Conceptual framework for collaborative open innovation with a startup ecosystem

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Abstract

The terms collaboration and startup ecosystem have become key elements within the discourse pertaining to open innovation processes in big corporations and startups alike. Even though the practice as well as the academic use of such terms to describe these forms of collaboration with startup ecosystems has increased over the last five years, little research has been done to precisely define their meaning and characteristics within the context of open innovation. The purpose of this paper is to investigate these terms, as well as to examine how they differ from related and often-interchanged concepts. By means of a systematic literature review, these definitions are derived, and a foundation for theoretical knowledge is provided. These definitions are expected to facilitate a consensus in the understanding and usage of these terms among academics and professionals.

Keywords: Open innovation, innovation, entrepreneurship, corporate innovation, collaboration, startups, startup ecosystem, co-innovation, literature review.

Introduction

In recent years, the terms collaboration and startup ecosystem have been frequently used by business executives, organizations and academics within the context of open innovation. The last decade has seen the rapid growth of digitalization and the use of open innovation practices within the startup community. This is owing to the utility offered by technology in the successful exploitation of new opportunities and in dealing with the accompanying challenges brought about by the rapidly changing technological landscape (Chesbrough & Brunswicker, 2014). Hence, these terms have gained considerable importance and the usage of such terms has become frequent (Borissenko & Boschma, 2016).

Digitalization is a fast-moving megatrend, leading to rapidly changing circumstances for entire industries, and thus, it is widely believed to create both opportunities and challenges for businesses of all sizes. It is expected that digitalization will most affect large corporations, who face these challenges through collaborative open innovation (Chesbrough & Brunswicker 2014). Opening up the innovation process to external partners has been recognized by both researchers and managers as a key factor in successful innovation (Gassmann & Enkel, 2004). In particular, collaborative open innovation practices between large corporations and startups has gained momentum over the last few years (Chesbrough & Brunswicker 2014; Mocker, Bielli, & Haley, 2015; Hathaway, 2016; Waters-Lynch & Potts, 2017). The term startup ecosystem is closely associated with open innovation. Silicon Valley, for example, is often referred to as a startup ecosystem (Engel & del Palacio, 2009; Oxford Dictionaries, 2017; Pauwels, Clarysse, Wright & Van Hove, 2016), wherein open innovation considered a key element in fostering entrepreneurship (Smorodinskaya, Russell, Katukov, & Still, 2017) and the ability to harness the newest ideas and concepts (Borissenko & Boschma, 2016; Durst & Poutanen, 2013; Mason & Brown, 2014).

Even though the practice of, as well as the academic interest in, collaborative forms of innovation with startup ecosystems has increased over the last five years, little research has been done on understanding precisely what these terms – open innovation and startup ecosystem – actually mean, and how one can comprehensively define their characteristics. One of the main challenges of investigating collaboration and startup ecosystems is that these terms are, in many cases, used by different researchers and practitioners to mean different things (used discordantly), or that they are used interchangeably with other terms for similar concepts (Barratt, 2004; Dominguez, 2011; Suominen, Seppänen, & Dedehayir, 2016). For instance, the term collaboration is often used interchangeably with concepts such as cooperation and coordination. The concept of an ecosystem is rooted in the natural sciences (Willis, 1994), and has not only been adopted within the field of innovation, regardless of the associated business context, but has also been misapplied, for instance, when the term community was intended (Suominen, Seppänen, & Dedehayir, 2016). Since collaborative open innovation with startup ecosystems is gaining importance, both in practice and theory (Borissenko & Boschma, 2016; Chesbrough & Brunswicker, 2014), it is appropriate to propose precise definitions for these terms in order to allow a clear understanding of the practice of open innovation, and in doing so, to better facilitate communication between and within the professional and academic communities.

In this article, definitions and usages of the terms collaboration and startup ecosystem within the context of open innovation are first explored. The article discusses the differences between these terms and terms used for similar concepts such as coordination and cooperation. Thereafter, the article provides a precise definition of collaborative open innovation within the context of a startup ecosystem. During the work leading to this paper, an exploratory approach to a systematic, rule-guided, qualitative literature review (Mayring, 2000) was followed. A review of contemporary literature (in keeping with VomBrocke, Simons, Niehaves, Reimer, Plattfaud, & Cleven, 2009) on core keywords related to collaborative open innovation with startup ecosystems was carried out. This was followed by research into explanatory concepts towards understanding how these terms are structured within the context of open innovation. By comparing prior and related research on those terms, clear definitions and graphical illustrations for these terms and the links between their characteristics are developed and explained. To limit its scope, this paper will focus on open collaborative innovation between large companies and startups. The approach of this paper is original because it is the first attempt (to the knowledge of the authors) to propose a specific understanding of these terms. The resulting definitions are expected to lay the groundwork for a common understanding and use within both academia and practice.

The paper is structured as follows: In the following section, we outline the importance of collaboration and startup ecosystems within the context of open innovation between corporations and startups. We then describe our methodology before detailing our results. We next discuss these outcomes and provide conclusions while describing the limitations of this study. Finally we outline recommendations for further research.

The importance of collaboration and the startup ecosystem within open innovation

The pace of technological development and innovation has never been faster than today, and corporations are at constant threat of not being able to keep up with the pace of change (Schättgen & Mur, 2016). This is especially the case for large companies for whom the new standards require an inevitable change in strategic and organizational framework if they expect to survive economically. In particular, shorter innovation cycles, rising development costs, and limited resources are some of the reasons why companies can no longer innovate in isolation (Gassmann & Enkel, 2004). It is becoming increasingly common for large corporations to adapt to these challenges through open innovation

(hereafter referred to as "OI"), first introduced by Chesbrough (2003). Opening up the innovation process to external partners has been recognized by both researchers, businesses and industry managers as being key to successful innovation (Aubert, Kishore, & Iriyama, 2015; Chesbrough, 2003). The OI process is an approach that adapts to the changing circumstances of the innovation environment by allowing the boundaries of a corporation to become less rigid and thereby allowing for conditions that facilitate external collaboration (Chesbrough, 2017). OI can thus be understood as "the antithesis of the traditional vertical integration model in which integral innovation activities lead to internally developed products and services that are then distributed by the firm" (Chesbrough, 2017, p.35). The OI paradigm is characterized by "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation" (Chesbrough, 2006, p.1). OI is thus a combination of internal and external knowledge exchanged through external partnerships, which may occur in the interactive forms of cooperation, coordination, or collaboration.

Chesbrough & Brunswicker (2014) observed that knowledge created outside of a corporation's boundaries, such as that created by and acquired from startups, has become increasingly important for increasing the pace of innovation. Disruption of major industries in recent years has been attributed to startups such as Airbnb and Uber that play a key role in accelerating innovation, an essential requirement for the survival of corporations. Startups are typically agile, adaptive and resilient because they are not restricted by established processes and administrative procedures (Schättgen & Mur, 2016; Weiblen & Chesbrough, 2015). This is especially apparent when considering how the practice of formal partnerships has significantly increased over the last ten years (Ringel, Taylor, & Zablit, 2016). In fact, disruptive innovations emerging from startups have long been considered a threat to the survival of corporations. However, as of late, this threat is being turned into an opportunity by both startups and corporations, in addressing individual resource or knowledge gaps through collaborative partnerships (Schättgen & Mur, 2016). Neyens, Faems, & Sels (2010) found that collaborating corporations outperform those that do not initiate collaboration with external partners. Synergies resulting from such collaborations offer many advantages for both parties. Collaborations with startups primarily allow large corporations to detect, develop, and test new technologies with lower costs and less risk. These collaborations also promote engagement with creative fresh talent and exposure to new ideas. On the other hand, startups are interested in profiting from the considerable resources a corporation has to offer, such as market knowledge and experience, networks, finance, the strong reputation of the corporation itself, and the chance to test their products to see how they would fit within the market (Weiblen & Chesbrough, 2015).

In addition, through formal partnerships, corporations become more visible to the startup ecosystem (Mocker, Bielli, & Haley, 2015). Therefore, many large European corporations have already set foot in the startup ecosystem to enhance their collaborative engagement. Such corporations typically reach out to the startup ecosystem through their own innovation programs, or by participating in programs involving or organized by third party organizations (Mind the Bridge, 2017).

Methodology

To develop a full definition of collaborative open innovation with regard to startup ecosystems, systematic approach with regards to the literature review was adhered to, as is standard practice in the IS field (Cumbie, Jourdan, Peachey, Dugo, & Craighead, 2005; Palvia, 2015, Gough, Oliver, & Thomas, 2012; Petticrew & Roberts, 2006). Fink (2005, p.3) states that a literature review can be best defined as a "systematic, explicit and reproducible design for identifying, evaluating and interpreting the existing body of recorded documents." The two main objectives of a literature review are to summarize the past research by identifying the relevant patterns, themes and issues, and to assist in

identifying the fundamental concepts within the said area of study (Meredith, 1993). It can also contribute significantly to identifying any gaps in research (Bryman, 2015) while presenting a summary of current research at a level that is readily understandable. Furthermore, a literature review can form the basis for the proposal of a theory (Seuring & Gold, 2012).

An explicit method was designed for the review (Mayring 2002; Pittaway, Robertson, Munir, & Neely, 2004; Seuring & Gold 2012). The study constituted of a process of selecting and analyzing relevant papers which dealt with similar themes: startup ecosystem, collaboration, and OI. Through this study, it was possible to provide a descriptive analysis of the current body of knowledge on the intersection of these subjects. The review for this research was carried out by two researchers over a period of 18 months (September 2016 to April 2018). Each of the two researchers was responsible for carrying out a review on each selected article, applying open coding, category creation and abstraction. This was followed by a joint discussion of the findings until an agreement was reached regarding interpretation of the data (Nachmias & Nachmias, 1996).

Sampling

According to Patton (2015), any sampling performed in a systematic literature review should be in line with academic conventions on sampling procedures. In this research, we only considered English and German publications from peer-reviewed journals. The publication search was carried out by applying a keyword search. The authors identified keywords on the subject based on a preliminary review of the literature and brainstorming. The keywords included “network”, “system”, “community”, “co-creation”, “co-innovation”, “cooperation”, “coordination”, “business-, and innovation ecosystem”, “collaborative ecosystem”, “open innovation”, “startup-“, “collaboration” and “ecosystem”. The keywords were constructed into search strings. For example, the search string [(“startup*”) OR (“innovation*”) AND (“ecosystem*”) OR (“network*”) AND (collaboration*”) AND (“open innovation*”)] was the first string used for finding citations. An initial search of Google Scholar was undertaken using the search string above to identify further keywords for the main search. Additional words, such as service-, platform-co-design, co-development, co-working, or cluster were added to the search terms. The basic search string “open innovation” AND “startup*” AND “ecosystem” AND “collaboration*” was used in seven search engines: Wiley (http://www.wiley. com), Springer (http://www.springerlink.com), Emerald (http://www.emeraldinsight.com), Elsevier’s Scopus (https://www.elsevier.com/solutions/scopus), and libraries such as JSTOR (http://www.jstor.org), and EBSCO (http://www.ebsco. com), as well as the Oxford Dictionary (https://www.oxforddictionaries.com/), to identify the key citation index for the review. This approach was chosen based on the volume of citations related to the basic search string. The chosen engine was Elsevier’s Scopus. In addition to this engine, experience reports and articles as well as general definitions from Oxford Dictionaries were utilized in the review. The citation databases chosen – Scopus, Google, and Oxford Dictionaries – were reviewed using the identified search strings. These search strings were progressively analyzed from the most basic to the most complex. The results were first ordered by relevance and then by recency. An initial selection of context-relevant papers was performed by checking the keywords in the articles. Using the final string, 142 citations were obtained. Further, inclusion and exclusion criteria were identified. In the first group of articles, the research topics were concerned with the subject of collaboration. The data was collected using a cyclical process and analyzed in order to describe the framework of collaborative open innovation within a startup ecosystem. A search on items of constructs was conducted, considering open ecosystems, startups, collaborations and corporations by first reviewing all the concepts dealing with collaboration. The

resulting summary of these characteristics is presented in Figure 1, as well as the titles of the articles that included them.

Collaboration																								
Characteritics / Author, Year	Chesbrough, 2017	Mind the Bridge, 2017	Smorodinskaya, Russell & Katukov, 2017	Waters-Lynch & Potts, 2017	Borissenko and Boschma, 2016	Hathaway, 2016	Ringel, Taylor & Zablit, 2016	Schättgen & Mur, 2016	Mockere, Bielli & Haley, 2015	Weiblen & Chesbrough, 2015	Chesbrough & Brunswicker, 2014	Durst & Poutanen, 2013	Lee, Olson, and Trimi 2012	Neyens, Faems & Sels 2010	Piller, Vossen & Ihl, 2010	Chesbrough and Schwartz, 2007	Fliess & Becker, 2006	Franke & Piller, 2004	Olson, 2004	Stoller-Schai, 2003	Mattessich et. al, 2001	Schrage, 1995	Sinclair, Fox & Bullon, 1995
Increasing importantce of collaborations with startups for open innovation		x	x	x		x	x		x		x		x	x							x		
Favours the process of open innovation and value creation	x				x			x		x				x		x	x		x				
Formal, mutually benefical relationsips / synergies												x	x								x	x	
Enables knowledge flow								x					x									x	
Two or more people working together																x					x		x
(Social and dynamic) creation process with common goals, mission and vision															x						x	x	
A jointly created structure and on shared authority, accountability, resources, and rewards.													x					x			x		
Divided tasks and shared control and risks																				x	x		
Well-defined structures, responsabilities and communication processes																					x		

Figure 1: Characteristics of collaboration as identified in the literature. The crosses mark which article dealt with the characteristic.

Next, the inductive method was applied to identify the construct “ecosystem” in the second group of articles, which included articles dealing with both business and economic perspectives on ecosystems. This provided detailed information concerning the state of the industry of understanding the characteristics of startup ecosystems. Figure 2shows the resulting characteristics of startup ecosystems, along with the corresponding article that included each point.

Startup Ecosystem															
Characteritics / Author, Year	Oxford Dictionaries, 2017	Smorodinskaya et al., 2017	Arikka-Sternroos, Peltola, Rikkiev & Saari, 2016	Berger & Kuckertz, 2016	Borissenko and Boschma, 2016	Pauwels, Clarysse, Wright & Van Hove, 2016	Mintzberg, 2015	Mason and Brown, 2014	Durst & Poutanen, 2013	Isenberg 2013	Isenberg, 2011	Isenberg 2010	Engel & del Palacio, 2009	Ferrary & Granovetter, 2009	Saxenian, 1994
Composes a community of interacting organisms / actors / institutions	X	X					X	X				X		X	
Composes a physical (entrepreneurial) environment	X	X						X			X				
Is an open, interconnected system (e.g. complex network)	X						X				X				X
Silicon Valley as an example	X					X							X		
Open collaboration as a key element / process which fosters entrepreneurship/innovation		X			X			X	X						
Independent startups as a fundamental driver for innovation			X	X								X			
Environment interconnects the micro- and marco level of economies		X						X				X			
Creation of synergy effects		X							X						
Of temporarily unfolding and evolutionary nature					X						X				
Self-sustainable concept										X					
Six generic (successful) ecosysem domains											X				
Non-hierarchical system															X

Figure 2: As in Figure 1, but for the characteristics of a startup ecosystem.

The term startup and other search terms used to identify papers about new ventures (like entrepreneur and derived terms) are also commonly used to address other phenomena. For example, entrepreneurship is an individual disposition investigated in several studies. Therefore, exclusion criteria were introduced in order to exclude these unrelated papers systematically. The citations identified were then reviewed according to those inclusion and exclusion criteria. Two stages were undertaken to reduce the number of citations. The first analyzed the titles and keywords of sources according to the criteria, leaving 86 articles. The second analyzed the abstracts of the articles – which had been classified as potentially being of interest in the previous step – in order to assess their actual compatibility with the inclusion and exclusion criteria. The definitions and perspectives of the authors of these articles were assessed, using the cross-reference technique, to check if there were any additional papers that should still be incorporated in the review process (Coleman, Fadel, Fitzpatrick, & Thomas, 2017). After this check, 38 citations remained. These 38 sources represent the material used for the review. The 38 sources were analyzed in order to identify frequently addressed issues. These issues were then organized into the themes “startup ecosystem” (15 sources) and “collaboration” (23 sources), and the results obtained for each theme were summarized and discussed.

The first evaluation of the literature was aimed at gaining a rough idea of the nature of the publications that were being examined. The evaluation entailed assessing the distribution of the selected publications over time; the number of articles in the different journals; the classification of articles depending on the research techniques applied; and finally, how the papers were distributed geographically. This initial evaluation provided a preliminary picture of the analyzed materials based on these characteristics, allowing some categories and dimensions to be selected prior to the actual reviewing of the material. These categories in turn, were refined as the review progressed (Seuring &

Müller 2008; Seuring & Gold 2012; Brandenburg, Govindan, Sarkis, & Seuring, 2014; Govindan, Soleimani, & Kannan 2015). A report structure was identified. The report structure sought to guide the analysis of the papers by different reviewers. It indicated the primary information to be collected (Pittaway, Robertson, Munir, & Neely, 2014). An individual report was written for each paper and its respective author, according to the identified report structure. Specifically, the main characteristics linked to the two themes collaboration and (startup) ecosystem in the papers and the main results were reported. Based on the identified results, each researcher defined a list of relevant characteristics. The initial lists contained a number of topics ranging in score from 8 to 14 for collaboration and from 10 to 13 for (startup) ecosystem. The reports were circulated among the authors, and each author made comments on the others' reports and lists. The process continued until convergence on the contents of the papers was achieved. Also, the lists of topics were circulated, and when possible, the number of topics was reduced in order to reach as small a number of themes, including homogeneous topics, as possible. Articles were reviewed once again and the relevant sections of the literature were written theme of the articles being reviewed. From this, a diagram was formulated, which describes how open collaborative innovation exists between independent startups and big companies, and how this relates to startup ecosystems. Figure 3 summarizes the cyclical process that was used in the data collection and the analysis, as well as the research tools that were employed while developing the taxonomic framework.

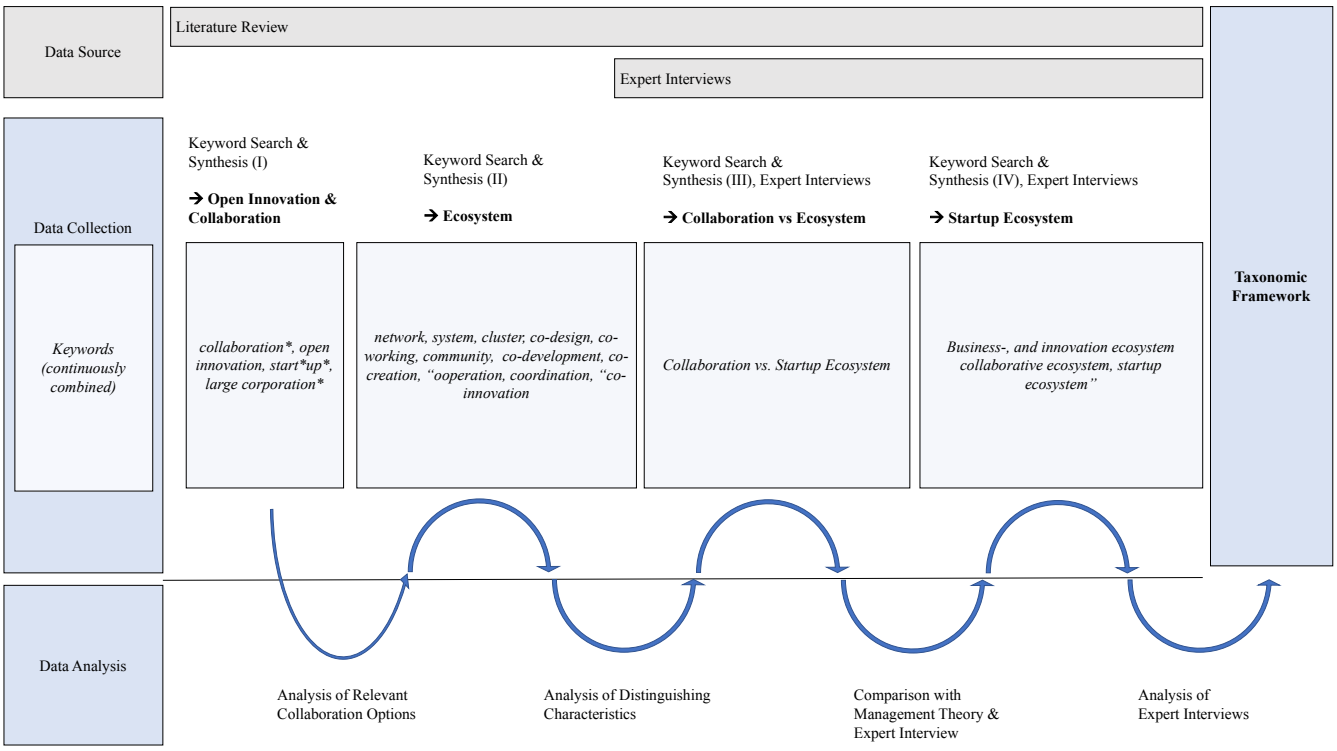

Figure 3: Cyclical research process used in the data collection and analysis.

When the year of publications is considered, analyzing the frequency of the retrieved papers makes clear that this subject of study and the evidence base are relatively recent (Figure 4). Up to 2009, only eight papers were published on the theme of collaboration within the context of open innovation. Apart from one publication in early 1994, only one paper had been published on startup ecosystems within the context of open innovation. Further, for the period between 2009 and 2017, the data shows an increase in the frequency of publications on the subject. Between 2012 and the present, the search

retrieved at least one paper/year on the topic of interest, with a maximum of eight papers in 2016. It is evident that the number of publications relevant to the topic has increased substantially in recent years, indicating a growing interest in the subject. The topic is now well established and is of significant research interest.

In terms of how the selected papers were distributed among journals, we found that they were published in 24 distinct journals, clearly indicating the diversity of groups that are interested in this topic. This suggests a number of different academic perspectives on the subjects.

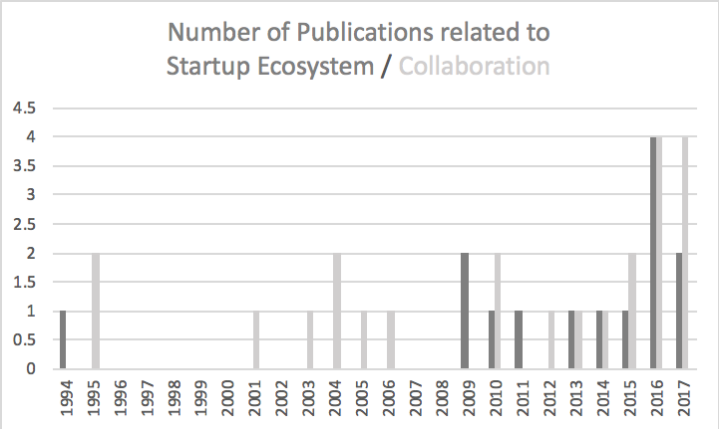

Figure 4: The number of publications covering the issues dealt with in this work over time.

Rigor of Research

A literature review of relevant articles was carried out in order to develop an all-inclusive framework for collaborative open innovation within a startup ecosystem. The literature review involved researchers integrating large volumes of textual data, and then systematically identifying the properties of the phenomenon being investigated that are found across the data collected (Al-Debei & Avison, 2010; Holsti, 1969; Krippendorff, 2004). In this study, a qualitative approach was selected (Altheide, 1996; Bryman, 2015) involving the identification of themes that were expected to emerge from the review. Objectivity of research was achieved by using a structured and systematic process for avoiding researcher bias (Kassarjan, 1977; Mayring, 2003). Both deductive and inductive approaches were utilized in the derivation of structured dimensions and associated analytic categories that lead to the systematic grouping of the reviewed literature. The deductive approach involved the selection of dimensions and categories prior to the analysis, while the inductive approach was employed to refine and add to the selected dimensions and categories (Richards, 2014; Richards & Morse, 2012). The in-depth analysis of the selected text allowed for the identification of concepts associated closely with collaboration and startup ecosystem.This facilitated the refinement of the framework relating these concepts, while using the collected information as the guidelines for synthesizing the acquired knowledge dealing with collaboration between corporations and startup ecosystems, again with the aim of developing an all-inclusive and integrated framework (Baregheh, Rowley, & Sambrook, 2009; Al-Debei & Avison, 2010).

One problem that arose was the fact that, due to the large volume of extant literature, it was impossible to read everything word for word. The problem is compounded when the material is spread over broadly defined issues, as is the case in this study (Brewerton & Millward, 2001). This is therefore related to the literature review, where the researchers have the responsibility of deciding how the paper

is to be examined and comprehended, the associated risks only able to be minimized or eliminated by having more researchers analyzing the data (Mayring, 2002). Therefore, in an attempt to reduce the potential for bias, the two authors coded for the derived categories to enhance inter-coder reliability. However, including two coders can result in subjective interpretations as they may differ in their personal approach to the mental processes, which in turn creates inter-subjectivity (Potter & Levine-Donnerstein, 1999). For example, considering the case of judging a particular code, joint consultations were made by referring to an agreed-upon coding standard to solve the issue. The categories themselves were defined to ensure the reliability of the coding process was upheld. Finally, the whole research process was documented for transparency and to allow replication, as well as to ensure the quality and usefulness of the literature review (Kolbe & Burnett, 1991).

The paper is reliable as all the formal steps required in the analysis were followed by the two authors. It met the minimum required standards, but given that the time allocation for this research work was limited, it was not practical to include more information than what is presented. The inter-rater tool indicated that the reliability is high, which gives credit to the two researchers who have been working together as a team on this research for 18 months. Despite the result from the inter-rater, different judgments – which were resolved – arose. For transparency, we documented everything involved in the whole research process. The research paper was also validated internally by continual presentation in seminars and by discussion with fellow researchers, a process which contributed substantially to the minimization risk and heightened validity of our choice of scientific articles. The result is an appropriate and comprehensive review of the literature (Brandenburg, Govindan, Sarkis, & Seuring, 2014; Brewerton & Millward 2001; Reim, Parida, & Örtqvist 2015).

Results

The literature review aimed to refinine the concept of open collaborative innovation in a startup ecosystem by defining collaboration and startup ecosystems within the context of open innovation. In this section, the results of the literature review study are presented as follows.

Collaboration in the Context of Open Innovation

The term cooperation is derived from the Latin noun cooperatio or the Latin verb cooperari, which translates as “participation” and “to participate.” Etymologically, these terms combine the prefix con, meaning “with” or “together,” and the verb operari, meaning “to work.” Sinclair et al. (1995) reiterate the original meaning of the term stating that “a cooperative activity is done by people working together” (p. 361). Cooperation is therefore the manifestation of the willingness of two or more individuals to work together in order to reach a common or individual goal through the division of labor (Stoller-Schai, 2003). In particular, cooperation is characterized by the division of a joint task, wherein each cooperating party individually solves assigned subtasks within a commonly negotiated context (Stoller-Schai, 2003). Parties involved in a cooperative activity exchange information, knowledge, and experiences as needed, but they may not engage in joint actions or planning, may not construct joint structures, and may not share a joint mission. In a cooperative undertaking between two organizations, each organization may retain its independent authority; and this arrangement implies a low level of risk (Mattessich, Murray-Close, & Monsey, 2001). Cooperation strives for mutual benefit, but the goals may be either of a common or individual nature (Fitzek & Katz, 2006). Coopetition is a sub-form of cooperation that combines the advantages of cooperation and competition. In the context

of business, Luo defines coopetition as "cooperating to create a bigger business pie while competing to divide it up" (Luo, 2004, p. 201).

The word coordination is derived from the Latin term coordinatio, consisting of the prefix con, meaning "together," and the noun ordination, meaning "order." A general definition of coordination that is widely accepted is "the managing of dependencies between entities" (Malone & Crowston, 1994). Sinclair et al. (1955) define coordination more broadly as "organizing the activities of two or more groups, so that they work together efficiently and know what the others are doing" (p. 362). Stoller-Schai (2003) defines coordination as "a mutual adjustment of actions through the regulation by a precise timing and organization, based on implicit or explicit rules and a clear assignment of subtasks to the parties involved" (p. 46). Within organizations, the coordination of actions and processes is often determined by organizational structures. As a result, the optimization of such coordination will inevitably call for structural reorganization as circumstances change (Stoller-Schai, 2003). Coordination is more formal than cooperation since it includes joint planning, the use of interdependent communication channels, the shared understanding of a common mission, and the sharing of resources and rewards (Mattessich, Murray-Close, & Monsey, 2001).

Collaboration derives from the Latin term collabōrāre, a combination of con, and laborare, meaning "labor." Sinclair, Fox & Bullon describe collaboration as "a piece of work as a result of people or groups working together" (1995, p. 307). Based on an extensive literature review, Mattessich, Murray-Close, & Monsey (2001) distinguish between collaboration, cooperation, and coordination in terms of four distinguishing sets of elements that characterize each type of partnership. These are discussed in relation to collaboration as follows:

1. Vision and relationships: Collaboration is characterized by a durable and pervasive relationship among two or more previously separate parties who create, pursue common goals and have a shared mission. This includes the undertaking of one or more long-term, results-oriented projects.

2. Structure, responsibilities, and communication: Collaborative relationships require the recreation of organizational structures. This process includes the establishment of well-defined communication channels and of clearly-defined roles that constitute the formal division of labor. An iterative and comprehensive negotiating process is inevitably required to establish a common frame of reference for determining joint strategies and success measures.

3. Authority and accountability: Authority in a collaborative partnership is determined by the organizational structures of the involved parties and is purposefully divided among the parties. Leadership is dispersed, and both control and risks are shared. Stoller-Schai (2003) adds that this establishes an environment of equal opportunity and enables fair discussions that reflect the participants' complementary competencies and various perspectives, elements that are essential for a collaborative process to reach its full potential.

4. Resources and rewards: Since every party contributes its individual resources and reputation to the partnership, collaboration potentially poses a high level of risk. While resources are pooled or jointly secured, rewards are achieved through synergy and are shared among the members of the collaboration.

Schrage (1995) further highlights creativity with a social aspect as an important characteristic of collaboration and demonstrates a connection within the context of innovation: "...collaboration is the purpose of shared creation: two or more individuals with complementary skills interacting to create a

shared understanding that none had previously possessed or could have come to on their own. Collaboration creates a shared meaning about a process, a product, or an event. In this sense, there is nothing routine about it. Real innovation comes from this social matrix" (p. 33). Therefore, process is considered as an important element of the proposed definition.

Collectively, these findings are utilized to provide a comprehensive description of the concept of collaboration as distinguished from cooperation and coordination, based on five distinguishing elements (Figure 5).

Element / Form of Partnership	Cooperation	Coordination	Collaboration
Vision and Relationships	• Informal relationships • No commonly defined or shared goals, mission or vision • Interaction as needed, may last indefinitely	• More formal relationships • Compatible missions, goals and vision • Interaction usually around one specific project of definable length	• Formal relationships • Durable and persuasive relationship • Common mission, goals and vision • One or more projects aiming at long-term results
Structure, Responsibilities and Communication	• No common organizational or planning efforts • Information is shared as needed	• Some planning and division of roles and establishment of communication channels • Parties function relatively independently	• Recreation of organizational structures • Iterative and comprehensive negotiation process
Process	• Enforced, individual process	• Mutual adjustment of actions, defined by structures	• Social, dynamic creation
Authority and Accountability	• Authority rests solely with the individual organization • Central, independent control • No shared risks • Little risk level	• Authority rests with individual organizations, but with consultation among parties • Little shared risk • Increased risk level	• Authority determined by organizational structure, purposefully divided • Sharing of control • Sharing of risks • High risk level
Resources and Rewards	• Separation of resources • Separation of rewards	• Mutually acknowledged resources, can be made available for a specific project • Mutually acknowledged rewards	• Individual contribution • Pooled and jointly secured resources • Shared rewards based on synergy effects

Figure 5: The defining elements of collaboration, cooperation, and coordination (based on Mattessich et al., 2001 and Schrage, 1995).

Collaboration is therefore defined here in relation to large corporations and startups, within the context of open innovation as:

> *A strongly committed, formal, and mutually beneficial relationship between two or more parties with common goals and a common vision to innovate, achieved through a social and dynamic process of value creation, based on a jointly-created structure and well-defined responsibilities and tasks, as well as on shared control, risks, authority, accountability, resources, and rewards. Collaboration may be differentiated from coordination and cooperation in terms of its underlying vision, structure, authority and accountability, resources and rewards, and the process by which innovation is brought into existence*.

A striking observation that emerges from a more in-depth review of academic research and reports on collaboration is that there exist several sub-forms of collaboration applicable to open-innovation partnerships. They are discussed as follows to further the understanding of the concept of collaboration.

One of these sub-forms is co-innovation. According to Lee, Olson, & Trimi (2012), co-innovation is a "new innovation paradigm where new ideas and approaches from various internal and external sources are integrated in a platform to generate new organizational and shared values" (p. 817). Another sub-form is co-development, a collaborative product-oriented partnership. Chesbrough & Schwartz (2007) define co-development partnerships as "increasingly effective means of innovating the business model to improve innovation effectiveness". "These partnerships", they add, "embody a mutual working relationship between two or more parties aimed at creating and delivering a new product, technology or service" (p. 55). Co-development integrates partners into the Research and Development (R&D) processes that underlie innovation, thus creating business-model options that can significantly reduce the expense of R&D, expand innovation output and open up new markets that may otherwise have been inaccessible (Fliess & Becker, 2006; Olson, 2004). Additionally, one approach to co-development – co-creation – allows the customers themselves to be actively involved in the design of new offerings, often with resources provided by the corporation (Franke & Piller, 2004). On the basis of a conscientious literature review, Galvagno & Dalli (2014) define co-creation as "the joint, collaborative, concurrent, peer-like process of producing new value, both materially and symbolically" (p. 644). From the perspective of innovation studies, the focus of co-creation is towards collaborative open processes involving companies and users. Research on information systems falls within the scope of this perspective, hence its focus on customer relationship management (Alavi, Ahuja, & Medury, 2012) and on technologies that support open-innovation platforms for customer engagement (Jonsson, Westergren, & Holmstrom, 2008; Kohler, 2016; Zwass, 2010). Summing this up, Piller, Vossen, & Ihl (2010) define co-creation as an "active, creative, and social process, based on collaboration between producers (retailers) and customers (users)" (p. 9). Building upon this understanding, Lee, Olson, & Trimi (2012) add that "the core of co-innovation includes engagement and compelling experience" in order to create value. Co-creation includes co-design, in which social exchanges and latent needs serve as sources of information that need to be considered when innovating (Franke & Piller, 2004). Spinuzzi's (2012) review and discussion of recent work on the term co-working concludes by defining it as a "service that proprietors provide indirectly, by providing a space where co-workers can network their other activities" by engaging in internal and external peer-to-peer interactions (p. 418). Co-working may thus be understood as a service that may be used to facilitate collaboration – an optional support service.

This understanding of co-working is illustrated in Figure 6, showing the interconnections between the various terms elaborated upon in this section.

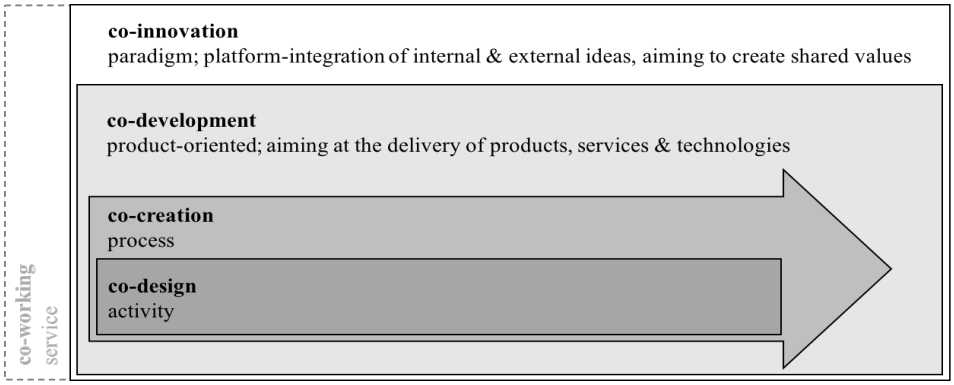

Figure 6: Relevant forms of collaboration, which are applied in open innovation partnerships (the arrow of co-creation symbolizes a process).

Reports on real-life cases or empirical studies often refer to co-innovation as a form of collaboration. This is in accordance with the definition of co-innovation found in Lee, Olson, & Trimi (2012) as discussed above. It must be granted however, that pertinent academic literature contains discordant definitions of co-innovation, referring to co-innovation as both a collaborative interaction (Lee, Olson, & Trimi, 2012) that typically involve customer-driven processes (Piller, 2008; Ramaswamy, 2009; Romero & Molina, 2011; Vernette & Hamdi-Kidar, 2013), and as a cooperative interaction (Bossink, 2002; Maniak & Milder, 2008) that may include coordinative elements. Throughout this paper, we will rely on the definition of co-innovation drawn from Lee, Olson, & Trimi (2012), as it is a relatively recent definition and is supported by a range of recent authors (Piller, 2008; Ramaswamy, 2009; Romero & Molina, 2011; Vernette & Hamdi-Kidar, 2013), and corresponds with how the term is most commonly used in practice.

Figure 7 depicts the role of collaboration within the context of OI and shows how the functions of collaboration differ from those of other sorts of partnership.

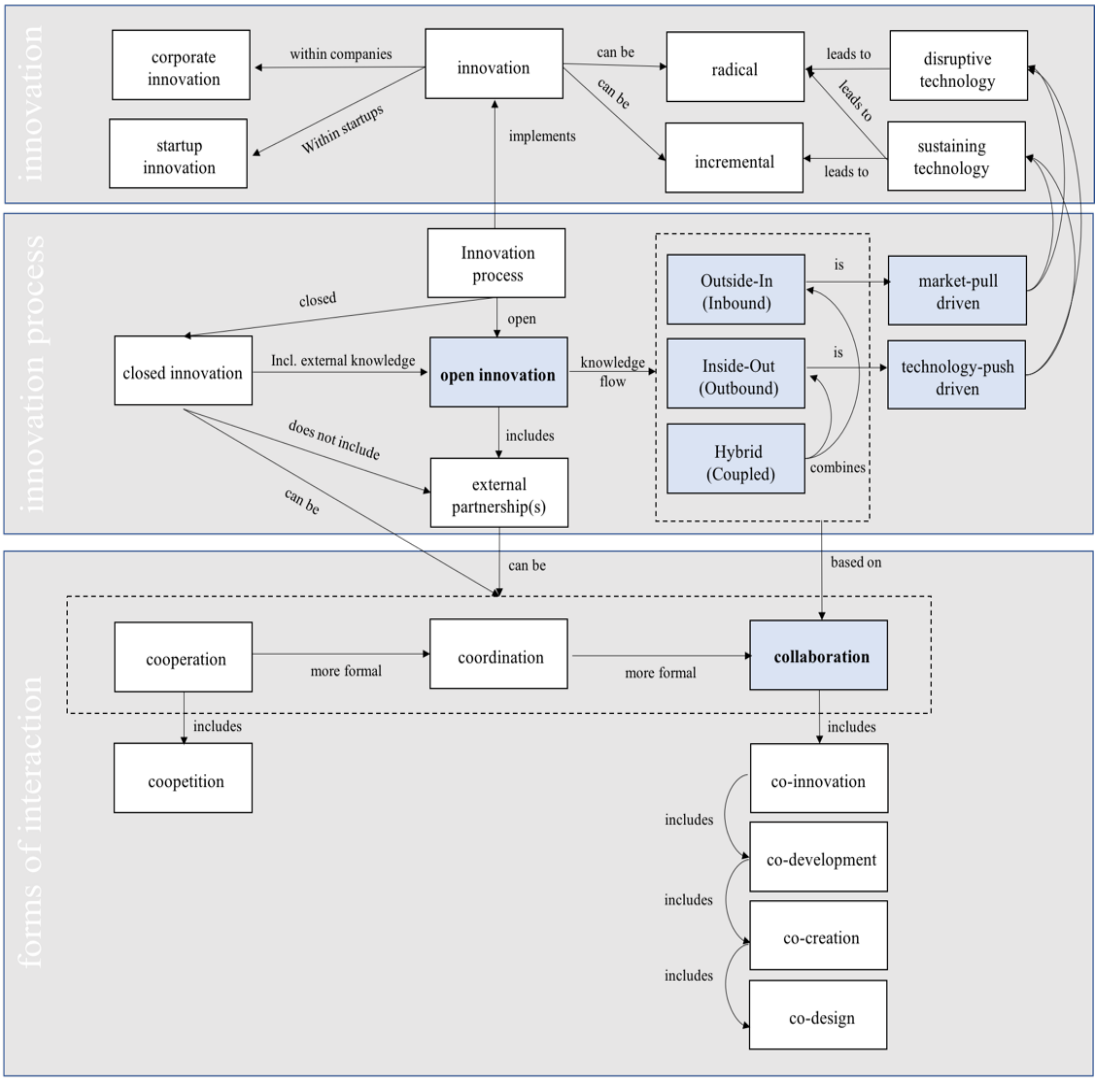

Figure 7: Collaboration within the context of open innovation and how it differs from such other partnership options as coordination and cooperation.

Collaborating with a startup ecosystem

There are a number of locations such as Silicon Valley, New York City, Boston, London, Tel Aviv and Berlin that are often referred to as startup ecosystems (the term entrepreneurial ecosystem is often used as a synonym for startup ecosystem). Despite the frequent use of the term, past academic studies have applied it without a clear definition, which has led to increased conceptual ambiguity (Suominen, Seppänen, & Dedehayir, 2016). Based on the research (keyword research for "ecosystem" and "startup ecosystem") and synthesis of extant information available in business reports and academic literature undertaken during this work, this section provides a clear definition of the term and a description of the characteristics of the entities to which the term refers. Thus, this section addresses the second pair of questions pointed out in the introduction, which ask how the term startup ecosystem should be defined and how it differs from terms often treated as synonymous. To answer this, we first distinguish the term ecosystem from related terms often treated as its synonyms such as community, network, environment, habitat, system and cluster.

The Oxford Dictionaries (2017) classify ecosystem first as an ecological term, meaning "a biological community of interacting organisms and their physical environment". This reference then adds that in general use, ecosystem denotes "a complex network or interconnected system," offering "Silicon Valley" as a prominent example ("Silicon Valley's entrepreneurial ecosystem"). General definitions from Oxford Dictionaries on related terms of closely associated concepts imply that the term ecosystem represents a composite concept; it describes the unification of a habitat or environment with a community, where community is a more complex form of a network (Oxford Dictionaries, 2017). Mintzberg (2015) applies this general understanding of ecosystem to the context of collaboration by suggesting that "at an organizational level, effective companies function as communities of human beings. Of course, all companies need robust networks to communicate among their parts as well as to connect to the outside world. But far more crucial is the need for collaboration, and that requires a strong sense of community in the organization" (p.1). Moreover, a community describes interdependent groups, while a network is an interconnected group (Oxford Dictionaries, 2017). A network is based on a system, while a network with a lack of interconnections may be referred to as a sole cluster (Oxford Dictionaries, 2017). Figure 8 depicts the interrelationships that arise from the different terms just described.

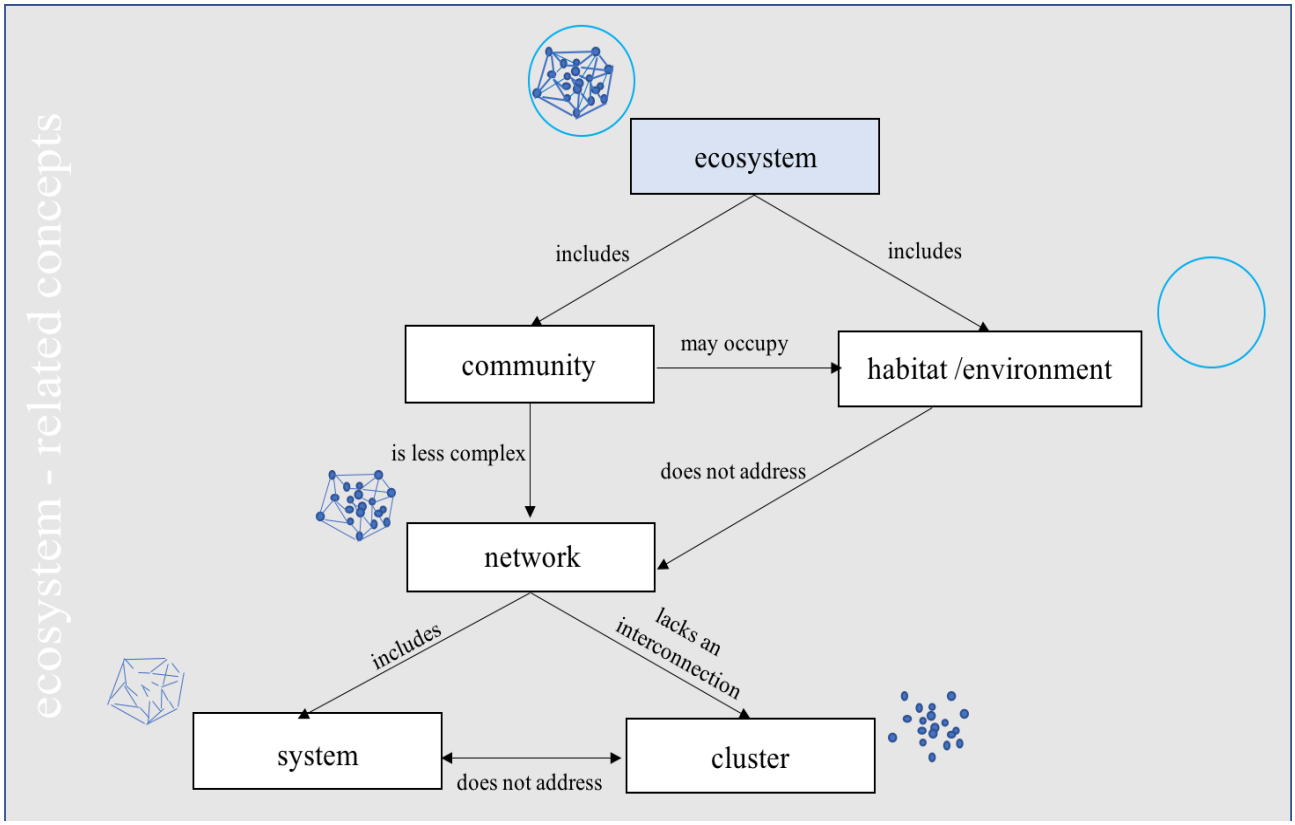

Figure 8: Linkages between an ecosystem and common terms related to it.

To achieve a deeper and more contextually-relevant understanding of the concept of ecosystem, the economic and business literature was researched. Smorodinskaya, Russell, Katukov, & Still (2017) conducted a survey of the literature reviews on ecosystem-studies and clarified typical features. It was concluded that "in the age of non-linear innovation and digital technologies, innovation can be better nurtured within a special innovation-conducive environment" (p. 5247). The researchers further concluded that such an environment interconnects the micro- and macro- levels of economics, where if an environment includes the co-creation of value through open collaboration, it behaves as an ecosystem. As concluded above, collaboration encourages a synergy of factors within the ecosystem (Smorodinskaya, Russell, Katukov, & Still, 2017). Such factors can be found in diverse areas such as strategy and leadership, organizational culture, resources, human resources management, people, partners, technology and governance. Thus, connectivity, critical and creative thinking, diversity and positive confrontation across different visions and angles are "conducive to the generation of new ideas in form of new products, services and processes in the global marketplace and eventually foster productivity through embedded technology, with efficiency gains" (Smorodinskaya, Russell, Katukov, & Still, 2017, p. 5246). Due to their collaborative nature, ecosystems are of a temporally unfolding and evolutionary nature (Borissenko & Boschma, 2016). Isenberg (2013) also emphasizes the importance of the high-order interactions and self-sustainability of an ecosystem. However, with the rapid rise of the use of the term ecosystem, research seems to have widely neglected the heterogeneous aspect of the concept (Brown & Mason, 2017). Therefore, we will elaborate on the term startup ecosystem from analogies within different contexts and objectives such as a "business ecosystem" or an "innovation ecosystem".

As commented on, since the concept of a startup ecosystem is relatively new, no commonly accepted definition has yet evolved (Brown & Mason, 2017). However, based on a synthesis of definitions across extant literature, Mason & Brown (2014) retrieved a traceable definition of the term, referring to it as "a set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (...), institutions (corporations, universities, public sector agencies, financial bodies) and entrepreneurial processes (...) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment" (p. 5).

Following this definition, a startup ecosystem is seen to include three crucial aspects: a community (a complex interconnection of entrepreneurial actors and institutions as well as organizations), processes and an environment. The community is comprised of startups, large companies (including VC and law firms, consulting groups, research laboratories, media and public relations and recruitment agencies), universities, public sector bodies, health care systems, banks (commercial and investment) and stock markets (Berger & Kuckertz, 2016; Ferrary & Granovetter, 2009; Isenberg 2010; Mason & Brown, 2014).

A particularly influential approach to identifying specific environmental domains related to startup ecosystems has been developed by Daniel Isenberg (Brown & Mason, 2014). Isenberg (2011) presents six generic "domains" as preconditions for a successful ecosystem: a conducive culture (success stories and societal norms), supportive policies (government and leadership), the availability of appropriate financial capital, quality human capital (labor and educational institutions), venture-friendly markets for products (networks and early customers) and a range of institutional supports (infrastructure, government and NGOs). Isenberg (2011) stresses the fact that ecosystems are highly complex and that they emerge under unique environments (e.g., specific industries or geographical scales, level of maturity). His model thus represents a generic and simplified reflection of real-world ecosystems.

The startup ecosystem in Silicon Valley in particular, is defined as a dense and highly developed scale-up ecosystem (Pauwels, Clarysse, Wright, & Van Hove, 2016). The economic success of Silicon Valley – which Saxenian (1994) was among the first to document and examine (Mason & Brown, 2014) – was attributed to its "relatively open, non-hierarchically regional network-based industrial system," which contrasts with regions where "traditional hierarchies prevailed within firms, and relations with local institutions were distant" (Saxenian, 1994, p. 59).

Arikka-Sternroos, Peltola, Rikkiev, & Saari (2016) contrast a startup ecosystem to other ecosystems and conclude that an innovation ecosystem consists of all actors, technologies and institutions that enable innovation. An innovation ecosystem focuses on the integration of knowledge and the exploitation of businesses, and this class of ecosystems includes business ecosystems. A business ecosystem is a narrowed definition of an innovation ecosystem because it is characterized by being specifically comprised of upstream and downstream actors, as well as their related technologies and institutions. Here, the focus lies on the creation of customer value. A platform ecosystem is based on a platform that is typically owned by a "hub actor" that connects markets. A service ecosystem is characterized by a service-dominant logic, emphasizing the systemic and institutional nature of value (co-)creation with a focus on service exchange and resources

In conclusion, a startup ecosystem may be defined as:

> *A self-sustainable, open and interconnected concept of an evolutionary nature, consisting of a community (interdependent actors, organizations and institutions) in a local, innovation-conductive environment (interconnecting the micro & macro level of an economy), which fosters collaboration through an open innovation process, especially between independent startups and large corporations, creating synergy effects in diverse areas and resulting in entrepreneurship and innovation. A startup ecosystem primarily differentiates itself from other,*

often interchanged, ecosystem-concepts by having independent startups as a fundamental driver (for innovation) at its core.

Figure 9 illustrates the interactions between various actors in the process of collaborative open innovation within a startup ecosystem. Specifically, the diagram presents open collaborative innovation involving independent (non-corporate) startups and large companies within a startup ecosystem, shown along with the environmental domains, the interconnections within the community and the (open innovation) process.

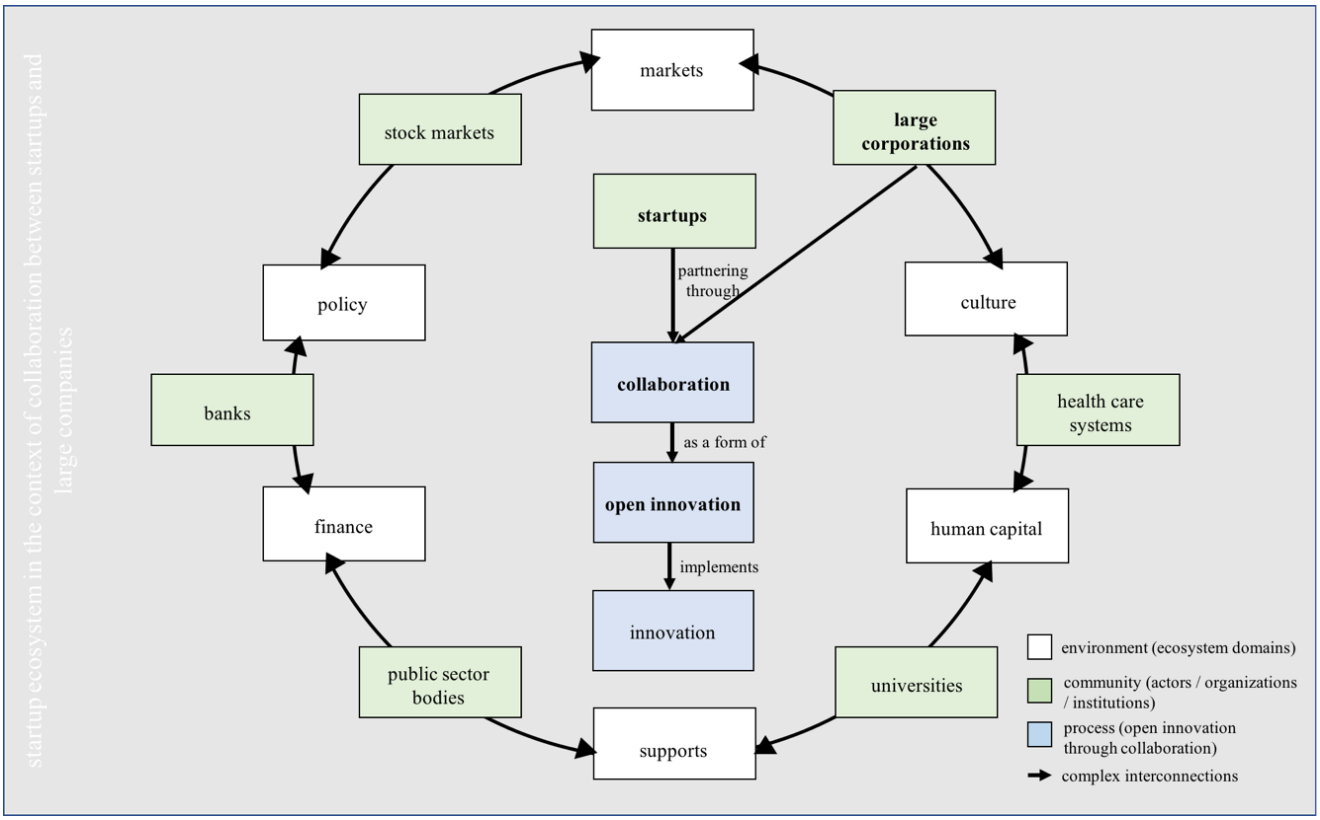

Figure 9: Collaborative open innovation with a startup ecosystem (illustrating the innovation process between startups and large companies).

As a final point, collaborative open innovation with a startup ecosystem may be defined as:

A social and dynamic process of value creation, based on a strongly committed, formal, mutually beneficial, jointly structured and shared relationship between independent startups and large corporations as part of a community within a self-sustainable, open innovation-conductive environment (interconnecting the micro and macro level of an economy), aiming at common goals and a common vision to innovate, and which results in entrepreneurship and innovation.

Discussion

The presented literature review summarizes the literature on the growing phenomenon of collaborative open innovation within startup ecosystems. The review reveals a mature field of study on the practice of open collaborative innovation. However, the literature on the subject incorporates the use of vague terminology, identified as an area of investigation requiring further development both with regard to general theory and in the precise use of terms in academia and practice.

The contribution of this paper is twofold. First, it presents a review that provides guidance for both researchers and practitioners on the subject of collaborative open innovation and their underlying concepts, highlighting the main perspectives identified in past research on the subject. Second, it identifies some research issues for future investigation.

The review reveals that research on startup ecosystems has increased over the last five years. It was further shown that a significant number of studies in recent years have been carried out on collaboration in its relation to external innovation over the last few years, whereas earlier research focused primarily on the structure of such relationships.

One limitation of this study lies with its methodology. The study relied on specific databases with limitations on keywords and hence on the relevance of sources. This restriction implies that there may be other journals and reports that were relevant but were not considered. In particular, the grey literature was not consulted. Nonetheless, credible and reputed journals in management science within the academic domain were indexed in the databases consulted. Therefore, it is believed that the review presented is comprehensive and the conclusions drawn are robust.

The definitions derived in this paper have a particular focus on collaboration between large corporations and startups. This is because of the growing practice of open innovation between such parties. However, the underlying principles of the definitions remain the same when referring to collaboration between other actors, institutions or organizations within a startup ecosystem. To generalize the definitions, the occurrence of the terms startups and large corporations may be replaced by any two or more parties.

Furthermore, the resulting definitions derived in this paper are based on a consolidation of elements from various authors and thus only have a limited significance. However, at the time of writing, the current authors believe that this review is an accurate representation of the body of research on collaborative open innovation published to date.

For future research, it is suggested that interviews with relevant experts be undertaken to judge the acceptance of how these terms have been defined as well as their general applicability. Furthermore, it would be useful to understand the impact of collaborative open innovation upon the wider community and the environment it operates in. For instance, a research question of consideration is “how strong are the interconnections between the elements of such a business environment and the community, and to what extent is each element involved in the collaborative open innovation process?” Finally, the sub-concepts of collaboration such as co-innovation or co-creation need further investigation. For example, future research may seek to investigate how these concepts are applied in practice, which combinations of these concepts are most common, and what constitute their success factors. This will contribute to a more developed theory and a better general understanding of collaborative open innovation and its characteristics.

Conclusion

Within the context of open innovation, we have derived novel definitions of collaboration and startup ecosystem. The resulting definitions rely heavily on previous related research and provide a

clear delimitation of similar and often interchangeably used concepts. It was found that collaboration describes a formal partnership, mainly distinguishing itself from cooperation and coordination in terms of aspects such as vision, structure, authority & accountability, resources & rewards and its process. It was further found that the concept of an ecosystem constitutes a merger of often interchangeably used concepts, e.g., environment and community, while a startup ecosystem like Silicon Valley is characterized by having independent startups as a fundamental driver for innovation at its core. These definitions were then consolidated, leading to a generally applicable definition of collaborative open innovation within a startup ecosystem. This consolidated definition emphasizes key elements of the concept: the innovation process, the collaborating community and the startup-driven environment. The definitions derived in this paper imply a theoretical knowledge foundation, which is expected to facilitate a more uniform use of such terms by both academics and professionals. However, there is considerable scope for further development and research on the subject as collaborative open innovation is a complex and influential and yet, relatively underexplored. This work and that of future researchers, is expected to greatly advance the knowledge base pertaining to this phenomenon that is the focus this study, which in turn will serve to facilitate innovation and the development of new opportunities.

References

Aarikka-Stenroos, L., Peltola, T., Rikkiev, A., & Saari, U. (2016). Multiple Facets of Innovation and Business Ecosystem Research: The Foci, Methods and Future Agenda. *XXVII ISPIM Innovation Conference*, Porto, Portugal, 19-22 June 2016, pp. 1-33.

Alavi, S., Ahuja, V., & Medury, Y. (2012). Metcalfe's law and operational, analytical and collaborative CRM- using online business communities for co-creation. *Journal of Targeting, Measurement & Analysis for Marketing,* 20 (1), 35-45.

Al-Debei, M. & Avison, D. (2010). Developing a unified framework of the business model concept. *European Journal of Information Systems*, 19 (3), 359-376.

Altheide, D. L. (1996). *Qualitative Media Analysis.* Thousand Oaks, CA: Sage Publications.

Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. *Management Decision*, 47 (8), 1323-1339.

Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal*, 9(1), 30-42. Retrieved June 24, 2018, from https://doi.org/10.1108/13598540410517566.

Bernard, H. R. (2011). *Research Methods in Anthropology* (5 ed.), Lanham, Maryland: AltaMira Press.

Bernard, H. R. & Ryan, G. W. (2009). *Analyzing Qualitative Data: Systematic Approaches* (2 ed.). Thousand Oaks, CA: Sage Publications.

Berger, E. & Kuckertz, A. (2016). Female Entrepreneurship in Startup Ecosystems Worldwide. *Journal of Business Research*, 69 (11), 5163-5168, 2016. Retrieved May 4, 2018, from https://ssrn.com/abstract=2779709.

Borissenko, Y. & Boschma, R. (2016*). A critical review of entrepreneurial ecosystems: towards a future research agenda*. No 1630, Papers in Evolutionary Economic Geography (PEEG), Utrecht University, Section of Economic Geography.

Bossink, B.A.G. (2002). The development of co–innovation strategies: stages and interaction patterns in interfirm innovation. *R&D Management,* 32, 311–320. Retrieved May 4, 2018, from https://doi.org/10.1111/1467-9310.00263.

Brandenburg, M., Govindan K., Sarkis, J., & Seuring, S. (2014). Quantitative Models for Sustainable Supply Chain Management: Developments and Directions. *European Journal of Operational Research,* 233 (2): 299–312.

Brewerton P. & Millward, L. *Organisational research methods*. London: Sage, 2001.

Brown, R. & Mason, C. (2017). Looking inside the spiky bits: a critical review and conceptualization of entrepre neurial ecosystems. *Small Business Economics*, 49(1), 11–30. Retrieved July 4, 2018, from https://doi.org/10.1007/s11187-017-9865-7.

Bryman, A. (2015). *Social Research Methods.* Oxford University Press.

Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology.* Cambridge, MA: Harvard Business School Press.

Chesbrough, H. (2006). Open innovation: A new paradigm for understanding industrial innovation. In *Open Innovation*. Researching a New Paradigm, ed. H. Chesbrough, W. Vanhaverbeke, and J. West, 1-12. New York, NY: Oxford University Press.

Chesbrough, H. (2017). The Future of Open Innovation. The future of open innovation is more extensive, more collaborative, and more engaged with a wider variety of participants. *Research-Technology Management*, 60(1), 35–38. Retrieved July 4, 2018, from https://doi.org/10.1080/ 08956308.2017.1255054.

Chesborugh, H. & Brunswicker, S. (2013). Managing Open Innovation in Large Firms. *Research Technology Management,* 47(23), 1–44. Retrieved January 10, 2018, from https://doi.org/10.1007/978-3-642-31650-0_14.

Chesbrough, H. & Brunswicker, S. (2014). A Fad or a Phenomenon? The Adoption of Open Innovation Practices in Large Firms. *Research Technology Management*, 57(2), 16–25. Retrieved May 4, 2018, from https://doi.org/10.5437/08956308X5702196.

Chesbrough, H. & Schwartz, K. (2007). Innovating Business Models with Co-Development Partnerships. *Research Technology Management,* 50(1), 55-59. Retrieved May 4, 2018, from https://doi.org/10.1080/ 08956308.2007.116574192007.11657419.

Coleman, B.L., Fadel, S. A., Fitzpatrick, T., & Thomas S.-M. (2017). Influenza and Other Respiratory Viruses, *John Wiley & Sons Ltd.,* Vol 12, No 3. Retrieved May 16, 2018, from https://onlinelibrary.wiley.com/doi/epdf/10.1111/irv.12478.

Corley, K. G. & Gioia, D. A. (2011). Building Theory About Theory Building: What Constitutes a Theoretical Contribution? *Academy of Management Review,* 36(1), 12–32.

Cumbie, B. A., Jourdan, Z., Peachey, T., Dugo, T. M., & Craighead, C. W. (2005). Enterprise resource planning research: where are we now and where should we go from here?. *JITTA: Journal of Information Technology Theory and Application*, 7 (2), 21-36.

Dominguez, C. (2011). *Collaboration: What does it really mean?*. Retrieved May 12, 2018, from https://blogs.cisco.com/news/collaboration-what-does-it-really-mean.

Durst, S. & Poutanen, P. (2013). Success factors of innovation ecosystems: a literature review. *Social and Behavioral Sciences*, 156, 365–370. https://doi.org/10.1016/j.sbspro.2014.11.204.

Ferrary, M. & Granovetter, M. (2009). The role of venture capital firms in Silicon Valley's complex innovation network. *Economy and Society*, 38(2), 326–359. Retrieved May 4, 2018, from https://doi.org/10.1080/ 03085140902786827.

Fink, A. (2005). *Conducting Research Literature Reviews: From the Internet to Paper* (2nd edition). Thousand Oaks: Sage, 2005.

Fink, A. (1998). *Conducting research literature reviews: from paper to the internet*. Thousand Oaks: Sage, 1998.

Fitzek, F. & Katz, M. (2006). *Cooperation in wireless networks: Principles and applications – real egoistic behavior is to cooperate*. Dordrecht: Springer Verlag.

Fliess, S. & Becker, U. (2006). Supplier integration - Controlling of co-development processes. *Industrial Marketing Management*. Retrieved July 11, 2018, from https://doi.org/10.1016/j.indmarman.2005.07.004.

Franke, N. & Piller, F.T. (2004). Toolkits for user innovation and design: An exploration of user interaction and value creation. *Journal of Product Innovation Management*, 21(6), 401-415.

Galvagno, M. & Dalli, D. (2014). Theory of value co-creation: a systematic literature review. *Managing Service Quality: An International Journal*, 24(6), 643–683. https://doi.org/10.1108/MSQ-09-2013-018.

Gassmann, O. & Enkel, E. (2004). Towards a Theory of Open Innovation: Three Core Process Archetypes. *R&D Management Conference (RADMA),* 7.-9. July 2004, Lisbon, Portugal.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research Notes on the Gioia Methodology. *Organizational Research Methods*, 16(1), 15–31.

Gough, D., Oliver, S., & Thomas, J. (2012). *An Introduction to Systematic Reviews*. Thousand Oaks, CA: SAGE Publications.

Govindan, K., Soleimani, H., & D. Kannan (2015). Reverse Logistics and Closed-loop Supply Chain: A Comprehensive Review to Explore the Future. *European Journal of Operational Research*, 240 (3), 603–626.

Hathaway, I. (2016), What Startup Accelerators Really Do. *Harvard Business Review*. Retrieved May 4, 2018, from https://hbr.org/2016/03/what-startup-accelerators-really-do.

Holsti, O. R. (1969). *Content Analysis for the Social Sciences and Humanities*. Boston, MA: Addison-Wesley Pub. Co..

Isenberg, D. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 40–50.

Isenberg, D. (2011). *The entrepreneurship ecosystem strategy as a new paradigm for economy policy: principles for cultivating entrepreneurship*. Babson Park: Babson Entrepreneurship Ecosystem Project, Babson College.

Isenberg, D. (2013). *Worthless, Impossible and Stupid: How Contrarian Entrepreneurs Create and Capture Extraordinary Value*. Boston: Harvard Business Review Press.

Jonsson, K., Westergren, U., & Holmstrom, J. (2008). Technologies for value creation: an exploration of remote diagnostics systems in the manufacturing industry. *Information Systems Journal*, 18 (3), 227-245.

Kassarjan, HH (1977). Content analysis in consumer research. *The Journal of Consumer Research 1977*, 4(1), 8–18.

Kohler, T. (2016). Corporate accelerators: Building bridges between corporations and startups. *Business Horizons*, 59(3), 347–357. Retrieved March 28, 2018, from https://doi.org/10.1016/j.bushor.2016.01.008.

Kolbe, H. R. & Burnett, M. S. (1991). Content-analysis research: An examination of applications with directive for improving research reliability and objectivity. *Journal of Consumer Research*, 18(2), 243–250.

Krippendorff, K. (2004). Reliability in content analysis. *Human Communication Research*, 30 (3), 411-433.

Lee, S. M., Olson D.L., & Trimi, S. (2012). Co-Innovation: Convergenomics, Collaboration, and Co-Creation for Organizational Values. *Management Decision,* 50 (5), 817–31. Retrieved May 4, 2018, from https://doi.org/10.1108/00251741211227528.

Luo, Y. (2004). *Coopetition in International Business*. Frederiksberg, DK: Copenhagen Business School.

Malone, T.W. & Crowston, K. (1994). The interdisciplinary study of coordination. *ACM Computing Surveys (CSUR),* 26(1), 87-119.

Maniak, R. & Midler, C. (2008). Shifting from co-development to co-innovation. *International Journal of Auto- motive Technology and Management*, 8 (4), 449–468.

Mattessich, P., Murray-Close, M., & Monsey, B.R. (2001). *Collaboration: What makes it work: A review of re- search literature on factors influencing successful collaboration.* Minnesota, USA: Wilder Publishing Centre,.

Mayring P. (2003). *Qualitative Inhaltanalyse – Grundlagen und Techniken.* Weinheim, Germany: Beltz Verlag; 2003.

Mayring P. (2002). *Einführung in die qualitative Sozialforschung – eine Anleitung zum qualitativen Denken.* Weinheim, Germany: Beltz Verlag; 2002.

Meredith J. (1993). Theory building through conceptual methods. *International Journal of Operations & Production Management*, 1993;13(5):3–11.

Mind the Bridge (Ed.) (2017). *European Corporate Innovation Outposts - The Who's Who. San Francisco V 1.0, March 2017 Crowd Companies: The Corporate Innovation Imperative*. Retrieved May 4, 2018, from http://www.web-strategist.com/blog/2017/02/21/report-the-corporate-innovation-imperative/.

Mintzberg, H. (2015). We Need Both Networks and Communities. *Harvard Business Review*. Retrieved July 4, 2018, from https://hbr.org/2015/10/we-need-both-networks-and-communities.

Mocker, V., Bielli, S., & Haley, C. (2015). *Winning Together: A guide to successful corporate-startup collaborations.* Retrieved May 4, 2018, from https://www.nesta.org.uk/sites/default/files/winning-together-sum- mary_0.pdf.

Morse, J. M. (1997). Perfectly Healthy, but Dead: The Myth of Inter-Rater Reliability. *Qualitative Health Research*, 7(4), 445–447.

Nachmias, C.F. & Nachmias, D. (1996). *Research methods in social sciences*. London: Worth Publisher; 1996.

Neyens, I., Faems, D., & Sels, L. (2010). The impact of continuous and discontinuous alliance strategies on startup innovation performance. *International Journal of Technology Management*,

52(3/4), 392-410. Retrieved May 4, 2018, from https://doi.org/10.1504/IJTM.2010.035982.

Olson, J.G. (2004). Co-Development: Collaborating across boundaries on joint strike fighter. In: Beyerlein, M., Johnson, D., & Beyerlein, S. (Ed.). Complex Collaboration: Building the Capabilities for Working Across Boundaries. Advances in Interdisciplinary Studies of Work Teams. *Emerald Group Publishing Limited*, 2004, S.27 – 58.

Oxford Dictionaries (2017). "Ecosystem", *Oxford Dictionary*. Oxford: Oxford University Press, Retrieved July 4, 2018, from https://en.oxforddictionaries.com/definition/ecosystem.

Palvia, P. (2015). Methodological and topic trends in information systems research: A meta-analysis of IS journals. *Communications of the Association for Information Systems,* 37 (1), 30.

Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods: Integrating Theory and Practice* (4 ed.). Thousand Oaks, CA: SAGE Publications.

Pauwels, C., Clarysse, B., Wright, M., & Van Hove, J. (2016). Understanding a new generation incubation model: The accelerator. *Technovation*, 50, 13–24. Retrieved May 4, 2018, from https://doi.org/10.1016/j.technovation.2015.09.003.

Petticrew, M. & Roberts, H. (2006). *Systematic reviews in the social sciences: a practical guide,* Hoboken, New Jersey: Blackwell Publishing.

Piller, F. (2008). Interactive value creation with users and customers. Ideas for Innovative Leaders from the Peter Pribilla Foundation. In: Huff, A.S. (ed), "*Leading Open Innovation",* Munich: Peter-Pribilla-Foundation.

Piller, F., Vossen, A., & Ihl, C. (2010). *A Typology of Customer Co-Creation in the Innovation Process*. Retrieved July 11, 2018, from https://ssrn.com/abstract=1732127.

Pittaway, L., Robertson, M., Munir, D., & Neely, A. (2004). Networking and innovation: a systematic review of evidence. *International Journal of Management Reviews,* Volume 5/6 Issue 3&4 pp. 137–168.

Potter, W. J. & Levine-Donnerstein, D. (1999). Rethinking validity and reliability in content analysis. *Journal of Applied Communication Research*, 27(3), 258–284.

Ramaswamy, V. (2009). Leading the transformation to co-creation of value. *Strategy & Leadership*, 37, 32–37.

Reim, W., Parida, V., & Örtqvist, D. (2015). Product–Service Systems (PSS) Business Models and Tactics – A Systematic Literature Review. *Journal of Cleaner Production*, 97, 61–75.

Richards, L. (2014). *Handling Qualitative Data* (3 ed.), Thousand oaks, CA: SAGE Publications.

Richards, L. & Morse, J. M. (2012). README FIRST for a User's Guide to Qualitative Methods, *SAGE Publications,* 2012.

Ringel, M., Taylor, A., & Zablit, H. (2016). *The Most Innovative Companies 2016: Getting "Not Invented Here."* The Boston Consulting Group (BCG). Retrieved May 4, 2018, from https://media-publica- tions.bcg.com/MIC/BCG-The-Most-Innovative-Companies-2016-Jan-2017.pdf.

Romero, D. & Molina, A. (2011). Collaborative networked organizations and customer communities: Value co-creation and co-innovation in the networking era. *Production Planning & Control*, 22, 447–472.

Saxenian, A. (1994). *Regional Competitive Advantage: culture and competition in Silicon Valley and Route 128*. Harvard University Press: Cambridge, MA.

Schrage, M. (1995). *No more teams. Mastering the dynamics of creative collaboration*. New York: Currency Doubleday.

Schättgen, N. & Mur, S. (2016). *The age of collaboration.* Retrieved May 4, 2018, from http://www.adlittle.com/downloads/tx_adlreports/ADL_MatchMaker_The_Age_of_Collaboration.pdf.

Seuring, S. & Gold, S. (2012). Conducting Content-analysis Based Literature Reviews in Supply Chain Management. *Supply Chain Management: An International Journal*, 17 (5): 544–555.

Seuring, S. & Müller, M. (2008). From a Literature Review to a Conceptual Framework for Sustainable Supply Chain Management. *Journal of Cleaner Production*, 16 (15): 1699–1710.

Shah, S. K. & Corley, K. G. (2006). Building Better Theory by Bridging the Quantitative? Qualitative Divide. *Journal of Management Studies*, 43(8), 1821–1835.

Sinclair, J., Fox, G., & Bullon, S. (1995). Collins Cobuild English Dictionary. London: Harper Collins Publishers,. In Stoller-Schai, D. (2003), "*E-Collaboration: Die Gestaltung internetgestützter kollaborativer Handlungsfelder*", Published Dissertation, University of St. Gallen. Bamberg: Difo-Druck.

Smorodinskaya, N., Russell, M. G., Katukov, D., & Still, K. (2017). Innovation Ecosystems vs. Innovation Systems in Terms of Collaboration and Co-Creation of Value. *Proceedings of the 50th Hawaii International Conference on System Sciences*, *Big Island, Hawaii, January 4-7, 2017*, 5245–5254. Retrieved May 4, 2018, from http://doi.org/10.24251/HICSS.2017.636.

Spinuzzi, C. (2012). Working alone together: coworking as emergent collaborative activity. *Journal of Business Technology*, Communication (26), 399–441.

Stoller-Schai, D. (2003). *E-Collaboration: Die Gestaltung internetgestützter kollaborativer Handlungsfelder*. Published Dissertation, University of St.Gallen. Bamberg: Difo-Druck.

Suominen, A., Seppänen, M. & Dedehayir O. (2016). Innovation Systems and Ecosystems: A Review and Synthesis. *XXVII ISPIM Innovation Conference*, Porto, Portugal, 19-22 June 2016.

VomBrocke, J., Simons, A., Niehaves, B., Reimer, K., Plattfaud, R., & Cleven, A. (2009). Reconstructing the giant: On the importance of rigour in documenting the literature search process. *ECIS 2009 Proceedings*, 161.

Waters-Lynch, J. & Potts, J. (2017). The social economy of coworking spaces: a focal point model of coordination. *Review of Social Economy*. Retrieved July 11, 2018, from https://doi.org/10.1080/00346764.2016.1269938.

Weiblen, T. & Chesbrough, H. W. (2015). Engaging with Startups to Enhance Corporate Innovation. *California Management Review*, 57(2), 66–90. Retrieved May 4, 2018, from https://doi.org/10.1525/cmr.-2015.57.2.66

Willis, A.J. (1994). Arthur Roy Clapham, 1904–90. *Biographical Memoirs of Fellows of the Royal Society,* 39, 73–90.

Zwass, V. (2010). Co-creation: toward a taxonomy and an integrated research perspective. *International Journal of Electronic Commerce*, 15 (1), 11-48.