge to judge it by, may impact the legitimacy judgement. A parallel that does find support is that cultural proximity shows to influence legitimacy judgements. Furthermore, respondents 3, 4 and 5 suggest that to convince others of legitimacy of an innovation it is important to tailor the message to the audience, thus implicitly suggesting towards supporting the relation between the constructs. However, it seems premature to draw the conclusion that this relation find support, without specific cases of radical innovation to analyze the relation the judgements surrounding uncertainty at the intersection between these constructs.

In summary, the constructs and the relations between the constructs find support on a lot of elements. To be conservative in drawing conclusions means that the relationship between resources and legitimacy, and affordances and legitimacy, requires additional research. The intersections between the constructs of legitimacy and resources, and affordances and legitimacy, can be researched more appropriately by researching specific radical innovation cases since this would allow more specific and detailed questions to research these links.

6. Discussion

In this chapter, the central research question will be addressed. However, first the sub questions will be reflected on. Since the answer to the sub questions develop understanding of the context. Furthermore, the contribution to research, limitations and recommendations for future research will be addressed.

6.1. Central research question

"How can Dutch small and medium enterprises in the ICT service sector pursue radical innovation?"

This research is limited in scope, and explorative in nature. As such, the discussion needs to be interpreted in this context.

Radical technological innovation is associated with market development, and thus higher degrees of uncertainty and risk. Therefore, this uncertainty needs to be addressed to reduce the perception of risk. For example, through linking the technological innovation to other industries with similar innovation pattern. Furthermore, using media to educate potential stakeholders may prove valuable to develop markets too.

A radical technological innovation still requires development, and to this end potential users need to be deeply understood. Thus, intense interaction for the purpose of information gathering, to develop knowledge, may be necessary. Indeed, through understanding the potential users deeply the technology may find a better fit.

To develop a deep understanding of the potential users' needs requires tacit knowledge exchange. To this end, institutional and geographic proximity may positively influence tacit knowledge exchange. Furthermore, to establish such knowledge exchanges requires leveraging networks for access. The creation, exchange and absorption of tacit knowledge is a highly strategic routine since tacit knowledge is hard to observe and copy.

Third party validation may be an important pattern to gain access to networks, and the associated resources. Additionally, developing networks is an accepted influencing pattern. Indeed, it is through networks that SMEs in the ICT service sector can access resources external to the organization to pursue radical innovation.

In summary, if a SME wishes to pursue a radical innovation and the SME lacks the resources to do so because of its size, then it may look for partnerships for those resources. Partnerships can provide resources and are found through networks. Networks may thus predetermine radical innovation opportunities and outcomes for SMEs. To access existing networks, or create new networks, the organization and the technological innovation needs to be perceived as legitimate. Legitimacy can be derived from newly created networks or influencing existing ones. The energy cost of influencing existing ones is lower, though it may come at a relational cost. Developing new networks requires more resources but does not run the risk of incurring the same relational costs. While developing new networks may find more social approval, the existing theory and this research suggests that influencing existing networks may be chosen more frequently.

6.2. Contribution to research

Patterns emerged through the explorative research into the decisions and thought patterns of decision makers within the Dutch ICT service industry in the context of radical innovation. Thus, this explorative research can support and inform future research. Indeed, the understudied context of ICT service industry suggests some deviations from the literature framework. For example, the using of codified knowledge, and underrepresentation of the value of tacit knowledge, is noteworthy and deserves future research. Furthermore, while openness to partnerships is high, the threshold and depth of openness to partnerships may be limited to the least strategic and cooperative resource, financial resources. Thus, while superficially matching literature in terms of desirability, this research finds the willingness for cooperation to be potentially very shallow, and would require further research.

Networks, the power dynamic within and across, has not been linked to innovation opportunities prior. However, several indications of the governing effects of network power are observed. For example, respondents suggested that for technological innovation within this domain the technology matters little compared to the evaluation of the actor introducing the technology, judging it on the networked power. Furthermore, third party validation may be a strong signal for legitimacy too.

In summary, this research confirms and supports several theoretical propositions regarding radical technological innovation. The similarities and differences found serve to develop theoretical models for future research.

6.3. Limitations

The sample of this research is too small for generalization to the broader industry. Furthermore, the context of the research limiting it to the Netherlands further limits generalization options of this research. As such, this research should be taken as an explorative study to find indication of patterns for future research.

As suggested by Normann & Ramirez (1993) innovation in the context of cooperation should not be interpreted from a single view since a value constellation is implied through the interplay of network partners. As such, to get an understanding why specific actors in a specific arrangement decide to work together the motivations of, and the arrangement, needs to be researched. Furthermore, in support of the value constellation argument, Corsaro et al. (2012) suggests that cooperative innovation is equal to value co-creation. Supporting the notion that cooperation may be understood in the context of value exchange. However, this was not part of the scope of this research. Thus, this research does not claim to make any assertions about the value exchange or constellation between actors.

Amara & Landry (2005) assert that innovation that is judged to have a greater degree of novelty are more likely to have used a wider range of information sources to develop or improve their products. Thus, the innovativeness supposedly correlates with the range of information sources used. Similarly, Godoe (2000) mentions that high quality innovations are the result of intimate and prolonged interaction. In this research no innovation is judged on their quality or innovativeness. Indeed, the governing effects of perceived uncertainty and risk is researched. Thus, this research does not qualify innovation and contains no such valuations. While this research focuses on radical technological innovation, this does not imply quality nor does the qualify the spectrum of innovativeness.

This research explored what decision makers said they would do. However, this may not be reflective of what they choose to do in a specific context. For example, the techniques mentioned unaided by a question frame suggested influencing existing networks, although the answers to subsequent questions referring to literature suggest developing new networks as being preferential. Thus, research methodologies like case studies may be more suited to find true actions.

6.4. Recommendations for future research

Tacit knowledge, and knowledge in general, was expected to be mentioned as crucially important for radical innovation. Nevertheless, this did not explicitly materialize, but implicitly it is broadly supported throughout the interviews. As such, through reflection and analyzing the answers the importance of knowledge is clear. However, this comes with the risk of introducing confirmation bias. Then again, it could also be argued that everything is a source of information and knowledge, thus it not explicitly being mentioned may be a case of 'not seeing the forest for the trees'. Future research may more directly address this observation for validation.

Codified knowledge gathering, through media or trendwatchers, was referenced as an important process too in guiding innovation decisions. Despite theory suggesting that tacit knowledge is more valuable and strategic. While these information sources may not be equal, and not be treated as equal by respondents, this research did not investigate the relative value and weight on various sources of knowledge. For example, codified knowledge of a sufficiently advanced nature may be innovative to networks the actor is part of, and in the context of resource integration that may be enough. Since it is possible that specialists are required to translate advanced codified knowledge, and thus this could still create value. Alternatively, it may serve only coordination purposes. This research serves no insight in the value of codified knowledge nor proposes any qualification of codified knowledge types but does indicate the value of this domain for future research.

The legitimacy influencing techniques in relation to network society theory are crucial to understand better. If innovation outcomes are mediated by the power, or legitimacy, of the actor or consortium that tries to develop it, then this is pivotal to understand. A quantitative study could illuminate how connected actors are, and thus what opportunity space they experience. Furthermore, institutional distance may govern the patterns actors have access to, thus research should be sensitive to this. Furthermore, research into the similarities between geographically disparate areas but institutional proximate areas may open more generalization options.

A number of contradictions surfaced throughout the research. Firstly, for example, while everyone was open to partner for resources, the threshold to do so upon questioning is very high (only existential threats) or can be qualified to only be the case for the least strategic resources (e.g. finance). Thus, it may be worthwhile to qualify the willingness to partner for resources based on types of resources and/or preconditions of actors since an argument can be made that SMEs may not truly be interested and open for partnerships based on these findings. Secondly, the interviewees suggested that customers may be unknowingly incompetent and say you need to understand the problem behind the question. However, the same interviewees use market information, which is developed based on the same incompetent customers, to make decisions. Thus, this rational disconnect may be indicative of a bias, mediating factors, or a combination of both. Thirdly, the value of face-to-face meetings for deep interaction is referenced by some interviewees, despite the philosophical position in general that geographic distance should not matter. Literature suggests that this deep interaction at a distance is a skill, but does not offer insight or guidance beyond that. Thus, this may be a limit to globalization, or this limit may be side-stepped by globalization turning the world more homogeneous, as suggested by interviewee 1, and therefore needing no or less deep interaction for understanding. Fourthly, and lastly, interviewees suggest having a preference for actors to develop new networks to establish legitimacy. However, literature suggests that the other forms of legitimacy development require less resources and are thus used more. Indeed, the unaided examples offered by the same interviewees are in line with the literature. Therefore, there seems to be a disconnect between what this sample said they prefer and what they may do. Furthermore, there are some findings that if a third party manipulates the existing network of

an interviewee that while this may be considered 'distasteful' that there are no repercussions. In fact, it may be understood as part of business. Thus, this is indicative of complex and disparate judgements between first and third person perspective, as well as between judgements and repercussions. This research only superficially touched on this subject and more research may be necessary to understand the connections between judgements and actions.

The ICT service industry, as it trades knowledge mediated by the internet, is an industry that is very susceptible to global competition and cooperation. As such, if the trend of servitization of products continues then elements of physical products may be open to the same forces. As such, the ICT service industry may serve as a foray into understanding what impact globalization may have on services more generally and be worthy of industry specific research.

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Appendixes
Appendix A: Tables

Table A1. Search terms and queries performed in SLR process.

	Main search term	Full query
Query 1	innovation cluster	"innovation cluster" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 2	collaboration cluster	"collaboration cluster" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 3	innovation hub	"innovation hub" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 4	collaboration hub	"collaboration hub" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 5	collaborative network	"collaborative network" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 6	innovation network	"innovation network" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 7	interorganizational collaboration	"interorganizational collaboration" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 8	interorganizational network	"interorganizational network" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 9	interorganizational innovation	"interorganizational innovation" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 10	innovation between organizations	"innovation between organizations" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 11	collaboration between organizations	"collaboration between organizations" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 12	network between organizations	"network between organizations" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 13	interorganizational cluster	"interorganizational cluster" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 14	interorganizational hub	"interorganizational hub" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 15	service innovation	"service innovation" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 16	service dominant logic AND innovation	"service dominant logic" AND "innovation" W/100 "ICT" SUBJAREA(BUSI) AND (LIMIT-TO (DOCTYPE,"ar"))
Query 17	entrepreneurial ecosystem AND innovation	"entrepreneurial ecosystem" AND "innovation" W/100 "ICT" SUBJAREA(BUSI) AND (LIMIT-TO (DOCTYPE,"ar"))
Query 18	entrepreneurial ecosystem AND collaboration	"entrepreneurial ecosystem" AND "collaboration" W/100 "ICT" SUBJAREA(BUSI) AND (LIMIT-TO (DOCTYPE,"ar"))
Query 19	community of practice	"community of practice" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 20	community of practice and innovation	"community of practice" and "innovation" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))
Query 21	establishing innovation cluster	"establishing innovation cluster" W/100 "ICT" SUBJAREA(BUSI) (LIMIT-TO (DOCTYPE , "ar"))

Table A2. search results and remaining results after selection steps

Query number	Search results	first selection	second selection
Query 1	9	9	3
Query 2	0	0	0
Query 3	0	0	0
Query 4	0	0	0
Query 5	9	9	3
Query 6	161	20	10
Query 7	4	4	1
Query 8	0	0	0
Query 9	0	0	0
Query 10	0	0	0
Query 11	0	0	0
Query 12	0	0	0
Query 13	0	0	0
Query 14	0	0	0
Query 15	105	20	3
Query 16	100	20	7
Query 17	80	20	4
Query 18	6	6	1
Query 19	0	0	0
Query 20	0	0	0
Query 21	0	0	0
Total	474	108	32

Table A3. structured literature review descriptives

DOI	Author type	Methodology			Sample characteristics			
		Research methods	Quantitative research methods	Qualitative research methods	Location of sample of firms	Industry of the sample of firms	Knowledge intensity of sample of firms	Size of companies
10.1016/j.technovation.2012.02.003	Academic/s	Qualitative		Interviews	Portugal	Molecular biotechnology and software for telecommunications	High	SMEs
10.1007/s11187-017-9870-x	Academic/s	Quantitative	Regression analysis		EU-28 member states + norway and switzerland			
10.1007/s11187-017-9870-x	Academic/s	Literature review		literature analysis				
10.22215/TIMREVIEW/1216	Academic/s and Practitioner/s	Qualitative		Case study	Indonesia	ICT		
10.1016/j.indmarman.2011.11.017	Academic/s	Qualitative		Interviews	United Kingdom	Mobile technology, data management, medical diagnosis, bio-technology, IT or software related compa- nies	High	SMEs
10.1016/j.respol.2019.03.018	Academic/s	Literature Review		literature analysis				
10.1080/08985626.2010.505268	Academic/s	Qualitative		Interviews	Spain	Electronics and information and communication technology	High	
10.1007/s10961-018-9695-z	Academic/s	Quantitative	data analysis		Germany		High	SMEs
10.1017/jmo.2017.13	Academic/s	Literature review		literature analysis				
10.1080/08985626.2013.860193	Academic/s	Quantitative	data analysis		Portugal	ICT	High	
10.1016/j.indmarman.2009.07.002	Academic/s	Mixed	survey confirmatory, factor analysis, structural equation modelling. Sample through snowball	Interviews	Australia	Information and communication technology, biotechnology/nanotechnology	High	Not specified
10.1016/j.indmarman.2016.03.005	Academic/s	Qualitative		Interviews, action research		Medicine		Combination
10.22215/TIMREVIEW/1216	Academic/s and Practitioner/s	Qualitative		Case study	Finland	Bio-economy	High	
10.1007/s00191-006-0030-8	Academic/s	Quantitative	survey results, ordered probit model		Spain	Hotels and restaurants, transports, telecommunications, temporary work, engineering and architectural services, and security and other ancillary business services	High	Not specified
10.1016/j.indmarman.2011.05.002	Academic/s	Qualitative		Case study	Finland	IT	High	Not specified
10.1016/j.indmarman.2015.02.038	Academic/s	Mixed	questionaire, structural equation modeling	Interviews	Spain	Biotechnology	High	SMEs
10.1007/s10961-005-5027-1	Academic/s and Practitioner/s	Mixed	data analysis	questionaire	Canada	IT		Mixed

Appendix B: Figures
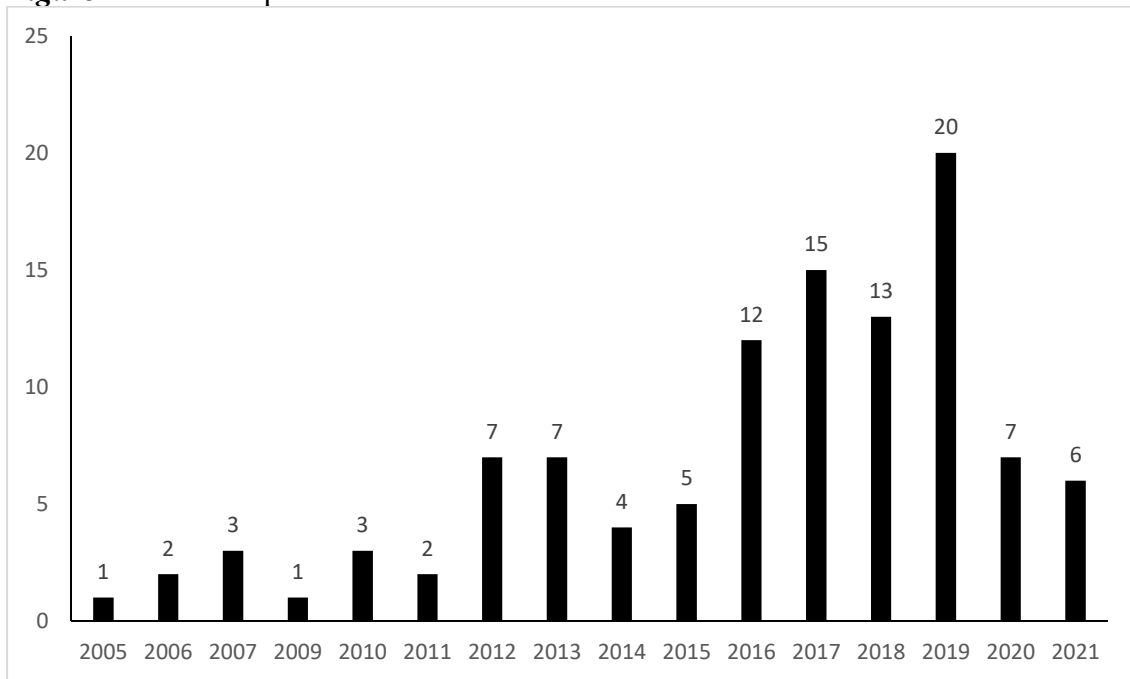*Figure B1*. Year of publication after first selection
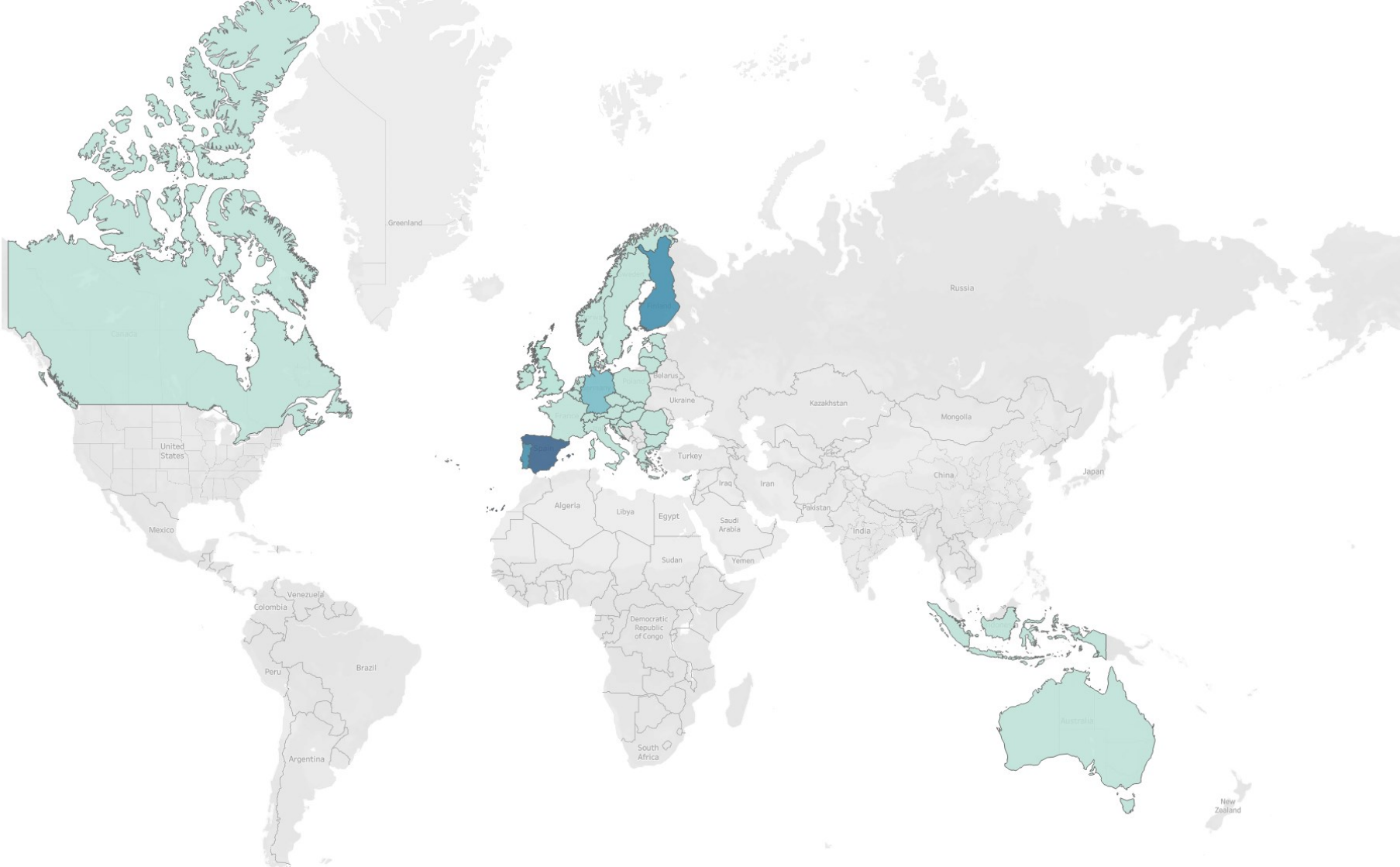
Figure B2. Geographic sample distribution

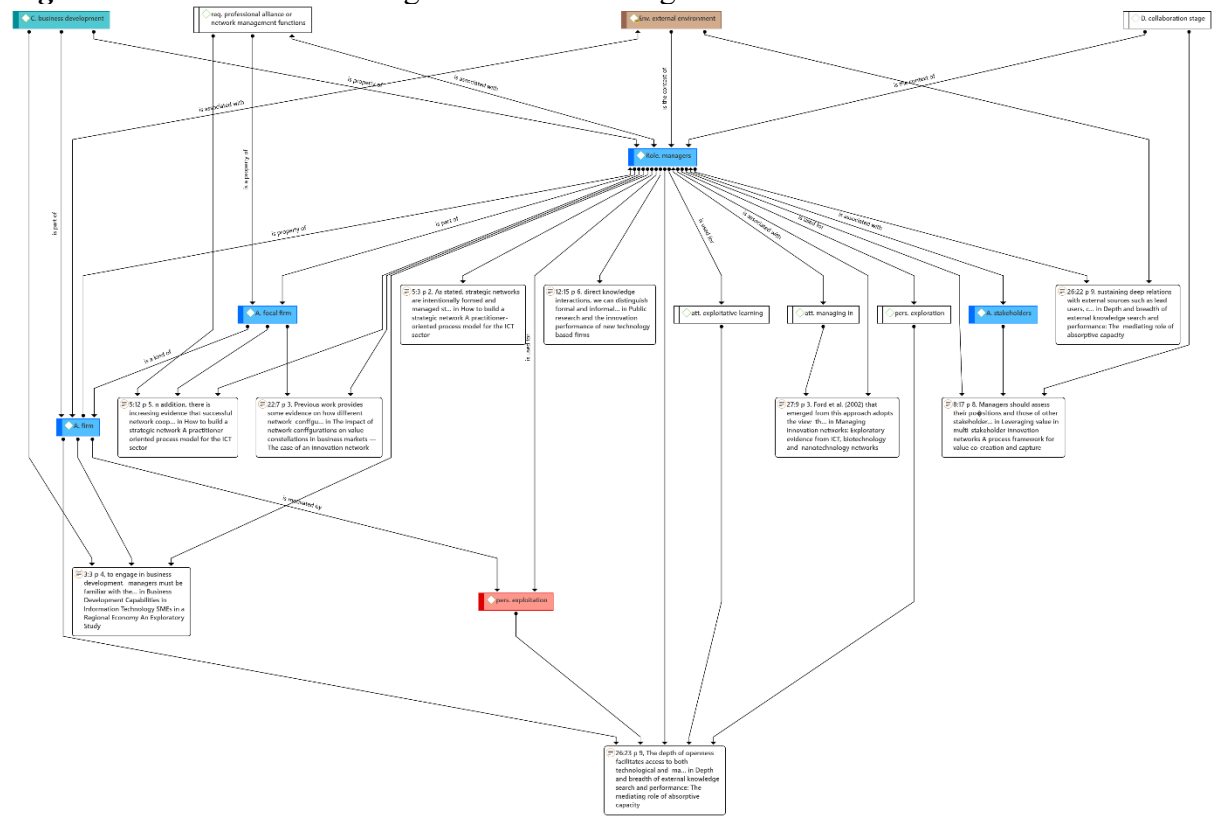**Figure B3**. network of meaning for the label managers
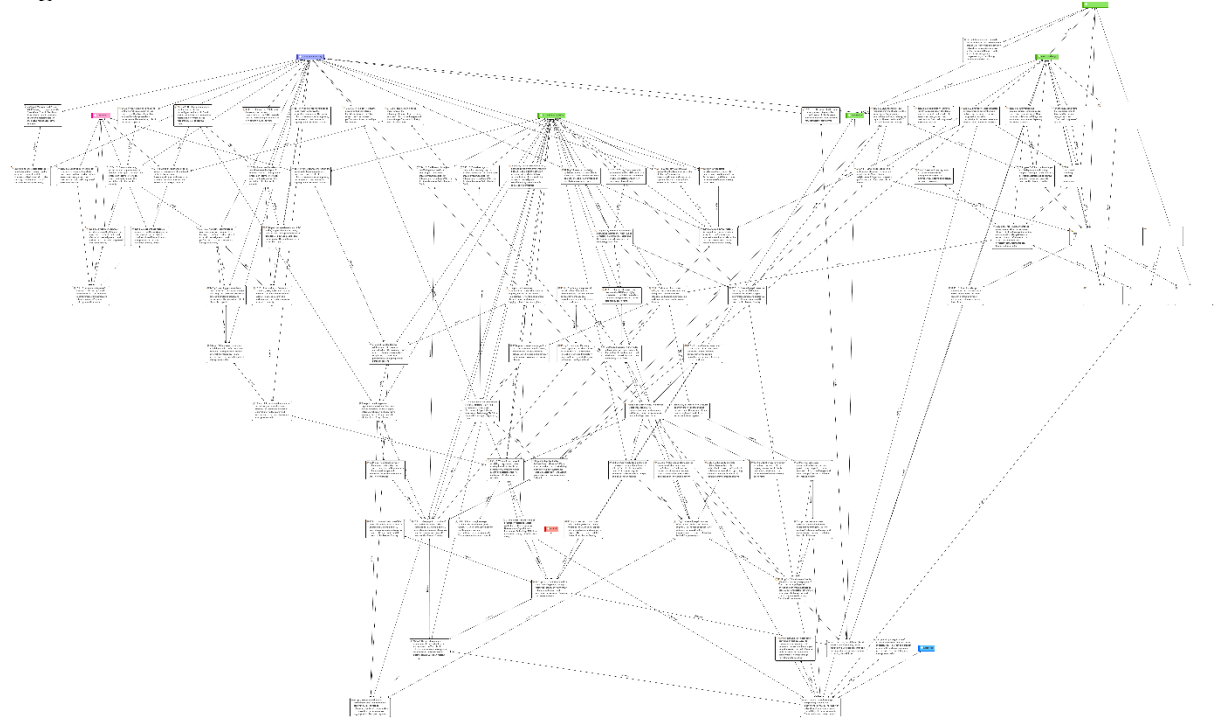

Figure B4. resources network of relations

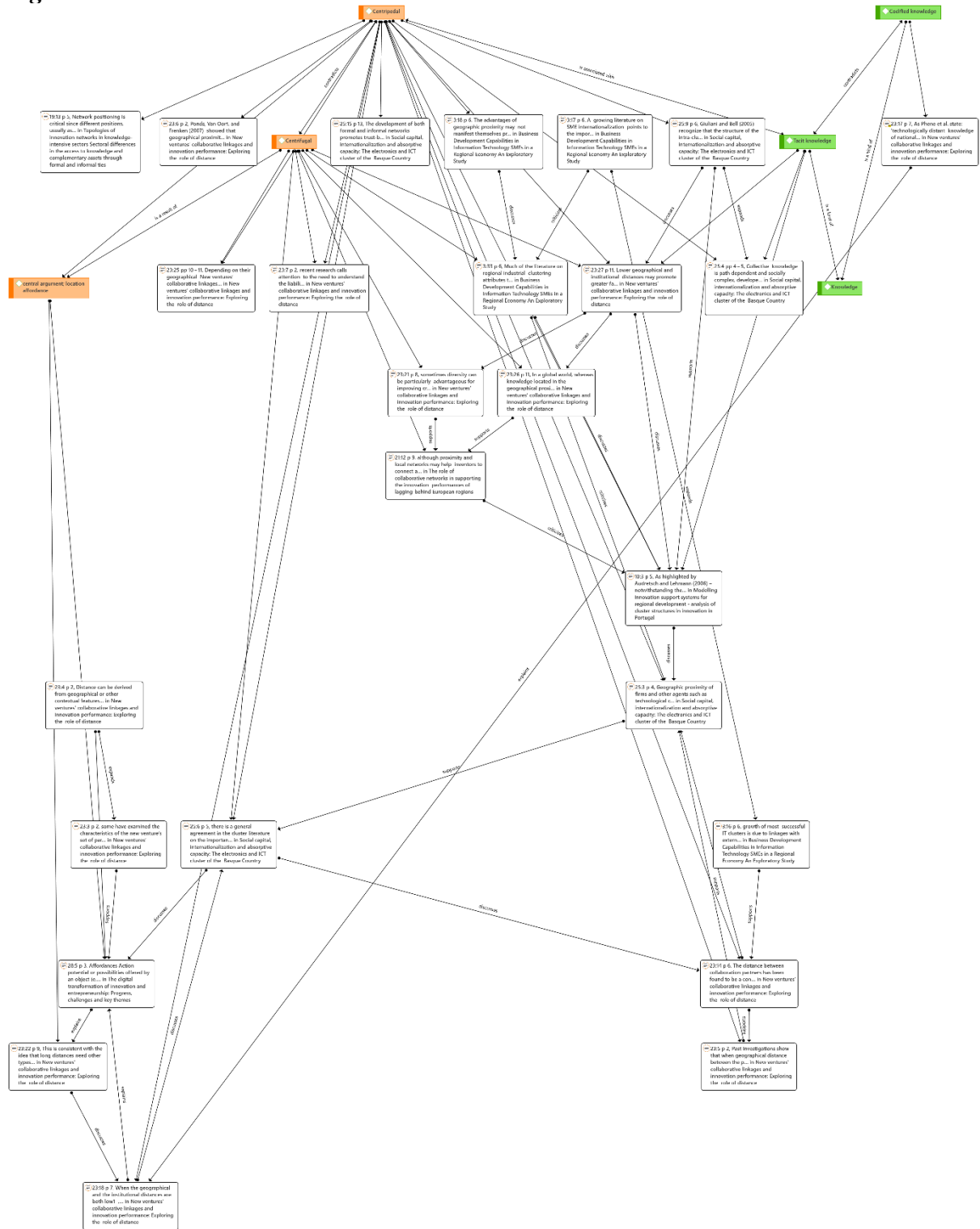***Figure B5***. distance network of relations

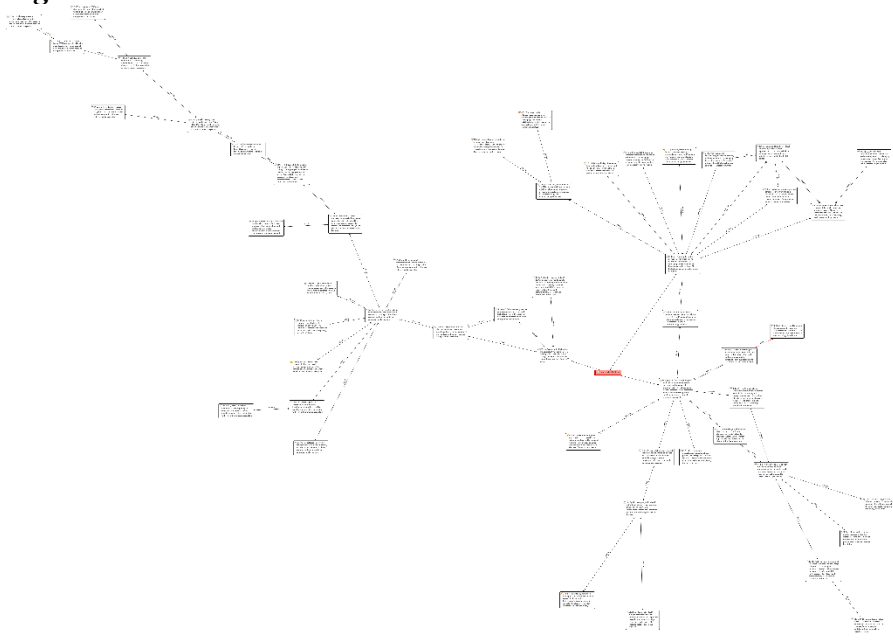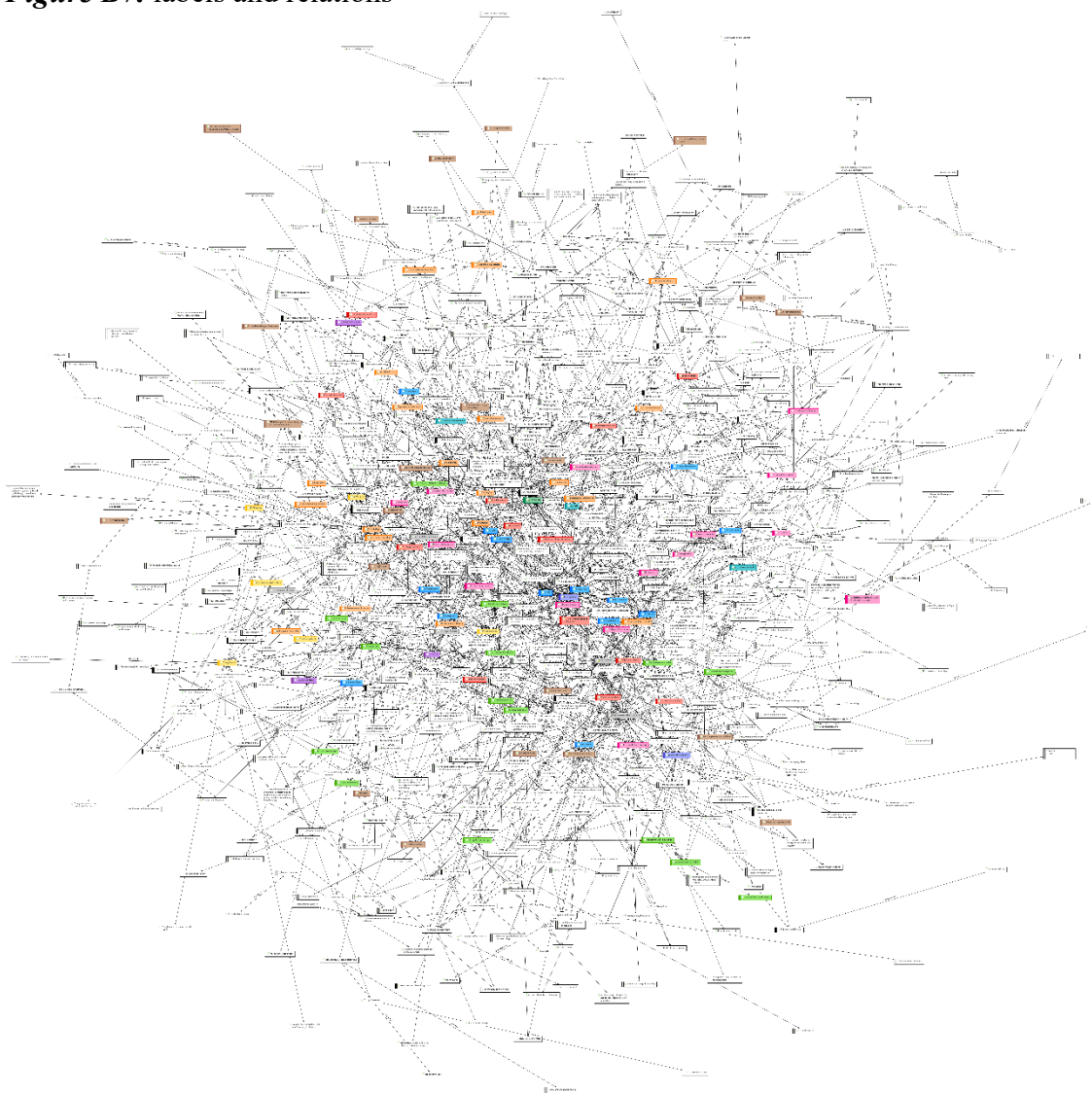*Figure B6.* relational construct network of relations

Figure B7. labels and relations

Appendix C: Interview script

<mark>Innovatie proces</mark>
Vanuit uw eigen ervaring weet je wellicht dat innovatie verschillende vormen kan aannemen. Bijvoorbeeld, product, service en business model innovatie.
Q1. In jouw ervaring, welke vormen van innovatie ben je bekend mee?
Om dieper op het proces van innovatie in te gaan. In de ICT dienstensector vindt er een informatie uitwisseling plaats tussen producent en consument wanneer een dienst afgenomen wordt door afstemming en afbakening van gewenste uitkomst. Via dit patroon geeft de consument markt informatie.
Q2. Tot welke hoogte herken je dit patroon, en welke rol heeft informatie verkregen via dit patroon op innovatieprocessen in deze sector?
Q3. Zou jij voorbeelden kunnen geven van andere bedrijfsroutines die sturend zijn in innovatie processen in deze sector?
<mark>Radicale innovatie</mark>
Om verder te gaan wil ik een onderscheid aanbrengen tussen radicale en incrementele innovatie. Zoals je misschien weet is het verschil tussen deze twee vormen is dat radicale innovatie een nieuwe markt creëert. Om nu de link te leggen naar het eerdere patroon van markt informatie verkrijgen via consumenten, dat lijkt bij radicale innovatie niet mogelijk.
Q4. Herken je dit, en hoe navigeer je deze uitdaging?
Om dieper te gaan. Radicale innovatie brengt zogezegd hogere risico's en meer onzekerheid met zich mee, want de radicale technologische innovatie gaat gepaard met onduidelijkheid rondom de wenselijkheid van diezelfde technologie. Om dit anders te verwoorden. Een radicale innovatie maakt iets mogelijk dat voorheen niet mogelijk was, en potentiële consumenten moeten de afweging maken of de technologie een positieve bijdrage maakt aan hun wereld.
Q5. In hoeverre ben je het hier mee eens, en heb je een aanvulling daarop?
<mark>Middelen</mark>
We blijven deze gedachtegang volgen van radicale innovatie in ICT dienstensector en gaan verder op de markt creatie. Om een markt te creëren heb je middelen nodig. Voorbeelden hiervan zijn technologieën, financiële middelen, routines, relaties en kennis.
De vraag is nu:
Q6. Welke middelen zijn het meest belangrijk volgens jou om een markt te creëren voor een radicale innovatie?
Q7. Hoe zie je het relatieve belang van deze verschillende middelen ten opzichte van elkaar?
De benodigde middelen kunnen vanuit het bedrijf komen, maar ook vanuit externe partijen. Het delen van middelen is in zekere zin het delen van risico's. Vandaar dat het wenselijk kan zijn om samen te werken aan innovatie.
Q8. Hoe denk jij hierover?

<mark>Netwerken</mark>
Het vinden van partners gaat via netwerken. Via professionele netwerken, sociale netwerken, bij wijze van spreken kun je partners vinden via je kapper. Het is duidelijk dat deze netwerken niet gelijk aan elkaar zijn.
Q9. Welke netwerken zou je inzetten, en hoe, om potentiële partners te vinden in de context van radicale innovatie?
Om de rol van netwerken beter te begrijpen zou ik graag aanvullende context willen introduceren. In netwerken is sprake van afstand. Afstand in geografische termen, en institutionele termen. Met geografisch bedoel ik bijvoorbeeld afstand in kilometers. Institutionele afstand gaat meer over de overlap in bedrijfscultuur, normen en waarden, processen en routines bijvoorbeeld.

Q10. **Wat is de rol van afstand, zowel geografisch als institutioneel, in netwerken voor de vraag hoe je tot partner selectie komt voor radicale innovatie?**

Nu wil ik graag het onderliggende dilemma introduceren in relatie tot afstand in netwerken. Geografische en institutionele nabijheid heeft een positieve invloed op communicatie en coördinatie, en daardoor ook uitkomsten. Echter, hechte netwerken die hoog scoren kunnen gelimiteerd zijn in de zin dat ze lokaal optimale uitkomsten produceren en onderhevig zijn aan zo genaamde lock-in effecten. Het risico dat hier in schuilt is dat in innovatie ontwikkeling voor een lokaal optimale uitkomst gegaan wordt die niet buiten het lokale netwerk kan schalen omdat het hechte netwerk niet representatief is voor het losse netwerk.

Q11. Hoe waardeer en balanceer jij deze aspecten?

Legitimiteit

We gaan nog een allerlaatste stap dieper. De voorgaande vragen leiden naar vragen rondom legitimiteit. Legitimiteit kun je relateren aan het eerdere concept van wenselijkheid van technologische innovatie. Een nieuwe informatie technologie wordt beoordeeld op wenselijkheid, en zo vindt er ook een beoordeling plaats gerelateerd aan de partij of partijen die de innovatie aandraagt. Legitimiteit draagt dus in zich de vraag of de technologie wenselijk is, met de aanvulling dat dan ook de brenger beoordeeld wordt op kwaliteiten.

Q12. Stel jezelf voor dat een partij je introduceert tot een nieuwe informatie technologie. Hoe beoordeel je de componenten van de technologie, en de componenten van de partij die het aandraagt voor legitimiteit?

Tot dusver hebben we het gehad over radicale innovatie. Om dit te contextualiseren gaan we een stukje terug naar incrementele innovatie. Zoals je misschien nog herinnerd zei ik dat incrementele innovatie minder grote risico's vertegenwoordigd. Stel je nog steeds hetzelfde voor dat een andere partij iets aan jou voorstelt met als het enige verschil is dat risico's nu lager zijn.

Q13. Hoe verhoudt in jouw ervaring de beoordeling van radicale innovatie zich tot de beoordeling van incrementele innovatie? Wat zijn de verschillen volgens jou?

Het beoordelen van legitimiteit is relatief subjectief. Echter, het is een perceptie, en kan dus worden beïnvloed. Stel jezelf weer de situatie van de nieuwe radicaal innovatieve technologie voor, maar nu vanuit het perspectief dat jij deze nieuwe technologie wilt introduceren.

Q14. Hoe overtuig je potentiële afnemers en partners van de legitimiteit dat de technologie wenselijk is en dat met jou de markt gecreëerd gaat worden?

Uit de literatuur wil ik graag vier categorische patronen om legitimiteit vragen te beïnvloeden behandelen. Die wil ik samen doorlopen, en ik zou aan jou willen vragen om hierop te reflecteren en deze te wegen. Na iedere statement zou ik graag erbij stil staan en erop willen reflecteren. Als het onduidelijk is wat ik bedoel kan ik ook voorbeelden geven.

- Bedrijven kunnen in hogere of mindere mate voldoen aan wet- en regelgeving, als ook technologische standaarden. Daarmee wordt bedoeld dat conformiteit leidt tot perceptie van lagere risico's en minder vernieuwing. Afwijking leidt tot perceptie van hogere risico's en meer vernieuwing. (Ex. Chatbots (incr.), deel mobiliteit (rad.))
- Bedrijven kunnen selectief omgaan met context. Dit is strategisch omgaan met dingen die je benoemt, en niet benoemd. Waarbij je focust om jezelf en de innovatie in een positief licht te zetten. (Ex. Bitcoin, financiele vrijheid vs geen overzicht)
- Bedrijven kunnen bestaande netwerken manipuleren. Er zijn impliciete en expliciete regels en normen in netwerken, een bedrijf kan deze regels en normen oprekken om baten uit bestaande netwerken te halen en de wenselijkheid te beïnvloeden. (ex. Bitcoin op e-commerce vakbeurs)
- Bedrijven kunnen nieuwe netwerken creëren om legitimiteit te ontlenen aan de nieuwe technologie. (ex oprichten van community)

Deze vier patronen hebben impact op de legitimiteit beoordeling.

Q15. Springt er een techniek uit voor je? Welke zou je wel of niet toepassen, of waar laat je die beoordeling vanaf hangen?