CRANFIELD UNIVERSITY

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HOW ARE PARTNERS USED IN THE SEARCH FOR INNOVATIONS?
A SYSTEMATIC REVIEW

CRANFIELD SCHOOL OF MANAGEMENT
MANAGEMENT RESEARCH

MRes
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degree of Master of Research

Abstract

The importance of search partnerships has grown as a mode to search for innovations. However, in spite of this development, notions of open innovation combined with new propositions to change the search process in favour of sustainability have unravelled a need to take stock of the existing literature of search partnerships and the aims that these partnerships follow. This review addresses this shortcoming and synthesises the literature on search partnerships to analyse the current state of knowledge to deliver future research opportunities.

A systematic review process was adopted by means of a set a set of pre-defined stages. These stages included the formulation and positioning of the review question within the larger literature domains, a systematic research process which included the adoption of search strings, relevance and quality appraisal criteria, as well as a stock-taking process of descriptive and thematic features, which followed the logic of prescriptive synthesis. This process led to a representative sample of 73 articles which were analysed subsequently.

The tentative findings reveal that the literature is underpinned by a combination of theories linking to evolutionary or transaction-based understandings of search partnerships. Also, six conditions were found to drive search partnerships and when they are likely to form. Moreover five interventions were identified that relate to the use of search methods, boundary spanning activities, and the number, type and involvement levels with the partner. Finally search partnerships have been found to yield five outcomes: partnerships, and various types of innovations, higher social goals, as well as market knowledge.

By combining contexts, interventions, and outcomes, research opportunities are identified that should inform future reviews, including the need for more research in sustainability-led search partnership contexts and a better understanding of search strategy configurations in relation interventions used and anticipated search partnership outcomes obtained.

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1 Introduction

Over the last decades the boundaries of innovation have witnessed an unprecedented shift to more open forms of innovation (Chesbrough 2003). This development has increased the interest in collaborative alliances and in different industries and the ways firms search together for innovations (Hagedoorn 2002). This search is framed by the observation that firms need to have routines in place to enable effective search to happen (Nelson and Winter 1982).

Interest in R&D partnerships inspired research on the effectiveness of search partnerships in creating innovation outcomes and the reasons what motivated such collaborations (Brettel and Cleven 2011; Hagedoorn 2002; Link and Scott 2005; Tether 2002). This development was supplemented by a number of mechanisms offered over time by the open innovation literature, for example innovation contests, consortia, or intermediaries (Pisano and Verganti 2008; Terwiesch and Xu 2008; Zhang and Li 2010). Moreover, the need to understand ways of searching for sustainability-led innovation outcomes and involving external stakeholders in the innovation process have recently become more relevant (Ayuso, Rodríguez, García-Castro and Arino 2011; Seebode, Jeanrenaud and Bessant 2012). This relevance applies not only for the search process itself, but also an understanding of the contextual partnership conditions and the search objectives in which the search process occurs.

Nonetheless, past reviews conducted in this field have not addressed these developments. Former synthesised contributions related to aspects of local and nonlocal search without addressing the occurred changes in open innovation partnership formation (Laursen 2012). This work seeks to address this shortcoming by conducting a review on *search processes in collaborative partnerships*. It follows a systematic approach by Tranfield et al. (2003), which is a methodology that emerged from the medical sciences to synthesise larger volumes of literature systematically and to minimise author bias in reviewing scholarly contributions. Given the ability of this approach to synthesise larger volumes of literature it is deemed suitable to take stock of the current literature on search partnerships.

In order to yield robust results from this meta-review, a series of steps was followed. First, a scoping study was conducted to provide exploratory account of the literature. Second, a systematic review protocol was established prior to researching the literature. This protocol contained a set of predefined stages that were followed during the review. As part of this process articles were appraised by means of relevance and quality criteria to ensure that scholarly contributions were relevant for the extant question. Moreover, descriptive and thematic data were extracted to enable a seamless audit trail and to then continue on with synthesising the review findings by means of prescriptive synthesis (Denyer and Tranfield 2009).

The following chapters will subsequently report on all stages in more detail. The next chapter will outline the emergence and relevance of search partnerships as well as its thematic position within the literature.

2 Positioning the field of inquiry

This chapter seeks to clarify the origins and the relevance of the focus of inquiry – search processes in search partnerships. Accordingly, the review domains underpinning this work will be presented as well as the relevance of partnerships and search processes. Subsequently definitions and constructs will be provided which will be used to develop a review question along with a set of sub-questions.

2.1 Review domains

This section describes the review domains in which the review question is positioned: *strategic management* and *innovation management*. This step is relevant to better understand the broader thematic implications that underpin this study.

The first definition refers to the notion of *strategic management*. This term refers to the body of literature that is fundamentally concerned with the major measures by which firms can achieve competitive advantage (Nag, Hambrick and Chen 2007; Teece, Pisano and Shuen 1997). It contains contributions from economics and political science and also areas of research that concern this systematic review - the role of partnerships and alliances in a firm context. As partnerships are a central construct of this review, this literature domain was considered relevant and has been searched extensively during a scoping study, which preceded this work.

The second definition refers to *innovation management*, which describes "purposive inflows and outflows of knowledge to accelerate innovation, and to expand the markets for external use of innovation, respectively" (Chesbrough and Vanhaverbeke 2006, p.1). In this domain, contributions from the domains of psychology, sociology, and philosophy are found and link to the search of innovations that describe the process by which individuals and their organizations search for new knowledge (Fleming and Sorenson 2004; Nelson and Winter 1982; Rosenkopf and Almeida 2003). Because search is also a relevant construct for this review, this domain has also been searched as part of the scoping study which was conducted prior to this work.

As described with both definitions, the domains of strategic and innovation management are broad because they represent an intersection of many different research disciplines. Thus, for the purpose of this review, the relevant aspects were extracted and irrelevant ones scoped out. As Figure 1 shows, this refinement was part of the scoping study and led to this review on search partnerships.
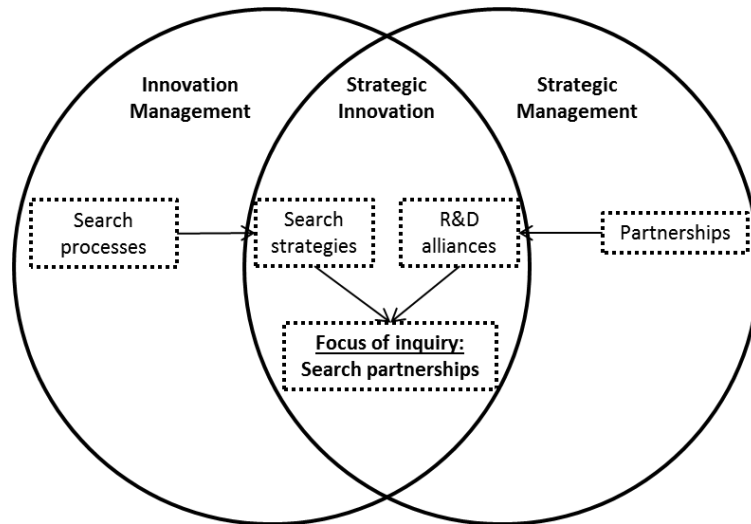
Figure 1: Review domains as described in the scoping study

Next, the thematic origins of partnerships and search processes will be explained to identify its thematic position in more detail.

2.2 Partnerships

This section will first give a short historical outline on partnerships and will then develop a definition of what is understood by a search partnership.

Within strategic management, the role of partnerships was understood initially as a fundamental activity in all corporate endeavours (Starbuck 1965) but was not explicitly researched until the 1970's when sociologists like Mark Granovetter and economists like Oliver Williamson provided ways of explaining interpersonal tie structures and transaction costs between partners (Granovetter 1973; Williamson 1981).

According to Granovetter, interpersonal tie structures referred to different relationships which partners share different ties with. Strong tie partnerships refer to partnerships as rather involved interactions, whereas weak ties suggest the opposite, such as is the case of acquaintances (Granovetter 1973). On the other hand, Williamson argued that partners exchange transaction costs in the sense that there are either repeated case-by-case bargaining situations or relationship-specific contracts (Williamson 1981). Thus, in strategic alliances, each partner has motives that drive the transactions made between partners. This claim was extended by studies on agency which suggested that separating ownership and control leads to a divergence of interests between managers and owners (Fama 1980; Fama and Jensen 1983; Jensen and Meckling 1976). These observations prepared the ground for stakeholder theory, which, building on the notions of agency and transaction costs, argued for a balancing of stakeholder relationships in strategic management (Freeman 1984). In order to resolve conflicts between various stakeholders, a wider audience of interests should be considered and integrated, which consequently meant that more partnerships with a number of stakeholders should be formed in line with corporate governance principles (Donaldson and Preston 1995; Mitchell, Agle and Wood 1997).

Another viewpoint that emerged described partnerships as a learning entity- a stance which was also often borrowed in the innovation literature (Mintzberg, Ahlstrand and Lampel 2009). Thus, unlike the focus in transaction-cost economics, the bargaining and

transactional processes were left aside and instead the equal treatment of partners assumed.

Building on this, the resource-based view was framed which argued that firms have different bundles of resources – strengths and weaknesses - which are created as a response to imperfect markets (Penrose 1959; Wernerfelt 1984). Barney expanded on this view and argued that these resources yield competitive advantages, especially when these resources are valuable, rare, inimitable, and non-substitutable (Barney 1991). This stance was different from a transaction-based perspective as firm-internal resources were at the focus of attention rather than the bargaining process. Moreover, the role of a firm's absorptive capacity was used, which describes a firm's ability to a firm's prior obtained knowledge (Cohen and Levinthal 1990). The reasoning behind this was that firms need to be able to absorb external knowledge inside the firm in order to operationalize the learning from various information channels. Thus, in the context of partnerships, this meant that each other's absorptive capacity could be increased through learning relationships.

These learning relationships in an innovation context, which we will call 'search partnerships' in this review, have been defined as a "specific set of different modes of inter-firm collaboration where two or more firms, that remain independent economic agents and organizations, share some of their R&D activities" (Hagedoorn 2002, p.478). However, as this definition emphasises firm structures over learning experiences, this definition needs to be extended. For example, Fey and Birkinshaw emphasise that partnerships refer to the "development of knowledge through relationships with specific partner firms" (Fey and Birkinshaw 2005, p.601). In this definition, the aspects of learning play a stronger role in a firm context. This is in line with this review but also misses alternative partnership arrangements in an open innovation context. For example, 'hobby innovators' who occasionally share their knowledge and resources with the firm (Greer and Lei 2012) are excluded as well as 'fringe stakeholders' who are not directly affected by firm activities but yet can yet be described as involved partners (Hart and Sharma 2004). Also, what happens when social partners at the 'base of the

pyramid' are selected (Hart and Christensen 2002), given that such partnerships are not formal.

These examples justify two definitional extensions. The first refers to the role of ideological, institutional, or demographic similarities (Birkinshaw et al. 2007, p.75), and the second relates to the role of partnership mechanisms. For example, when alternative collaboration mechanisms are selected where a large number of participants work on an innovation issue (Pisano and Verganti 2008; Terwiesch and Xu 2008), they cannot be technically seen as a partnering firm although they offer their knowledge and skills to them. Therefore, the formal alliance setup of a search partnership has to be widened by a broader definition, which will be described as a *voluntary formal and informal interactions between a firm and one or more partners who are connected by a shared problem, project, network, or objective in the context of environmental, social, or economic goals for the purpose of knowledge creation.*

Next, the role of the search process in the context of a search partnership will be described.

2.3 Search processes

This section presents a short historical outline on the role of search processes and will then develop a definition relevant for this review.

Following Schumpeter to the year of 1934, the role of search was not explicitly mentioned but linked to innovation itself as a driver of economic change (Schumpeter 1934). This understanding emphasised an entrepreneurial understanding of innovation, which placed the leader at the centre of attention. In 1982, however, Nelson and Winter described that economic development takes place on a set of evolutionary, yet dynamic trajectories of which search routines form a corporate response to these market changes (Nelson and Winter 1982). This emphasised the search routine in contrast to an entrepreneurial understanding of searching for innovations.

As for search routines, Nelson and Winter described them as the fundamental mechanism in which organizations recombine, relocate, and manipulate existing knowledge to create new knowledge (March and Simon 1958; Nelson and Winter 1982). This insight had implications as search was not subject to radical, but rather incremental innovation shifts. In line with this finding, many scholars were attracted by this view and studied larger firms' R&D alliances that partnered for the purposes of technological innovation (Hagedoorn 2002). However, in many cases, firms relied on their internal R&D functions and therefore did not collaborate as intensively with external sources of innovation. Even in such circumstances, internal and incremental search activities were at the centre of attention.

However, in the year of 2003, Chesbrough's works on open innovation caused a paradigm shift (Chesbrough 2003; Chesbrough and Vanhaverbeke 2006). The notion of open innovation explained that firms were described as more successful innovators when they turn to external sources of knowledge and combine it with internal capabilities. These capabilities are understood to include search routines with external partners as part of a search processes.

Defining the search process, it has been referred to as part of an innovation continuum consisting of three distinct stages: searching, selecting, and implementing (Tidd and Bessant 2009). Following this categorisation, the process of searching is a front-end activity in a chain of processes that lead to the commercialisation of new products or services. These outcomes – which will be termed *innovations* - can be either continuous or discontinuous, depending on the magnitude of change which resulted from the innovation process. However, when only observing the search process, the focus lies with finding *"new ideas that have commercial potential"* (Laursen and Salter 2006, p.131). Thus, it does not claim to instantly produce commercially viable outcomes, rather tentative ones that have the potential to become successful once taken forward. In turn, search also presents the largest opportunity for fundamentally refocusing the organizational knowledge base (Köhler, Sofka and Grimpe 2012).

There is no agreed definition of where search 'starts' and where search 'ends': Some distinguish between searching and scoping (Day and Schoemaker 2004), others prefer to describe search as three-staged scoping, signalling, and screening process (de Faria, Lima and Santos 2010; Fontana, Geuna and Matt 2006). In spite of the current disagreement, this review will refer to the search process as a broader entity because for the purposes of synthesis it would not be beneficial to adopt a narrower definition as relevant contributions could be missed. Therefore the search process will be defined as *an activity that seeks to identify commercially viable, emerging signals or ideas from various information channels for delivering knowledge beneficial for the generation of innovations.*

Having defined the role of search partnerships and the search process, the next section will describe the review question followed by a series of sub-questions that inform this review.

2.4 Review questions

The last two sections have provided definitions on both search processes and partnerships in an innovation context. These definitions were provided in preparation for a review question which will be presented next. It reads as follows:

How are partners used in the search for innovations?

As the nature of this review is exploratory and the literature domains dispersed, exploratory synthesis is deemed a feasible approach to this review (Rousseau, Manning and Denyer 2008). Moreover, because this question entails a set of distinct themes, it is accompanied a number of implications that will require further scrutinising.

Also of interest are the conditions under which search partnerships form, as they are deemed to shape the way how partners are used for the search for innovations. For example, are search activities driven by financial aspects (Becker and Dietz 2004), or are search partners used as a source for new knowledge (Kang and Kang 2009)? Or do search strategies determine whom to partner with, as suggested by systematic innovation methods (Bianchi, Campodall'Orto, Frattini and Vercesi 2010)? Following these observations, the antecedent conditions prior to the search process will be appraised, asking:

What partnering conditions drive the search for innovations?

Given the previously described changes in the open innovation seeker-solver relationship, this question could provide insights on the role of circumstances that firms face prior to establishing a partnership. For example, are market-based changes still dominant drivers for the formation of partnerships (de Faria et al. 2010), or have other circumstances relating to policy themes driven this process (Seebode et al. 2012). Moreover, this question also intends to describe the mechanisms that partners choose to form or maintain a search partnership.

This review also seeks to set out to deliver a better understanding on the role of search strategies, " is akin to defining a company's cognitive frame—the structure within which new evidence will be fitted to create meaning" (Nicholas, Ledwith and Bessant 2013). This statement raises questions relating to the strategic configurations that search partners employ to select or maintain partnerships. For example, do search partners adopt more open searches with a variety of different partners (Laursen and Salter 2006) or do they prefer different modes of partnering and searching (Sofka and Grimpe 2010)? In line with these observations, the following will be asked:

What search strategies do partners adopt in the search for innovations?

These types of questions would ideally reveal search configurations which can be appraised and influenced to drive the search for innovations more effectively, as the current debate on search remains ambiguous in detail.

Also unclear are the types of partnerships that are formed. Owing to the recent developments in the open innovation field, a variety of partnerships have emerged which are not represented in traditional partnership in reference to their degree of formality and institutional similarity. For the purposes of this review different types of partners will be appraised, asking:

What types of organisations partner together?

A valuable output would be to understand whether the type of partner affects innovation outcomes. For the purpose of this review, a distinction along institutional similarities will be made as to whether the partners share *similar* institutional objectives, for example, economic growth, knowledge creation, or social betterment. In contrast, when these institutions have different objectives, partners will be termed *dissimilar* because the nature of the institutions varies. This classification follows research on discontinuous innovation networks where notions of similar and dissimilar partnerships have been described along institutional differences (Birkinshaw et al. 2007).

Another implication of this question relates to the varying participation forms and involvement levels in open innovation and alliance partnership, which have been identified as relevant for this review (Narula 2004; Pisano and Verganti 2008; Terwiesch and Xu 2008). To this end, it remains unclear what drives partnership

involvement. For example, in the case of open innovation the partnership does not even need to be a seeker-solver relationship at all − it may be simply a service provider that did not intend to search for innovations (Holmes and Smart 2009). Or, what if dormant relationship becomes active because of specific knowledge requirements (Capaldo and Messeni Petruzzelli 2011; Harryson and Dudkowski 2008)? For this reason, the level of participation will be appraised, asking:

What are the search partner's levels of participation and involvement?

In the context of this review, a better understanding the relevance of partner involvement in search processes would be helpful. For example, it is suspected that involvement is related to a number of factors such as tie strength and network structure (Capaldo 2007; Harryson and Dudkowski 2008), trust levels and goodwill (Bunduchi 2012), but also power-related mechanisms relating to firm size or aspiration performance (Baum, Rowley and Shipilov 2005; Narula 2004).

Another aspect which has been tentatively discussed is the outcomes that are sought from a search process with partners. So far this review has assumed that firms establish partnerships to either search for incremental or discontinuous innovations. However, even if this assumption is likely to be a major concern in the literature, it is incomplete because the search process suggests that different outcomes are sought at different points in time. For example, at the beginning of the search process, peripheral signals are a desired enabling outcome as they indicate emergent future changes (Day and Schoemaker 2004). In contrast, search partnerships in technological contexts search for new product developments based on existing products (Tether 2002). Thus, the degree of finalisation is higher for products as opposed to market signals, which suggests that search outcomes are quite different depending on the search context. Therefore, it is desirable to understand more about these differences and the objectives that search partners have, asking the following question:

What do search partners search for?

Before heading into the next section, a few points will be made with regard to what will and will not be reviewed. Firstly, as previous definitions suggest, the firm level is the focus of inquiry in this review. Therefore, other levels will not be analysed as the search

process is understood to be an activity taking place amongst a number of individuals within a firm. There are scholars who are also interested in the individual level of search (Maggitti, Smith and Katila 2013) – but given the time constraints of this study, such aspects will be omitted.

Moreover, it should be emphasised that the search partnership is understood as a process that includes the forming and maintaining of relationships. The notion of 'finding, forming, and performing partners in a discontinuous innovation context has been described (Birkinshaw et al. 2007), and this review follows this description because search processes might be less formal than anticipated. This is an important point to make as the review question 'how are partners used in the search for innovations' could also suggest that only formal search partnerships are appraised. But as this review seeks to obtain a holistic understanding of the studied phenomenon, both the formation and maintenance of search partners will be included.

The purpose of this chapter was to position the role of search partnerships within the wider literature. The next step of this review will report on the adopted methodology in this   review.

3 Methodology

This chapter will give an account of methodology used for the extant systematic review.

Before outlining the undertaken stages in more detail, the rationale for undertaking a systematic review will be given. Subsequently, the review aims and objectives of this work will be presented as well as the anticipated outputs. Details will be provided with regard to adopted search strategies, study selection and quality assessment criteria. Moreover, data extraction and the synthesis methodology will be described in more detail.

3.1 Rationale for conducting a systematic review

This section presents the reasons why a systematic review was selected over other literature appraisal forms. As described in the introduction section, the use of a systematic review was tentatively outlined as a methodology that seeks to minimise author bias in reviewing scholarly contributions. They are described as a "self-contained research project in itself that explores a clearly specified question, usually derived from a policy or practice problem, using existing studies" (Denyer and Tranfield 2009, p.671). As previously stated, it originates from the medical science field and seeks to produce consistent, evidence-based, and reliable results regarding the development of practices and policies (Tranfield, Denyer and Smart 2003).

In order to ensure an evidence-based approach, the undertaken process must be replicable, transparent, and scientific (Cook, Mulrow and Haynes 1997). This level of rigour is achieved by a sequence of predefined stages during the literature search and ultimately supports the notion of evidence-based management (Briner, Denyer and Rousseau 2009). Therefore, consistent with the approach of Tranfield et al. (2003), several stages inform this systematic review.

At the start of a review, an unambiguous review question is required, obtained through an extensive scoping process and through support of an advisory panel. The second stage involves the approval of the systematic review protocol, which contains predefined search strings, a search strategy, quality and relevance criteria, as well as descriptive and thematic features that are of relevance for the review. The third stage involves a screening procedure in databases and journal articles according to inclusion and exclusion criteria. This is followed by the fourth stage, in which the first selection of relevant articles is appraised for quality. The fifth stage involves the extraction of data, in which articles are analysed. The last stage is concerned with the critical evaluation of studies based on the findings.

All herein mentioned stages will be consecutively described in more detail, except the scoping process as both the literature domains as well as the review question has been described previously.

3.2 Advisory panel

In order to support the systematic review process, an advisory panel has been formed. The members of the panel are as follows:

- *Dr Palie Smart*, Reader in Corporate Sustainability, Cranfield School of Management, expert in search strategies and corporate sustainability.
- *Dr Colin Pilbeam*, Senior Research Fellow, Cranfield School of Management, expert on management organisation and methodologies.
- *Dr Emma MacDonald*, Senior Lecturer in Marketing, Cranfield School of Management, expert on business partnerships and innovation management.
- *Ms Heather Woodfield*, Information Specialist for Social Science, Kings Norton Library, Cranfield University, search advisor.

Additionally academic support members of staff were drawn upon who also supported the systematic review process with general guidance.

3.3 Search strategy

Three systematic search strategies were followed during the review. They are described in Figure 2 and the main elements are listed below:

- *Protocol-driven research*: articles were searched and located in electronic databases by means of predefined search strings and databases.
- *In-depth article search*: articles were located by tracking references and locating citations that were of interest.
- *Snowballing*: articles were sourced by means of existing knowledge within the field as well as inquiries with the panel, and other forms of coincidental discovery.
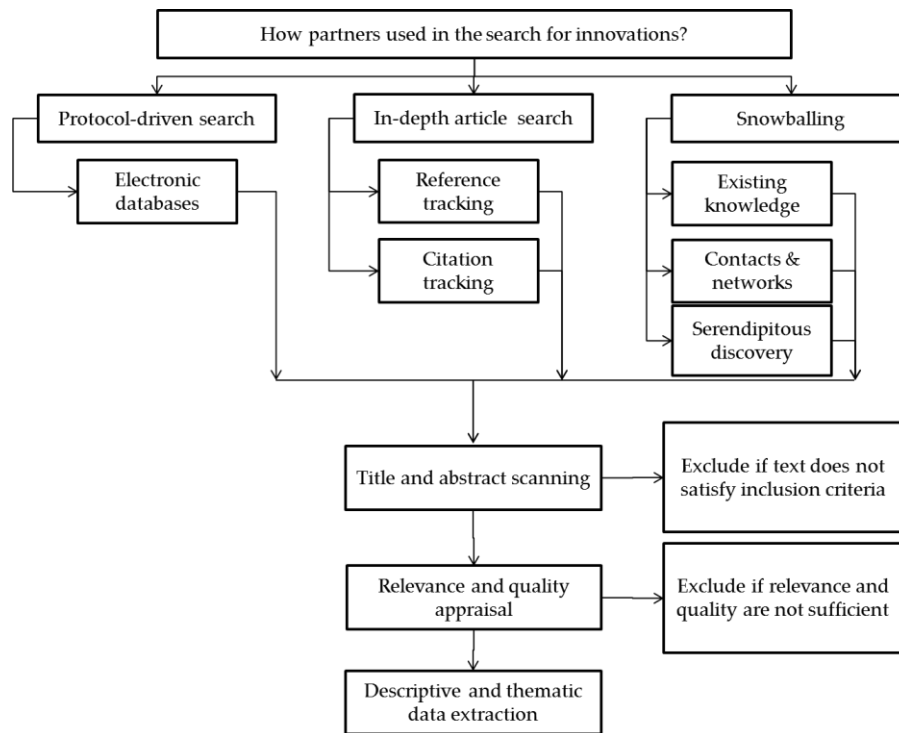
Figure 2: Simplified search strategy outline

Prior to explaining the subsequent stages regarding scanning and appraisal procedures, the search string development and database selection will be presented.

3.4 Search string and database selection

Next, search strings were developed and databases selected. The search string development process requires that a set of tested and predefined search strings are created to ensure a consistent a rigorous search process in journal databases. Moreover, this method is helpful as the domains of strategic management and innovation management are known to be rather messy and confusing. In chapter two, the role of search partnerships as well as the search process were described in the context of this review. As part of this elaboration, three relevant construct terms have been identified that were used to develop search strings: the terms *search, partner, and innovation*.

Then, search terms were combined to form individual search strings for the three search constructs. These strings, however, did provide large, unmanageable outcomes. Therefore strings were combined and then again tested within *EBSCO*. In spite of the changed conditions, the selected terms still yielded large results given the broad nature of search terms used, as displayed in Table 1.

Table 1: Search string results when combined with each other

String Name	String	Pre-tested result (EBSCO)	Title search only
String 1: *Partner + Search*	(Partner OR Collaborator OR Assist OR Cooperate OR Collaborate) AND (Search OR Seek OR Discover OR Find OR Learn OR Scanning OR Review)	64,926	1,762
String 2 : *Search + Innovation*	(Search OR Seek OR Discover OR Find OR Learn OR Scanning OR Review) AND (Innovation OR Discovery OR NPD OR "New Product Development" OR Invention OR "Front End" OR "Open Innovation")	83,046	1,348
String 3: *Innovation + Partner*	(Innovation OR Discovery OR NPD OR "New Product Development" OR Invention OR "Front End" OR "Open Innovation") AND (Partner OR Collaborator OR Assist OR Cooperate OR Collaborate)	16,012	138
String 4: *Partner + Innovation + Search*	(Partner OR Collaborator OR Assist OR Cooperate OR Collaborate) AND (Search OR Seek OR Discover OR Find OR Learn OR Scanning OR Review) AND (Innovation OR Discovery OR NPD OR "New Product Development" OR Invention OR "Front End" OR "Open Innovation")	2,938	3

Thus, for reasons of time constraints, results were only obtained from title searches and only in combination with the respective construct to make the sample more manageable. This was found acceptable because it was expected that most relevant articles were planned to be systematically sourced by means of reference tracking techniques.

Once that the search strings were developed, databases were chosen for searching contributions. A choice was made to select both *ABI/Inform* and *EBSCO* as search interfaces, as they were perceived to contain the most relevant databases after having scanned different interface database options. Publisher databases (e.g. *Scopus, Science Direct, Sage,* or *Wiley*) were omitted as it was found that results were obtained through the selected subject databases. Therefore, the inclusion of publisher databases would have created unnecessary duplicate searches.

For *ABI/Inform* the following databases were selected:

- *ABI/Inform Complete*: this database was selected as it was deemed a suitable database for management-related research, since it indexes well-rated journals and publications related to management.
- *IBSS*: this social-science database was chosen as it was found useful in obtaining articles related to management.

For *EBSCO*, the following databases have been selected:

- *Business Source Complete*: this database was selected because it contains a large collection of journals within the management field.
- *Environment Complete*: this database was included because it refers to environment-related journals which were perceived as possibly relevant for the review.
- *PsychInfo*: as this database is known to have a variety of well-established management journals, it was included as another relevant database.
- *GreenFILE*: although this database is small, it was included because it contains articles relating to human impact and the environment. It was reasoned that innovation outcomes and its relationships with intended or unintended impacts could be listed here.

3.5 Inclusion and exclusion of articles

Next, inclusion and exclusion criteria were developed that aided the selection of articles with regard to a set of criteria. The criteria were used during title and abstract scans, aiming for a list of articles of high and timely relevance for the review.

3.5.1 Title and abstract scanning

Following this rationale, 14,740 contributions were scanned in terms of study type, academic journal types, language, time period, and level of analysis. Moreover, the article was scanned for relevance criteria relating to the subject area. The results from this extraction process can be observed in Table 2, as it describes the body of literature and the number of articles extracted resulting from the presented inclusion and exclusion criteria.

Table 2: Body of literature and number of articles extracted

String	1	In	2	In	3	In	4	In	Total analysed:	Total included:
EBSCO	1,762	3	1,349	33	138	16	3	0	3,252	52
ABI/Inform	5,384	2	3,335	7	2,709	4	60	0	11,488	13
Total	**7,146**	**5**	**4,684**	**40**	**2,847**	**20**	**63**	**0**	<u>**14,740**</u>	<u>**65**</u>

The first criterion was the types of studies collected. It was found reasonable to include study types that were indicative of an academic conversation on search; this included conceptual, qualitative, as well as practitioner-oriented articles and university-near reports. Excluded sources were non- peer-reviewed contributions – this included conference publications, working papers, newspapers, trade journals, web-pages, books and theses. The exclusion criteria were found acceptable as they narrowed the search criteria due to time constraints and also it was planned to source seminal contributions from peer-reviewed articles included. By adopting these criteria during the title scanning phase, 13,031 articles were excluded, thus reducing the sample by 89%. This left a remainder of 1,709 articles that were analysed further.

The second criterion related to academic journal type during the title scanning stage. Although no specific restriction was made on the type of academic journal, contributions were restricted to dissemination channels that were likely to contain a scholarly conversation on search. It was reasoned that due to the specificity of the phenomenon journals should be included that are listed in academic journal ranks such as listed ABS-ranked or Cranfield ranked journals, as well as SCIMAGO rank journals or journals reviewed by the academic panel.. However, during the article scanning phase, no article was explicitly excluded for this reason because the relevant contributions were all rank-listed.

The third criterion referred to the *language type*. This criterion was adopted for time reasons and also to confine it to English-speaking publications due to its ease of access and reach. Moreover, it was reasoned that given the English-speaking context of this review the references should be citable and researchable for other academics. However, there were no articles which were excluded for this reason as all relevant contributions found in databases were written in English.

The fourth criterion was the *adopted timeframe*, which was kept open in order to identify the growing interest in the field over time. Thus this criterion did not allow for an exclusion based on publication year during the abstract scanning phase.

The fifth criterion refers to the *level of analysis*, which was confined to the firm level. As was explained previously, time constrains as well as an interest in firm-level interactions justified this decision. Following this criterion during the abstract scanning phase, 25 articles were excluded, which reduced the number to 1,684 articles.

Table 3: Abstract and title scanning criteria for including and excluding articles

Relevance criterion	Inclusion	Exclusion
Study type	Conceptual, qualitative, and quantitative articles, practitioner articles, university-near reports.	Conference publications, working paper, (unpublished source), newspapers, trade journals, web-pages, books, theses.
Academic journal types	High-impact factor ranked journals, listed ABS-ranked journals, listed Cranfield ranked journals, listed SCIMAGO rank journals, journals reviewed by panel.	All other journals not listed.
Language	English.	Non-English publications.
Time period	Open.	None.
Level of analysis	Firm level.	Individual and system level.
Relevance criteria	Conversation on either/both search and/or partnership objectives.	No search and/or partnership objectives apparent within an innovation context.

The sixth criterion referred to *topical relevance*, which was appraised during title and abstract scanning by searching for relevant constructs on search processes and/or search partnerships. In order to establish a homogeneous dataset for further analysis on relevant constructs, articles were excluded that were not contextualised within strategic management and innovation management domains. This was deemed reasonable as the focus of inquiry was positioned within these two larger domains. This led to an exclusion of 1,305 articles, resulting in 379 articles remaining.

Lastly, 314 articles were removed because of *duplicate entries* within the databases as part of the title and abstract scanning process or because the electronic database reduced results towards the end of the abstract scan. This reduced the sample to 65 articles, whose reference lists were subsequently reviewed for articles that could be relevant for the extant review.

Following the exclusion process, the next step was to perform a *reference scan* with the 65 articles obtained. This step was deemed feasible to identify relevant sources for this review. However, during this process, it was found that two more sources were

duplicates, for why they were also excluded from the review. This meant that in total 63 article reference lists were systematically searched for contributions. The reference scanning process yielded another 70 articles. However, after obtaining the articles through databases, 20 of them were found irrelevant because they did not refer to the central phenomenon studied. This meant that 50 articles were taken to the full paper relevance appraisal stage in addition to the 63 articles that were extracted directly from the databases. Moreover, five articles known to the author were included for a full paper relevance appraisal. In total, 118 articles were taken further to the full paper relevance appraisal stage, where more refined criteria were applied to identify relevant sources. The article exclusion process is summarised in Figure 3.
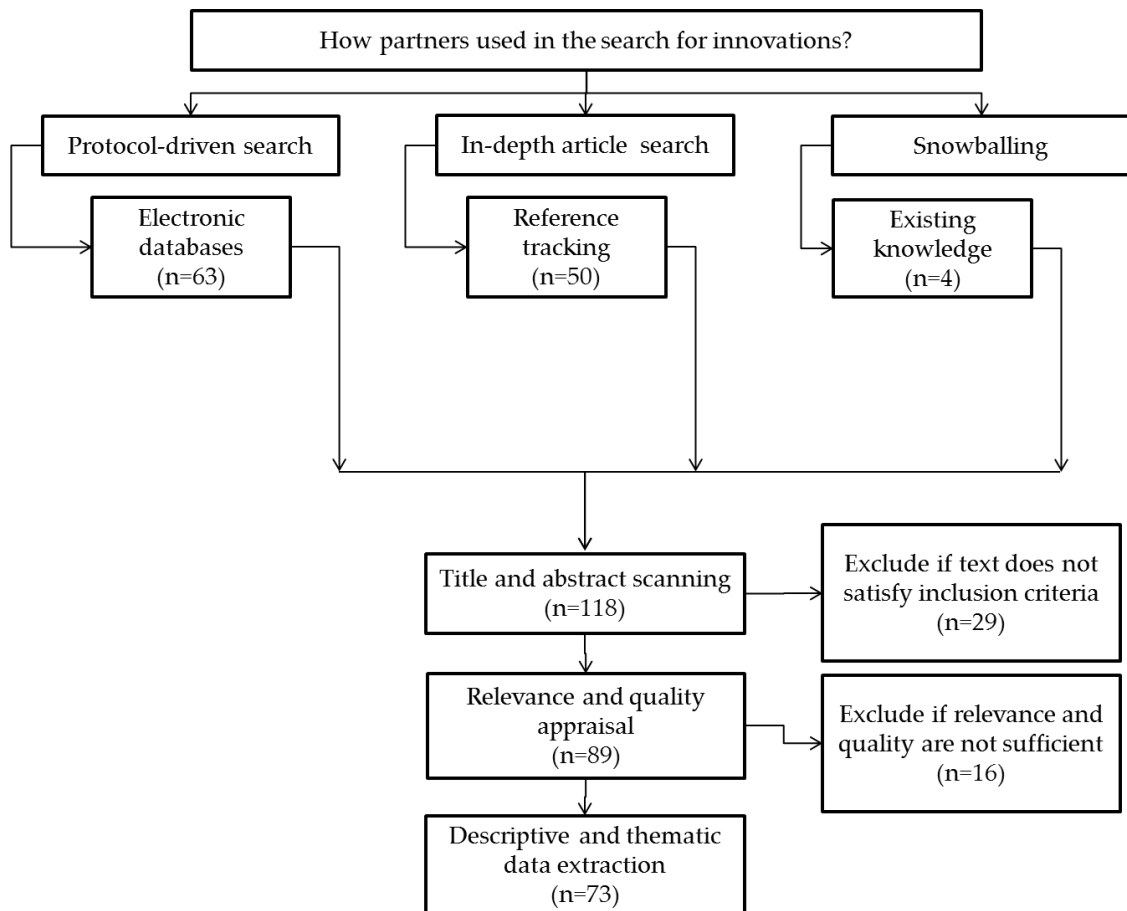
Figure 3: Articles included and excluded

3.5.2 Full paper relevance appraisal

Subsequent to the reference and abstract scanning process, 118 articles were assessed in relation to its relevance to the review question. As shown in Table 4, this process of including and excluding articles based on topical relevance, was more refined in that criteria were used that appraised the relevance of this review related to *conceptual, empirical, and methodological features*. For conceptual articles it was found relevant to include articles that contained partnership or search selection practices. In turn this meant that conceptual contributions were excluded if they did not address either of these constructs conceptually. For empirical articles, articles were included that explained notions of search and/or partnerships in regard to types, objectives, relationships, its moderating relevance as well as innovation performance outcomes. This was found reasonable as the multiple facets of both constructs were of interest to describe the search for innovations with partners in its full entirety. Consequently, articles that did not contain at least one of these criteria were not included in the review due to its lacking relevance.

Table 4: Full paper relevance criteria

Type of article	Inclusion *At least one of the described aspects should be described in an article:*	Exclusion
Conceptual articles	• A discussion of the theories, models or conceptual frameworks supporting either search or partner selection practices.	None of these aspects are found in the article
Empirical articles	• An empirical investigation describing or explaining the relationship of search and partnerships. • An empirical investigation describing or explaining partnership types or objectives of partnerships in the context of search. • For quantitative papers, constructs should explain the impact of moderating factors of the search and partnerships. • For quantitative papers, articles referring to innovation performance and firm performance should be disclosed in a way that inferences can be made for the search-partnership construct.	None of these aspects are found in the article
Methodological articles	• Assumptions, the field of study, sample etc. should be disclosed, as well as their limitations. • A research design and /or result that is feasible, with well-grounded concepts obtained from theory. • Disclosure of deviating factors, if available.	None of these aspects are found in the article

Methodological articles were included if they also were of relevance to how innovations could be searched. In particular assumptions or interesting approaches in regard to the research design were included. In turn, articles that did not contain any methodological relevance were excluded. The envisaged content for each type of article is described in Table 4.

Through this in-depth process, 29 articles were excluded, of which 18 were scoped out for reasons of wrong context and 11 for reasons of using the wrong level of analysis. This brought down the sample to 89 articles. Of these 89 articles, 21 were conceptually relevant, 67 were empirical, and one article was methodological.

3.6 Quality appraisal

Next, the 89 articles were scrutinised by means of quality criteria. This appraisal included a thorough article scan with regard to its theoretical contribution, its contribution quality, methodological rigour, and argument strength. These four criteria have been established for the purpose of this review and were cross-checked with the advisory panel. A more detailed description of this process can be found in the appendix and the questions are listed in Table 5.

Table 5: Quality appraisal questions

Theoretical contribution	Is there a conceptual framework guiding data collection?
	Is a conceptual framework selected after data collection to guide analysis?
	Is there a largely implicit theoretical orientation?
	If more than one perspective is used, how coherently do the different perspectives relate to each other?
	Are they listed?
	Are they defined?
	Are they compatible?
	Consistent use of concepts?
Contribution quality	Are all information disclosed to assess the contribution?
	Is the contribution witty, novel, original, and surprising?
	Are there obvious weaknesses that make the contribution tentative?
Methodological rigour	Was the author's position clearly stated? (perspective, bias)
	The method of sampling is stated or described
	The characteristics of those included in the study are defined (and are comparable to the wider population)
	Was there an adequate description of the method of data collection given?
	A description is given of how the themes and concepts were identified in the data
	The analysis was performed by more than one researcher
	Negative/discrepant results were taken into account?
Argument strength	Is the research question addressed
	How much of the information collected is available for independent assessment?
	Are the explanations for the results plausible and coherent?
	Are the results of the study compared with those from other studies?

In order to understand how articles were excluded, the appraisal mechanism will be shortly explained. For each theme, a set of questions were prepared to allow for a thorough appraisal of articles. Each question was underpinned by set possible answers which were weighted against a 3-point scale. Desirable answers would receive a higher score as opposed to less desirable answers. Then each of the four themes yielded averages which were added to a possible maximum rating of 12 points. Articles that did not exceed 8 out of 12 possible full points were excluded. This process led to an exclusion of 16 articles.

The final article sample contained 73 articles which were taken further for the data extraction phase.

3.7 Descriptive data extraction

The data extraction was conducted with Excel 2010, where a personalised format was adopted. This format followed the subsequent steps described by Tranfield et al. (2003), and aimed to collect different information at different stages of the review process. Table 6 presents the identification and extraction criteria which were adopted during this phase, as well as the reason why this criterion was deemed useful.

Table 6: Identification and extraction criteria

Descriptive themes	Columns underpinning descriptive themes	Reason
Background information	Information is provided on the ascribed article ID, where the article was sourced (e.g. database, grey literature), article title and authors involved.	To establish an audit trail.
Journal selection	Describes the journal or general source as well as the source type (e.g. a book, conference paper etc.).	Analyses sources in which the review question is discussed.
Country	This describes where the institution that published the article is located.	Analyses countries in which the article is discussed.
Continent	Describes the continent location.	Analyses geographic sources in which the article is discussed to understand its global distribution.
Year	Describes the year of publication.	Analyses how interest in the subject evolved over time.
Ontology	What is the underlying ontology of this study?	Identifies conflicting ontologies.
Data collection methods	Is the study a theoretical, empirical (qualitative or quantitative), or mixed study?	Describes the body of knowledge with regard to its level of consolidation and maturity.
Method type quant	Specifies the type of method used in quantitative studies (e.g. experiments).	Analyses preferred quantitative data collection methods.
Method type qual	Specifies the type of method used in qualitative studies (e.g. interviews).	Analyses preferred qualitative data collection methods.
Unit of analysis	Specifies what is being studied.	Identifies differences in the unit of analysis.
Level of analysis	Specifies the level in which the construct is studied.	Identifies differences in the level of analysis.
Study characteristics	Describes the theoretical frameworks adopted, the sample selection characteristics, sample size as well as the country sampled.	Identifies theoretical underpinning and constituent sampling characteristics.

This extraction process was applied to all 73 articles. A full analysis of all articles in relation to these criteria can be found in the appendix.

3.8 Thematic data extraction

The next step was to appraise the sampled articles thematically. During this stage, the review sought to follow the principles of explanatory synthesis (Briner et al. 2009) in order to support the development of a specific pattern of explanations. This approach was selected as the area of inquiry suggested that a synthesised aggregation of the literature would be relevant and helpful as an outcome.

Also, this explanatory synthesis approach was complemented by the use of the CIMO logic according to Denyer et al. (Denyer, Tranfield and van Aken 2008). CIMO stands for context-intervention-mechanism-outcome and describes a prescriptive research synthesis format. This format, as defined in Table 7, was found relevant to obtain a better understanding of the respective analytical building blocks that make up this area of research. Moreover, as this review question is positioned within both innovation and strategic management domains which are known to be divergent, there is a perceived value of synthesising the literature with the CIMO approach.

Table 7: Definitions for context, intervention, mechanism, and outcome (adopted from Denyer et al. 2008)

Synthesis element	Definition
Context	Refers to surrounding factors and the nature of the human actors that influence behavioural change.
Intervention	Refers to behaviour influencing aspects that managers (or firms in the case of this review) have at their disposal.
Mechanism	Refers to what the interventions trigger.
Outcome	Refers to the outcome of the intervention.

As this chapter reported on the methodology adopted in this review, the next step is to disclose both descriptive and thematic findings in subsequent order. The next chapter will discuss the descriptive findings in more depth.

4 Descriptive analysis of the literature

This section presents the descriptive findings from this review and is the starting point of analysis for the sampled 73 articles. These findings are relevant to understand where the topic of interest is studied and disseminated, and in what ways. Therefore the subsequent sections in this chapter will present tentative responses answering these questions.

The first section will describe the journals concerned with search partnerships. Then the maturity of research field is appraised by analysing the methods used and by identifying the methodological scholarly preferences exhibited in the studies. In order to understand the level of scholarly interest over time, the evolution of the article sample will also be analysed. Moreover, the geographic spread within this research will be studied to understand what nations perceive this theme to be more (or less) relevant.

4.1 Dissemination channels

The objective of presenting dissemination channels as part of this review is to identify relevant scholarly sources for this review, and to understand these scholarly sources as proxies for the degree of interest coming from various scholarly research domains.

In response to this inquiry, Figure 4 presents all 73 scholarly contributions found in relation to dissemination channels used.

Dissemination Channels (n=73)

Channel	Count
Research Policy	14
International Journal of Management Reviews	4
Strategic Management Journal	4
Academy of Management Journal	4
Journal of Product Innovation Management	4
Management Science	3
Long Range Planning	3
Technovation	3
R&D Management	3
Creativity and Innovation Management	2
Academy of Management Executive	2
Journal of Management Studies	2
Administrative Science Quarterly	2
International Journal of Innovation...	2
Industrial & Corporate Change	2
Journal of Management	2
Advanced Institute of Management Research	1
Organization Science	1
European Management Review	1
Scandinavian Journal of Management	1
Harvard Business Review	1
Production Planning & Control	1
IEEE Transactions on Engineering Management	1
Technology Analysis & Strategic Management	1
Industrial Management & Data Systems	1
Organization Studies	1
Industry and Innovation	1
Research-Technology Management	1
International Journal of Production Economics	1
Seoul Journal of Business	1
Journal of Business Research	1
California Management Review	1
Journal of Small Business Management	1

Figure 4: Dissemination channels

A number of interesting observations can be made from this figure. The first observation refers five main contributing journals: *Research Policy, Strategic Management Journal, Academy of Management Journal, International Journal of Management Reviews,* and *Journal of Product Innovation Management*. These five journals represent 42% of the overall sample, of which *Research Policy* contributes 20% through 14 contributions. This implies that dissemination sources originate from innovation and strategic management journals, which exhibits an equally strong interest from both domains. This share was evident in all reported dissemination channels apart from exceptions coming from manufacturing and economics journals.

Another observation refers to the total number of journals. 32 peer-reviewed journals and one university-near report have been included, of which 16 journals publish more than one article on partner selection or search. Although ambiguity remains with regard to the level of consolidation, this aspect along with the top five contributing journals suggests that this subject is discussed in a fairly consolidated field. This increases the likelihood that most relevant articles on the topic were sourced and that no important contributions were missed.

Another observation includes types of journal relating to its empirical orientation. For example, practitioner-oriented contributions coming from *Harvard Business Review* and *Academy of Management Executive* as well as the *Advanced Institute for Management Research* represent a minority in this sample. In fact, few practice-oriented contributions were found on the subject. On the other hand, especially in the first five articles there is a large share of articles seeking to build theory. This is understood to suggest that the review question posed has produced many review questions which are in need for further review. This makes this research domain a rather divergent field. Yet, as the extant graph does not illustrate the data collection methods, it is difficult to assert whether this research domain is rather consolidated or not. Therefore the next section will break down different data collection methods.

4.2 Data collection methods

The objective for understanding data collection methods is to make inferences on the level of maturity within the literature domain, and to describe common methodological preferences.

The level of maturity is assumed to be high when there is a high share of empirical studies available and a low level of conceptual studies. Therefore it is assumed that, over a certain time period, conceptual studies develop into empirical studies. This is not to assert that empirical studies may not be seminal in conceptual development. However, the assumptions made in empirical works tend to be tested and aggregated to a measurable extent.

Figure 5 presents the outcomes of this study which follow this logic. The main observations from this graph are that a majority of 54 articles sampled data through empirical means – that is, qualitative and quantitative methods were used to collect data. This would indicate that this review domain builds on a set commonly established concepts underpinned by seminal papers. As will be shown later, this is the case in this review.
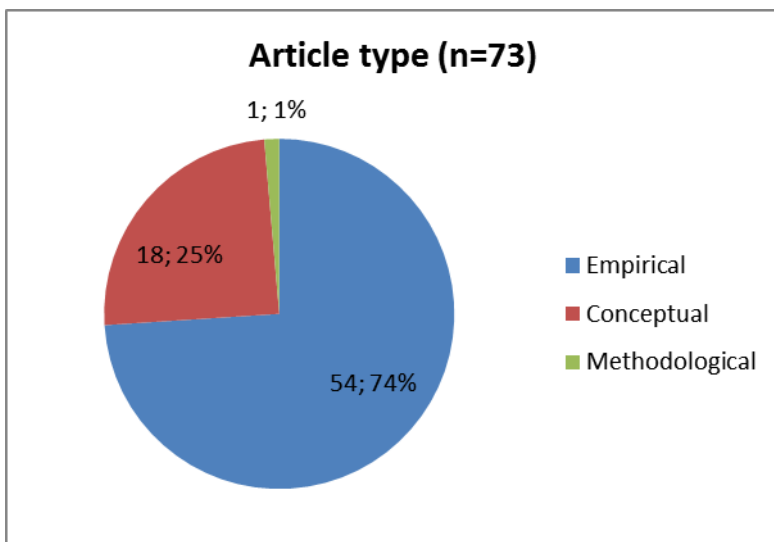
Figure 5: Article type by contribution

However, there are also 18 conceptual articles that discuss the need for further research. In fact, when taking the ratio of 19 versus 54 articles, a share of 35% is obtained which suggests a further development beyond established empirical conventions within the field. This is not the majority but it indicates that the level of consolidation is possibly overrated because new research avenues are proposed that previously were not considered in empirical studies. One methodological article was also found and described a search method (Bianchi et al. 2010).

Figure 6 describes, at a more refined level of analysis, identified scholarly methodological preferences. For example, 31 articles (42%) were sampled by means of quantitative methods, followed by 18 theoretical contributions (25%), 13 mixed articles (18%), ten qualitative articles (14%), and one practical article (1%).
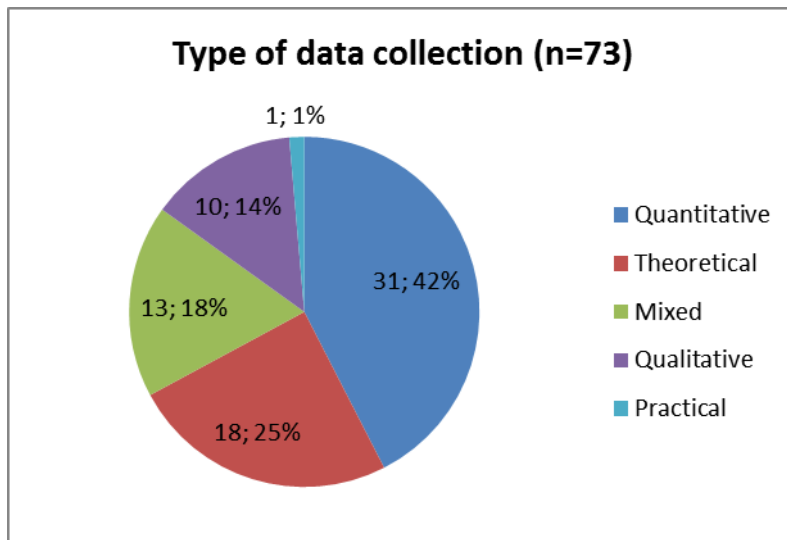
Figure 6: Type of data collection

There are two implications that are in line with the observations regarding the level of consolidation. The first finding refers to the quantitative methodologies. As it was argued that such methods are underpinned by conceptual and empirical works, the share of 42% reveals a concern for generalisations and predictions which is comparatively *lower* than the concern for qualitative studies. Admittedly, when adding mixed data collection sources, the empirical share increases to 44 articles, which then again represents a majority of the sample (60%). However, as there are still 18 theoretical articles sampled in addition to ten articles which adopted a qualitative data collection strategy, it is asserted that there are still divergent elements within the sample indicating

that the field is still receiving propositions from scholars arguing for a reconsideration of perspectives.

4.3 Methodological preferences

This section is of interest to understand how the review question was actually studied. Therefore, the review will describe *conceptual*, *qualitative*, and *quantitative* methods used to enable further inferences how robust the review findings are.

Figure 7 describes how *conceptual* works were used. There are overall 19 conceptual articles when including the practical article used.
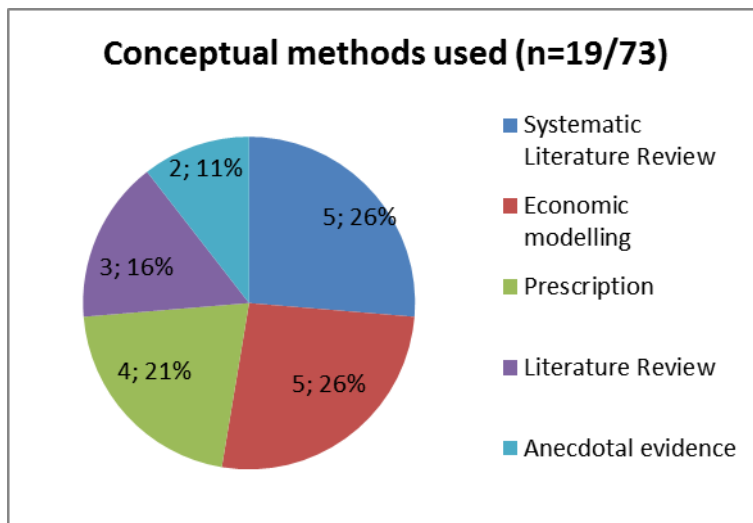
Figure 7: Conceptual methods used

The graph illustrates no clear preference for one specific method. Six articles applied prescriptive or anecdotal methods. Such methods have been understood to be less robust as findings are not always replicable. On the other hand, a majority of methods applied a more rigorous level of analysis, which indicates that contributions have been peer-reviewed and cross-checked by other scholars.

Figure 8 provides a more detailed description of the methods used during *qualitative* sampling. Adding mixed method with qualitative method sampling, a result of 23 articles was received.
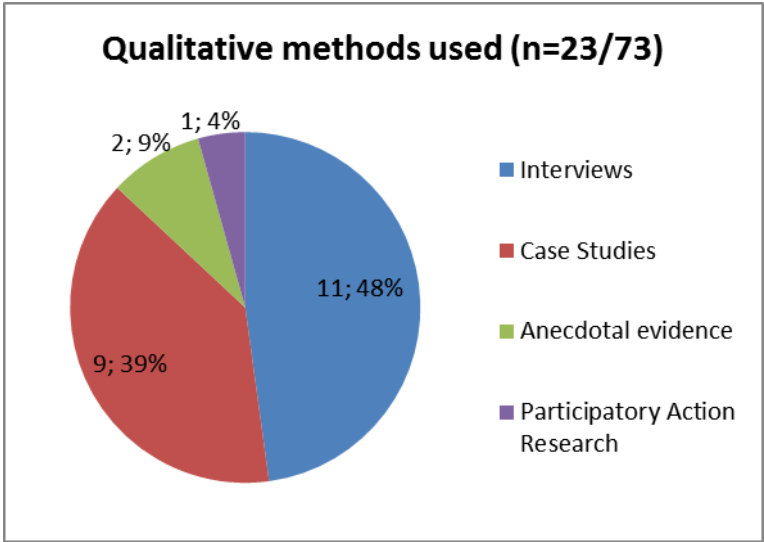
Figure 8: Qualitative methods used

Of these 23 articles, 13 articles used interviews or anecdotal evidence, whereas 10 articles either followed a case study or action research based method. Both methods are known to have both strengths and limitations which refer to author bias. In this sense both methods can be applied by more or less rigorous means. On the other hand, the quality appraisal stage ensured that contributions were of sufficiently high standard. This is why the methods obtained from this figure are assumed to be robust.

Figure 9 outlines the analysis techniques selected for *quantitative* methods - this includes 35 regression models and nine other various quantitative methods.
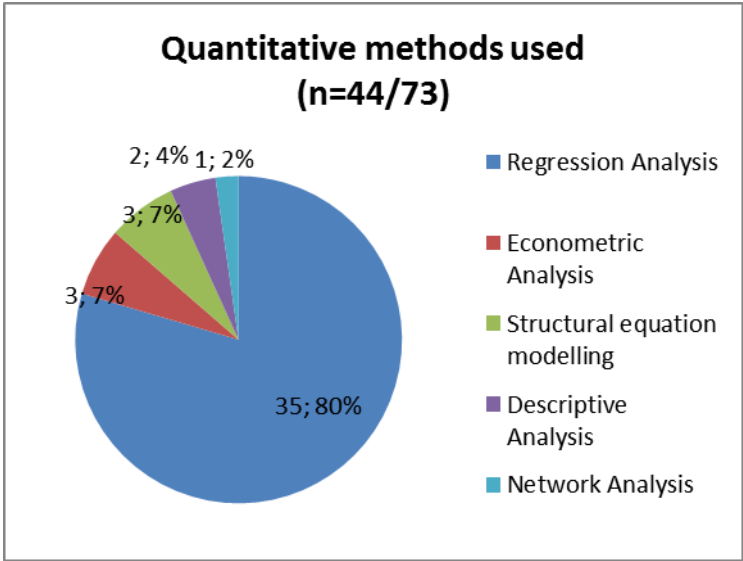
Figure 9: Quantitative methods used

A large majority of 35 out of 44 articles – that is, 79% of the sample - used different types of regression analysis depending on the sample. Even if regression types differed, there is an indication for a strong preference for making generalizable predictions. This objective is also observable with other methods used, for example econometric method sampling (three articles) and structural equation modelling (three articles). One article each used network analysis or descriptive statistics. The inferences made from this graph are similar to the ones from the qualitative methods in that the articles are assumed to be conducted with robust methods.

4.4 Evolution of literature

The evolution of literature is studied to understand in which year the 73 articles were published over time, as shown in Figure 10. This allows a further positioning of the level of maturity with regard to the review question. Moreover, as this review adopted an open timeframe, interesting observations were made with regard to interest in the field.
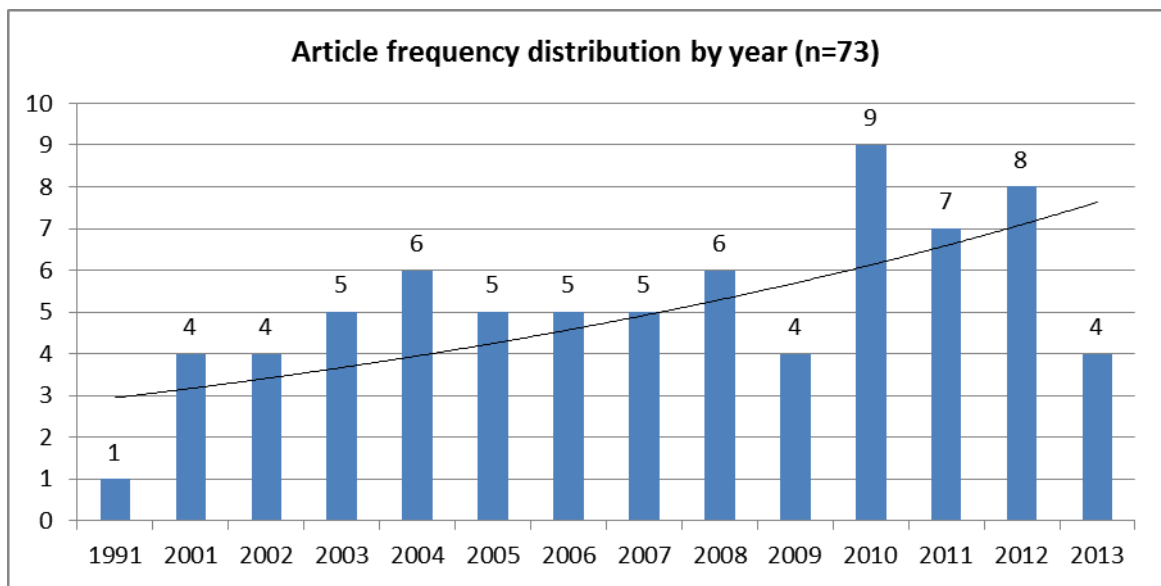
Figure 10: Article distribution frequency by year

The first observation is the significant time gap between 1991 and 2001. The reason why only one paper was included from 1991 may be either owed to the quality appraisal criteria or issues of online availability. However, leaving these two explanations aside, this graph also describes interest in collaboration with partners only in the late 2000s.

In this context, it is also important to mention that seminal pieces have not been included in the sample from 1980-2000 even if they are quoted and mentioned within this review. Moreover, these seminal pieces have contributed to a wide range of management-related fields and strictly speaking cannot be associated solely with this review question. Thus, the large gap in the evolution of literature is suspected to indicate a limited interest in this particular review question.

A second observation refers to the article frequency between 2001 and 2013. Although there is a growing interest in the field of search with partners, interest appears to be rather constant which slowly moves within a corridor upwards. For example, between 2001 and 2009, four to six articles were published in the field. As of 2010 to 2012, this corridor increased to seven to nine articles. As the year of 2013 has not ended, publications moving within the corridor of 7-9 articles would be expected. Thus it can be said that interest is growing but at a slowly moving rate.

A third observation refers to the fact that interest only increased in the last decade. As was noted earlier, the advent of open innovation in 2003 triggered a growing interest in search partnerships with external sources. This change of emphasis would explain the rapid increase in the 2000's and the continuously growing field of research.

4.5 Geographic location

In order to understand whether the research interest can be found at national, regional, or global levels, the geographic location was also analysed. Figure 11 describes the geographic location of the articles by country and continent, determined by the publication source, which allows for a tentative contextualisation of the results within the regions of study.
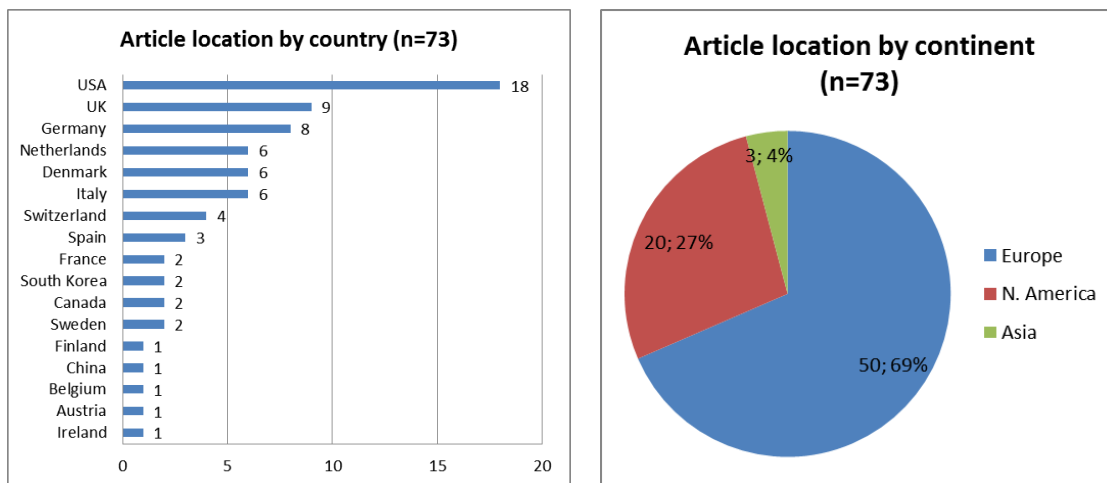
Figure 11: Article location by country and continent

The break-down into regions and nations suggests that globally, interest is weak in the field of study, as neither African, South American, or Australian nations have written on the subject. As was expected, the most represented continents are Europe, North America, and Asia.

At a national level, five countries were particularly interested in the subject: the United States (18), the United Kingdom (9), Germany (8), the Netherlands (6), and Denmark (6). These 49 contributions represent 67% of the sample and make this research highly consolidated in cultural terms. This aspect becomes even more visible when grouping regions - North American and European nations make up 96% of the sample. This can be explained by the language restriction as well as the high level of industrialisation which makes interest in search partnerships probably more prevalent. In light of these findings, the results obtained from this review should be analysed within this cultural context.

4.6 Industrial sector analyses

The article contributions have also been studied with regard to its industrial sectors. Although it was not possible to conduct a descriptive analysis because of incomplete data within the sample set, it was yet possible to identify three categorisations: *single-industry studies, multiple-industry studies,* and *context-free studies.*

Single-industry sectors were studied mostly empirically in technological domains. Therefore, this sample was strongly biased in terms of search for technological innovations coming from different areas which are listed in Table 8. In contrast, *non-technological industries* are also listed in this table and related to studies in the banking sector (Baum et al. 2005), fashion (Cillo and Verona 2008), as well as software industries (Hagedoorn 2002). It was found that a larger share of studies employed studies in a technological context.

Multiple industry studies were conducted by means of surveys either in different countries or sectors (Bayona, Garc and Huerta 2001; Becker and Dietz 2004) and were aimed to contrast the difference between low and high technology sectors in European countries with regard to search pattern (Grimpe and Sofka 2009; Kaufmann and Tödtling 2001; Laursen and Salter 2004; Laursen and Salter 2006; Miotti and Sachwald 2003; Sofka and Grimpe 2010). Also, the historical development of R&D partnerships in multiple industries over time (Hagedoorn 2002; Link and Scott 2005) enabled an understanding of the differences and similarities in search partnerships.

Sometimes the research context was bound to circumstances in which environmental or social objectives were relevant. In such cases multiple industry studies were also preferred (Ayuso et al. 2011; Hart and Dowell 2011; Holmes and Smart 2009; Rondinelli and London 2003), possibly indicating a search for generalizable claims.

Table 8: Single-industry sectors studied

Industrial Sector	Authors
Technological contexts	
Manufacturing	Becker and Dietz 2004
	Brunswicker and Hutschek 2010
	Bunduchi 2012
	Cantarello et al. 2012
	Capaldo 2007
	Cousins et al. 2011
	Faems et al. 2005
	de Faria et al. 2010
	Harryson and Dudkowski 2008
	Kang and Kang 2010
	Li et al. 2008
	Nieto and Santamaría 2007
Biotechnology and pharmaceutical industries	Fabrizio 2009
	Luo and Deng 2009
Electric and electronic industries	Capaldo and Messeni Petruzzelli 2011
	Lin et al. 2013
	Narula 2004
Automation	Katila and Chen 2008
Robotics	Katila and Ahuja 2002
Optical disk industries	Rosenkopf and Nerkar 2001
Semiconductor firms	Rosenkopf and Almeida
Telecommunications	Feller et al 2013
	Phelps 2010
Transportation industries	Wagner 2013
Non-technological contexts	
Fashion	Cillo and Verona 2008
Software industries	Hagedoorn 2002
Banking	Baum 2005

There were also context-free studies which have not identified specific industries. From an industrial point of view, these contributions did implicitly claim generalizability of their findings beyond any industrial context. Although this may be contested, some contributions implied that a search method or other formal and informal setup was generally useful in processes of searching for or with an innovation partner (Bessant and von Stamm 2002; Day and Schoemaker 2004; Pisano and Verganti 2008; Terwiesch

and Xu 2008; Wissema and Euser 1991). This is in contrast to studies which relied on contextual elements in firms' different search strategy capabilities (Mahdi 2003).

This chapter provided descriptive findings with regard to search partnership properties and contextual features. Next the analytical themes will be analysed obtained during the thematic analysis with regard to contexts, interventions, mechanisms, and outcomes.

5 Thematic analysis of the literature

This chapter reports on the thematic findings and identifies themes within the literature. This is an important step preceding the synthesis stage, where all analytical blocks are re-assembled to form a cohesive picture of the current state of knowledge.

Following the logic of prescription in identifying *contexts, interventions, mechanisms* and *outcomes* (Denyer et al. 2008), analytical building blocks of the literature are presented. Figure 12 describes all analytical components relating to each of the four categories whose sub-themes will be discussed next and in sequential order. The questions posed in section 2.4 will also be addressed in relation to the scholarly responses found.

Context	Intervention	Mechanism	Outcome
Knowledge and capability requirements	Boundary spanning	Transaction-based change	Search partnerships
Financial resource requirements	Conduit mechanisms		Process innovations
Familiarity conditions	Partner type selection		Product innovations
Industrial environment			
Market access	Breadth of partnerships		Market knowledge
Changes in social norms	Depth of partnerships	Evolutionary change	Higher social goals

Figure 12: Analytical components identified in the literature

5.1 Search partnership context

The search partnership context refers to surrounding factors and the nature of human actors that influence behavioural change (Denyer et al. 2008). Therefore it seeks to provide a response to the following review questions:

> *What partnering conditions drive the search for innovations?*

Six conditions were identified: *knowledge and capability requirements, financial resource requirements, familiarity conditions, industrial environment, market access, and changes in social norms.* They will be presented next in more detail.

5.1.1 Knowledge and capability requirements

Knowledge and capability requirements refer to *knowledge needs* that each partner would not be able to obtain by themselves (Schulze and Brojerdi 2012). As knowledge represents a *resource* which can be possessed and, in combination with routines, can form a capability (Hart and Sharma 2004), it can be argued that knowledge resources stem from various sources, which need to be obtained and integrated. Thus, a driving force of both the search and maintenance of search partnerships is the realisation that the firm is deficient of such knowledge. Knowledge deficiencies directly relate to a firm's *absorptive capacity*, which refers to a firm's ability to recognize, assimilate, and commercialise new, external information (Cohen and Levinthal 1990, p. 128). This makes it a relevant antecedent driving partnership formation. The crucial relevance of absorptive capacity conditions within firms has been raised previously (Fabrizio 2009; Grimpe and Sofka 2009) in that firms should have sufficient absorptive capacity levels to be able to take in new knowledge (Birkinshaw et al. 2007). In other cases, absorptive capacities are increased by the mere fact of partnering , as more R&D experts become available to innovate with (Miotti and Sachwald 2003). Consequently, deficient absorptive capacity levels should be counteracted with absorptive capacity investments in the form of hiring experts (Fabrizio 2009).

The creation of new capabilities results from learning outcomes achieved by changes of search routines (Feller, Parhankangas, Smeds and Jaatinen 2013). Examples for this are relational capabilities, which are deemed an antecedent to form partnerships (Capaldo 2007; Capaldo and Messeni Petruzzelli 2011; Phelps 2010). Search capabilities were also described as ways to locate new sources of information (Bessant and von Stamm 2002; Holmes and Smart 2009; Nicholas et al. 2013). Also, the role of ambidexterity has been termed a circumstantial capability, which, when achieved, yields both incremental and discontinuous innovation outcomes as firms master the challenge of allocating their resources for different innovation purposes (Cantarello et al. 2012;

Sidhu, Commandeur and Volberda 2007). Finally, there is the notion of dynamic capabilities, which refers to the ability of a firm to respond to changing market conditions by acquiring the appropriate set of resources required for adapting to this change (Eisenhardt and Martin 2000; O'Reilly and Tushman 2008). These examples suggest that the search for knowledge and capability drive for both routine and innovation developments.

5.1.2 Financial resource requirements

Along with circumstantial knowledge deficiencies, *financial resources* requirements have been identified. Scholars refer to search costs that influence both the scope and depth of search, resulting in more or less search partners (Day and Schoemaker 2004; Katila and Ahuja 2002; Laursen and Salter 2006). Moreover, search investments moderate the degree to which firms search for other partners, and whether these searches are rather broad or deep (Katila and Ahuja 2002; Li et al. 2008). There are also scholars who emphasise the advantages of sharing resources, as search costs can be shared in the form of R&D alliances (Fabrizio 2009; de Faria et al. 2010; Miotti and Sachwald 2003; Wissema and Euser 1991). This practice has been reported on repeatedly in technology intensive environments, as the use of alliance platforms leads to more efficient search investments (Bayona et al. 2001; de Faria et al. 2010; Feller et al. 2013; Fritsch and Lukas 2001; de Man and Duysters 2005; Miotti and Sachwald 2003). The role of oversearching was also addressed in relation to financial resources, as the excessive binding of resources results in high search costs (Laursen and Salter 2006). Also, maintaining dormant relationships for future innovations have been reported as costly (Birkinshaw et al. 2007).

5.1.3 Familiarity conditions

Familiarity conditions refer to structural firm elements that partners find with each other, such as similar firm sizes (de Faria et al. 2010; Fritsch and Lukas 2001; Katila and Ahuja 2002; Kaufmann and Tödtling 2001), firm age (Laursen and Salter 2004; Lavie and Rosenkopf 2006; Li et al. 2008; Luo and Deng 2009), ownership structure

(Classen, Van Gils, Bammens and Carree 2012; Li et al. 2008), and R&D spending capacities in general (Miotti and Sachwald 2003; Wissema and Euser 1991). To this end, it was observed that partnership formation is more likely when partners share similar institutional conditions (Grimpe and Sofka 2009; Laursen and Salter 2006; Luo and Deng 2009). In contrast, in cases where SMEs partner with firms, they are likely to possess less resources and thus find themselves binding to larger firms, especially when larger firms shift search costs to suppliers (Fritsch and Lukas 2001; Narula 2004).

Even if partnerships in familiar conditions are argued as feasible ways to extract knowledge in a trusted setting among 'friends' (Li et al. 2008), dangers of inertia in familiar search networks are found (Birkinshaw et al. 2007; Katila and Chen 2008; Phelps 2010; Pittaway, Robertson, Munir, Denyer and Neely 2004). Thus, in order to avoid inertia, existing ties should be left and new ones formed, especially for the purposes of discontinuous change (Birkinshaw et al. 2007). In familiar networks, partners are more likely to let go if there are different partnership aspirations that drive the substitution with different partners (Baum et al. 2005). Even if there is no conclusive evidence whether familiar or unfamiliar conditions yields better results, they can be argued to impact search partnerships.

5.1.4 Industrial environment

The *industrial environment and its technological intensity* have also been referred to as an important factor in search partnership formation (Laursen and Salter 2004). According to Becker and Dietz, cooperation varies amongst different industrial sectors: for example, there exist less partnerships in the wood industry as compared to the automotive industry (Becker and Dietz 2004) due to varying knowledge requirements and the need to maintain an R&D department. Also, Hagedoorn's longitudinal study on R&D shows that different types of inter-firm partnerships changed over time and have become more common in high-technology environments since 1960 (Hagedoorn 2002; Link and Scott 2005). Other scholars also observe that low-technology environments are not as willing to collaborate (Laursen and Salter 2006), possibly because there are less R&D departments and thus lesser degrees of absorptive capacity (Grimpe and Sofka 2009). By implication, with an increasing degree of technological intensity R&D

partnership formation becomes likely (de Faria et al. 2010; Fritsch and Lukas 2001; Tether 2002).

5.1.5 Market access

Market access also drives partnership formation and refers to accessing *know-how* as described in the knowledge requirement context (Bayona et al. 2001), or to accessing different innovation networks and intermediary services (Bayona et al. 2001; Bianchi et al. 2010; Capaldo 2007; Day and Schoemaker 2004; Gassmann, Daiber and Enkel 2011; Harryson and Dudkowski 2008). For example, firms maintain dormant partnerships without any requests to collaborate until this partner may become useful (Birkinshaw et al. 2007). On the other hand, market access is deemed not as important – it is rather financial pressures as search costs can be shared amongst partners (Bayona et al. 2001). In both dormant and active partnerships, search investments have to be made by means of boundary spanning to gain and maintain access to new sources of knowledge or technologies (Harryson and Dudkowski 2008; Rosenkopf and Nerkar 2001), Also, depending on the access the firm has to external firms and intermediaries (Capaldo 2007; Harryson and Dudkowski 2008), such search costs are lower if weak-tie and strong-tie search partnerships are regularly maintained over time (Capaldo 2007).

5.1.6 Changes in social norms

Another tentatively discussed driver into search partnerships are *changes in social norms*. This aspect shares linkages with both formal and informal governance. For example, more formal contracts may be necessary when social norms are not shared in spite of a need to collaborate due to perceived public pressures (Holmes and Smart 2009; Rondinelli and London 2003). Also, public legitimacy pressures drive innovations with higher social or environmental goals and may result in low trust levels between partners owing to contradicting institutional objectives, making formal contracts necessary (Rondinelli and London 2003).

On the other hand, informal governance – that is, aspects of trust and relational capital (Li et al. 2008) – are relevant elements as they relate to the ways in how decisions are made between partners and without the need of a formal contract (Bayona et al. 2001; Lavie and Rosenkopf 2006; Li et al. 2008; Phelps 2010). Especially in partnerships which are similar, trust obviates the need for formal contracts (Li et al. 2008). However, conditions in which social norms drive search partnership formation suggest that formal governance measures are preferred over informal ones (Rondinelli and London 2003).

This section has presented six conditions driving search partnerships and will turn next to the interventions encountered in this review.

5.2 Search partnership interventions

Interventions refer to influencing aspects that firms have at their disposal (Denyer et al. 2008). Therefore this section will report on search partnership interventions and describe what strategies are used to search for innovations. Five interventions were identified: *boundary spanning, conduit mechanisms, partner type selection, breadth of partnerships, and partnership depth*. These interventions correspond to three questions which were previously set out in chapter 2. The first question is "w*hat search strategies do partners adopt in the search for innovations?"* corresponds with the whole section on search partnership interventions as the extant interventions are understood as different responses in the search for innovations.

The second question asked relates to "w*hat types of organisations partner together?"* and will be predominantly addressed in section 5.2.3. The third question is "w*hat are the search partner's levels of participation and involvement?"* will also be described in the sections on search breadth and depth.

5.2.1 Boundary spanning

Boundary spanning activities refer to a firm's ability to search and scan its environment (Rosenkopf and Nerkar 2001), for example the *search for knowledge channels* (Fey and Birkinshaw 2005) – or the *search for partners* (Birkinshaw et al. 2007). In network searches, boundary spanning is described as the search for distant knowledge sources (Capaldo and Messeni Petruzzelli 2011; Cillo and Verona 2008; Katila and Ahuja 2002; Phelps 2010; Poetz and Prügl 2010). However, following the seminal contribution by March (1991) on exploration and exploitation, boundary spanning is more often referred to the search for familiar knowledge sources within or outside the proximity of the seeking firm – thus finding knowledge either in local networks or engaging in non-local, exploratory searches (Cantarello et al. 2012; March 1991). This theme has been widely discussed and expanded on as a key intervention in the context of search strategies (Classen et al. 2012; Laursen 2012; Pittaway et al. 2004; Rosenkopf and Nerkar 2001; Sidhu et al. 2007).

Moreover, distant boundary spanning is beneficial for exploratory innovation searches in both technological and non-technological domains (Cillo and Verona 2008; Harryson and Dudkowski 2008; Holmes and Smart 2009; Nicholas et al. 2013). This search mode is also contrasted to exploitative searches by providing a framework that explains both technological and organisational boundary spanning searches (Rosenkopf and Nerkar 2001). Exploration and exploitation are also linked to ambidexterity, which describes the concurrent process of managing both exploratory and exploitative searches (Sidhu et al. 2007). By implication, firms differ in the way how boundary spanning activities are managed.

5.2.2 Conduit mechanisms

The search for distant partners is also facilitated by 'conduits' (Holmes and Smart 2009) which is another area of interest for discontinuous innovation scholars (Bessant and von Stamm 2002; Birkinshaw et al. 2007; Nicholas et al. 2013; Zhang and Li 2010). Conduit mechanisms refer to both *search methods* and *platforms* yielding contextually distant sources of knowledge.

In relation to *search methods*, a number of problem-solving approaches are proposed that link distant knowledge sources through systematic appraisal techniques (Bianchi et al. 2010; Brunswicker and Hutschek 2010; Poetz and Prügl 2010). These activities involve innovative referral systems (Poetz and Prügl 2010), analogical problem solving (Brunswicker and Hutschek 2010), and also systematic techniques that indicate what type of innovation could incrementally drive existing products (Bianchi et al. 2010).

Search platforms refer to the use of intermediaries and alternative partnerships as a conduit in which boundaries to different partners can be extended (Bessant and von Stamm 2002; Birkinshaw et al. 2007; Holmes and Smart 2009; Nicholas et al. 2013; Terwiesch and Xu 2008; Zhang and Li 2010). In this context, both formal and informal intermediaries are used to span both local and nonlocal boundaries within a network (Baum, Cowan and Jonard 2010; Capaldo 2007; Capaldo and Messeni Petruzzelli 2011; Harryson and Dudkowski 2008). It is proposed to maintain a mix of trusted 'conduits'

close to the firm, because distant knowledge sources can then be sourced more effectively (Baum et al. 2010).

5.2.3 Partner type selection

Aspects on *partner type selection* relate to the importance of similar and dissimilar partners during the search for innovations.

In *similar partnerships*, firm age, size, market positions, and other demographic characteristics are found relevant because the exploitation of knowledge is easier (Fabrizio 2009), costs are lower (de Faria et al. 2010), and innovation success is higher (Becker and Dietz 2004). Also, depending on the degree of commercial viability and the stage of research, different types of partners for different purposes should be selected. For example, it is suggested to use suppliers to scan emergent market signals (Cousins et al. 2011). Also, it is argued that partner selection should be based on a firm's knowledge needs and its ability to absorb knowledge inflows (Grimpe and Sofka 2009; Köhler et al. 2012). Moreover, the search with a specialised set of partners should be selected over a variety of partners (Grimpe and Sofka 2009) – this contradicts Laursen and Salter's work on open search strategies, who do not draw this contextual distinction (Laursen and Salter 2006; Sofka and Grimpe 2010). In other cases similar search partnership types with customers are preferred over more dissimilar ones from universities, for example in the generation of logistics and service innovations (Wagner 2013).

In *dissimilar partnerships*, the role of firm-university relationships is emphasised as universities are good sources for heterogeneous knowledge (Fontana et al. 2006; Laursen and Salter 2004; Perkmann and Walsh 2007). However, depending on the industrial sector, knowledge can be more or less 'radical', depending on the degree of finalisation enabling quick exploitation – as is the case in biotechnology or engineering services (Perkmann and Walsh 2007). Other dissimilar partners selected are non-profit-firms or stakeholders engaging with for-profit firms (Ayuso et al. 2011; Holmes and Smart 2009; Rondinelli and London 2003).

A majority of studies adopted a *mix of similar and dissimilar* search partnerships: for example customers, suppliers, competitors, and universities (Brettel and Cleven 2011; Classen et al. 2012; Emden, Calantone and Droge 2006; Faems et al. 2005; de Faria et al. 2010; Fontana et al. 2006; Grimpe and Sofka 2009; Henttonen, Ritala and Jauhiainen 2011; Kang and Kang 2010; Kaufmann and Tödtling 2001; Köhler et al. 2012; Laursen and Salter 2006; Sofka and Grimpe 2010; Tether 2002). In fact, the partnership configuration remained roughly the same in the studied articles and indicates that innovations with a market focus are preferred over other sources. To this end, it was found that firms expose themselves to a broad set of different partners for different reasons, and adopt this structure according to their needs to innovate (Pittaway et al. 2004). This would confirm the notion that, in the perception of firms, partnerships as interventions play an important role in the search for innovations, which are used for acquiring unusual knowledge sources (Birkinshaw et al. 2007).

In open innovation partner searches, propositions are made to select partners according to the *problem type* encountered. For example, Pisano and Verganti propose a two-by-two matrix in which they describe different partner selection mechanisms for different types of innovation (Pisano and Verganti 2008). In this matrix, either experts are selected for problems requiring high levels of technical knowledge – or innovation communities are selected for the tackling of a predefined problem by a high number of unknown 'hobby innovators' (Greer and Lei 2012). Also, an economic model is described to decide whether it is better to search with open innovation intermediaries or without them, depending on the nature of the problem encountered (Terwiesch and Xu 2008). Here the problem or outline is defined by the seeking firm that is searching for a solver to deliver a solution. However, this can only work in cases where the problem is actually known. In cases where these problems are not known, the role of moving into 'unchartered territory' in discontinuous innovation searches prevents such coordinated measures (Birkinshaw et al. 2007). In such searches, conduit mechanisms are deemed more effective because the unusual partners can be found more frequently for innovating (Bessant and von Stamm 2002; Birkinshaw et al. 2007; Nicholas et al. 2013) because the seeker and the solver are less confined to cognitive boundaries (Nicholas et al. 2013).

5.2.4 Breadth of partnerships

The breadth of partnerships refers to the *number of search partners* involved with a firm. The number of search partners has been studied by scholars with regard *to how many partners are used* and whether a *smaller or larger number of partners are useful* for innovation.

With regard to *the number of search partners*, two single-firm studies find that the number of partners vary amongst sectors (Becker and Dietz 2004) as well as with regard to firm structure – as in the case of SME partnerships (Narula 2004). In multiple firm studies, these numbers were often not disclosed, apart from a few exceptions (Laursen and Salter 2004; Laursen and Salter 2006). However, it appeared as if smaller firms tended to use fewer partners than larger firms because smaller firms tend to have fewer resources available to form or maintain search (Narula 2004). Moreover, the tendency to search for smaller partner networks, especially where little technical knowledge is available in the firm, was preferred over broader searches with many partners (Brunswicker and Hutschek 2010; Poetz and Prügl 2010; Rondinelli and London 2003). From this follows that the search partnership is biased towards an understanding of smaller entity partnerships instead of larger-number search partners with a great level of anonymity.

More *general implications of search breadth* were also discussed. For example, it was found that search breadth (and thus a higher number of partners) increases the inflow of heterogeneous knowledge (Becker and Dietz 2004; Day and Schoemaker 2004). In fact, search breadth has been frequently studied along with search depth (Katila and Ahuja 2002; Laursen and Salter 2006; Rosenkopf and Almeida 2003). To this end it was found that search openness has positive implications for discontinuous innovation performance compared with search depth, where incremental innovation performance increases (Laursen and Salter 2006). But firms are also able to 'over-search', thus investing too many resources in too many partnerships (Day and Schoemaker 2004; Laursen and Salter 2006). Although not explicitly addressed by Pisano and Verganti in their study on collaboration setups for innovation, it is assumed that the processing of a high number of external partners is inhibited because firms have limited absorptive

capacities to manage a larger number of partners (Cohen and Levinthal 1990). This implication is relevant especially for firms operating in resource-constrained environments who have to leverage or allocate their resources more stringently in comparison with larger enterprises (Narula 2004).

5.2.5 Depth of partnerships

Partnership depth refers to varying *search intensities*, resulting in different degrees of relationship intensity, which is understood as changing degrees of partner involvement.

It was found that many studies assumed *relationship intensities* to be equal and high for both search partners. For example, terms such as 'stakeholder engagement' (Ayuso et al. 2011; Holmes and Smart 2009), 'collaborations' (Li et al. 2008; Rondinelli and London 2003), or simply 'alliances' were used to express a mutual-involvement relationship (Harryson and Dudkowski 2008; Luo and Deng 2009; Schulze and Brojerdi 2012). Degrees of lower involvement were not referenced as often; however some few examples relate to low-involvement setups which are referred to as 'arm's length relationships' (Rondinelli and London 2003), or no-involvement setups which are simply internal R&D activities with no external search partnerships (Rosenkopf and Nerkar 2001). One study suggested that firms pay for no-involvement intensity partnership to maintain access to potential knowledge sources in the future (Birkinshaw et al. 2007). Moreover, the role of supplier-firm relationships implies different interests resulting in different involvement intensities coming from each partner (Narula 2004).

Search depth and search breadth are mentioned as two modes of search with varying levels of intensity (Capaldo and Messeni Petruzzelli 2011; Cillo and Verona 2008; Day and Schoemaker 2004; Katila and Ahuja 2002; Laursen and Salter 2006; Rosenkopf and Almeida 2003; Rosenkopf and Nerkar 2001). For example, broad search is more dispersed but less intense, whereas narrow search is intense and focused (Day and Schoemaker 2004). This observation suggests that relationship intensities vary depending on the *structure of the partnership*. For example, weak and strong tie network partnerships are discussed in relation to its relevance for innovation outcomes and were found to be both important during the search process at different points in time

(Capaldo 2007) because weak tie contacts enable new knowledge inflows (Capaldo 2007). However, it is also argued that there is no proof that more relevant innovation passes through existing weak tie contacts in contrast to stronger-tie contacts (de Faria et al. 2010). Therefore the role of relationship intensity and structure remains unresolved.

It is also claimed that differences in market power or aspiration performance moderate the willingness of a partner to stay involved with a partner (Baum et al. 2005; Narula 2004). Also, institutional differences inhibit partner involvement, as goals are too different from one another (Fey and Birkinshaw 2005; Rondinelli and London 2003). In such cases, one partner may be willing to collaborate, but the other partner is disinterested because no higher goal is shared. In this case, the focus on shared project goals is proposed to enable the partnership to perform well at a higher intensity level (Birkinshaw et al. 2007).

5.3 Search partnership outcomes

Search partnership outcomes refer to the outcome of the intervention previously presented. It seeks to provide insights to the question:

"What do partners search for in a search partnership?"

The previous sections on contexts and interventions have already provided tentative insights on the anticipated outcomes. Five subordinate innovation search outcomes were identified: *search partnerships, process innovations, product innovations, market knowledge,* and *higher social goals*. These different types will be presented next.

5.3.1 Search partnerships

As the search for partners provides a seminal ground for innovating (Baum et al. 2010; Luo and Deng 2009), it was studied under what circumstances search partnerships are established (Capaldo 2007; Pisano and Verganti 2008). For example, some scholars question whether direct collaboration should be preferred over intermediaries (Pisano and Verganti 2008; Terwiesch and Xu 2008; Zhang and Li 2010), finding that the problem type should determine the search partnership. Moreover, the conduit mechanisms presented also hint towards a search for partners for the purposes of innovating, as in the case of pyramiding (Poetz and Prügl 2010) or analogical problem solving (Brunswicker and Hutschek 2010).

To this end, the use for a similar or dissimilar partners is also discussed, for example whether trusted friends should be preferred over strangers (Bunduchi 2012; Li et al. 2008) due to fears of opportunism and appropriability risks and because complementary skills benefit both partners (Emden et al. 2006; Luo and Deng 2009). However, it is also found that networks with similar partners yield less innovation benefits due to inertia (Luo and Deng 2009; Zhang and Li 2010). Discontinuous innovation scholars suggest the use of 'conduits' to find unusual partners and for a working partnership (Bessant and von Stamm 2002; Birkinshaw et al. 2007; Nicholas et al. 2013), thus improving the probability of discontinuous knowledge inflows.

5.3.2 Process innovations

Search partners seek to establish changes in firm routines and form new capabilities on the basis of their learning outcomes (Feller et al. 2013). Such innovations were often accompanied by a mix of incremental process and product innovation searches (Becker and Dietz 2004; Fritsch and Lukas 2001; Köhler et al. 2012; Lin et al. 2013; Nieto and Santamaría 2007). Process innovations were also searched independent of technological context (Ayuso et al. 2011; Pittaway et al. 2004; Tether 2002; Wagner 2013). In only a few cases were process innovations studied independently, especially when the context was bound to a service-related endeavour (Dixon and Clifford 2007; Pittaway et al. 2004; Wagner 2013). In one case, the empirical sample yielded the serendipitous discovery of process innovations, suggesting that the search was not intended (Holmes and Smart 2009). In environmental studies, the search for innovative processes was deemed an important element to integrate different stakeholder groups (Ayuso et al. 2011; Hart and Sharma 2004).

5.3.3 Product innovations

The search for product innovations was a strong theme in the sample and was used either as a readily exploitable search outcome or as a superordinate goal for the delivery of future products.

With regard to the search for *commercially viable innovations*, scholars searched for innovations based on existing product improvements (Fritsch and Lukas 2001; Greer and Lei 2012; Lin et al. 2013; Tether 2002), thus seeking quick commercialisation as a final outcome due to highly competitive environments.

Other cases treated product innovations as a superordinate goal. This included radical searches in technologically-bound domains (Emden et al. 2006; Fontana et al. 2006; Kang and Kang 2010; Katila and Ahuja 2002; Mahdi 2003; Nieto and Santamaría 2007; Rosenkopf and Almeida 2003) or other modes of scanning and finding products in contextually distant contexts (Bianchi et al. 2010; Brunswicker and Hutschek 2010;

Cousins et al. 2011; Harryson and Dudkowski 2008; Poetz and Prügl 2010). In these instances, product innovation searches were aimed at 'new product development' and therefore the learning outcomes were at the focus of interest instead of quick commercialisation. Consequently, such outcomes were linked to different types of search interventions, for example boundary spanning searches (Lin et al. 2013; Rosenkopf and Almeida 2003; Rosenkopf and Nerkar 2001; Sidhu et al. 2007) or open innovation searches (Katila and Ahuja 2002; Laursen and Salter 2006).

5.3.4 Market knowledge

Market knowledge outcomes refer to emergent trends and signals (Cousins et al. 2011; Day and Schoemaker 2004; Wagner 2013). They are argued to shape search strategies, as the search for market knowledge can be different for each firm depending on the search pattern adopted (Grimpe and Sofka 2009).

These patterns have been linked with the search for innovative processes and products (Emden et al. 2006; Lavie and Rosenkopf 2006; Lin et al. 2013; Sidhu et al. 2007; Wissema and Euser 1991), of both incremental and discontinuous nature. For example, in low-technological industries, market-knowledge outcomes were used to incrementally innovate on the basis of existing products, as in clothes for the fashion industry (Cillo and Verona 2008). On the other hand, high-technological industry applied scanning techniques with their suppliers to search for new market trends in anticipation of future products (Cousins et al. 2011). Open innovation scholars also suggest collaboration with customers (Greer and Lei 2012), as 'search partners' can be used to obtain both incremental and discontinuous knowledge (Bessant and von Stamm 2002; Birkinshaw et al. 2007; Nicholas et al. 2013; Pisano and Verganti 2008; Terwiesch and Xu 2008). Intermediaries yield market knowledge from a range of providers (Birkinshaw et al. 2007; Zhang and Li 2010) and create 'deliberate diversity' (Bessant and von Stamm 2002; Nicholas et al. 2013) which enables the emergence of signals from peripheral sources driving the search for market signals (Day and Schoemaker 2004).

5.3.5 Higher social goals

The role of higher social goals refers to improving the environmental or social performance of the firm by providing technical guidance at an operational or strategic level (Rondinelli and London 2003).

Higher social goals are searched though engaging stakeholders to innovate either products or processes (Holmes and Smart 2009; Rondinelli and London 2003). A stakeholder orientation found beneficial to deliver process and product innovation (Ayuso et al. 2011; Hart and Sharma 2004). Also, the importance for product stewardship is highlighted (Hart and Dowell 2011), which takes social and environmental responsibility for a firm's product portfolio into account. If dissimilar goals are indicated in the search partnership it is proposed that partners invest goodwill and trust (Birkinshaw et al. 2007; Bunduchi 2012; Rondinelli and London 2003) so that both social betterment for one partner and for-profit gains for another partner can be achieved. Some search partnerships that aimed for higher goals emerged by serendipity – and only when both partners realised that they could achieve more together in economic, environmental, or social terms, product and process innovations took place which resulted in innovations with higher social goals (Holmes and Smart 2009).

5.4 Mechanisms

As mechanisms determine what interventions trigger (Denyer et al. 2008), these triggering elements have been understood to be theoretical underpinnings in this review. Almost every article found used and combined a wide array of theoretical underpinnings, which can be traced back to two major groupings: *evolutionary changes* and *transaction-based changes*. These are described and explained below.

Evolutionary changes refer to changes in learning dimensions and incorporate theories of learning. Therefore, aspects of open innovation, the knowledge-based view, as well as the resource based view have been grouped in this view as they assume an equal-stance relationship between the searches partners involved. In contrast, *transaction-based changes* have been found to describe bargaining situations of power and resources. Thus, theories relating to transaction costs and changed power allocations such as stakeholder theory, institutional theories, as well as social capital theories have been grouped under this theme. The appendix provides further details in how the articles were grouped.
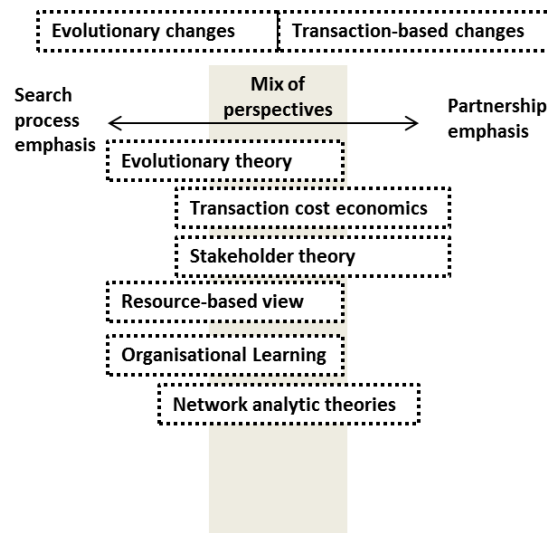
Figure 13: Continuum of evolutionary and transaction-based changes in search partnerships

Both labels are not perfect in that they could have been grouped along lines of contingency or behaviour, as done in Smith and Hitt's book on management theories

(Smith and Hitt 2005). However, as Figure 13 shows, they interact with each other, for why this representation was deemed useful to allow a closer look into the theoretical conventions of this literature. More details on the combinations used in the studied sample will be provided next.

5.4.1 Evolutionary changes

The evolutionary change perspective has been used frequently to describe the evolutionary process of search as a stable trajectory shaped by search routines (Nelson and Winter 1982). Studies who used this theory therefore adopted the notion of imperfect, dynamic economic environments which leads firms to adopt search routines with external partners. This theoretical underpinning was found in three quarters of the sample.

However, with aspects of search being at the foreground, studies often combined it with theories of learning as well as knowledge and capability-related theories (Classen et al. 2012; Feller et al. 2013; Henttonen et al. 2011; Katila and Chen 2008; Köhler et al. 2012). These theories were deemed complementary as the notions of learning combine well with the idea that searches follow evolutionary learning trajectories. In line with this view, the resource-based theory added to notions of evolutionary learning in proposing that firms acquire valuable resources during searches with search partners (Nieto and Santamaría 2007; Rosenkopf and Almeida 2003; Rosenkopf and Nerkar 2001), which can then be used to yield competitive advantage.

Therefore, because these theoretical underpinning are indifferent to the role partnership motivations, it is understood to emphasise the search process more by a larger concern for learning outcomes and dynamic economic environments.

5.4.2 Transaction-based changes

The transaction-based underpinning has been used to describe the conflicting and beneficial aspects of search partnerships (Williamson 1981). Its emphasis lies with

agency relationships. This underpinning was also popular but was selected in a quarter of the studies encountered.

Transaction-based changes discussed the role of search networks and search partner motivations (Capaldo 2007; Harryson and Dudkowski 2008; Li et al. 2008; Miotti and Sachwald 2003). Also, theories of social capital were often combined with transaction-based theories, trying to explain how relationships form and why they are maintained, and reasoning along the lines of relationship value and trust levels (Baum et al. 2005; Bunduchi 2012; Capaldo and Messeni Petruzzelli 2011; Fey and Birkinshaw 2005; Rondinelli and London 2003). Other examples are studies that link search partnerships with governance of external partners (Day and Schoemaker 2004; Fey and Birkinshaw 2005; Li et al. 2008; Pisano and Verganti 2008) or where conflicting interests amongst a wider group of stakeholder relationships are balanced (Hart and Sharma 2004; Holmes and Smart 2009; Rondinelli and London 2003). In these cases, the role of the power or resource transaction was treated as the salient aspect of study.

Some scholars added the resource-based perspective to their studies to emphasise that governance also includes elements of learning, as in the case of alliance or open innovation activities (Becker and Dietz 2004; Miotti and Sachwald 2003; Narula 2004; Terwiesch and Xu 2008). However, the salient aspects of such combinations nevertheless remained somewhat agency-oriented.

Following these extant analytical building blocks, this chapter identified contexts, interventions, mechanisms and outcomes relating to search partnerships. The descriptions found in this chapter have prepared the ground for synthesising views encountered in the literature in the next chapter, which we will turn to next.

6 Synthesis of thematic analysis

This section presents the synthesis from the previous section and describes what we know from what we don't know. It will focus on the interactions between these outlined components. Then, all observations made during the thematic review and synthesis will be described to derive further research opportunities. Moreover, the contribution of this work will be outlined in relation to the scholarly implications, managerial implications, as well as the contributions for the PhD that will follow from this work.
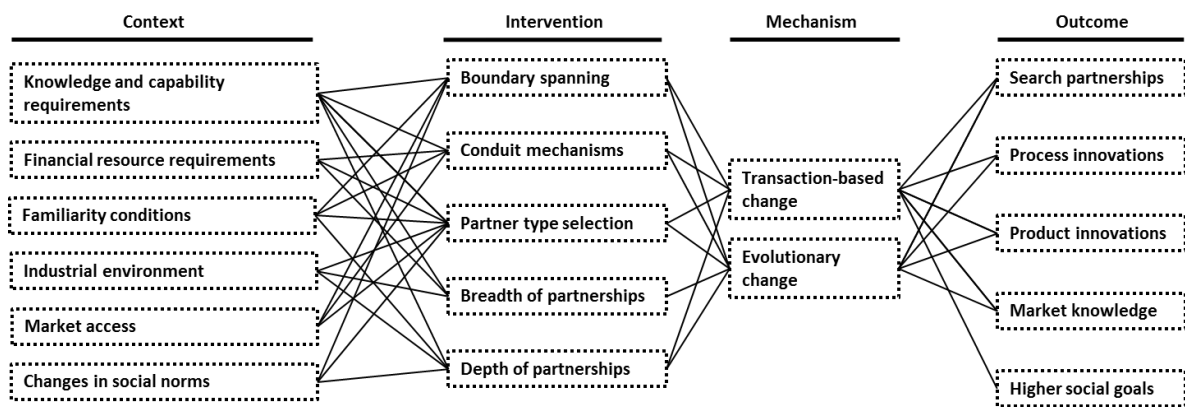
Figure 14: Model on search partnerships context, intervention, mechanisms and outcome

Figure 14 describes a model which reports on the identified linkages. These links will be explained next.

6.1 Current knowledge on search partnerships

Several statements have emerged as salient themes of the sample and are indicative of the current state of knowledge and will be presented consecutively for each contextual feature, as contextual elements are understood as a starting point for search partnerships.

The first contextual element relates to *knowledge and capability requirements*. It drives the search for partners, processes, products, markets, and higher goals, achieved by means of a variety of search partnership interventions. This statement is worth noting because this condition was a major driver in the sample. By implication scholars were more concerned with the knowledge acquisition process of searching as opposed to the various conditions enabling search partnerships to firm. For example, it would have been possible to see more societal pressures driving search partnerships (Kemper 2012), but this could not be confirmed in a majority of studies.

Financial requirements were also studied as a driver delivering process improvements in the search for product innovations. They are supplemented by conduit mechanisms and the selection of similar partners, depending on the financial resources available.

Financial resources are required as well as trust and goodwill due to unintended spillovers, possibly reducing innovation performance (Bayona et al. 2001; Becker and Dietz 2004; de Faria et al. 2010). Moreover, search costs are linked to interventions of search breadth and depth, as a search with too many partners must be moderated accordingly in order to yield process, product, market, and higher goals outcomes (Laursen and Salter 2006). No studies were found that claimed that no financial investments were needed to search for innovations.

Familiarity conditions also drive the search and maintenance of partnerships. There are partners who are in 'love of the same' (Luo and Deng 2009), thus choosing to innovate with trusted partners. These familiar collaborations yield incremental product and process innovations because results can be more successfully exploited. On the other hand, the need for searching for discontinuous innovations in unchartered territory has also been raised (Birkinshaw et al. 2007), but a majority of firms tends to search for incremental technological solutions which are often be solved in familiar search partnership conditions. When familiarity conditions are left behind in favour of less

familiar environments, it was found in a number of studies that conduit mechanisms gain importance in the search for discontinuous innovations (Birkinshaw et al. 2007; Nicholas et al. 2013; Zhang and Li 2010).

The *industrial environment* was also found to shape search partnerships. For example, in less competitive environments, firms show lower levels of search partner involvement and are more interested in delivering against a variety of innovation outcomes within their established environment (Grimpe and Sofka 2009). However, the involvement levels rises with increasing competition and technological intensity (Fritsch and Lukas 2001).

Also, the use of interventions is shaped by the industrial environment. For example, boundary spanning activities are less frequent in low-technology industries (Fritsch and Lukas 2001), search numbers are smaller for SMEs than for larger firms (Narula 2004), and the conditions to expect partnerships to form differ as well (Fritsch and Lukas 2001). The industrial environment therefore shapes search partnership formation and its outcomes.

Market access refers to the ability to source market knowledge from formal and informal partners, conduits, or intermediaries. These partners are sourced by means of conduit mechanisms delivering search partnerships, relevant knowledge, or capabilities. Moreover, the role of search breadth and depth links into the role of access conditions, as the involvement of partners from a variety of sources is less indicated in non-technological sectors. Boundary spanning activities are also a frequent response to market access needs, as emergent trends and peripheral signals can be obtained which support the delivery of innovations (Birkinshaw et al. 2007; Day and Schoemaker 2004; Rosenkopf and Nerkar 2001).

Changes in social norms also drive search partnerships delivering against higher social goals. This endeavour was either supported by dissimilar partnerships delivering process innovations, or by focusing product stewardship to focus on product innovations (Hart and Dowell 2011; Hart and Sharma 2004; Holmes and Smart 2009; Rondinelli and London 2003). It is found important that the partner should own dissimilar knowledge which has the potential to deliver innovations that acknowledge

the norm changes (Rondinelli and London 2003). These changes were most often delivered by smaller expert numbers instead of larger numbers.

With regard to mechanisms, the literature was aligned with theories using either *evolutionary or transaction-based* underpinnings. Search partnerships were either canvased as learning entities that deliver against a dynamic market along stable trajectories. Resources were exchanged to deliver against innovation outcomes. The theoretical underpinnings were complemented by various theories that supplemented or refined this view according to the phenomenon studied.

Based on the findings of this chapter, relevant aspects requiring further research will be addressed in the next section.

6.2 Aspects requiring further research

The previous section appraised the current knowledge and prepared the ground for deriving future research opportunities. These will be grouped along *interactions* between analytical components, as well as the *configurational components* constituting each theme, respectively, as shown previously in Figure 14. Although a number of opportunities have been identified, only the most salient ones will be reported on.

6.2.1 Research on interactions

This section will report on the interaction deficiencies found in dimensions of contexts, interventions, mechanisms, and outcomes.

For *context-related conditions*, it was found that the search for knowledge drove search partnerships more frequently than the search for higher social goals. Although both contextual dimensions are complementary, the implications are that a majority of scholars searched for innovations without anticipating any higher social value apart from the product or service offering itself. These contributions are important but a closer look is necessary to find better ways of delivering against outcomes. The importance is indicated by research propositions by scholars as well as the anticipated changes in material availability and social pressures, yielding a growing need for responsible innovation (Allwood, Ashby, Gutowski and Worrell 2011; Hart and Dowell 2011; Pandza and Ellwood 2013; Seebode et al. 2012). Following these calls, it would be interesting to learn more about how higher social goals drive the innovation process in relation to the other contextual dimensions presented.

In regard to *interventions* and their interaction with each other, studies have been found that investigated the role of each intervention, such as search openness (Laursen and Salter 2006), boundary spanning activities (Rosenkopf and Nerkar 2001), or partner selection practices (Bunduchi 2012; Li et al. 2008). What is less understood are the configurations that search partners should adopt when searching for different innovation outcomes. For example, in the case of process innovations, should more partners be

used or less partners, from local or distant sources, at high or low search intensity levels? Again, scholars have responded to each of these measures. However, it would be helpful to review the interventions proposed in the model in relationship to each other to assess different configuration outcomes.

The *outcomes* have been presented as five themes: partners, process innovations, product innovations, market knowledge, and higher social goals. Although the relationship between product, process, and market outcomes is assumed, it was surprising to see that a majority of outcomes did not address higher social goals. Similar to the findings relating to context, the outcomes also are poorly understood on how higher social goals are achieved in relationship with products, processes, and markets. Although few studies exist that describe notions of 'sustainable innovations' as products, processes or services that contribute to environmental and social betterment (Bos-Brouwers 2010; Tello and Yoon 2008), they do not reveal any relationships with other innovation outcomes as described in the model. Therefore it would be interesting to explore how the pursuit of higher social goals in relation to other innovation outcomes changes innovation processes.

Mechanisms have been described in relation to two theoretical labels: *evolutionary* and *transaction-based*. As scholars made use of a number of different theories, the question arises to how they should be configured under changing search conditions. For example, should the search for innovations with higher social goals follow both evolutionary trajectories to pay tribute to the need for search routines, or should the balancing of interests be emphasised in order to satisfy stakeholder concerns? It would be useful to provide a more refined model which displays aspects of innovative search under different circumstances, thus exploring whether other theoretical underpinnings are more appropriate.

6.2.2 Research on configurational components

This section will present three future opportunities for the study of configurational elements encountered in this review.

The first opportunity relates to changes in *involvement intensity levels.* There has been tentative proof of a case where this search partnership was not initially anticipated – the partnership started out as an awareness project and later became a search partnership (Holmes and Smart 2009). As no studies have been found that studied this phenomenon, it would be interesting to review how *firms that do not intentionally search actually do search* for innovations. In line with this question, the role of unusual partners in a sustainability context would suit this review question as, for example, environmental organisations helping firms to improve their processes might intend to innovate. Thus, interesting research avenues could follow from these questions.

The second opportunity relates to the use of *partners in conduit setups*. As intermediary structures are relevant for the search of innovations, the involvement intensities of the conduits were not studied. For example, how does a boundary spanner mediate between partnerships of high and low levels of intensity? This question implies that firms approach partners to search with, and that these partners follow a search pattern which is unexplored. It would be interesting to see whether involvement intensity levels with the intermediary vary depending on whether it shares more stable strong ties, as opposed to an intermediary with a large number of weak ties.

The third opportunity relates to *partnership numbers*. It was interesting to see that firms tend to adopt partnership configurations with narrow expert setups. On the other hand, large-scale partnership numbers promise higher knowledge inflow rates coming from 'hobby innovators' and customers (Greer and Lei 2012; Pisano and Verganti 2008). In line with higher social goal outcomes, it would be interesting to explore such open innovation mechanisms with 'fringe stakeholders' (Hart and Sharma 2004) to better understand how social aims can be better linked with traditional product or process innovations. This research avenue is promising as it also touches on innovation forms that seek to explore how people deliver innovative solutions under constrained conditions (Ahuja 2012). Such constrained conditions are also repeatedly raised in sustainability-oriented innovation studies (Hansen 2009; Seebode et al. 2012), which implies that this context is fit-for-purpose for studying partnership configurations.

6.2.3 Contribution for my PhD

In line with the reported research opportunities, this section will build on the previously identified deficiencies to deliver a research question. A description will also be given for how this research question could be studied in the future.

In response to the contextual deficiencies, it was found that higher social goals are not well understood in relation to other drivers forming search partnerships. Therefore a future contribution would lie in using a context in which higher social goals along with other circumstances drive the search for innovations, yielding corresponding outcomes. As mentioned previously, a suitable contextual domain is the field of sustainability because this domain also pursues higher goals. By implication, search partnerships could be researched with partners who are driven by sustainability aims. Within this context, the role of search intensities and numbers by means of comparing search configurations adopted by firms could also be studied.

Therefore, by summing up the opportunities mentioned in this section, the following research question is asked in response to the outcomes from this review:

In circumstances of sustainability-driven pressures, how do search partners configure their search strategies to deliver innovations of higher social value?

The future studies informing this research question would be underpinned by the previously proposed model in Figure 14, thus building theory on a case-study basis by comparing different firm sear partnership configurations and contributing to both evolutionary theory as well as elements originating from stakeholder theory.

The next section will present the contributions of this review in more detail.

6.3 Contribution of this review

As the previous section derived future research opportunities, review implications in both scholarly and managerial dimensions will be presented to address whether this review has added value for both academics and practitioners.

6.3.1 Scholarly implications

One scholarly implication of this study refers to the review itself. To the author's knowledge, only one study by Laursen (2012) did collate a number of articles by means of a review to explore search strategies in the context of variety creation (Laursen 2012). However, this review did not study search partnerships, for why this work contributes by consolidating the literature in this field.

Also, this review produced a series of categorisations and causalities that can be reviewed and refined further by other scholars. In terms of categorisations, the notion of search context and intervention, but also the search outcome classification should be emphasised because the search literature has not always been clear on the anticipated search outcomes at different stages of searching. It was also appreciated that search partnerships are both searched and maintained under different circumstances and at varying degrees of commitment. Also, the components within the presented model represent variables which provide further opportunities for research as these variables can be further tested and refined.

In terms of causality, a relationship between contexts, interventions, and outcomes was formed which are worth of further investigation. More specifically, the interventions and the finding that the number, type, scope, and intensity of partnerships interact, is another contribution which can be further researched both empirically and conceptually. On a theoretical level, this separation of search strategy components enable a better delineation of search partnerships and depending on the central phenomenon searched provides further understandings in both transaction-based as well as evolutionary underpinnings.

This review also prepared the ground for further research of search partnerships in the context of sustainability. As the literature has shown reluctance in linking the domains of search with the literature on sustainability, this study offers a seminal base for further opportunities to research within this context, as it has unravelled this shortcoming in the context of this review question.

6.3.2 Managerial implications

There are managerial implications for managers and policy makers, especially for corporate strategists and innovation managers who wish to better understand the nature of their own search activities with partners.

For policy makers the extant outputs support the identification of different search configurations adopted by different firms. These configurations have been named along type, number, intensity, and boundary spanning activities, for why they can be used to identify what measures are adopted in search partnerships. Moreover, the proposition regarding research in the sustainability domain offers policy makers guidance on how to allocate research funding. As sustainability-led innovations become more important, this model provides a list of criteria under which firms that search for sustainability outcomes can be selected in order to research further the implication of this contextual change towards delivering against higher social goals.

For both corporate strategists and innovation managers, the outlined framework is also helpful as it provides a tentative description of search strategy aspects useful to frame firms' corporate responses. Although this model remains untested, the proposed model allows – depending on the contextual pressures and anticipated aims of the partnership - for an appraisal of search configurations with regard to selected direct or indirectly involved partners, the number of partners involved, the variety of institutions involved, and their involvement intensities. Moreover, managers can frame search partnership objectives more precisely along search outcomes at different stages. Therefore this review enables firms to understanding their own activities better with the help of this presented model.

Next, the conclusions of this review will be provided along with limitations of this review and a personal reflection of the systematic review process.

7 Conclusion

This systematic review has analysed the extant literature on how firms use partners in the search for innovations. First, the systematic review process and its associated descriptive findings were presented, followed by a number of identified characteristics and relationships relating to the contexts, interventions, mechanisms, and outcomes. These themes were subsequently presented and related to each other to deliver a thorough account of the state of knowledge and future research opportunities and to provide a model which depicts each analytical component in relationship with each other.

In order to complete this review, this last chapter will first describe the limitations encountered in this study and second provide personal reflections regarding the review process.

7.1 Limitations

This section describes the limitations that have influenced, driven and shaped this study. In relation to the influences, it is important to note that biases and preferences could not be fully avoided. There are some examples that highlight this.

The first example refers to the method that was used. In fact, the author selected the CIMO logic as an analytical tool because it was deemed fit-for-purpose to answering the review question. This is because the review question referred to partnerships, which can be analysed with regard to partnership contexts, interventions, mechanisms, and outcomes. Despite this careful reasoning, the methodological preference also shaped the decision in adopting this method.

The second example refers to how the literature was analysed. To this end, the realist CIMO logic was not fully in line with the ontology of the author, who adopts a critical-realist stance. In regard to this matter it is important to note that the author paid careful attention to establish an audit trail so that reasoning inferences could be traced. However, the danger remained in conducting both inductive and deductive analyses which led to implicit and explicit findings which were embedded in this review. This should be considered when reading the analysis.

Also, although quality criteria were established which aimed at increasing the rigour during the review process, a certain level of subjectivity could not always be avoided. For example, it was hard to dismiss personally well-known articles with high content relevance due to quality criteria. But then this list of developed criteria greatly supported the generation of a sample set of articles which represented the most important studies in this literature domain. Thus, bias could be reduced but not fully excluded during the quality appraisal stage.

Another bias relates to the language sample. As the review protocol confined the language circle to English-speaking publications for practical reasons, many valuable perspectives relating to the search for innovations in partnerships might have been missed. But as the aim of this study was to contribute to theory by means of synthesising the body of literature, this limitation was accepted.

During the write-up phase of this work, the author was also influenced with regard to content coming from the strategic management domain. In this regard, the work of Mintzberg, Ahlstrand and Lampel (Mintzberg et al. 2009) as well as the Smith's and Hitt's book on theory development (Smith and Hitt 2005) strongly influenced the authors thinking in terms of theoretical underpinnings and the respective subsets of strategic management feeding into innovation management such as organisational learning. As a scholarly novice, there is always the danger of missing aspects from a literature domain which haven't yet been discovered. This might be also the case in this work in that some aspects have been over- or under-emphasised due to the bias that influenced the author.

7.2 Personal reflection

As the previous section reported on the limitations of this study, this last section will reflect on my experience during the systematic review process over the last three months. These experiences related to the organisation of a systematic review as well as personal challenges and learning outcomes.

First, I would like to describe my experience in organising the systematic review process. As this was my third systematic review ever conducted, I was able to use previous experience. Although it was helpful to have a good understanding of the systematic review process, it yet did come with my own personal challenges. The first challenge, for example, was owed to the fact that I had set the deadline of the systematic review process one month ahead of schedule. Although there were concerns with regard to the quality output when shortening the review to a month, I think I was able to maintain the quality level given that I was able to save time through well-prepared spread sheets and systematic review protocols from previous reviews. I achieved this by preparing myself early so that I could take sufficient time to analyse the selected articles.

With regard to the systematic review itself, I acknowledged that the review is here to support the progression of my further studies in that it forces the researcher to analyse the literature in a rigorous manner. As part of the analysis, I therefore adopted a flexible approach when it came to including referencing because I realised that many seminal papers would otherwise not be included if a purely technical approach is adopted. I therefore tried to maintain the spirit of 'pragmatic research' (Denyer and Tranfield 2009). At the same time, the systematic review exercise was still required as it enabled thematic patterns to occur which I would have probably not picked up otherwise.

This brings me to the learning outcomes of this review. The first learning outcome relates to my ability to analyse literature. I have experienced again a great amount of impatience from my side to get through the literature quickly. Although this level of determination is helpful to achieve timely results, this skill sometimes gets in the way of conducting in-depth analyses. During this review I have worked hard to prevent myself from rushing through the analysis. I have done this by undertaking different types of analyses at different points in time of this review to be able to separate a large task – the

systematic review – into a large number of small tasks – the analyses at different points in time.

Another challenge that I sought to take on is the level of clarity within the document. As I sometimes tend to overcomplicate sentences, I have focused on providing a simple structure that can be followed easily. I have also sought to produce a chain of evidence, where possible, to avoid tentative interpretations within the review. Although I feel that there is still need for improvement, I have gained more confidence in the process of writing-up documents in a clear and consistent manner. Also, I have paid attention to providing enough contextual cues during the development of the argument, so that readers could better follow the line of reasoning through worked examples.

Another aspect which relates to clarity involves the ability to master a complicated and messy area of research. I have therefore sought to read extensively around the subject in parallel to this review. This involved books by Smith's and Hitt's '*Great Minds in Management*' (Smith and Hitt 2005) as well as Mintzberg, Ahlstrand and Lampel's '*Strategy Safari*' (Mintzberg et al. 2009) to support my thinking during the systematic review process. This enabled me to better understand the different theoretical developments in the field of strategic management and innovation. From this followed a greater degree of clarity when writing up the document as it could be more easily positioned within the literature. For example, I was able to maintain a more consistent use of terms through this process. I deem this skill essential for developing clear arguments that can be followed by other academics.

Another struggle that I encountered was the way in which I was analysing the literature. Although I was clear on what I was searching, I was unsure to how to analyse and later synthesise conceptual and empirical findings. Although I have learned how empirical research fields evolve from case studies and theoretical contributions, it remained difficult for me to draw relevant conclusions from different article types.

With regard to my own preferences, I have started to realise that I am attracted by articles that are engaging and well-written. Some contributions within the sample were a challenge to read because of the authors adopted writing style. Also, I seem to prefer shorter articles from longer ones that instantly deal with the phenomenon. During the analysis, I also discovered that I preferred well-positioned and synthesised articles that

provide an overview of the literature. This tells me that I prefer to synthesise rather than to analyse. However, realising that analysis precedes the synthesising stage; I sought to improve my analytical skills to balance out this personal bias in future work.

In summary, this review has been great in obtaining a better understanding of my researched phenomenon, and acquiring useful techniques in appraising and analysing the literature.

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Appendices

Appendix A - List of Full paper appraisal criteria

	Criterion	Code
Conceptual	Discussion of the theories, models or conceptual frameworks supporting search. C1	C1
	Discussion of the theories, models or conceptual frameworks supporting partner selection practice. C2	C2
Empirical	An empirical investigation describing or explaining the relationship of search and partnerships. E1	E1
	An empirical investigation describing or explaining partnership types in the context of search. E2	E2
	An empirical investigation describing or explaining objectives of partnerships in an innovation context. E3	E3
	For quantitative papers, constructs should explain the impact of moderating factors of the search and partnerships. E4	E4
	For quantitative papers, articles referring to innovation performance and firm performance should be disclosed in a way that inferences can be made for the search-partnership construct. E5	E5
Methodological	Assumptions, field of study, sample etc. being fully disclosed, as well as their limitations. M1	M1
	A research design and /or results that are feasible, with well-grounded concepts obtained from theory. M2	M2
	Disclosure of deviating factors, if available. M3	M3

Appendix B – Included and excluded articles

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
1	Adamczyk, S.	Bullinger, A.	Möslein, K.			Creativity and Innovation Management	Journal	2012	Innovation Contests: A Review, Classification and Outlook	Conceptual	Database	C2	Innovation contests as OI practice to engage with "external innovators"	
2	Alston, K.	Roberts, J.				Corporate Environmental Strategy	Journal	1999	Partners in New Product Development: SC Johnson and the Alliance for Environmental Innovation	Empirical	Database	E2	Implicit discussion of partnership successes for environmental NPD-	
3	Arshi, T.					International Business Research	Journal	2012	Entrepreneurial Intensity in the Corporate Sector in Oman: The Elusive Search Creativity and	Empirical	Database			No discussion of partnership or search

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Innovation					
4	Bae, J.					Seoul Journal of Business	Journa l	20 12	The Hazards of Leapfrog: Search Routines for Alliance Partner and Evolution of Organizational Capabilities	Conceptu al	Datab ase	C2	Search routines are discussed as a construct to developin g capabilitie s	
5	Baldo, F.	Rabelo, R.	Vallejo s, R.			Internati onal Journal of Producti on Research	Journa l	20 09	A framework for selecting performance indicators for virtual organisation partners' search and selection	Conceptu al	Datab ase			Partner selection is not core, the main contribution is the criteria selection - so innovation context missing..
6	Baum, J.	Cowan, R.	Jonard, N.			Manage ment Science	Journa l	20 10	Network-Independent Partner Selection and the Evolution	Conceptu al	Datab ase	C1	Discusses partnershi p networks by means	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									of Innovation Networks				of model	
7	Bianchi, M.	Campodal l'Orto, S.	Frattini , F.	Vercesi , P.		R&D Manage ment	Journa l	20 10	Enabling Open Innovation in Small- and Medium-Sized Enterprises: How to find Alternative Applications for your Technologies	Methodol ogical	Datab ase	M1	TRIZ is used to enable NPD search for SMEs	
8	Brettel, M.	Cleven, N.				Creativit y and Innovati on Manage ment	Journa l	20 11	Innovation Culture, Collaboration with External Partners and NPD Performance	Empirical	Datab ase	E1	Explores search and partnershi ps and develops partner constructs	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
9	Bunduchi, R.					Production Planning & Control	Journal	2012	Trust, Partner Selection and Innovation Outcome in Collaborative New Product Development	Empirical	Database	E2	Trust is the main construct used for partner selection in NPD	
10	Cantarello, S.	Martini, A.	Nosella, A.			Creativity and Innovation Management	Journal	2012	A Multi-Level Model for Organizational Ambidexterity in the Search Phase of the Innovation Process	Empirical	Database	E1	Explores ambidexterity search & antecedents and one partnership construct present	
11	Capaldo, A.	Messeni Petruzzelli, A.				Scandinavian Journal of Management	Journal	2011	In Search of Alliance-Level Relational Capabilities: Balancing Innovation Value Creation and Appropriability in R&D Alliances	Empirical	Database	E1	Explores search, relational capabilities, and the value created from the activity	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
12	Lindgaard Christensen, J.	Dahl, M.	Eliasen, S.	Nielsen, R.	Richter Østergaard, C.	Industry and Innovation	Journal	2011	Patterns and Collaborators of Innovation in the Primary Sector: A Study of the Danish Agriculture, Forestry and Fishery Industry	Empirical	Database	E2	explores partnerships in agroindustry with innovation outcomes	
13	Cillo, P.	Verona, G.				Long Range Planning	Journal	2008	Search Styles in Style Searching: Exploring Innovation Strategies in Fashion Firms	Empirical	Database	E1	Search and partnership are conceptually discussed on the basis of a small empirical study	
14	Classen, N.	Van Gils, A.	Bammens, Y.	Carree, M.		Journal of Small Business Management	Journal	2012	Accessing Resources from Innovation Partners: The Search Breadth of	Empirical	Database	E1	Search breadth of SMEs is tested empirically	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Family SMEs					
15	Cousins, P.	Lawson, B.	Peterse n, K.	Handfi eld, R.		Journal of Product Innovati on Manage ment	Journa l	20 11	Breakthrough Scanning, Supplier Knowledge Exchange, and New Product Development Performance	Empirical	Datab ase	E1	The breakthro ugh scanning construct is of interest in relation to the partner selected	
16	Crossan, M.	Apaydin, M.				Journal of Manage ment Studies	Journa l	20 10	A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature	Conceptu al	Datab ase			Organisation al innovation is discussed broadly without reference to search or partners
17	de Faria, P.	Lima, F.	Santos, R.			Research Policy	Journa l	20 10	Cooperation in Innovation Activities: The Importance of Partners	Empirical	Datab ase	E2	Cooperati on partners in innovation activities are	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
													discussed.	
18	de Man, A-P.	Duysters, G.				Technov ation	Journa l	20 05	Collaboration and Innovation: A Review of the Effects of Mergers, Acquisitions and Alliances on Innovation	Conceptu al	Datab ase	C2	Links collaborati on and innovation to test in the context of M&A vs. Alliances	
19	Emden, Z.	Calantone , R.	Droge, C.			Journal of Product Innovati on Manage ment	Journa l	20 06	Collaborating for New Product Development: Selecting the Partner with Maximum Potential to Create Value	Empirical	Datab ase	E1	Partner selection in the context of NPD	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
20	Fabrizio, K.					Research Policy	Journa l	20 09	Absorptive Capacity and the Search for Innovation	Empirical	Datab ase	E5	The relationshi p of absorptive capacity and search is discussed as well as more efficient partnershi p types.	
21	Feller, J.	Parhankan gas, A.	Smeds, R.	Jaatine n, M.		Organiza tion Studies	Journa l	20 13	How Companies Learn to Collaborate: Emergence of Improved Inter-Organizational Processes in R&D Alliances	Empirical	Datab ase	E2	Collaborat ions with R&D alliances	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
22	Fiet, J.	Norton, W.	Clouse , V.			Journal of Engineer ing and Technol ogy Manage ment	Journa l	20 07	Systematic Search as a Source of Technical Innovation: An Empirical Test	Empirical	Datab ase			This discusses search in its own rights (systematic vs. Alertness). This is interesting, but not directly relevant (and wrong level of analysis)
23	Frisham mar, J.					Internati onal Journal of Innovati on and Technol ogy Manage ment	Journa l	20 05	Managing Information in New Product Development: A Literature Review	Conceptu al	Datab ase	C1	An informatio n-processing view on NPD (search) and collaborati on	
24	Brunswi cker, S.	Hutschek, U.				Internati onal Journal of Innovati on	Journa l	20 10	Crossing Horizons: Leveraging Cross-Industry Innovation Search in the	Empirical	Datab ase	E1	Cross-industry analogical solving activity	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
						Manage ment			Front-End of the Innovation Process					
25	Chiang, Y-H.	Hung, K-P.				R&D Manage ment	Journa l	20 10	Exploring Open Search Strategies and Perceived Innovation Performance from the Perspective of Inter-Organizational Knowledge Flows	Empirical	Datab ase			Search is only discussed as a firm accessing knowledge externally but does not go beyond this.
26	Greer, C.	Lei, D.				Internati onal Journal of Manage ment Reviews	Journa l	20 12	Collaborative Innovation with Customers: A Review of the Literature and Suggestions for Future Research	Conceptu al	Datab ase	C2	Collaborat ive innovation as a means to interact with customers and businesses	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
27	Greve, H.	Taylor, A.				Administrative Science Quarterly	Journal	2000	Innovations as Catalysts for Organizational Change : Shifts in Organizational Cognition and Search	Empirical	Database			Organisational change is the main focus, search is somewhat treated as a factor to achieve change. Not directly relevant
28	Hacklin, F.	Marxt, C.	Fahrni, F.			International Journal of Production Economics	Journal	2006	Strategic Venture Partner Selection for Collaborative Innovation in Production Systems: A Decision Support System-based Approach	Methodological	Database	M2	A tool for partner selection in collaborative innovation (decision-oriented) is presented.	
29	Hazakis, K.					International Research Journal of Finance and	Journal	2008	Managing the Dynamics of Technological Creativity and Innovation: An Analysis of the	Conceptual	Database			Institutional level

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
						Economi cs			Experience of European Union Mediterranean Partners					
30	Henttone n, K.	Ritala, P.	Jauhiai nen, T.			Internati onal Journal of Innovati on Manage ment	Journa l	20 11	Exploring Open Search Strategies and Their Perceived Impact on Innovation Performance —Empirical Evidence	Empirical	Datab ase	E2	Search strategies related to "partner focus"	
31	Hilgers, D.					Internati onal Journal of Business Research	Journa l	20 11	Broadcast Search: Applying the Idea of Open Innovation For University- Industry Technology Transfer	Empirical	Datab ase	E3	Describes the innovation contest as a mechanis m for searching	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
32	Hughes, A.					University of Auckland Business Review	Journa l	20 12	Universities as Innovation Partners	Conceptu al	Datab ase			Policy-orientedness, not firm level
33	Kang, K.	Kang, J.				Technol ogy Analysis & Strategic Manage ment	Journa l	20 10	Does Partner Type Matter in R&D Collaboration for Product Innovation?	Conceptu al	Datab ase	E1	Partnershi p types matter.	
34	Keupp, M.	Palmié, M.	Gassm ann, O.			Internati onal Journal of Manage ment Reviews	Journa l	20 11	The Strategic Management of Innovation: A Systematic Review and Paths for Future Research	Conceptu al	Datab ase	C1	Systemati c review on Strategic Innovatio n under which some relevant RQ fall under.	
35	Köhler, C.	Sofka, W.	Grimp e, C.			Research Policy	Journa l	20 12	Selective Search, Sectoral Patterns, and the Impact on	Empirical	Datab ase	E1	Selectivity as a construct for partner selection	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Product Innovation Performance					
36	Korsgaar d, S.					Internati onal Journal of Entrepre neurial Behavio ur & Research	Journa l	20 13	It's Really Out There: A Review of the Critique of the Discovery View of Opportunities	Conceptu al	Datab ase			Entrepreneur ial perspective
37	Koukkar i, H.					Engineer ing, Construc tion and Architect ural Manage ment	Journa l	20 10	Transformatio n of a Research Centre Toward an Innovation Partner in the Construction Sector	Conceptu al	Datab ase	C2	Partnering process model	
38	Lager, T.	Frishamm ar, J.				Journal of Business Chemistr y	Journa l	20 09	Collaborative Development of New Process Technology/E quipment in the Process Industries: In Search of	Conceptu al	Datab ase	C1	Conceptua l discussion of Collaborat ion in NPD	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Enhanced Innovation Performance					
39	Laursen, K.					Industria l & Corporat e Change	Journa l	20 12	Keep Searching and you'll Find: What do we Know About Variety Creation through Firms' Search Activities for Innovation?	Conceptu al	Datab ase	C1	Critical review of search	
40	Lin, C-J.	Li, C-R.	City, H.	Quarter , X.	City, F.	Industry and Innovati on	Journa l	20 13	The Effect of Boundary-Spanning Search on Breakthrough Innovations of New Technology Ventures	Empirical	Datab ase	E1	Search needs to be aligned with the environme nt	
41	Luo, X.	Deng, L.				Journal of Manage ment Studies	Journa l	20 09	Do Birds of a Feather Flock Higher? The Effects of Partner Similarity on	Empirical	Datab ase	E1	Partnershi p similarity vs dissimilari	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Innovation in Strategic Alliances in Knowledge-Intensive Industries				ty	
42	Maccob y, M.					Research Technol ogy Manage ment	Journa l	19 97	Learning to Partner and Partnering to Learn	Conceptu al	Datab ase	C2	Partner definitions .	
43	Maggitti , P.	Smith, K.	Katila, R.			Research Policy	Journa l	20 13	The Complex Search Process of Invention	Empirical	Datab ase			Individual level, focuses on invention
44	Mahdi, S.					Industria l & Corporat e Change	Journa l	20 03	Search Strategy in Product Innovation Process: Theory and Evidence from the Evolution of Agrochemical Lead Discovery process	Conceptu al	Datab ase	C1	Problem-decision-learning	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
45	Marjano vic, S.	Fry, C.	Chata way, J.			Science and Public Policy	Journa l	20 12	Crowdsourcin g Based Business Models: In Search of Evidence for Innovation 2.0	Empirical	Datab ase	E4	Crowdsou rcing mechanis m linked to OI, Search, et al.	
46	Muller, A.	Hutchins, N.				Strategy & Leadersh ip	Journa l	20 12	Open Innovation helps Whirlpool Corporation discover New Market Opportunities	Conceptu al	Datab ase			No deeper discussion on search or partner selection
47	Ngamkr oeckjoti, C.	Speece, M.				Asia Pacific Journal of Marketin g and Logistics	Journa l	20 08	Technology Turbulence and Environmental Scanning in Thai Food New Product Development		Datab ase			Search and partner construct not explicitly discussed
48	Nicholas , J.	Ledwith, A.	Bessan t, J.			Research - Technol ogy Manage ment	Journa l	20 13	Reframing the Search Space for Radical Innovation	Conceptu al	Datab ase	C1	Search strategies	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
49	Pittaway, L.	Robertson, M.	Munir, K.	Denyer, D.	Neely, A.	International Journal of Management Reviews	Journal	2004	Networking and Innovation: a Systematic Review of the Evidence	Conceptual	Database	C1	Networking and innovation structure reveals partnership mechanisms	
50	Poetz, MK	Prügl, R				Journal of Product Innovation Management	Journal	2010	Crossing Domain-Specific Boundaries in Search of Innovation: Exploring the Potential of Pyramiding	Empirical	Database	E1	Pyramiding-people with an interest in a particular type of expertise will tend to know people who know more about that expertise	
51	Sands, S.					Management Review	Journal	1981	The Key to New Product Development: Improve the Search Process	Conceptual	Database	C1	Search is good for New product developm	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
													ent	
52	Schulze, A.	Brojerdi, G.				Europea n Manage ment Review	Journa l	20 12	The Effect of the Distance between Partners' Knowledge Components on Collaborative Innovation	Empirical	Datab ase	E2	Collaborat ive innovation performan ce	
53	Sidhu, J.	Command eur, H.	Volber da, H.			Organiza tion Science	Journa l	20 07	The Multifaceted Nature of Exploration and Exploitation: Value of Supply, Demand, and Spatial Search for Innovation	Empirical	Datab ase	E1	Search types (supply/de mand side search)	
54	Sofka, W.	Grimpe, C.				R&D Manage ment	Journa l	20 10	Specialized Search and Innovation Performance - Evidence	Empirical	Datab ase	C1	Search strategies	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
									Across Europe					
55	Ahuja, S.					Mworld	Journal	2012	Learn About Jugaad Innovation	Conceptual	Database			Interview
56	Wagner, S.					IEEE Transactions on Engineering Management	Journal	2013	Partners for Business-to-Business Service Innovation	Empirical	Database	E2	Partners and search in service innovation	
57	Winch, G.	Courtney, R.				Technology Analysis & Strategic Management	Journal	2007	The Organization of Innovation Brokers: An International Review	Empirical	Database			Brokers in diffusion processes
58	Zhang, Y.	Li, H.				Strategic Management Journal	Journal	2010	Innovation Search of New Ventures in a Technology Cluster: The Role of Ties with Service Intermediaries	Empirical	Database	E1	Service intermediaries as search partners	

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#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
59	Zolghadri, M.	Amrani, A.	Zouggar, S.	Girard, P.		International Journal of Computer Integrated Manufacturing	Journal	2011	Power Assessment as a High-Level Partner Selection Criterion for New Product Development Projects	Empirical	Database			Power & partnerships selection with supplier (not really NPD) - project level, not firm
60	Jenssen, J.	Nybakk, E.				International Journal of Innovation Management	Journal	2013	Inter-organizational Networks and Innovation in small, Knowledge-Intensive Firms: A Literature Review	Conceptual	Database			Institutional- not firm level
61	Aronson, Z.	Reilly, R.	Lynn, G.			International Journal of Technology Management	Journal	2008	The Role of Leader Personality in New Product Development Success: An examination of Teams developing Radical and	Empirical	Database			Wrong unit of analysis- leader

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									Incremental Innovations					
62	Badir, Y.	Buchel, B.	Tucci, C.			International Journal of Technol ogy Manage ment	Journa l	20 08	The Role of Communicatio n and Coordination between Network Lead Companies' and their Strategic Partners in Determining NPD Project Performance	Empirical	Datab ase			Project performance not of interest
63	Silva, M.	Leitao, J.				International Journal of Entrepre neurship and Small Business	Journa l	20 09	Cooperation in Innovation Practices among firms in Portugal: Do External Partners Stimulate Innovative Advances?	Empirical	Datab ase	E2	Seeks to establish a relationshi p between the two constructs .	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
64	Baum, J.	Rowley, T.	Shipilo v, A.			Administ rative Science Quarterl y	Journa l	20 05	Dancing with Strangers: Aspiration Performance and the Search for Underwriting Syndicate Partners	Empirical	Refere nce trackin g	E1	Aspiration s to partner for search	
65	Bayona, C.	Garc, T.	Huerta, E.			Research Policy	Journa l	20 01	Firms' motivations for cooperative R & D: an empirical analysis of Spanish firms	Empirical	Refere nce trackin g	E1	Motives to partner with R&D	
66	Becker, W.	Dietz, J.				Research Policy	Journa l	20 04	R&D Cooperation and Innovation Activities of Firms— Evidence for the German Manufacturing Industry	Empirical	Refere nce trackin g	E2	Impact of cooperatio n on innovation performan ce	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
67	Bessant, J.	von Stamm, B.				Advance d Institute of Manage ment Research	Univer sity-near report	20 02	Twelve Search Strategies that could save your Organisation	Conceptu al	Refere nce trackin g	C1	Search framewor k	
68	Capaldo, A.					Strategic Manage ment Journal	Journa l	20 07	Network Structure and Innovation: The Leveraging of a Dual Network as a Distinctive Relational Capability	Empirical	Refere nce trackin g	E1	Relational capabilitie s express the ability to form partnershi ps for innovation	
69	Dyer, J.	Hatch, N.				Sloan Manage ment Review	Journa l	20 04	Using Supplier Networks to Learn Faster	Conceptu al	Refere nce trackin g	C2	Partner types presented	
70	Faems, D.	Van Looy, B.	Debac kere, K.			Journal of Product Innovati on Manage ment	Journa l	20 05	Interorganizati onal Collaboration and Innovation: Toward a Portfolio Approach	Empirical	Refere nce trackin g	E3	Partner types and motivatio ns and how they affect innovation performan	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
													ce	
71	Fey, C.	Birkinsha w, J.				Journal of Manage ment	Journa l	20 05	External Sources of Knowledge, Governance Mode, and R&D Performance	Empirical	Refere nce trackin g	E1	Openness to ideas and partners	
72	Fontana, R.	Geuna, A.	Matt, M.			Research Policy	Journa l	20 06	Factors affecting University– Industry R&D Projects: The Importance of Searching, Screening and Signalling	Empirical	Refere nce trackin g	E1	Searching, screening, signalling with partners	
73	Fritsch, M.	Lukas, R.				Research Policy	Journa l	20 01	Who cooperates on R&D?	Empirical	Refere nce trackin g	E1	Openness and cooperatio n on R&D	
74	Grimpe, C.	Sofka, W.				Research Policy	Journa l	20 09	Search Patterns and Absorptive Capacity: Low- and	Empirical	Refere nce trackin g	E1	search patterns as access, reliability, transferabi	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									High-Technology Sectors in European Countries				lity trade-offs	
75	Gupta, A.	Smith, K.	Shalley , C.			Academ y of Manage ment Journal	Journa l	20 06	The Interplay Between Exploration and Exploitation	Conceptu al	Refere nce trackin g			Refers to the management of ambidexterit y more than to relationships or search as constructs
76	Hagedoo rn, J.					Research Policy	Journa l	20 02	Inter-firm R&D partnerships: an overview of major trends and patterns since 1960	Conceptu al	Refere nce trackin g	E3	Motivatio ns for R&D partnering visualised in trends	
77	Hansen, M.					Administ rative Science Quarterl y	Journa l	19 99	The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across	Empirical	Refere nce trackin g			Organisation al sub-units, not external partnerships/ searches conducted

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Organization Subunits					
78	Harryso n, S.	Dudkows ki, R.				Journal of Manage ment Studies	Journa l	20 08	Transformatio n Networks in Innovation Alliances – The Development of Volvo C70	Empirical	Refere nce trackin g	E2	Creativity networks as mechanis m	
79	Hitt, M.	Dacin, M.	Levitas , E.	Arregle , J.-L.	Borza, A.	Academ y of Manage ment Journal	Journa l	20 00	Partner Selection in Emerging and Developed Market Contexts: Resource-Based and Organizational Learning Perspectives	Empirical	Refere nce trackin g			No innovation context
80	Jansen, J.					Manage ment Science	Journa l	20 06	Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational	Empirical	Refere nce trackin g			Focuses on management of both not search or partners

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Antecedents and Environmental Moderators					
81	Kang, K.	Kang, J.				Internati onal Journal of Innovati on Manage ment	Journa l	20 09	How Do Firms Source External Knowledge for Innovation? Analysing Effects of Different Knowledge Sourcing Methods	Empirical	Refere nce trackin g	E1	Search strategy whom to collaborat e with	
82	Katila, R.	Chen, E.				Administ rative Science Quarterl y	Journa l	20 08	Effects of Search Timing on Innovation: The Value of not being in Sync with Rivals	Empirical	Refere nce trackin g	E1	Search strategy when to collaborat e with whom and how (explore/e xploit)	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
83	Katila, R.	Ahuja, G.				Academ y of Manage ment Journal	Journa l	20 02	Something Old, Something New: A Longitudinal Study of Search Behavior and New Product Introduction	Empirical	Refere nce trackin g	E1	Search depth and scope in unidimens ional spaces (leading to collaborati ons or not)	
84	Kaufma nn, A.	Tödtling, F.				Research Policy	Journa l	20 01	Science– Industry Interaction in the Process of Innovation: The Importance of Boundary-Crossing Between Systems	Empirical	Refere nce trackin g	E2	Partner breadth through explorator y partnershi ps	
85	Laursen, K.	Salter, A.				Research Policy	Journa l	20 04	Searching High and Low: What Types of Firms use Universities as a Source of	Empirical	Refere nce trackin g	E1	Open search strategy with universitie s	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Innovation?					
86	Laursen, K.	Salter, A.				Strategic Manage ment Journal	Journa l	20 06	Open for Innovation: The Role of Openness in Explaining Innovation Performance among UK Manufacturing Firms	Empirical	Refere nce trackin g	E1	Search strategy and innovative performan ce - degree of openness	
87	Lavie, D.	Rosenkop f, L.				Academ y of Manage ment Journal	Journa l	20 06	Balancing Exploration and Exploitation in Alliance Formation	Empirical	Refere nce trackin g	E1	Attribute exploratio n - partners whose org attributes differ from prior partners	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
88	Lechner, C.	Floyd, S.				Long Range Planning	Journa l	20 07	Searching, Processing, Codifying and Practicing – Key Learning Activities in Exploratory Initiatives	Empirical	Refere nce trackin g			Unit of analysis is manager, not firm
89	Li, D.	Eden, L.	Hitt, M.	Ireland, R.		Academ y of Manage ment Journal	Journa l	20 08	Friends, Acquaintances , or Strangers? Partner Selection in R&D Alliances	Empirical	Refere nce trackin g	E1	Friends, acquainta nces, strangers as partner selection	
90	Link, A.	Scott, J.				Research Policy	Journa l	20 05	Universities as Partners in U.S. Research Joint Ventures	Empirical	Refere nce trackin g	E3	Motivatio ns why firms partner (venture size)	
91	Littler, D.	Leverick, F.	Bruce, M.			Journal of Product Innovati on Manage ment	Journa l	19 95	Factors affecting the Process of Collaborative Product Development: A Study of UK	Empirical	Refere nce trackin g	E3	Motivatio ns why partners partner for R&D	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Manufacturers of Information and Communicatio ns Technology Products					
92	Miotti, L.	Sachwald, F.				Research Policy	Journa l	20 03	Co-operative R&D: Why and with Whom?	Empirical	Refere nce trackin g	E3	Motivatio ns to partner (knowledg e, resources ect)	
93	Narula, R.					Technov ation	Journa l	20 04	R&D collaboration by SMEs: new opportunities and limitations in the face of globalisation	Empirical	Refere nce trackin g	E3	Motivatio n to partner between SME & large firm (more resources)	
94	Negassi, S.					Research Policy	Journa l	20 04	R&D Co-operation and Innovation a Microeconom etric Study on French firms	Empirical	Refere nce trackin g			No search-only broad account of cooperation in innovation

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
95	Nieto, M.	Santamaría, L.				Technovation	Journal	2007	The Importance of Diverse Collaborative Networks for the Novelty of Product Innovation	Empirical	Reference tracking	E2	Partner network impact on innovation outcomes	
96	Oxley, J.	Sampson, R.				Strategic Management Journal	Journal	2004	The Scope and Governance of International R&D Alliances	Empirical	Reference tracking			Alliance scope determines when or when not to partner but does not talk about how partners are used in search
97	Perkmann, M.	Walsh, K.				International Journal of Management Reviews	Journal	2007	University–Industry Relationships and Open Innovation: Towards a Research Agenda	Conceptual	Reference tracking	E2	Relational involvement and classifications of partner types in OI context	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
98	Phelps, C.					Academy of Management Journal	Journal	2010	A Longitudinal Study of the Influence of Alliance Network Structure and Composition on Firm Exploratory Innovation	Empirical	Reference tracking	E2	Alliance structure shapes search (and openness)	
99	Pisano, G.	Verganti, R.				Harvard Business Review	Journal	2008	Which kind of collaboration is right for you?	Conceptual	Reference tracking	E3	Ways to collaborate and partner up	
100	Powell, W.	Koput, K.	Smith-Doerr, L.			Administrative Science Quarterly	Journal	1996	Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology	Empirical	Reference tracking			No search context

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
101	Rivkin, J.	Siggelko w, N.				Manage ment Science	Journa l	20 03	Balancing Search and Stability: Interdependen cies among Elements of Organizational Design	Empirical	Refere nce trackin g			Although search context with interaction, the focus lies on the decision pattern in a firm and not how firms use partners for innovation. CEO as unit of analysis
102	Rosenko pf, L.	Nerkar, A.				Strategic Manage ment Journal	Journa l	20 01	Beyond Local Search: Boundary-spanning, Exploration, and Impact in the Optical Disk Industry	Empirical	Refere nce trackin g	E3	Exploratio n behaviour in search (and partner selection)	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Year	Article Title	Paper type	Source	Inclusion Code	Reason for inclusion	Reason for exclusion
103	Rosenko pf, L.	Almeida, P.				Manage ment Science	Journa l	20 03	Overcoming Local Search Through Alliances and Mobility	Empirical	Refere nce trackin g	E2	Alliance become more useful the further away technologi cal distance is	
104	Terwiesc h, C.	Xu, Y.				Manage ment Science	Journa l	20 08	Innovation Contests, Open Innovation, and Multiagent Problem Solving	Conceptu al	Refere nce trackin g	E3	Seeker and solver (degree of openness) offers more solutions for a problem.	
105	Tether, B.					Research Policy	Journa l	20 02	Who co-operates for innovation, and why: an empirical analysis	Empirical	Refere nce trackin g	E3	Partnershi p through innovation co-operation	
106	Wissema , J.	Euser, L.				Long Range Planning	Journa l	19 91	Successful Innovation Through Networks	Conceptu al	Refere nce trackin g	E3	Describes collaborati on forms in Technolog	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
													ical R&D	
107	Holmes, S.	Smart, P.				R&D Manage ment	Journa l	20 09	Exploring Open Innovation Practice in Firm-Nonprofit Engagements: A Corporate Social Responsibility Perspective	Empirical	Person al knowl edge	E3	Motivatio ns why firms partner	
108	Day, G.	Schoemak er, P.				Long Range Planning	Journa l	20 04	Driving Through the Fog: Managing at the Edge	Conceptu al		E1	Upstream peripheral search implies partnershi ps with customers	
109	Howell, J.	Sheab, C.				Journal of Product Innovati on Manage ment	Journa l	20 01	Individual Differences, Environmental Scanning, Innovation Framing, and Champion Behavior: Key	Empirical				Champion-wrong unit of analysis

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
									Predictors of Project Performance					
110	Ritter, T.	Gemünde n, H-.G.				Journal of Business Research	Journa l	20 03	Network Competence: Its Impact on Innovation Success and its Antecedents	Empirical		E1	Innovatio n partner contributi ons	
111	Rondinel li, D.	London, T.					Journa l	20 03	How Corporations and Environmental Groups Cooperate: Assessing Cross-Sector Alliances and Collaborations	Empirical		E1	Partner collaborati on decisions	
112	Gould, R.					Journal of Technol ogy Manage ment & Innovati	Journa l	20 12	Open Innovation and Stakeholder Engagement	Conceptu al	Person al knowl edge	C2	Stake holder engageme nt as partner selection	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
						on								
113	Ayuso, S.	Rodríguez , M.	García-Castro, R.	Arino, M.		Industria l Manage ment & Data Systems	Journa l	20 11	Does Stakeholder Engagement Promote Sustainable Innovation Orientation?	Empirical	Person al knowl edge	C2	Innovatio n discussed within sustainabil ity context with reference to engageme nt practice	
114	Hall, J.	Vredenbu rg, H.				MIT Sloan Manage ment Review	Journa l	20 03	The Challenges of Innovating for Sustainable Development	Conceptu al		C2	Case examples of how firms did (and did not) collaborat e with NGOs	

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/ Source	Type	Ye ar	Article Title	Paper type	Sourc e	Inclu sion Code	Reason for inclusion	Reason for exclusion
115	Hart, S.					Academ y of Manage ment Review	Journa l	19 95	A Natural-Resource-Based View of the Firm	Conceptu al				Broad brush strategy and research agenda
116	Hart, S.	Sharma, S.				Academ y of Manage ment Executiv e	Journa l	20 04	Engaging Fringe Stakeholders for Competitive Imagination	Conceptu al		C2	Fringe stakeholde rs as partners	
117	Hart, S.	Dowell, G.				Journal of Manage ment	Journa l	20 11	A Natural-Resource-Based View of the Firm: Fifteen Years After	Conceptu al	Person al knowl edge	C2	Engaging BoP and Fringe Stakehold ers as partners	
118	Birkinsh aw, J	Bessant, J	Delbri dge., R.			Californi a Manage ment Review	Journa l	20 07	Finding, Forming, and Performing: Creating Networks for Discontinuous Innovation	Empirical	Person al knowl edge	C2	Unusual partnershi p selection	

Appendix C – Quality appraisal with relevant articles

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
1	Adamczyk, S.	Bullinger, A.	Möslein, K.			Creativity and Innovation Management	Journal	2012	Innovation Contests: A Review, Classification and Outlook
2	Alston, K.	Roberts, J.				Corporate Environmental Strategy	Journal	1999	Partners in New Product Development: SC Johnson and the Alliance for Environmental Innovation
3	Bae, J.					Seoul Journal of Business	Journal	2012	The Hazards of Leapfrog: Search Routines for Alliance Partner and Evolution of Organizational Capabilities
4	Baum, J.	Cowan, R.	Jonard, N.			Management Science	Journal	2010	Network-Independent Partner Selection and the Evolution of Innovation Networks

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
5	Bianchi, M.	Campodall'Orto, S.	Frattini, F.	Vercesi, P.		R&D Management	Journal	2010	Enabling Open Innovation in Small- and Medium-Sized Enterprises: How to find Alternative Applications for your Technologies
6	Brettel, M.	Cleven, N.				Creativity and Innovation Management	Journal	2011	Innovation Culture, Collaboration with External Partners and NPD Performance
7	Bunduchi, R.					Production Planning & Control	Journal	2012	Trust, Partner Selection and Innovation Outcome in Collaborative New Product Development
8	Cantarello, S.	Martini, A.	Nosella, A.			Creativity and Innovation Management	Journal	2012	A Multi-Level Model for Organizational Ambidexterity in the Search Phase of the Innovation Process

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
9	Capaldo, A.	Messeni Petruzzelli, A.				Scandinavian Journal of Management	Journal	2011	In Search of Alliance-Level Relational Capabilities: Balancing Innovation Value Creation and Appropriability in R&D Alliances
10	Lindgaard Christensen, J.	Dahl, M.	Eliasen, S.	Nielsen, R.	Richter Østergaard, C.	Industry and Innovation	Journal	2011	Patterns and Collaborators of Innovation in the Primary Sector: A Study of the Danish Agriculture, Forestry and Fishery Industry
11	Cillo, P.	Verona, G.				Long Range Planning	Journal	2008	Search Styles in Style Searching: Exploring Innovation Strategies in Fashion Firms
12	Classen, N.	Van Gils, A.	Bammens, Y.	Carree, M.		Journal of Small Business Management	Journal	2012	Accessing Resources from Innovation Partners: The Search Breadth of Family SMEs

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
13	Cousins, P.	Lawson, B.	Petersen, K.	Handfield, R.		Journal of Product Innovation Management	Journal	2011	Breakthrough Scanning, Supplier Knowledge Exchange, and New Product Development Performance
14	de Faria, P.	Lima, F.	Santos, R.			Research Policy	Journal	2010	Cooperation in Innovation Activities: The Importance of Partners
15	de Man, A-P.	Duysters, G.				Technovation	Journal	2005	Collaboration and Innovation: A Review of the Effects of Mergers, Acquisitions and Alliances on Innovation
16	Emden, Z.	Calantone, R.	Droge, C.			Journal of Product Innovation Management	Journal	2006	Collaborating for New Product Development: Selecting the Partner with Maximum Potential to Create Value
17	Fabrizio, K.					Research Policy	Journal	2009	Absorptive Capacity and the Search for Innovation

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
18	Feller, J.	Parhankangas, A.	Smeds, R.	Jaatinen, M.		Organization Studies	Journal	2013	How Companies Learn to Collaborate: Emergence of Improved Inter-Organizational Processes in R&D Alliances
19	Frishammar, J.					International Journal of Innovation and Technology Management	Journal	2005	Managing Information in New Product Development: A Literature Review
20	Brunswicker, S.	Hutschek, U.				International Journal of Innovation Management	Journal	2010	Crossing Horizons: Leveraging Cross-Industry Innovation Search in the Front-End of the Innovation Process
21	Greer, C.	Lei, D.				International Journal of Management Reviews	Journal	2012	Collaborative Innovation with Customers: A Review of the Literature and Suggestions for Future Research

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
22	Hacklin, F.	Marxt, C.	Fahrni, F.			International Journal of Production Economics	Journal	2006	Strategic Venture Partner Selection for Collaborative Innovation in Production Systems: A Decision Support System-based Approach
23	Henttonen, K.	Ritala, P.	Jauhiainen, T.			International Journal of Innovation Management	Journal	2011	Exploring Open Search Strategies and Their Perceived Impact on Innovation Performance—Empirical Evidence
24	Hilgers, D.					International Journal of Business Research	Journal	2011	Broadcast Search: Applying the Idea of Open Innovation For University-Industry Technology Transfer
25	Kang, K.	Kang, J.				Technology Analysis & Strategic Management	Journal	2010	Does Partner Type Matter in R&D Collaboration for Product Innovation?

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
26	Keupp, M.	Palmié, M.	Gassmann, O.			International Journal of Management Reviews	Journal	2011	The Strategic Management of Innovation: A Systematic Review and Paths for Future Research
27	Köhler, C.	Sofka, W.	Grimpe, C.			Research Policy	Journal	2012	Selective Search, Sectoral Patterns, and the Impact on Product Innovation Performance
28	Koukkari, H.					Engineering, Construction and Architectural Management	Journal	2010	Transformation of a Research Centre Toward an Innovation Partner in the Construction Sector
29	Lager, T.	Frishammar, J.				Journal of Business Chemistry	Journal	2009	Collaborative Development of New Process Technology/Equipment in the Process Industries: In Search of Enhanced Innovation Performance

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
30	Laursen, K.					Industrial & Corporate Change	Journal	2012	Keep Searching and you'll Find: What do we Know About Variety Creation through Firms' Search Activities for Innovation?
31	Lin, C-J.	Li, C-R.	City, H.	Quarter, X.	City, F.	Industry and Innovation	Journal	2013	The Effect of Boundary-Spanning Search on Breakthrough Innovations of New Technology Ventures
32	Luo, X.	Deng, L.				Journal of Management Studies	Journal	2009	Do Birds of a Feather Flock Higher? The Effects of Partner Similarity on Innovation in Strategic Alliances in Knowledge-Intensive Industries
33	Maccoby, M.					Research Technology Management	Journal	1997	Learning to Partner and Partnering to Learn

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
34	Mahdi, S.					Industrial & Corporate Change	Journal	2003	Search Strategy in Product Innovation Process: Theory and Evidence from the Evolution of Agrochemical Lead Discovery process
35	Marjanovic, S.	Fry, C.	Chataway, J.			Science and Public Policy	Journal	2012	Crowdsourcing Based Business Models: In Search of Evidence for Innovation 2.0
36	Nicholas, J.	Ledwith, A.	Bessant, J.			Research-Technology Management	Journal	2013	Reframing the Search Space for Radical Innovation
37	Pittaway, L.	Robertson, M.	Munir, K.	Denyer, D.	Neely, A.	International Journal of Management Reviews	Journal	2004	Networking and Innovation: a Systematic Review of the Evidence

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
38	Poetz, MK	Prügl, R				Journal of Product Innovation Management	Journal	2010	Crossing Domain-Specific Boundaries in Search of Innovation: Exploring the Potential of Pyramiding
39	Sands, S.					Management Review	Journal	1981	The Key to New Product Development: Improve the Search Process
40	Schulze, A.	Brojerdi, G.				European Management Review	Journal	2012	The Effect of the Distance between Partners' Knowledge Components on Collaborative Innovation
41	Sidhu, J.	Commandeur, H.	Volberda, H.			Organization Science	Journal	2007	The Multifaceted Nature of Exploration and Exploitation: Value of Supply, Demand, and Spatial Search for Innovation
42	Sofka, W.	Grimpe, C.				R&D Management	Journal	2010	Specialized Search and Innovation Performance -

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
									Evidence Across Europe
43	Wagner, S.					IEEE Transactions on Engineering Management	Journal	2013	Partners for Business-to-Business Service Innovation
44	Zhang, Y.	Li, H.				Strategic Management Journal	Journal	2010	Innovation Search of New Ventures in a Technology Cluster: The Role of Ties with Service Intermediaries
45	Silva, M.	Leitao, J.				International Journal of Entrepreneurship and Small Business	Journal	2009	Cooperation in Innovation Practices among firms in Portugal: Do External Partners Stimulate Innovative Advances?
46	Baum, J.	Rowley, T.	Shipilov, A.			Administrative Science Quarterly	Journal	2005	Dancing with Strangers: Aspiration Performance and the Search for Underwriting Syndicate Partners

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
47	Ayuso, S.	Rodríguez, M.	García-Castro, R.	Arino, M.		Industrial Management & Data Systems	Journal	2011	Does Stakeholder Engagement Promote Sustainable Innovation Orientation?
48	Gould, R.					Journal of Technology Management & Innovation	Journal	2012	Open Innovation and Stakeholder Engagement
49	Hall, J.	Vredenburg, H.				MIT Sloan Management Review	Journal	2003	The Challenges of Innovating for Sustainable Development
50	Hart, S.	Sharma, S.				Academy of Management Executive	Journal	2004	Engaging Fringe Stakeholders for Competitive Imagination

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
51	Hart, S.	Dowell, G.				Journal of Management	Journal	2011	A Natural-Resource-Based View of the Firm: Fifteen Years After
52	Holmes, S.	Smart, P.				R&D Management	Journal	2009	Exploring Open Innovation Practice in Firm-Nonprofit Engagements: A Corporate Social Responsibility Perspective
53	Bayona, C.	Garc, T.	Huerta, E.			Research Policy	Journal	2001	Firms ' motivations for cooperative R & D: an empirical analysis of Spanish firms
54	Becker, W.	Dietz, J.				Research Policy	Journal	2004	R&D Cooperation and Innovation Activities of Firms—Evidence for the German Manufacturing Industry

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
55	Bessant, J.	von Stamm, B.				Advanced Institute of Management Research	University-near report	2002	Twelve Search Strategies that could save your Organisation
56	Capaldo, A.					Strategic Management Journal	Journal	2007	Network Structure and Innovation: The Leveraging of a Dual Network as a Distinctive Relational Capability
57	Dyer, J.	Hatch, N.				Sloan Management Review	Journal	2004	Using Supplier Networks to Learn Faster
58	Faems, D.	Van Looy, B.	Debackere, K.			Journal of Product Innovation Management	Journal	2005	Interorganizational Collaboration and Innovation: Toward a Portfolio Approach

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
59	Fey, C.	Birkinshaw, J.				Journal of Management	Journal	2005	External Sources of Knowledge, Governance Mode, and R&D Performance
60	Fontana, R.	Geuna, A.	Matt, M.			Research Policy	Journal	2006	Factors affecting University–Industry R&D Projects: The Importance of Searching, Screening and Signalling
61	Fritsch, M.	Lukas, R.				Research Policy	Journal	2001	Who cooperates on R&D?
62	Grimpe, C.	Sofka, W.				Research Policy	Journal	2009	Search Patterns and Absorptive Capacity: Low- and High-Technology Sectors in European Countries
63	Hagedoorn, J.					Research Policy	Journal	2002	Inter-firm R&D partnerships: an overview of major trends and patterns since 1960

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
64	Harryson, S.	Dudkowski, R.				Journal of Management Studies	Journal	2008	Transformation Networks in Innovation Alliances – The Development of Volvo C70
65	Kang, K.	Kang, J.				International Journal of Innovation Management	Journal	2009	How Do Firms Source External Knowledge for Innovation? Analysing Effects of Different Knowledge Sourcing Methods
66	Katila, R.	Chen, E.				Administrative Science Quarterly	Journal	2008	Effects of Search Timing on Innovation: The Value of not being in Sync with Rivals
67	Katila, R.	Ahuja, G.				Academy of Management Journal	Journal	2002	Something Old, Something New: A Longitudinal Study of Search Behavior and New Product Introduction
68	Kaufmann, A.	Tödtling, F.				Research Policy	Journal	2001	Science–Industry Interaction in the Process of Innovation: The Importance of Boundary-

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
									Crossing Between Systems
69	Laursen, K.	Salter, A.				Research Policy	Journal	2004	Searching High and Low: What Types of Firms use Universities as a Source of Innovation?
70	Laursen, K.	Salter, A.				Strategic Management Journal	Journal	2006	Open for Innovation: The Role of Openness in Explaining Innovation Performance among UK Manufacturing Firms
71	Lavie, D.	Rosenkopf, L.				Academy of Management Journal	Journal	2006	Balancing Exploration and Exploitation in Alliance Formation
72	Li, D.	Eden, L.	Hitt, M.	Ireland, R.		Academy of Management Journal	Journal	2008	Friends, Acquaintances, or Strangers? Partner Selection in R&D Alliances

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
73	Link, A.	Scott, J.				Research Policy	Journal	2005	Universities as Partners in U.S. Research Joint Ventures
74	Littler, D.	Leverick, F.	Bruce, M.			Journal of Product Innovation Management	Journal	1995	Factors affecting the Process of Collaborative Product Development: A Study of UK Manufacturers of Information and Communications Technology Products
75	Miotti, L.	Sachwald, F.				Research Policy	Journal	2003	Co-operative R&D: Why and with Whom?
76	Narula, R.					Technovation	Journal	2004	R&D collaboration by SMEs: new opportunities and limitations in the face of globalisation

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
77	Nieto, M.	Santamaría, L.				Technovation	Journal	2007	The Importance of Diverse Collaborative Networks for the Novelty of Product Innovation
78	Perkmann, M.	Walsh, K.				International Journal of Management Reviews	Journal	2007	University–Industry Relationships and Open Innovation: Towards a Research Agenda
79	Phelps, C.					Academy of Management Journal	Journal	2010	A Longitudinal Study of the Influence of Alliance Network Structure and Composition on Firm Exploratory Innovation
80	Pisano, G.	Verganti, R.				Harvard Business Review	Journal	2008	Which kind of collaboration is right for you?
81	Rosenkopf, L.	Nerkar, A.				Strategic Management Journal	Journal	2001	Beyond Local Search: Boundary-spanning, Exploration, and Impact in the

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
									Optical Disk Industry
82	Rosenkopf, L.	Almeida, P.				Management Science	Journal	2003	Overcoming Local Search Through Alliances and Mobility
83	Terwiesch, C.	Xu, Y.				Management Science	Journal	2008	Innovation Contests, Open Innovation, and Multiagent Problem Solving
84	Tether, B.					Research Policy	Journal	2002	Who co-operates for innovation, and why: an empirical analysis
85	Wissema, J.	Euser, L.				Long Range Planning	Journal	1991	Successful Innovation Through Networks

#	First author	Second author	Third author	Fought author	Fifth author	Journal/Source	Type	Year of Publication	Article
86	Day, G.	Schoemaker, P.				Long Range Planning	Journal	2004	Driving Through the Fog: Managing at the Edge
87	Ritter, T.	Gemünden, H-.G.				Journal of Business Research	Journal	2003	Network Competence: Its Impact on Innovation Success and its Antecedents
88	Rondinelli, D.	London, T.				Academy of Management Executive	Journal	2003	How Corporations and Environmental Groups Cooperate: Assessing Cross-Sector Alliances and Collaborations
89	Birkinshaw, J	Bessant, J	Delbridge., R.			California Management Review	Journal	2007	Finding, Forming, and Performing: Creating Networks for Discontinuous Innovation

Appendix D – Quality appraisal

Article #	Is there a conceptual framework guiding data collection?	Is a conceptual framework selected after data collection to guide analysis?	Is there a largely implicit theoretical orientation?	If more than one perspective is used, how coherently do the different perspectives relate to each other?	Are they listed?	Are they defined?	Are they compatible?	Consistent use of concepts?	Are all information disclosed to assess the contribution?	Is the contribution witty, novel, original, and surprising?	Are there obvious weaknesses that make the contribution tentative?	Was the author's position clearly stated? (perspective, bias)	The method of sampling is stated or described	The characteristics of those included in the study are defined (and are comparable to the wider population)	Was there an adequate description of the method of data collection given?	A description is given of how the themes and concepts were identified in the data	The analysis was performed by more than one researcher	Negative/discrepant results were taken into account?	Is the research question addressed	How much of the information collected is available for independent assessment?	Are the explanations for the results plausible and coherent?	Are the results of the study compared with those from other studies?	Theoretical Base	Contribution Quality	Methodological Rigour	Argument Strength	8 or above
1	1	1	1	1	1	1	2	2	2	1	1	1	3	1	3	1	3	1	1	3	2	1	1,3	1,33	1,86	1,75	6,19
2	1	1	2	3	1	1	3	3	2	2	1	2	3	3	3	1	3	1	3	1	3	1	1,9	1,67	2,29	2	7,83
3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	1	2	1	2	3	3	2	2	3	3	2	2,5	10,5
4	2	2	2	3	3	3	3	3	2	3	1	2	3	3	2	3	3	3	3	3	3	3	2,6	2	2,71	3	10,3
5	3	2	2	3	1	2	3	3	1	3	2	2	3	3	3	1	3	3	3	1	3	2	2,4	2	2,57	2,25	9,2
6	3	2	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3	2	2	2	2,9	2,33	2,86	2,25	10,3
7	3	3	3	3	3	3	3	3	2	3	2	3	3	2	3	3	1	3	3	1	2	3	3	2,33	2,57	2,25	10,2
8	2	2	2	3	2	2	2	2	2	2	1	2	3	2	2	2	2	3	3	1	2	2	2,1	1,67	2,29	2	8,08
9	3	3	2	3	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	1	3	2	2,5	3	3	2,25	10,8

Article #	Theoretical contribution								Contribution quality			Methodological rigour								Argument strength			Quality appraisal criteria – Total				In?
	Is there a conceptual framework guiding data collection?	Is a conceptual framework selected after data collection to guide analysis?	Is there a largely implicit theoretical orientation?	If more than one perspective is used, how coherently do the different perspectives relate to each other?	Are they listed?	Are they defined?	Are they compatible?	Consistent use of concepts?	Are all information disclosed to assess the contribution?	Is the contribution witty, novel, original, and surprising?	Are there obvious weaknesses that make the contribution tentative?	Was the author's position clearly stated? (perspective, bias)	The method of sampling is stated or described	The characteristics of those included in the study are defined (and are comparable to the wider population)	Was there an adequate description of the method of data collection given?	A description is given of how the themes and concepts were identified in the data	The analysis was performed by more than one researcher	Negative/discrepant results were taken into account?	Is the research question addressed	How much of the information collected is available for independent assessment?	Are the explanations for the results plausible and coherent?	Are the results of the study compared with those from other studies?	*Theoretical Base*	*Contribution Quality*	*Methodological Rigour*	*Argument Strength*	**8 or above**
10	1	1	1	2	1	1	2	1	2	1	1	1	3	3	2	2	2	2	2	1	1	1	1,3	1,33	2,14	1,25	5,98
11	2	2	3	2	3	3	1	3	3	3	1	3	3	3	3	3	3	1	3	1	3	1	2,4	2,33	2,71	2	9,42
12	2	1	3	3	2	2	3	3	2	1	2	3	3	2	3	2	3	2	3	2	2	2	2,4	1,67	2,57	2,25	8,86
13	2	3	2	1	2	2	2	2	2	2	1	2	2	2	2	2	2	2	3	2	3	2	2	1,67	2	2,5	8,17
14	3	2	2	2	2	2	2	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3	2,3	3	2,57	3	10,8
15	3	2	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2,6	3	3	3	11,6
16	3	3	2	2	3	2	2	3	3	2	1	2	3	3	2	2	2	2	2	2	2	2	2,5	2	2,29	2	8,79
17	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	12
18	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	1	2	2	3	3	2,86	2	10,9
19	1	1	1	2	1	2	2	2	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1,5	1	1,57	1	5,07
20	2	1	3	3	3	3	2	2	2	2	1	1	1	2	2	2	3	1	3	2	3	3	2,4	1,67	1,71	2,75	8,51
21	3	2	3	3	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2	3	2,8	3	2,57	2,5	10,8
22	2	2	2	3	1	2	3	3	2	2	2	2	3	2	3	3	3	2	2	2	2	2	2,3	2	2,57	2	8,82
23	2	2	3	2	2	2	3	2	2	2	2	2	3	3	2	2	3	2	2	2	2	2	2,3	2	2,43	2	8,68
24	2	1	1	2	2	2	3	2	2	1	1	1	2	2	2	2	1	1	2	2	2	2	1,9	1,33	1,57	2	6,78
25	3	3	2	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	2	2,9	3	2,86	2,75	11,5

Article #	Theoretical contribution								Contribution quality			Methodological rigour							Argument strength				Quality appraisal criteria – Total				In?
	Is there a conceptual framework guiding data collection?	Is a conceptual framework selected after data collection to guide analysis?	Is there a largely implicit theoretical orientation?	If more than one perspective is used, how coherently do the different perspectives relate to each other?	Are they listed?	Are they defined?	Are they compatible?	Consistent use of concepts?	Are all information disclosed to assess the contribution?	Is the contribution witty, novel, original, and surprising?	Are there obvious weaknesses that make the contribution tentative?	Was the author's position clearly stated? (perspective, bias)	The method of sampling is stated or described	The characteristics of those included in the study are defined (and are comparable to the wider population)	Was there an adequate description of the method of data collection given?	A description is given of how the themes and concepts were identified in the data	The analysis was performed by more than one researcher	Negative/discrepant results were taken into account?	Is the research question addressed	How much of the information collected is available for independent assessment?	Are the explanations for the results plausible and coherent?	Are the results of the study compared with those from other studies?	*Theoretical Base*	*Contribution Quality*	*Methodological Rigour*	*Argument Strength*	**8 or above**
26	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	2,8	3	2,86	3	11,6
27	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	2,8	3	2,86	3	11,6
28	1	1	1	2	1	1	1	1	1	2	1	2	2	2	1	1	1	1	2	1	3	2	1,1	1,33	1,43	2	5,89
29	1	1	2	2	1	2	2	3	3	2	1	3	2	2	2	2	2	1	3	2	2	2	1,8	2	2	2,25	8
30	2	2	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	3	3	3	3	2	2,8	3	2,29	2,75	10,8
31	3	2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	3	3	3	2	3	3	2,9	3	2,43	2,75	11,1
32	3	3	2	3	3	3	3	3	2	3	2	2	2	2	2	2	3	2	2	2	2	2	2,9	2,33	2,14	2	9,35
33	1	1	2	2	1	2	2	2	1	1	3	2	1	1	1	1	1	1	2	1	1	2	1,6	1,67	1,14	1,5	5,93
34	2	2	3	3	3	3	3	2	3	3	2	2	3	3	3	2	1	3	3	2	3	3	2,8	2,67	2,43	2,75	10,6
35	1	1	2	1	2	2	2	2	3	2	1	3	1	3	1	2	3	1	3	1	2	1	1,6	2	2	1,75	7,38
36	2	3	2	3	1	1	2	3	3	3	2	2	3	3	3	2	3	1	3	3	3	2	2,1	2,67	2,43	2,75	9,97
37	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2,67	3	3	11,7
38	2	3	3	3	3	3	3	2	2	3	2	2	3	1	2	2	3	2	2	2	3	2	2,8	2,33	2,14	2,25	9,48
39	1	1	2	3	1	2	3	3	3	2	1	2	2	2	3	2	1	1	2	1	1	1	2	2	1,86	1,25	7,11
40	2	2	2	3	3	2	3	2	3	2	3	3	3	2	2	2	3	3	2	2	3	2	2,4	2,67	2,57	2,25	9,86
41	3	3	3	2	3	3	2	2	3	3	3	3	3	3	2	2	2	3	3	3	3	2	2,6	3	2,57	2,75	10,9

Article #	Theoretical contribution								Contribution quality			Methodological rigour							Argument strength				Quality appraisal criteria – Total				In?
	Is there a conceptual framework guiding data collection?	Is a conceptual framework selected after data collection to guide analysis?	Is there a largely implicit theoretical orientation?	If more than one perspective is used, how coherently do the different perspectives relate to each other?	Are they listed?	Are they defined?	Are they compatible?	Consistent use of concepts?	Are all information disclosed to assess the contribution?	Is the contribution witty, novel, original, and surprising?	Are there obvious weaknesses that make the contribution tentative?	Was the author's position clearly stated? (perspective, bias)	The method of sampling is stated or described	The characteristics of those included in the study are defined (and are comparable to the wider population)	Was there an adequate description of the method of data collection given?	A description is given of how the themes and concepts were identified in the data	The analysis was performed by more than one researcher	Negative/discrepant results were taken into account?	Is the research question addressed	How much of the information collected is available for independent assessment?	Are the explanations for the results plausible and coherent?	Are the results of the study compared with those from other studies?	*Theoretical Base*	*Contribution Quality*	*Methodological Rigour*	*Argument Strength*	8 or above
42	3	3	3	3	3	3	3	3	2	3	2	2	2	2	3	3	3	2	2	3	2	3	3	2,33	2,43	2,5	10,3
43	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	2	3	2	2	2	3	2,67	2,86	2,25	10,8
44	3	3	3	3	3	3	3	3	2	2	3	2	3	3	3	3	3	3	3	2	2	2	3	2,33	2,86	2,25	10,4
45	1	1	1	2	2	1	2	2	2	1	1	1	2	1	1	2	3	2	2	2	1	1	1,5	1,33	1,71	1,5	6,05
46	3	3	1	2	2	2	2	3	2	3	2	2	3	2	2	3	2	3	2	3	2	2	2,3	2,33	2,43	2,25	9,26
47	2	1	2	1	1	2	2	2	2	3	1	3	3	3	2	3	3	1	3	2	3	2	1,6	2	2,57	2,5	8,7
48	1	1	2	2	1	1	2	1	3	1	1	1	1	1	1	2	1	1	3	3	3	2	1,4	1,67	1,14	2,75	6,93
49	1	1	3	3	1	2	2	3	1	3	2	2	1	2	2	2	2	2	3	2	2	1	2	2	1,86	2	7,86
50	3	2	3	2	3	3	2	3	3	3	3	2	2	3	2	3	3	3	3	2	3	3	2,6	3	2,43	2,75	10,8
51	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2,9	3	3	3	11,9
52	3	3	3	3	3	3	3	3	3	3	3	1	2	3	2	3	2	2	3	2	2	2	3	3	2,14	2,25	10,4
53	3	3	3	3	3	3	3	2	2	3	3	3	3	3	2	3	3	3	3	2	2	2	2,9	2,67	2,86	2,25	10,6
54	3	3	3	3	2	2	3	3	3	2	2	3	3	2	3	3	2	2	3	2	2	2	2,8	2,33	2,57	2,25	9,9
55	1	2	2	2	2	2	3	3	2	3	2	1	1	2	3	2	2	1	3	3	3	3	2,1	2,33	1,71	3	9,17
56	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	3	3	3	2	3	2	3	3	2,57	2,5	11,1
57	2	2	2	2	2	2	3	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2,1	1,67	2	2	7,79

Article #	Theoretical contribution								Contribution quality			Methodological rigour							Argument strength				Quality appraisal criteria – Total				In?
	Is there a conceptual framework guiding data collection?	Is a conceptual framework selected after data collection to guide analysis?	Is there a largely implicit theoretical orientation?	If more than one perspective is used, how coherently do the different perspectives relate to each other?	Are they listed?	Are they defined?	Are they compatible?	Consistent use of concepts?	Are all information disclosed to assess the contribution?	Is the contribution witty, novel, original, and surprising?	Are there obvious weaknesses that make the contribution tentative?	Was the author's position clearly stated? (perspective, bias)	The method of sampling is stated or described	The characteristics of those included in the study are defined (and are comparable to the wider population)	Was there an adequate description of the method of data collection given?	A description is given of how the themes and concepts were identified in the data	The analysis was performed by more than one researcher	Negative/discrepant results were taken into account?	Is the research question addressed	How much of the information collected is available for independent assessment?	Are the explanations for the results plausible and coherent?	Are the results of the study compared with those from other studies?	*Theoretical Base*	*Contribution Quality*	*Methodological Rigour*	*Argument Strength*	**8 or above**
58	2	3	3	3	3	2	3	2	2	2	2	3	3	3	2	2	3	2	3	2	3	2	2,6	2	2,57	2,5	9,7
59	2	3	3	2	3	3	3	3	3	3	2	3	3	2	3	2	3	3	3	1	2	3	2,8	2,67	2,71	2,25	10,4
60	2	3	3	3	3	3	2	3	2	3	3	3	3	3	2	3	3	3	3	2	2	2	2,8	2,67	2,86	2,25	10,5
61	2	3	3	3	2	2	2	2	2	2	3	2	2	2	2	2	3	2	3	2	2	2	2,4	2,33	2,14	2,25	9,1
62	2	2	3	2	3	2	3	3	2	3	3	2	3	2	3	3	2	2	3	2	2	2	2,5	2,67	2,43	2,25	9,85
63	2	2	3	3	3	3	3	3	2	2	3	2	2	3	3	3	1	2	2	3	3	2	2,8	2,33	2,29	2,5	9,87
64	3	2	3	3	2	2	2	3	3	3	2	2	3	2	1	2	2	3	2	1	2	2	2,5	2,67	2,14	1,75	9,06
65	2	2	2	2	3	1	2	2	2	1	1	2	2	2	2	2	2	2	2	2	1	2	2	1,33	2	1,75	7,08
66	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	1	3	3	3	3	2,86	2,5	11,4
67	3	3	3	3	3	2	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	2,9	2,67	2,86	3	11,4
68	3	2	2	3	2	2	2	2	2	2	3	3	2	2	2	2	3	3	3	2	2	2	2,3	2,33	2,43	2,25	9,26
69	3	2	3	3	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	2	2	2,8	3	2,86	2,5	11,1
70	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2,8	3	3	3	11,8
71	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	2,5	11,5
72	2	2	3	2	3	2	3	3	2	2	2	2	2	3	3	3	3	3	3	3	3	3	2,5	2	2,71	3	10,2
73	2	2	2	2	3	3	3	2	3	2	3	3	2	2	3	2	2	3	2	2	3	3	2,4	2,67	2,43	2,5	9,97

Article #	Theoretical contribution								Contribution quality			Methodological rigour							Argument strength				Quality appraisal criteria – Total				In?
	Is there a conceptual framework guiding data collection?	Is a conceptual framework selected after data collection to guide analysis?	Is there a largely implicit theoretical orientation?	If more than one perspective is used, how coherently do the different perspectives relate to each other?	Are they listed?	Are they defined?	Are they compatible?	Consistent use of concepts?	Are all information disclosed to assess the contribution?	Is the contribution witty, novel, original, and surprising?	Are there obvious weaknesses that make the contribution tentative?	Was the author's position clearly stated? (perspective, bias)	The method of sampling is stated or described	The characteristics of those included in the study are defined (and are comparable to the wider population)	Was there an adequate description of the method of data collection given?	A description is given of how the themes and concepts were identified in the data	The analysis was performed by more than one researcher	Negative/discrepant results were taken into account?	Is the research question addressed	How much of the information collected is available for independent assessment?	Are the explanations for the results plausible and coherent?	Are the results of the study compared with those from other studies?	*Theoretical Base*	*Contribution Quality*	*Methodological Rigour*	*Argument Strength*	8 or above
74	2	2	1	1	2	1	2	1	1	1	1	1	2	1	1	2	2	1	1	1	1	2	1,5	1	1,43	1,25	5,18
75	2	2	3	3	3	2	2	3	2	3	3	3	3	3	3	2	3	2	3	2	2	2	2,5	2,67	2,71	2,25	10,1
76	2	2	2	2	2	3	3	2	2	3	2	2	2	3	3	3	1	2	3	2	2	2	2,3	2,33	2,29	2,25	9,12
77	2	2	3	2	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	2	3	3	2,5	2,67	3	2,75	10,9
78	2	2	2	3	3	3	2	3	3	2	3	3	3	3	3	3	3	2	3	2	2	2	2,5	2,67	2,86	2,25	10,3
79	3	2	2	3	3	2	2	3	3	2	2	2	2	2	1	2	3	2	2	2	3	2	2,5	2,33	2	2,25	9,08
80	3	2	2	2	1	1	3	3	1	3	2	1	1	1	2	3	3	2	3	3	3	2	2,1	2	1,86	2,75	8,73
81	2	2	3	2	2	2	3	2	2	3	3	2	3	2	2	2	3	2	2	2	2	3	2,3	2,67	2,29	2,25	9,45
82	2	3	3	2	3	2	3	3	3	3	3	3	3	3	2	2	3	2	2	3	2	3	2,6	3	2,43	2,5	10,6
83	3	2	1	2	2	3	3	2	2	2	3	3	3	2	2	3	3	1	2	3	3	2	2,3	2	2,43	2,5	9,18
84	3	3	2	3	3	3	3	2	2	3	2	3	2	3	3	3	1	2	3	2	2	2	2,8	2,33	2,43	2,25	9,76
85	3	2	2	1	2	1	2	2	2	3	1	2	1	1	2	3	3	3	2	1	2	3	1,9	2	2,14	2	8,02
86	2	1	3	3	2	2	2	3	2	3	2	2	2	2	1	2	2	2	3	2	3	3	2,3	2,33	1,86	2,75	9,19
87	3	3	3	3	3	2	2	3	3	2	2	3	3	3	3	3	3	2	2	3	3	3	2,8	2,33	2,86	2,75	10,7
88	2	2	2	2	2	1	2	3	3	3	2	3	2	2	2	2	2	2	3	2	2	2	2	2,67	2,14	2,25	9,06
89	3	3	3	3	2	2	3	3	2	3	3	2	2	2	2	3	2	2	3	3	3	2	2,8	2,67	2,14	2,75	10,3

		Theoretical contribution								Contribution quality				Methodological rigour							Argument strength				Quality appraisal criteria – Total				In?
Article #		Is there a conceptual framework guiding data collection?	Is a conceptual framework selected after data collection to guide analysis?	Is there a largely implicit theoretical orientation?	If more than one perspective is used, how coherently do the different perspectives relate to each other?	Are they listed?	Are they defined?	Are they compatible?	Consistent use of concepts?	Are all information disclosed to assess the contribution?	Is the contribution witty, novel, original, and surprising?	Are there obvious weaknesses that make the contribution tentative?	Was the author's position clearly stated? (perspective, bias)	The method of sampling is stated or described	The characteristics of those included in the study are defined (and are comparable to the wider population)	Was there an adequate description of the method of data collection given?	A description is given of how the themes and concepts were identified in the data	The analysis was performed by more than one researcher	Negative/discrepant results were taken into account?	Is the research question addressed	How much of the information collected is available for independent assessment?	Are the explanations for the results plausible and coherent?	Are the results of the study compared with those from other studies?	*Theoretical Base*	*Contribution Quality*	*Methodological Rigour*	*Argument Strength*	8 or above
																												Included articles	**73**
																												Excluded articles	**16**

Appendix E – Final sample - background information

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
1	Ayuso, S.	Rodríguez, M.	García-Castro, R.	Arino, M.		Industrial Management & Data Systems	Journal	2011	Does Stakeholder Engagement Promote Sustainable Innovation Orientation?
2	Bae, J.					Seoul Journal of Business	Journal	2012	The Hazards of Leapfrog: Search Routines for Alliance Partner and Evolution of Organizational Capabilities
3	Baum, J.	Cowan, R.	Jonard, N.			Management Science	Journal	2010	Network-Independent Partner Selection and the Evolution of Innovation Networks
4	Baum, J.	Rowley, T.	Shipilov, A.			Administrative Science Quarterly	Journal	2005	Dancing with Strangers: Aspiration Performance and the Search for Underwriting Syndicate Partners
5	Bayona, C.	Garc, T.	Huerta, E.			Research Policy	Journal	2001	Firms ' Motivations for Cooperative R & D: An Empirical Analysis of Spanish Firms
6	Becker, W.	Dietz, J.				Research Policy	Journal	2004	R&D Cooperation and Innovation Activities of Firms—Evidence for the German Manufacturing

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
									Industry
7	Bessant, J	von Stamm, B.				Advanced Institute of Management Research	University-near report	2002	Twelve Search Strategies that could save your Organisation
8	Bianchi, M	Campodall'Orto, S.	Frattini, F.	Vercesi, P.		R&D Management	Journal	2010	Enabling Open Innovation in Small- and Medium-Sized Enterprises: How to find Alternative Applications for your Technologies
9	Brettel, M	Cleven, N.				Creativity and Innovation Management	Journal	2011	Innovation Culture, Collaboration with External Partners and NPD Performance
10	Brunswicker, S.	Hutschek, U.				International Journal of Innovation Management	Journal	2010	Crossing Horizons: Leveraging Cross-Industry Innovation Search in the Front-End of the Innovation Process
11	Bunduchi, R.					Production Planning & Control	Journal	2012	Trust, Partner Selection and Innovation Outcome in Collaborative New Product Development
12	Cantarello, S.	Martini, A.	Nosella, A.			Creativity and Innovation Management	Journal	2012	A Multi-Level Model for Organizational Ambidexterity in the Search Phase of the Innovation Process
13	Capaldo, A.	Messeni Petruzzelli, A.				Scandinavian Journal of Management	Journal	2011	In Search of Alliance-Level Relational Capabilities: Balancing Innovation Value

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
									Creation and Appropriability in R&D Alliances
14	Capaldo, A.					Strategic Management Journal	Journal	2007	Network Structure and Innovation: The Leveraging of a Dual Network as a Distinctive Relational Capability
15	Cillo, P.	Verona, G.				Long Range Planning	Journal	2008	Search Styles in Style Searching: Exploring Innovation Strategies in Fashion Firms
16	Classen, N.	Van Gils, A.	Bammens, Y.	Carree, M.		Journal of Small Business Management	Journal	2012	Accessing Resources from Innovation Partners: The Search Breadth of Family SMEs
17	Cousins, P.	Lawson, B.	Petersen, K.	Handfield, R.		Journal of Product Innovation Management	Journal	2011	Breakthrough Scanning, Supplier Knowledge Exchange, and New Product Development Performance
18	Day, G.	Schoemaker, P.				Long Range Planning	Journal	2004	Driving Through the Fog: Managing at the Edge
19	de Faria, P.	Lima, F.	Santos, R.			Research Policy	Journal	2010	Cooperation in Innovation Activities: The Importance of Partners
20	de Man, A-P	Duysters, G.				Technovation	Journal	2005	Collaboration and Innovation: A Review of the Effects of Mergers, Acquisitions and Alliances on Innovation

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
21	Emden, Z.	Calantone, R.	Droge, C.			Journal of Product Innovation Management	Journal	2006	Collaborating for New Product Development: Selecting the Partner with Maximum Potential to Create Value
22	Fabrizio, K					Research Policy	Journal	2009	Absorptive Capacity and the Search for Innovation
23	Faems, D	Van Looy, B.	Debackere, K.			Journal of Product Innovation Management	Journal	2005	Interorganizational Collaboration and Innovation: Toward a Portfolio Approach
24	Feller, J	Parhankangas, A.	Smeds, R.	Jaatinen, M.		Organization Studies	Journal	2013	How Companies Learn to Collaborate: Emergence of Improved Inter-Organizational Processes in R&D Alliances
25	Fey, C.	Birkinshaw, J.				Journal of Management	Journal	2005	External Sources of Knowledge, Governance Mode, and R&D Performance
26	Fontana, R	Geuna, A.	Matt, M.			Research Policy	Journal	2006	Factors affecting University–Industry R&D Projects: The Importance of Searching, Screening and Signalling
27	Fritsch, M	Lukas, R.				Research Policy	Journal	2001	Who cooperates on R&D?
28	Greer, C.	Lei, D.				International Journal of Management	Journal	2012	Collaborative Innovation with Customers: A Review of the Literature and Suggestions

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
						Reviews			for Future Research
29	Grimpe, C.	Sofka, W.				Research Policy	Journal	2009	Search Patterns and Absorptive Capacity: Low- and High-Technology Sectors in European Countries
30	Hacklin, F	Marxt, C.	Fahrni, F.			International Journal of Production Economics	Journal	2006	Strategic Venture Partner Selection for Collaborative Innovation in Production Systems: A Decision Support System-based Approach
31	Hagedoorn, J.					Research Policy	Journal	2002	Inter-Firm R&D Partnerships: An Overview of Major Trends and Patterns since 1960
32	Harryson, S.	Dudkowski, R.				Journal of Management Studies	Journal	2008	Transformation Networks in Innovation Alliances – The Development of Volvo C70
33	Hart, S.	Sharma, S.				Academy of Management Executive	Journal	2004	Engaging Fringe Stakeholders for Competitive Imagination
34	Hart, S.	Dowell, G.				Journal of Management	Journal	2011	A Natural-Resource-Based View of the Firm: Fifteen Years After
35	Henttonen, K	Ritala, P.	Jauhiainen, T.			International Journal of Innovation Management	Journal	2011	Exploring Open Search Strategies and Their Perceived Impact on Innovation Performance— Empirical Evidence

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
36	Holmes, S	Smart, P.				R&D Management	Journal	2009	Exploring Open Innovation Practice in Firm-Nonprofit Engagements: A Corporate Social Responsibility Perspective
37	Kang, K	Kang, J.				Technology Analysis & Strategic Management	Journal	2010	Does Partner Type Matter in R&D Collaboration for Product Innovation?
38	Katila, R.	Chen, E.				Administrative Science Quarterly	Journal	2008	Effects of Search Timing on Innovation: The Value of not being in Sync with Rivals
39	Katila, R	Ahuja, G.				Academy of Management Journal	Journal	2002	Something Old, Something New: A Longitudinal Study of Search Behavior and New Product Introduction
40	Kaufmann, A	Tödtling, F.				Research Policy	Journal	2001	Science–Industry Interaction in the Process of Innovation: The Importance of Boundary-Crossing Between Systems
41	Keupp, M.	Palmié, M.	Gassmann, O.			International Journal of Management Reviews	Journal	2011	The Strategic Management of Innovation: A Systematic Review and Paths for Future Research
42	Köhler, C.	Sofka, W.	Grimpe, C.			Research Policy	Journal	2012	Selective Search, Sectoral Patterns, and the Impact on Product Innovation Performance

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
43	Laursen, K.					Industrial & Corporate Change	Journal	2012	Keep Searching and you'll Find: What do we Know About Variety Creation through Firms' Search Activities for Innovation?
44	Laursen, K.	Salter, A.				Research Policy	Journal	2004	Searching High and Low: What Types of Firms use Universities as a Source of Innovation?
45	Laursen, K	Salter, A.				Strategic Management Journal	Journal	2006	Open for Innovation: The Role of Openness in Explaining Innovation Performance among UK Manufacturing Firms
46	Lavie, D.	Rosenkopf, L.				Academy of Management Journal	Journal	2006	Balancing Exploration and Exploitation in Alliance Formation
47	Li, D	Eden, L.	Hitt, M.	Ireland, R.		Academy of Management Journal	Journal	2008	Friends, Acquaintances, or Strangers? Partner Selection in R&D Alliances
48	Lin, C-J	Li, C-R.	City, H.	Quarter, X.	City, F.	Industry and Innovation	Journal	2013	The Effect of Boundary-Spanning Search on Breakthrough Innovations of New Technology Ventures
49	Link, A.	Scott, J.				Research Policy	Journal	2005	Universities as Partners in U.S. Research Joint Ventures
50	Luo, X.	Deng, L.				Journal of Management Studies	Journal	2009	Do Birds of a Feather Flock Higher? The Effects of Partner Similarity on Innovation in Strategic

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
									Alliances in Knowledge-Intensive Industries
51	Mahdi, S.					Industrial & Corporate Change	Journal	2003	Search Strategy in Product Innovation Process: Theory and Evidence from the Evolution of Agrochemical Lead Discovery process
52	Miotti, L.	Sachwald, F.				Research Policy	Journal	2003	Co-operative R&D: Why and with Whom?
53	Narula, R.					Technovation	Journal	2004	R&D Collaboration by SMEs: New Opportunities and Limitations in the Face of Globalisation
54	Nicholas, J.	Ledwith, A.	Bessant, J.			Research-Technology Management	Journal	2013	Reframing the Search Space for Radical Innovation
55	Nieto, M.	Santamaría, L.				Technovation	Journal	2007	The Importance of Diverse Collaborative Networks for the Novelty of Product Innovation
56	Perkmann, M.	Walsh, K.				International Journal of Management Reviews	Journal	2007	University–Industry Relationships and Open Innovation: Towards a Research Agenda
57	Phelps, C.					Academy of Management Journal	Journal	2010	A Longitudinal Study of the Influence of Alliance Network Structure and Composition on Firm

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
									Exploratory Innovation
58	Pisano, G.	Verganti, R.				Harvard Business Review	Journal	2008	Which Kind of Collaboration is Right for You?
59	Pittaway, L.	Robertson, M.	Munir, K.	Denyer, D.	Neely, A.	International Journal of Management Reviews	Journal	2004	Networking and Innovation: a Systematic Review of the Evidence
60	Poetz, MK	Prügl, R				Journal of Product Innovation Management	Journal	2010	Crossing Domain-Specific Boundaries in Search of Innovation: Exploring the Potential of Pyramiding
61	Ritter, T.	Gemünden, H-.G.				Journal of Business Research	Journal	2003	Network Competence: Its Impact on Innovation Success and its Antecedents
62	Rondinelli, D	London, T.				Academy of Management Executive	Journal	2003	How Corporations and Environmental Groups Cooperate: Assessing Cross-Sector Alliances and Collaborations
63	Rosenkopf, L.	Nerkar, A.				Strategic Management Journal	Journal	2001	Beyond Local Search: Boundary-spanning, Exploration, and Impact in the Optical Disk Industry
64	Rosenkopf, L.	Almeida, P.				Management Science	Journal	2003	Overcoming Local Search Through Alliances and Mobility
65	Schulze,	Brojerdi, G.				European	Journal	2012	The Effect of the Distance

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
	A.					Management Review			between Partners' Knowledge Components on Collaborative Innovation
66	Sidhu, J.	Commandeur, H.	Volberda, H.			Organization Science	Journal	2007	The Multifaceted Nature of Exploration and Exploitation: Value of Supply, Demand, and Spatial Search for Innovation
67	Sofka, W.	Grimpe, C.				R&D Management	Journal	2010	Specialized Search and Innovation Performance - Evidence Across Europe
68	Terwiesch, C.	Xu, Y.				Management Science	Journal	2008	Innovation Contests, Open Innovation, and Multiagent Problem Solving
69	Tether, B.					Research Policy	Journal	2002	Who Co-operates for Innovation, and Why: an Empirical Analysis
70	Wagner, S.					IEEE Transactions on Engineering Management	Journal	2013	Partners for Business-to-Business Service Innovation
71	Wissema, J.	Euser, L.				Long Range Planning	Journal	1991	Successful Innovation Through Networks
72	Zhang, Y.	Li, H.				Strategic Management Journal	Journal	2010	Innovation Search of New Ventures in a Technology Cluster: The Role of Ties with Service Intermediaries
73	Birkinshaw, J	Bessant, J	Delbridge., R.			California	Journal	2007	Finding, Forming, and

#	First author	Second author	Third author	Fourth author	Fifth author	Journal/Source	Type	Year of Publication	Article Name
						Management Review			Performing: Creating Networks for Discontinuous Innovation

Appendix F – Descriptive data extraction table

Descriptive themes	Columns underpinning descriptive themes	Reason
Background Information	Information is provided on the ascribed article ID, where the article was sourced (e.g. database, grey literature), article title and authors involved.	To establish an audit trail.
Journal Selection	Describes the journal or general source as well as the source type (e.g. a book, conference paper etc.).	Analyses sources in which the review question is discussed.
Country	This describes where the institution that published the article is located.	Analyses countries in which the article is discussed.
Continent	Describes the continent location.	Analyses geographic sources in which the article is discussed to understand continental spread
Year	Describes the year of publication.	Analyses how interest in the subject evolved over time.
Ontology	What is the underlying ontology of this study?	Identifies conflicting ontologies.
Data Collection Methods	Is the study a theoretical, empirical (qualitative or quantitative), or mixed study?	Describes the body of knowledge with regard to its level of consolidation and maturity.
Method Type Quan	Specifies the type of method used in quantitative studies (e.g. experiments).	Analyses preferred quantitative data collection methods.
Method Type Qual	Specifies the type of method used in qualitative studies.(e.g. interviews).	Analyses preferred qualitative data collection methods.
Unit of Analysis	Specifies what is being studied.	Identifies differences in the unit of analysis.
Level of Analysis	Specifies the level in which the construct is studied.	Identifies differences in the level of analysis.
Study Characteristics	Describes the theoretical frameworks adopted, the sample selection characteristics, sample size as well as the country sampled.	Identifies theoretical underpinning and constituent sampling characteristics.

Appendix G – Descriptive analysis

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
1	Spain	Europe	Positivist	Empirical	Quantitative	Logistic Regression	na	na	Investigates whether engagement with different stakeholders promotes sustainable innovation.	Firm
2	South Korea	Asia	Positivist	Conceptual	Theoretical	na	na	Economic modelling	Each alliance partner's capability development co-evolves.	Firm
3	Canada	N. America	Positivist	Conceptual	Theoretical	na	na	Economic modelling	The role of complementary knowledge stocks and knowledge dynamics relative to social capital as forces behind the formation and dynamics of innovation networks.	Firm
4	Canada	N. America	Positivist	Empirical	Quantitative	Network Analysis	na	na	Organizations performing far from historical and social aspirations may be more willing to accept the uncertainty and risk of nonlocal ties with relative strangers.	Firm
5	Spain	Europe	Positivist	Empirical	Quantitative	Logistic Regression	na	na	Motives that have caused industrial firms to cooperate in R&D.	Firm
6	Germany	Europe	Positivist	Empirical	Quantitativ	Econometric	na	na	Impact of R&D cooperation	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
					e	Analysis			on firm's innovation input and output; number of cooperation's affecting innovation behaviour of firm.	
7	UK	Europe	Positivist	Conceptual	Theoretical	na	na	Prescription	This briefing document focuses on search skills and suggests 12 different strategies for developing a search capability to detect triggers of discontinuous innovation.	Firm
8	Italy	Europe	Positivist	Methodological	Practical	na	na	Prescription	A quick and easy-to-use methodology for the identification of viable opportunities for out-licensing a firm's technologies outside its core business.	Firm
9	Germany	Europe	Positivist	Empirical	Quantitative	Structural equation modelling	na	na	Innovation culture impact on firm's openness to external knowledge.	Firm
10	Germany	Europe	Positivist	Empirical	Qualitative	na	Participatory Action Research	na	Systematic innovation search impact on innovation outcomes.	Firm
11	UK	Europe	Critical Realist	Empirical	Qualitative	na	Case Study Research	na	Role that trust plays during the selection of suppliers in NPD.	Firm
12	Italy	Europe	Positivist	Empirical	Qualitative	na	Case Study Research	na	How exploration and exploitation balancing can be	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
									achieved in practice.	
13	Italy	Europe	Positivist	Empirical	Quantitative	Poisson regression	na	na	How searching across knowledge domains affects both innovation value creation and appropriability in R&D alliances - alliance level of analysis.	Firm
14	Italy	Europe	Positivist	Empirical	Qualitative	na	Case Study Research (longitudinal)	na	How strong dyadic inter-firm ties and two alternative network architectures (a 'strong ties network' and a 'dual network') impact the innovative capability of the lead firm in an alliance network.	Firm
15	Italy	Europe	Critical Realist	Empirical	Qualitative	na	Case Study Research	na	The triggers of change; The locus of search; The role of individuals versus team in search; Expected outcomes of the process.	Firm
16	Netherlands	Europe	Positivist	Empirical	Quantitative	Logistic Regression	na	na	Differences in the diversity of cooperation partners between family and nonfamily SME's.	Firm
17	UK	Europe	Positivist	Empirical	Quantitative	Structural equation modelling	na	na	Investigates the effects of breakthrough search behaviours by the buyer firm On their technical proficiency, reliance on supplementary processing	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
									capacity with suppliers, and subsequent new product development and financial performance.	
18	USA	N. America	Critical Realist	Conceptual	Theoretical	na	na	Anecdotal evidence	A monitoring of the periphery can help diffuse small problems before they become crises.	Firm
19	Netherlands	Europe	Positivist	Empirical	Quantitative	Bivariate probit regression model with sample selection	na	na	Firm characteristics that determine the importance of cooperation innovation activities.	Firm
20	Netherlands	Europe	Critical Realist	Conceptual	Theoretical	na	na	Systematic Literature Review	Use and structure of strategic alliances and mergers and acquisitions.	Firm
21	USA	N. America	Positivist	Empirical	Qualitative	na	Case Study Research	na	Develops a process theory of partner selection for collaborative NPD alliances using a theory development approach.	Firm
22	USA	N. America	Positivist	Empirical	Quantitative	Mean backward patent regression	na	na	Examines the link between a firm's absorptive capacity-building activities and the search process for innovation.	Firm
23	Belgium	Europe	Positivist	Empirical	Quantitative	Tobit regression	na	na	Relationship between inter-organizational collaboration	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
									and innovative performance.	
24	Germany	Europe	Interpretivist	Empirical	Mixed	Structural equation modelling	Case Study Research (multiple)	na	How partnering firms may learn how to better manage their dyadic R&D collaborations (process learning).	Firm
25	Sweden	Europe	Positivist	Empirical	Mixed	OLS Regression	Interviews	na	Alliance/university/contracting effect on R&D performance.	Firm
26	Italy	Europe	Positivist	Empirical	Mixed	Econometric Analysis	Interviews	na	Determinants of research cooperation between firms and Public research organisations.	Firm
27	Germany	Europe	Positivist	Empirical	Quantitative	Logistic Poission Regression	na	na	The propensity to maintain different forms of R&D cooperation with customers, suppliers, competitors and public research institutions.	Firm
28	USA	N. America	Critical Realist	Conceptual	Theoretical	na	na	Systematic Literature Review	Reviews the literature that involves collaboration between (1) producers or suppliers and (2) customers or users, either as individual consumers or business customers.	Firm
29	Germany	Europe	Positivist	Empirical	Quantitative	Tobit regression	na	na	Firms from low- and high-technology sectors differ in their search patterns and these mediate the relationship	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
									between innovation inputs and outputs.	
30	Switzerland	Europe	Positivist	Conceptual	Theoretical	na	na	Economic modelling	A software tool for providing operationalized decision support has been developed, based on previous research in the area of collaborative innovation success factors.	Firm
31	Netherlands	Europe	Positivist	Conceptual	Theoretical	na	na	Economic modelling	Historical trends and sectoral patterns in R&D partnering since 1960.	Firm
32	Sweden	Europe	Critical Realist	Empirical	Qualitative	na	Case Study (in-depth, validating)	na	Learning alliances to support both exploration and exploitation	Firm
33	USA	N. America	Critical Realist	Conceptual	Theoretical	na	na	Anecdotal evidence	Radical Transactiveness (RT) is a dynamic capability which seeks to systematically identify, explore, and integrate the views of stakeholders on the "fringe" for the express purpose of managing disruptive change and building imagination about future competitive business models.	Firm
34	USA	N. America	Critical Realist	Conceptual	Theoretical	na	na	Literature Review	The natural-resource-based view of the firm can both benefit from recent work in dynamic capabilities and can itself inform such work.	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
35	Finland	Europe	Positivist	Empirical	Quantitative	Hierarchical regression	na	na	Search strategies that affect innovation performance.	Firm
36	UK	Europe	Critical Realist	Empirical	Qualitative	na	Case Study (multiple)	na	Practice of open innovation unfolding in inter-organizational collaborations that involve the voluntary or charitable sector.	Firm
37	South Korea	Asia	Positivist	Empirical	Mixed	Negative binomial regression	Interviews	na	The effect of R&D collaboration may vary depending on partner types.	Firm
38	USA	N. America	Positivist	Empirical	Mixed	Binomial Regressions	Interviews	na	Search timing relative to competitors .	Firm
39	USA	N. America	Positivist	Empirical	Quantitative	Poisson regression	na	na	How firms search, or solve problems, to create new products.	Firm
40	Austria	Europe	Critical Realist	Empirical	Quantitative	Logit regression	na	na	Linking firms to non-business systems stimulates innovativeness more than remaining within the business system's set of routines.	Firm
41	Switzerland	Europe	Critical Realist	Conceptual	Theoretical	na	na	Systematic Literature Review	Importance of innovation for a firm's competitive advantage and performance.	Firm
42	Germany	Europe	Positivist	Empirical	Quantitative	Tobit regression	na	na	A firm's competitive advantage and performance.	Firm
43	Denmark	Europe	Positivist	Conceptual	Theoretical	na	na	Literature Review	Critically reviews and synthesises contributions	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
									found in theoretical and empirical studies of firm-level innovation search processes.	
44	Denmark	Europe	Positivist	Empirical	Quantitative	Econometric Analysis	na	na	Factors that influence why firms draw from universities in their innovative activities.	Firm
45	Denmark	Europe	Positivist	Empirical	Quantitative	Tobit regression	na	na	Links search strategy to innovative performance	Firm
46	USA	N. America	Positivist	Empirical	Quantitative	Generalised Least Squares Regression	na	na	Absorptive capacity and organizational inertia impose pressures for exploration and exploitation with respect to the value chain function of alliances, the attributes of partners, and partners' network positions.	Firm
47	USA	N. America	Positivist	Empirical	Quantitative	Logistic Multinomial Regression	na	na	Partner selection may serve to safeguard firms' intellectual assets in R&D alliances.	Firm
48	China	Asia	Positivist	Empirical	Quantitative	Hierarchical moderated regression	na	na	Boundary-spanning search is a key activity for new ventures so that they can deal with different market forces to enhance their breakthrough innovations.	Firm
49	USA	N. America	Positivist	Empirical	Quantitative	Probit Regression	na	na	Conditions when a research joint venture (RJV) will	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
									involve a university as a research partner.	
50	USA	N. America	Positivist	Empirical	Quantitative	Negative binomial regression	na	na	Similar partners in a focal firm's alliance portfolio contribute to the firm's innovation up to a threshold, beyond which additional similar partners can lead to a decrease in innovation because of the trade-offs embedded in collaboration between similar partners.	Firm
51	UK	Europe	Critical Realist	Conceptual	Theoretical	na	na	Literature Review	This paper investigates different problem-solving strategies—herein called 'search strategies'—in the process of product innovation.	Firm
52	France	Europe	Positivist	Empirical	Quantitative	Logit regression	na	na	Determinants of the choice of partners with which firms co-operate on R&D.	Firm
53	Denmark	Europe	Positivist	Empirical	Mixed	Descriptive Analysis	Anecdotal evidence	na	How firms utilise R&D collaboration relative to large firms.	Firm
54	Ireland	Europe	Critical Realist	Empirical	Mixed	Descriptive Analysis	Anecdotal evidence	na	Firms utilise R&D collaboration relative to large firms.	Firm
55	Spain	Europe	Positivist	Empirical	Quantitative	Bivariate probit	na	na	The role of different types of collaborative networks in	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
						regression analysis			achieving product innovations and their degree of novelty.	
56	UK	Europe	Critical Realist	Conceptual	Theoretical	na	na	Systematic Literature Review	Diffusion and characteristics of collaborative relationships between universities and industry	Firm
57	France	Europe	Positivist	Empirical	Quantitative	Random effects Panel Linear Regression	na	na	Influence of the structure and composition of a firm's alliance network on its exploratory innovation (outcome)	Firm
58	USA	N. America	Positivist	Conceptual	Theoretical	na	na	Prescription	Firm leaders need to figure out the best way to leverage a network of outsiders.	Firm
59	UK	Europe	Positivist	Conceptual	Theoretical	na	na	Systematic Literature Review	Concerning the relationship between networking and innovation	Firm
60	Denmark	Europe	Positivist	Empirical	Mixed	Logit regression	Case Study	na	Pyramiding search method systematically provide a means of crossing domain-specific boundaries in search of innovation.	Firm
61	Denmark	Europe	Positivist	Empirical	Mixed	Unweighted least squares regression	Interviews	na	Network competence has a strong positive influence on the extent of interorganizational technological collaborations and on a firm's product and	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
									process innovation success.	
62	USA	N. America	Critical Realist	Empirical	Qualitative	na	Interviews; Reports;	na	Understand better cross-sector alliances.	Firm
63	USA	N. America	Positivist	Empirical	Quantitative	Negative binomial regression	na	na	Analysis of the impact of knowledge generated by these different types of exploration on subsequent technological evolution.	Firm
64	USA	N. America	Positivist	Empirical	Quantitative	Negative binomial regression	na	na	The formation of alliances and mobility of active inventors facilitate inter-firm knowledge flows across contexts.	Firm
65	Switzerland	Europe	Positivist	Empirical	Mixed	ANOVA Regression	Interviews	na	Examines the relationship of partners' knowledge base distance and innovation performance.	Firm
66	Netherlands	Europe	Positivist	Empirical	Mixed	ANOVA Regression	Interviews	na	The value of supply-side, demand-side, and spatial exploration and exploitation is contingent on the environment.	Firm
67	Germany	Europe	Positivist	Empirical	Quantitative	Tobit regression	na	na	Firms need to specialize their search strategy.	Firm
68	USA	N. America	Positivist	Conceptual	Theoretical	na	na	Economic modelling	We analyze the interaction between a seeker and a set of solvers.	Firm
69	UK	Europe	Positivist	Empirical	Quantitativ	Logistic	na	na	Investigates the patterns of	Firm

#	Country	Continent	Ontology	Article type	Method of data collection	Method type quan	Method type qual	Method type conceptual	Unit of analysis	Level of analysis
					e	Regression (Multivariate)				co-operation between innovating firms and external partners.	
70	Switzerland	Europe	Positivist	Empirical	Mixed	Tobit regression	Interviews	na	Do B-to-B service firms utilize external knowledge and ideas for innovation, and if so, which types of partners they collaborate with in their innovation activities.	Firm
71	Netherlands	Europe	Positivist	Conceptual	Theoretical	na	na	Prescription	Why and how companies work together on technological innovation.	Firm
72	USA	N. America	Positivist	Empirical	Mixed	OLS Regression	Interviews	na	Examination of the relationships between new ventures' ties with service intermediaries and their product innovation in the context of a technology cluster.	Firm
73	UK	Europe	Critical Realist	Empirical	Qualitative	na	Interviews	na	Examination how firms find and form discontinuous innovation networks	Firm

Appendix H - Study characteristics

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
1	Stake holder Theory; RBV	Mentions Freeman (1984); Wernerfelt (1984); Barney (1991). Need to balance stake holder interests through capabilities that enable collaboration with stakeholders from which an innovation occurs.	2004	Dow Jones Sustainability Index; SAM group database	Panel data	Multiple sectors	Brazil, Canada, Chile, Mexico, the USA, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, the UK, Australia, Hong Kong, Indonesia, Japan, Malaysia, Singapore, South Korea, Taiwan, Thailand.	n=983; 656 used.
2	Evolutionary theory; Organisational Learning; Behavioural theory; Transaction Cost Economics	Organisational capabilities; Evolutionary literature (Cyert and March). Routines (Nelson & Winter 1982)	na	na	na	na	France, Germany, Greece, Ireland, Italy, The Netherlands, Norway, Portugal, South Africa,	na
3	Evolutionary theory; Organisational Learning; Behavioural theory; Transaction Cost Economics	TCE (Williamson, 1975), Behavioural theory (Cyert & March 1963), Learning (March and Simon 1958)	na	na	na	na	Spain, Sweden, Switzerland, the UK, Australia, Hong Kong, Indonesia, Japan, Malaysia,	na

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
4	Behavioural theory	Knowledge-based view. Mention of TCE (Williamson, 1975), Search (Katila 2002),creative destruction (Schumpeter 1934), social structure network exchange (Granovetter 1985), Absorptive capacity (Cohen & Levinthal 1990). No mention of RBV.	1952-1990	All public offerings (debt and equity);mainly record of new issue data	Panel data	Investment banks	Singapore, South Korea, Taiwan, and Thailand.	n=82 banks in 422 network syndicates
5	Strategic Alliance; RBV	Competitive strategy (Porter 1986), Absorptive capacity (Cohen & Levinthal 1991), Competence (Hamel 1991); Evolutionary dynamics (Osborn & Hagedoorn 1997)	1996	Spanish National Institute of Statistics	Panel data	Multiple sectors	Spain	n=1652 spanish firms that conducted R&D activities
6	Behavioural Theory; Transaction Cost Economics	Transaction Cost Economics (Williamson, 1990); (Innovation) behaviour (no sources); Contingency (eg. Flaig and Stadler 1998); Capabilities (e.g. Teece and Pisano); Innovation	1992	Mannheim Innovation Panel	Panel data	Manufacturing	Germany	n=2048 firms

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
		Networks (e.g. DeBresson and Amesse, 1991); Organisational learning (no sources).						
7	Organisational Learning; Behavioural Theory;	Evolutionary theory (no source); Dynamic capabilities (no source); Absorptive capacity (no source).	na	na	Question naire	na	na	na
8	Strategic Positioning; Organisational Learning;	Open Innovation (Chesbrough 2003); Knowledge management (Dodgson et al 2006); Innovation networks (Dittrich and Duysters 2007). Positioning (no sources)	na	na	Panel data	na	na	na
9	RBV; Open Innovation (OL)	RBV (Wernerfeldt 1984); Competitive advantage (Barney 1986); Open Innovation (Chesbrough 2003); Knowledge-based view (Ahuja 2000); Competence (Teece 1986); Innovation Culture (Brentani & Kleinschmidt 2004);	2009	distributed through chamber of commerce	Survey	Multiple technology-based sectors	Germany	n=254 firms
10	Open Innovation (OL); Innovation	Open Innovation (Chesbrough 2003);	not	na	Participat ory	Car manufacturi	Germany	n=8 participants

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	Planning; Cognitive Distance	Innovation Planning (Pfeiffer 1971); Institutional theory (isomorphism); (no source); Knowledge-based view (Prahalad and Hamel 1990); Absorptive Capacity (Cohen and Levinthal 1990); Organisational Learning (March 1991); Bounded rationality (no source)	indicated		anecdotal sampling	ng		conducting analogical problem solving
11	Transaction Cost Economics	Transaction Cost Economics (Brockhoff, 1992); Social (capital) network building (Gulati 1995); Governance (Notebook 1996);	not indicated	na	Semi-structured interviews	Manufacturing and Telecommunication	not indicated	n=2 (contrasting sample)
12	Organisational Learning; Organisational Design	Ambidexterity (Duncan 1976); Organisational Design (Lawrence and Lorsch 1967); Organisational Learning (March 1991); Positioning (Abernathy and Clark 1985).	2008-2009	na	Semi-structured interviews	High-tech company	Italy	n=1 firm; n=5 interviews, intended as a "pilot case"
13	Transaction Cost Economics ; Organisational Design;	Social structure network exchange (Granovetter 1985), Absorptive capacity (Cohen and	1998-2003	R&D alliances established in Fortune 500	Patent analysis	Electric and Electronic Equipment Industry	not indicated	n=1515 firms

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	Organisational Learning;	Levinthal 1990);						
14	Transaction Cost Economics; Organisational ecology	Absorptive Capacity (Cohen and Levinthal 1990); Social (capital) network structure (Gulati 1995); Knowledge-based view & capabilties (Kogut & Zander 1992); Evolutionary Theory (Nelson and Winter 1982); Positioning (Porter 1985); TCE (Zajac & Olsen 1993).	1998-2000; 2003	na	Multiple methods (interviews, archives, observation, documentation)	Italian Furnishing	Italy	n=3 firms; n=not specified
15	Strategic Positioning; RBV	Positioning (Porter 1980); RBV (Barney 1991); Organisational Learning (March 1991)	2000-2007		Multiple methods (In depth case, anecdotal evidence, secondary sources)	Fashion	Italy; Germany	2 firms (comparative), n=20 interviews
16	Organisational Learning; OI; Behavioural Theory	Behavioural theory (Cyert and March 1963); Absorptive Capacity (1990); RBV; Evolutionary Economics (Nelson and Winter 1982); Organisational	2004	Belgian Belfirst database; Dutch Chamber of Commerce database	Survey	Multiple industries	Belgium; Netherlands	n=167 SME's who are interested in Innovation

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
		Learning (Levinthal and March 1993); Transaction cost economics (not mentioned)						
17	Organisational Learning; Information processing theory, decision-based theory; behavioural theory	Absorptive Capacity (Cohen and Levinthal 1990); Capabilities (Dyer and Singh 1998); Information processing (Galbraith 1973; Daft and Weick 1984)	not indicated	Chartered Institute of Purchasing and Supply	Survey	Manufacturing	UK	n=111 firms
18	Organisational Learning; Behavioural Theory;	Positioning (Foster & Kaplan 2001); Organisational Learning (March 1991); Attention-based view (no source);	na	na			na	
19	RBV; decision-based theory; behavioural theory	Open Innovation (Chesbrough 2003); Absorptive Capacity (Cohen and Levinthal 1990); Social structure network exchange (Granovetter 1973); RBV (Penrose 1959);	1998-2000	Portuguese Innovation Survey	Survey	Manufacturing	Portugal	n=766 firms
20	Organisational Design;	TCE (Williamson, 1975), Networks (Hagedoorn and Osborn 1997); RBV (Gerpott 1995);	na	na			na	

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
21	Process theory; Transaction cost economics, behavioural theories	Open Innovation (Chesbrough 2003); Absorptive Capacity (Cohen and Levinthal 1990); RBV (Barney 1991); Organisational Learning (e.g. Hamel 1991)	2003	na	Semi-structured interview	Multiple industries	not indicated	n=4 firms; n=7 interviews
22	Evolutionary economics; RBV; Organisational Learning	Knowledge-based view (Kugot and Zander 1992) Absorptive Capacity (1991); Relational view (Dyer and Singh 1998); Creative Destruction (Schumpeter 1934); TCE (Williamson 1975). Networks (various), Capabilities (Teece 1997)	1976-1999	Standard&Poors Industry surveys	Panel Data	Pharmaceutical & Biotechnology	not indicated	n=83 firms
23	Behavioural theory	Ambidexterity (Duncan 1976); Organisational Learning (March 1991); Creative Destruction (Schumpeter 1939);	1994-1996	EU Community Innovation survey	Survey	Manufacturing	Belgium	n=221 firms
24	Organisational Learning; Knowledge conversion;	Organisational Learning (Nonaka & Takeuchi 1995; Crossan Lane & White 1999); Evolutionary economics (Nelson and Winter	2002-2003	Internet	Multiple (interviews, simulations, debriefin	Telecommunications	Europe,N.America, Asia	n=2 projects; n=105 (survey)

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
		1983); Cognition (Anderson 1983); Absorptive Capacity (Cohen and Levinthal 1991)			g, follow up interviews, surveys)			
25	Behavioural Theory; Organisational Learning	Organisational Learning (Nonaka & Takeuchi 1995); Open Systems perspecive (Emery and Trist 1965); Social capital theory (Burt 1992); RBV (Barney 1991)	not indicated	na	Question naire	Multiple industries	Sweden, UK	n=107 (questionnair e); n=50 interviews
26	Behavioural theory; Transaction Cost Economics; Organisational Learning	Open Innovation (Chesbrough 2003); Absorptive Capacity (1991);	1997-2000	KNOW survey	Survey	Multiple sectors	Denmark, France, Germany, Greece, Italy, Netherlands, UK	n=558 (survey); n=70 (interviews)
27	Behavioural theory; Transaction Cost Economics;	Absorptive Capacity (1990);	not indicated	na	Question naire	Multiple sectors	Netherlands and the UK.	n=1800 firms
28	Decision-based theories; Transaction Cost Economics; Behavioural theories.	Ojanen & Hallikas (2009)-Org. Routines facilitating collaboration. Etgar (2008) - Consumer co-production model; Payne et al. (2008): Co-creating of value model	na	na	na	na	na	na
29	Behavioural theory;	Competitive advantage	1998-	EU Community	Panel	Multiple	Belgium, Czech Republic,	n=4500 firms

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	Organisational Learning;	(Barney 1991); Open Innovation (2003); Organisational Learning (March 1991);	2000	Innovation survey	data	Sectors	Estonia, Germany, Greece, Hungary, Iceland, Latvia, Lithuania, Norway, Portugal, Slovakia, Spain	
30	Organisation Design; Transaction Cost Economics	Decision support system (Williams and Lilley 1993); Organisation Design - Strategy-culture-structure (Marxt 2000)	na	na	na	na	(767), Germany (1656), Greece (342), Hungary (256), Iceland	na
31	Transaction cost economics, behavioural theory	TCE (Williamson 1996); Networks (Hagedoorn 1990)	1960-1998	MERIT-CATI database	Panel data	Multiple sectors	(125), Latvia (433), Lithuania (585), Norway (1190), Portugal (780),	not specified
32	network theory; Organisational Learning;	Open Innovation (2003); Networks (Granovetter 1973); Organisational Learning (Benner and Tushman 2003); Abidexterity (Duncan 1976)	2002-2007		Semi-structured interviews	Automotive	Slovakia (363) and Spain (3169).	n=1 firm ; n=120 interviews; 3 projects; 5 more interviews.
33	Decision-based theories; Behavioural theories; Organisational Learning	RBV (Barney 1991); Dynamic Capabilities (2000);	na	na	na	na	na	na
34	Decision-based theories; Behavioural	Stake holder theory (Freeman 1984; Schumpeter (1934);	na	na	na	na	na	na

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	theories; Organisational Learning	March (1991); Dynamic Capabilities (2000);						
35	Organisational Learning; Evolutionary Economics; Behavioural theory	Organisational Learning (1991); Evolutionary Economics (Nelson and Winter 1983);	2008-2009	Finnish Survey	Question naire	Multiple sectors	Finland	n=193 firms
36	Process theory; Stake holder theory; RBV	Organisational Learning (March 1991); Stakeholder Theory (Freeman 1984); Open Innovation (Chresbrough 2003); Absorptive Capacity (Cohen and Levinthal 1990);	2006-2008		semi-structured interviews	Multiple Sector	UK	n=8 firms; n=29 interviews
37	Behavioural Theory; Organisational Learning;	Absorptive Capacity (Cohen and Levinthal 1990);	2005	Korean Innovation Survey	Panel data	Manufafcturing	South Korea	n=1353 firms
38	Organisational Learning; Evolutionary Theory; Open Innovation	Organisational Learning (Argyris and Schön) 1978; Behavioural theory (Cyert and March, 1963); Nelson and Winter (1982)	1984-1998	na	semi-structured interviews	Industrial Automation	Japan, Europe, US	n=124 firms; regressions run in firm-years n=1304; n=285)
39	Organisational Learning; Behavioural	Organisational Learning (March 1991); Positioning (Porter	not indicated	Patent data and Trade Journals	Panel data	Industrial Robotics	Europe, Japan, US	n=124 firms;

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	Theory;	1985); Ambidexterity (Tushman & O'Reilly 1996); Evolutionary Theory (Nelson and Winter 1983);						
40	Organisational Learning, Organisational Design; Social theory	Social structure network exchange (Granovetter 1985).	1996	REGIS survey	Panel data	Multiple industries	UK, Belgium, Germany, Austria, Spain, Portugal, Finland	n=517 firms
41	Positioning; Organisational Design	Strategic Management (Nag et al 2007);	na	na	na	na	na	na
42	Behavioural theory; Organisational Learning; Evolutionary Economics	Open Innovation (Chesbrough); Absorptive Capacity (Cohen and Levinthal); Cognitive Framing (Ocasio 1997); Dynamic Capabilities (Teece, Pisano, Shien 1997); Evolutionary Economics (Nelson and Winter 1982)	2001	Community Innovation Survey	Panel data	Multiple industries	Belgium, Germany, Greece, Portugal, Spain	n=4933 firms
43	Evolutionary economics; behavioural theory; Organisational learning	Absorptive Capacity (1990); Dynamic Capabilities (2000); Organisational Learning (1991); Evolutionary Theory (Nelson and	na	na	na	na	na	na

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
		Winter 1982)						
44	Behavioural theory; Organisational Learning; Evolutionary Economics; OI	review	2001	UK Innovation survey	Panel data	Multiple industries	UK	n=2655 firms
45	Behavioural theory; Organisational Learning; Evolutionary Economics; OI	Open Innovation (Chesbrough 2003); Organisational Learning (March 1991); Behavioural (attention-based) theory (Ocasio 1997)	2001	UK Innovation survey	Panel data	Multiple industries	UK	n=2707 firms
46	Organisational Learning; Network	Behavioural theory (Cyert and March 1963); Absorptive Capacity (1990); Evolutionary Economics (Nelson and Winter 1982); Organisational Learning (March 1991);	1990-2001	Secudities Data Corporation Database	Panel data	Software firms	USA	n=314 firms; 19928 alliances, 8469 partners
47	Behavioural theory; Transaction Cost Economics;	Absorptive capacity (1991); Network (Gulati 1995); TCE (Williamson 1975)	1994-2003	Securities Data Corporation Database	Panel data	High-technology industries (manufacturing and services)	USA	n=1159 alliances
48	Positioning; Organisational	Positioning (Porter 1985); Evolutionary	not indicated	na	Survey	Electronics firms	China	n=227 firms

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	Learning; Organisational Design	Economics (Nelson and Winter 1982);						
49	Organisational Design; Organisational Learning	"Partner research" (Leyden and Link 1999)	1984-2003	CORE database	Panel data	Multiple industries	USA	n=913 partnerships
50	Organisational design (ecology); Institutional theory	Absorptive Capacity (Cohen and Levinthal 1990); Network structure (Granovetter 1973); Social structure (Gulati 1995); Organisational Learning (1991); Positioning (Porter 1985); Institutional theory (Meyer and Rowan 1977)	1988-1999	US Patent Office	Panel data	Biotechnology	USA	n=176 ; n=1171 firm year observations
51	Positioning; Organisational Design; Organisational Learning	Behavioural theory (Cyert and March 1963); Evolutionary theory (Nelson and Winter 1982); RBV (Penrose 1959; Wernerfeldt 1984); Positioning (Porter 1985); Dynamic Capabilities (Teece and Pisano 1994);	na	na	na	na	na	na
52	Evolutionary Theory; RBV;	Social networks (Gulati 1998); Capabilities	1994-	French Community	Panel	Multiple	France	n=9832 firms

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	Behavioural theory	(Kogut and Zander 1993); RBV	1996	Innovation Survey	data	industries		partnering
53	Organisational design (ecology)	RBV (no source); TCE (no source);	1998	na	Survey	Electronics hardware	USA	n=12 firms
54	Organisational Learning; Behavioural Theory; Evolutionary Economics	Absorptive Capacity (Cohen and Levinthal 1990); Capabilities (Leonard-Barton 1992); Rationality (Prahalad 2004);	na	Irish Development Agency, Enterprise Ireland, University of Limerick, Irish Management Insitute	Survey	Multiple industries	Ireland	n=107
55	Transaction Cost Econoics; Evolutionary Theory; RBV; Organisational Learning;	Open Innovation (Chesbrough, 2003); Absorptive Capacity (Cohen and Levinthal 1990); Evolutionary Theory (Nelson and Winter 1982); TCE (Williamson 1989)	1998-2002	Spanish Ministry of Science & Public Enterprise Foundation	Panel data	Manufacturing	Spain	n=1300 firms; 6500 observations
56	Organisational Learning; Organisational Design; Organisational Ecology	Open Innovation (Chesbrough 2006);	na	na	na	na	na	na
57	Organisational Learning;	Absorptive Capacity (Cohen and Levinthal	1987-1997	Delphion database	Patent data	Telecommunications	USA	n=77 firms; n=707

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
	Evolutionary theory; Transaction cost economics; Organisational Ecology	1990); Network structure (Granovetter 1973); Social structure (Gulati 1995); Organisational Learning (March 1991); Evolutionary Theory (Nelson and Winter 1982);				equipment		observations
58	Positioning; Organisational Design;	none mentioned but strong underbinnings by RBV; Positioning; Dynamic Capabilities; Open Innovation	na	na	na	na	na	na
59	Behavioural theory; Organisational Design	no explicit mention - meta review. But touches of TCE; RBV; Network structure.	na	na	na	na	na	na
60	Organisational Learning; Evolutionary Theory; Organisational Ecology	Absorptive Capacity (1990); Organisational Learning (1991); Evolutionary Theory (Nelson and Winter 1982);	2005-2008	Eight lead user studies	Survey	Multiple industries	not indicated	n=8 firms; 709 interviews; total of 1147 interview transcripts
61	Organisational Design;	Competence (Dosi and Teece 1993); TCE (Williamson);	1997	na	Interviews	Mechanical and Electrical Engineering	Germany	n=308 firms
62	Organisational ecology;	Networks (Gulati 1999); Absorptive Capacity	not indicated	Archival data	Interviews	Multiple industries	USA	n=16 interviews;

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
		(Cohen and Levinthal 1990); TCE (no source)						n=50 reports analysed
63	Organisational Learning; Resource-based view; Evolutionary Economics	Absorptive Capacity (Cohen and Levinthal 1990); Behavioural theory (Cyert and March 1963); Social Network Structure (Granovetter 1973); Social structure (Gulati 1995); Organisational Learning (March 1991); Positioning (Porter 1990); Evolutionary Economics (Nelson and Winter 1982);	1971-1995	US Patent Office	Patent data	Optical disk industry	USA	n=2333 patents; 371 firm-year observations
64	Organisational Learning; Resource-based view; Evolutionary Economics	RBV (Barney 1991); Relational view (Dyer & Singh 1991); Organisational Learning (March 1991); Evolutionary Theory (Nelson and Winter 1982);	1980-1995	US Patent Office	Patent data	Semiconductor firms	USA	n=74 firms; n=13986 dyadic observations; n=4560 events
65	Transaction cost economics; Organisational Learning;	Absorptive Capacity (Cohen and Levinthal 1990); Social network (Gulati 1995); TCE (Williamson 1979)	not indicated	na	Interviews	Multiple industries	Germany	n=53 projects; n=60 firms:; n=159 interviews

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
66	Organisational Learning; Behavioural Theory;	Absorptive Capacity (Cohen and Levinthal 1990); Behavioural theory (Cyert and March 1963); Organisational Learning (March 1991); Nelson and Winter (1982);	not indicated	Dutch trade association	Cross-sectional data	Manufacturing industries	Netherlands	n=85 interviews (1st); n=155 (2nd) interviews
67	Organisational Learning; Behavioural Theory;	RBV (Barney 1991; Wernerfeldt 1984); Open Innovation (Chesbrough); Absorptive Capacity (Cohen and Levinthal); Organisational Learning (March 1991); Positioning (Banbury and Mitchell 1995);	1998-2000	Community Innovation Survey	Panel data	Multiple industries	Belgium; Germany; Greece; Portugal; Spain	n=5082 observations
68	Transaction cost economics; Behavioural Theory	Open Innovation (Chesbrough 2003); TCE (no sources)	na	na	na	na	na	na
69	Organisation Design; Organisational Learning	Absorptive Capacity (Cohen and Levinthal 1990); Positioning (Porter 1980);	1994-1996	Community Innovation Survey	Panel Data	Manufacturing and Services	UK	n=1275 firms; 6152 observations
70	Organisation Design; Organisational Learning;	Dynamic Capabilities (Agarwal and Selen 2009); Open Innovation (Chesbrough 2011);	2005	Mannheim Innovation Panel	Panel data	Transportation and Logistics	Germany	n=264 firms

#	Theoretical framework adopted – first analysis	Theoretical frameworks – second analysis	Year of sample	Source	Type	Sector	Country	Sample size
		Absorptive Capacity (1990); Relational view (Dyer and Singh);						
71	Positioning; Organisational Design	no	na	na	na	na	na	na
72	Positioning; Organisational Ecology; Institutional Theory	Absorptive capacity (Cohen and Levinthal 1990); Positioning (Porter 1998); Networks	2001	na	Question naire	Multiple new ventures (8yrs or younger)	China	n=202 firms
73	Learning Literature	Evolutionary theory (not mentioned).	2003-2007	na	Interview s	Multiple	USA; Europe	n=22 firms; 73 interviews

Appendix I – Analysis of contexts, interventions, mechanisms, and outcomes

Knowledge requirements	Financial resource requirements	Familiarity conditions	Industrial environment	Market access	Changes in social norms	Depth of partnership	Breadth of partnership	Partner type selection	Boundary spanning	Conduit mechanisms	Transaction-based focus	Evolutionary focus	Search for partners	Search for changed process capabilities	Search for product knowledge	Search for market knowledge	Search for higher social goals
					x	High	Narrow	Dissimilar	Local	na		x	x	x		x	x
x			x			High	na	na	Local	na	x			x			
		x	x			Mix	Narrow	Similar	Local	na	x	x					
		x		x		High	Mix	na	Local	na	x	x					
	x	x				High	Narrow	Similar	Local	na	x	x					
x		x	x			Mix	Mix	Mix	Local	na	x	x					
			x			High	Open	Dissimilar	Mix	Yes		x				x	
x				x		High	Narrow	Mix	Local	Yes		x			x		
x						High	na	Mix	Local	na		x	x				
x				x		High	Narrow	Similar	Nonlocal	Yes		x			x		
x	x					High	Narrow	na	Local	na	x	x					
x						High	Open	na	Mix	na		x			x	x	x
		x		x		Mix	Open	Mix	Local	na	x	x	x	x	x	x	x
x						High	Open	na	Mix	na		x	x		x	x	x
x		x				na	Narrow	na	Mix	na		x				x	
x		x				High	Mix	Mix	Local	na				x	x		

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Knowledge requirements	Financial resource requirements	Familiarity conditions	Industrial environment	Market access	Changes in social norms	Depth of partnership	Breadth of partnership	Partner type selection	Boundary spanning	Conduit mechanisms	Transaction-based focus	Evolutionary focus	Search for partners	Search for changed process capabilities	Search for product knowledge	Search for market knowledge	Search for higher social goals
x						High	Narrow	Similar	Local	na				x			
x					x	Mix	Open	Dissimilar	Mix	na		x				x	x
	x			x		Mix	Mix	Mix	Local	na	x		x		x		
	x			x		Mix	Narrow	Similar	Local	na	x			x		x	
x						High	Mix	Mix	Local	na		x	x				
x						High	Mix	Dissimilar	Local	na		x			x	x	
				x		High	Mix	Mix	Local	na		x		x	x	x	
		x				High	Narrow	Similar	Local	na		x		x			
x		x				Mix	Mix	Mix	Local	na	x				x	x	
x	x	x	x			High	Mix	Dissimilar	Local	Yes			x	x		x	
	x					Mix	Narrow	Mix	Mix	na		x		x	x	x	
x						Mix	Narrow	Mix	Local	na	x	x		x	x	x	
x						Mix	Mix	Similar	Mix	na		x			x	x	
		x				Mix	Narrow	Similar	Local	na		x	x				
	x	x				High	Narrow	Similar	na	na						x	
x		x		x		High	Open	Similar	Mix	na		x	x	x			
					x	na	na	Dissimilar	Nonlocal	na		x		x	x	x	x
					x	na	Open	Dissimilar	Nonlocal	na		x	x	x	x	x	x

Knowledge requirements	Financial resource requirements	Familiarity conditions	Industrial environment	Market access	Changes in social norms	Depth of partnership	Breadth of partnership	Partner type selection	Boundary spanning	Conduit mechanisms	Transaction-based focus	Evolutionary focus	Search for partners	Search for changed process capabilities	Search for product knowledge	Search for market knowledge	Search for higher social goals
x		x				na	Mix	Similar	Local	na		x			x		
		x		x		Mix	Narrow	Dissimilar	Nonlocal	na		x		x	x		x
x		x				High	Narrow	Mix	Mix	na		x			x		
x						High	Mix	na	Local	na		x			x		
x			x			High	Mix	Mix	Local	na		x			x		
x						Mix	Mix	Dissimilar	Local	na	x				x		
		x				High	na	na	na	na		x		x			
x		x				High	Mix	Mix	Mix	na		x		x			
x		x	x			Mix	Mix	Mix	Local	na		x			x		
x						High	Mix	Mix	Local	Yes		x		x	x		
x		x				Mix	Mix	Mix	Mix	na		x		x	x		
x		x				Mix	Mix	Similar	Mix	na					x		
		x				Mix	Mix	Similar	Mix	na	x		x				
			x			High	na	Dissimilar	Local	na		x			x	x	
x		x				na	na	Dissimilar	na	na		x	x				
x	x			x		Mix	Mix	Dissimilar	Local	na					x		
			x			na	na	na	Local	na		x	x				
	x	x	x			High	Mix	Mix	Local	na	x		x				

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Knowledge requirements	Financial resource requirements	Familiarity conditions	Industrial environment	Market access	Changes in social norms	Depth of partnership	Breadth of partnership	Partner type selection	Boundary spanning	Conduit mechanisms	Transaction-based focus	Evolutionary focus	Search for partners	Search for changed process capabilities	Search for product knowledge	Search for market knowledge	Search for higher social goals
x	x	x	x			Mix	Mix	Similar	Local	na	x			x			
x				x		High	Open	Dissimilar	Mix	Yes		x			x	x	
x						High	Mix	Mix	Local	na		x		x	x		
				x		High	Mix	Dissimilar	Mix	na		x		x	x	x	
x				x		Mix	Mix	Mix	Mix	na	x			x			
x		x				High	Mix	Mix	Local	Yes		x	x		x	x	
	x	x		x		Mix	Narrow	Similar	Mix	na		x			x	x	
x						Mix	Mix	na	Nonlocal	Yes		x	x	x			
x				x		Mix	Mix	Mix	na	na		x		x	x		
x		x			x	Mix	Mix	Dissimilar	Nonlocal	na		x	x	x			x
x				x		High	Mix	Similar	Mix	na	x			x			
x		x				na	Mix	na	Mix	na		x			x		
x		x				High	Mix	Similar	Local	na		x		x			
x		x				High	Mix	Mix	Local	na		x		x	x	x	
x						High	Mix	Mix	Local	na		x			x		
	x					High	Open	Mix	Local	Yes							
x		x				High	Mix	Mix	Local	na		x	x	x			
x						High	Narrow	Mix	Local	na		x		x		x	

Knowledge requirements	Financial resource requirements	Familiarity conditions	Industrial environment	Market access	Changes in social norms	Depth of partnership	Breadth of partnership	Partner type selection	Boundary spanning	Conduit mechanisms	Transaction-based focus	Evolutionary focus	Search for partners	Search for changed process capabilities	Search for product knowledge	Search for market knowledge	Search for higher social goals
x	x			x		High	Mix	Similar	Local	na	x		x		x		
				x		High	Open	Dissimilar	Nonlocal	na		x			x	x	
x				x		Mix	Open	Dissimilar	Mix	Yes		x	x	x	x	x	