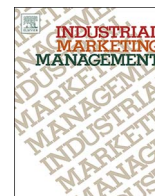




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## Network management in the era of ecosystems: Systematic review and management framework

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### ABSTRACT

Business-to-business (B2B) and business network scholars have begun adopting an “ecosystem” approach to describe the increasing interdependence and co-evolution of contemporary business and innovation activities. Although the concept is useful in communicating these issues, the challenge is the lack of overall understanding of the added value of the approach, its particular theoretical logic, and its links to network management. This systematic review analyzes the usage of the ecosystem concept in B2B journals and its implications for network management. Common themes are distilled, the specific features of the ecosystem approach are examined, and four categories of the ecosystem approach are identified: (a) competition and evolution; (b) emergence and disruption; (c) stable business exchange; and (d) value co-creation. We also examine shifts in management opportunities and challenges related to these developments. Finally, we suggest a revised network management framework, where we address the implications of utilizing an ecosystem layer for the analysis, as well as using the ecosystem as a perspective in the management of business and innovation networks. Overall, this study contributes to the literature by providing a coherence-seeking, systematic outlook on the increasingly useful, but still nascent and ambiguously utilized ecosystem approach.

### 1. Introduction

In 1999, Möller and Halinen noted that “The competitive environment of firms is undergoing a fundamental change. Traditional markets are being rapidly replaced by networks” (p. 413). They suggested that such a change requires that firms' customer and supplier relationships are viewed within the broader context of Research & Development (R & D) networks, deep supplier networks, and competitive coalitions. In this paper, we argue that we are witnessing another notable shift in the conceptual focus of industrial marketing and management—from networks toward ecosystems. This shift reflects the increased connectivity, interdependence, and co-evolution of actors, technologies, and institutions, hence demanding a different theoretical and empirical approach than typically adopted in relationship and network studies.

The ecosystem approach has recently gained a great deal of traction in disciplines such as strategic management (e.g., Adner, 2017; Ansari, Garud, & Kumaraswamy, 2016; Dattée, Alexy, & Autio, 2017) and innovation and technology management (e.g., Clarysse, Wright, Bruneel, & Mahajan, 2014; Gawer & Cusumano, 2014; Ritala, Agouridas, Assimakopoulos, & Gies, 2013). Industrial and business-to-business (B2B) marketing research has also increasingly adopted the

ecosystem concept for various purposes (e.g., Möller, 2013; Vargo, Wieland, & Akaka, 2015; Wilkinson & Young, 2013). One identified drawback is that the term “ecosystem” has become a buzzword, sometimes adding very little to the analysis itself (for a discussion on this, see Oh, Phillips, Park, & Lee, 2016; Ritala & Almpantopoulou, 2017). Indeed, a critical look at the rapid expansion of B2B studies using the concept reveals that it is used in various ways, ranging from a synonym for business networks to an analogy for interconnected environments, and even to a full-fledged theoretical and empirical approach. This calls for a critical examination of the value-adding features of the ecosystem approach. In this systematic review, we examine how the emergence of the ecosystem approach has been reflected in B2B marketing research and what are its implications for managing in business and innovation networks.

The concept of “ecosystem” was originally adapted from biology to the business context by Moore (1993), who used “business ecosystem” as an analogy to describe the interdependence and co-evolution that characterize contemporary business activities. Over a decade later, the concept began to gain prominence, and ever since, management and marketing literature have used a broad range of labels to capture the nature of this approach. These include conceptualizations such as the

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“innovation ecosystem” (Adner & Kapoor, 2010; Dattée et al., 2017; Ritala et al., 2013), “platform ecosystem” (Ceccagnoli, Forman, Huang, & Wu, 2012; Gawer & Cusumano, 2014), and “service ecosystem” (Lusch, Vargo, & Gustafsson, 2016; Vargo et al., 2015). In addition, the ecosystem approach has been linked to various research topics, such as competition and innovation (Moore, 1993), complementary relationships (Adner & Kapoor, 2010), marketing and systemic value creation (Vargo et al., 2015), the development and commercialization of technologies and industry clusters (Ansari et al., 2016; Gawer & Cusumano, 2014), and entrepreneurship policy and regional systems (Clarysse et al., 2014; Fukuda & Watanabe, 2008; Jahanmir, 2016). Moore (2013) summarized the development of the approach across three generations: the first generation focused on large focal actors who led business ecosystems; the second generation revolved around self-organized social movements and communities; and the third generation of business ecosystem studies combined both aspects. Moore (2013) suggested that an ecosystem approach allows the investigation of “a new form of organization...[one] that shows promise in achieving shared purposes, sharing value among many contributors, and in bringing the benefits of technology to a range of people, cultures and problems far beyond what earlier systems have achieved” (p. 3).

The crux of the ecosystem approach is that the focal set of actors (organizations, products, etc.) is examined as a part of a broad and interdependent systems environment. Because the ecosystem concept has been understood in several ways, as a starting point, we integrate knowledge from the previously mentioned ecosystem streams and define this as a co-evolutionary business system of actors, technologies, and institutions. Actors include the end-users or customers and user communities, developers and research organizations, competitors, and complementors throughout the entire value chain and network (e.g., Adner & Kapoor, 2010), as well as institutional actors (e.g., Koskela-Huotari, Edvardsson, Jonas, Sörhammar, & Witell, 2016). Technologies refer to the various types of platforms and technological frameworks that are shared by the ecosystem actors (e.g., Autio & Llewellyn, 2014; Gawer & Cusumano, 2014; Eloranta & Turunen, 2016). Institutions refer to the relevant regulators, policymakers, and interest groups, as well as the cultural and national contexts the institutions operate under (e.g., Ansari et al., 2016; Vargo et al., 2015).

Despite an exponential increase in the use of the ecosystem approach, current research lacks an explicit analysis and integrated understanding of the approach in B2B marketing, particularly in relation to business networks and their management. Therefore, we provide a systematic review to bridge this gap, with three research objectives. First, we map the key themes of the application of the ecosystem approach in B2B marketing and business network research. Second, building on the thematic analysis, we provide a high-level categorization of the ecosystem approach in B2B research. Third, we distinguish the key managerial opportunities and challenges in ecosystems in B2B markets by examining the emerging issues and aspects that “the ecosystem era” has created. Based on these examinations, we finally suggest a management framework for business networks in the era of ecosystems.

We acknowledge that there are different views on the essence of business networks and their management. The Industrial Marketing and Purchasing (IMP) School emphasizes interactive relationships between networked companies on the basic assumption that such business networks cannot be managed (e.g., Håkansson & Ford, 2002), whereas B2B research, which follows strategic network thinking, assumes that networks of companies can be managed toward a shared goal (e.g., Jarillo, 2006; Gulati, Nohria, & Zaheer, 1998; Möller & Svahn, 2006). These network approaches differ particularly in terms of what constitutes the network and what “managing” implies (see, e.g., Araujo & Easton, 1996; Aarikka-Stenroos, Sandberg, & Lehtimäki, 2014). In this paper, aligned with the systematic literature review procedure, we do not take a particular disciplinary stand on the issue. Instead, we adopt the role of an external observer and map how the researchers from different

streams within B2B research have applied the ecosystem approach in their studies and how this reflects on managing. Furthermore, the debate regarding the manageability of business networks seems to apply to ecosystems as well; some studies have shown that ecosystems can be managed to some extent (e.g., Iansiti & Levien, 2004; Ritala et al., 2013), whereas other studies see the ecosystem as a self-organizing construct (Basole, 2009; Clarysse et al., 2014).

This systematic review provides an overarching view of the emerging ecosystem approach in B2B marketing and business network literature and, in so doing, makes several important contributions to the literature. First, certain features of this approach provide added value to business network and network management literature. In particular, ecosystem research tends to direct the analytical focus toward co-evolutionary logic, as well as a broader and more open-ended outlook on network boundaries and composition. This allows for a more overarching examination of the increasingly interconnected actors, technologies, and institutions of contemporary business and innovation networks. Second, with the help of a systematic review, we identify four ecosystem research categories from B2B literature based on their focus on interaction and system dynamics: competition and evolution, emergence and disruption, stable business exchange, and value co-creation. These categories provide different ways to analyze ecosystems in B2B research. Finally, related to previous contributions, our study contributes to the network management literature by providing an updated view of the network management framework (cf. Möller & Halinen, 1999). We illustrate how B2B research has portrayed ecosystems as an additional layer beyond networks, as well as a perspective that provides additional insights into established layers of network management. Altogether, our study and the review provide an overarching view of network management in the era of ecosystems.

The paper proceeds as follows: first, we provide an overview on ecosystem streams and discuss the key constituents and drivers of the ecosystem approach. After presenting the methods for systematic literature review, we present our results on the key themes and categories for applying the ecosystem approach in B2B research and the related shifts in network management. Finally, we suggest a management framework and discuss the paper's conclusions and implications.

## 2. Overview of ecosystem literature

### 2.1. Major literature streams

Although ecosystem research often utilizes terms such as “innovation ecosystem” and “business ecosystem,” these concepts are quite often used rather loosely as umbrella concepts covering different thematic emphases and background assumptions (for further discussion see, e.g., Autio & Llewellyn, 2014; Tsujimoto, Kajikawa, Tomita, & Matsumoto, 2015; Valkokari, 2015; Oh et al., 2016). This tendency is also visible in B2B literature. Before taking a critical look at B2B literature, we first briefly discuss the characteristics of ecosystems and related literature streams.

Because different streams in ecosystem literature highlight the systemic nature of technology, business, and society, they are often multidisciplinary, located at the crossroads of the management, technology, marketing, and sociology fields. The major streams include the use of conventional, established concepts, such as the business ecosystem, innovation ecosystem, platform ecosystem, and industrial ecosystem, as well as emergent ones, such as the service ecosystem or entrepreneurial and start-up ecosystems. On the other hand, recent research has begun to adopt the term “ecosystem” as a standalone concept (Adner, 2017; Ansari et al., 2016; Williamson & De Meyer, 2012). Thus, ecosystem approaches differ, particularly in terms of the relevant sets of focal actors and their goals, as well as over the determining factors of ecosystems. We briefly discuss the main ecosystem literature streams below (summarized in Table 1).

*Business ecosystem* was the seminal label coined by Moore (1993).

**Table 1**  
Major ecosystem literature streams and their characteristics.

Ecosystem streams	Main characteristics	Example references
Business ecosystem Ecosystem consisting of both upstream and downstream value network actors and related technologies and institutions	a) Business ecosystems emphasizing collaboration and supply chain aspects b) Business ecosystems emphasizing the co-evolution of competition and collaboration	Iansiti & Levien, 2004; Adner, 2017 Moore, 1993; Li, 2009
Innovation ecosystem Ecosystem consisting of actors, technologies, and institutions that enable innovation	a) Firm-centric innovation ecosystems related to the focal actor and its technology, platform, brand, etc., connecting the various actors or stakeholders around it b) National or regional innovation systems c) Technological innovation systems	Rohrbeck, Hölzle, & Gemünden, 2009; Ritala et al., 2013; Autio & Llewellyn, 2014; Dattée et al., 2017 Fukuda & Watanabe, 2008; Clarysse et al., 2014 Markard & Truffer, 2008
Entrepreneurial and start-up ecosystems Ecosystems enabling the emergence and growth of new businesses	Start-up and entrepreneurial ecosystems that are often located in particular geographical areas or around a certain industry	Isenberg, 2010; Berger & Kuckertz, 2016; Acs et al., 2017
Platform ecosystem Ecosystems based on a digital platform	Ecosystems typically owned or governed by a “hub actor” or “platform leader” that connects various sides of markets to facilitate exchange and value creation	Gawer & Cusumano, 2002, 2014; Thomas et al., 2014; Wareham et al., 2014; Eloranta & Turunen, 2016
Service ecosystem Ecosystem approach based on service-dominant logic	Ecosystems emphasizing the systemic and institutional nature of value (co)creation with a focus on service exchange and resources	Vargo & Lusch, 2010; Lusch & Nambisan, 2015; Vargo et al., 2015; Banoun, Dufour, & Andiappan, 2016; Kohtamäki & Rajala, 2016; Taillard, Peters, Pels, & Mele, 2016

Business ecosystems include focal actors, as well as many organizations and institutions that fall outside of traditional business networks. These include the value chains of suppliers and distributors that directly contribute to the creation and delivery of products or services, such as the companies to which business functions are outsourced; financing institutions; organizations with complementary products that are used in conjunction with the focal product or service; competitors, customers, and end-users whose actions and feedback affect the development of the focal products or processes; and regulatory agencies and media outlets that have powerful, but less immediate, effects on the focal business (Iansiti & Levien, 2004; Li, 2009; Moore, 1993). Thus, “business ecosystem” can be considered a generic overarching concept for distinct types of interdependent and co-evolving systems of actors, technologies, and institutions.

*Innovation ecosystems* differ from business ecosystems in that they are characterized by innovation-driven goals and related uncertainties over value creation and capture (Dattée et al., 2017; Ritala et al., 2013). Furthermore, innovation ecosystems often also include societal actors, as well as private and public organizations that support innovation (Clarysse et al., 2014; Fukuda & Watanabe, 2008; Oh et al., 2016). Innovation ecosystems have also been analyzed from a technological system perspective (Markard & Truffer, 2008). *Entrepreneurial and start-up ecosystems* focus on formal (e.g., investors and government) and informal (e.g., peers and family) actors that support the creation and growth of new businesses (Isenberg, 2010; Berger & Kuckertz, 2016; Acs, Stam, Audretsch, & O’Connor, 2017). *Platform ecosystems* are created around technological platforms—typically owned by the focal organization—that connect multiple sides of markets together, such as users, advertisers, and content providers (Basole, 2009; Basole & Rouse, 2008; Eloranta & Turunen, 2016; Gawer & Cusumano, 2014; Thomas, Autio, & Gann, 2014; Wareham, Fox, & Cano Giner, 2014). *Service ecosystems* represent an emergent and rapidly growing stream introduced by Vargo and Lusch (2011); they are defined as spatial and temporal structures of loosely coupled social and economic actors that interact through institutions, technology, and language and co-create value.

In addition to these, there are also other distinct streams, such as *industrial ecology* and *industrial ecosystems* (e.g., Korhonen, 2001; Lowe & Evans, 1995), which integrate environmental management or biological and natural ecosystems and technological and industrial (eco)systems in terms of sustainable development. These are excluded from the current analysis because their system-aspect relates to the flow of materials, not business.

Table 1 briefly summarizes the largest ecosystem literature streams and their key characteristics.

## 2.2. Key constituents and underlying drivers of ecosystem approach

The ecosystem concept is increasingly used in B2B and business network research, but there is an on-going discussion regarding its role and added value. Based on the current literature and the drivers recognized within it, we outline two key theoretical constituents of the ecosystem approach that provide new conceptual tools for B2B and business network researchers. These include *co-evolutionary logic*, which defines the interactions and processes between the actors, technologies, and institutions of an ecosystem, and *boundaries and composition*, which define the contextual breadth within which the relevant set of actors, technologies, and institutions is situated. We also briefly discuss the underlying drivers in B2B context that strengthen these two constituents.

Co-evolutionary logic examines the system-based features of constant dynamism and evolution, as well as the inherent interdependence of the actors involved. The term “co-evolution” refers to multiple dynamics that interact with one another over time. Co-evolution occurs between e.g. markets and science, technology and market structures, technology and culture, and technology and regulatory structures (see, Geels, 2004; Geels & Schot, 2007). Co-evolution also implies a prolonged period of co-existence, experimentation, and competition for resources (Schot & Geels, 2008). Therefore, co-evolutionary logic moves the analytical focus beyond typical B2B interactions toward focusing on both short- and long-term trajectories where actors, technologies, and institutions co-evolve through their interactions, joint contexts, and shared purpose (see also Moore, 2013).

The benefits of analyzing co-evolution relate to the increasing connectivity and ambiguity of market and industry structures. There is a more extensive and heterogeneous set of networked actors to analyze, among which the roles and activities are constantly interconnected and co-evolving. For instance, recent B2B studies have examined the technological and innovation processes that occur through collaborations among diverse actors and stakeholders (Aarikka-Stenroos et al., 2014; Cantù, Ylimäki, Sirén, & Nickell, 2015; Koskela-Huotari et al., 2016; Mu, 2015; Singaraju, Nguyen, Niininen, & Sullivan-Mort, 2016; Vargo et al., 2015), as well as multi-sector innovation activities that are affected, for example, by technology, medicine, policy, and business contexts (e.g., Crié & Chebat, 2013; Singaraju et al., 2016). Furthermore, complex interactions between actors also involve diverse socially grounded tasks and processes related to information acquisition and stakeholder involvement (e.g., Gyrd-Jones & Kornum, 2013; Letaifa & Rabeau, 2013; Anderson, Holtström, & Öberg, 2012; Crié & Chebat, 2013; Xu, Frankwick, & Ramirez, 2016; Frow, McColl-Kennedy, & Payne, 2016). Such drivers have pushed researchers to seek

a broader outlook on the temporal and spatial dynamism than that which is typically understood when discussing “networks” (for discussion, see, e.g., Lusch et al., 2016).

The boundaries and composition of the “ecosystem entity” are important for creating a feasible theoretical frame that explains the entity’s organization (see, e.g., Santos & Eisenhardt, 2005). One distinguishing feature of studies adopting an ecosystem approach is the pursuit for a broader range of relevant actors and broader boundaries when compared to a business network or net approach (see, e.g., Frow et al., 2016). Structurally, networks include direct and indirect ties between actors, and the overall network is composed of these actors and their linkages (Håkansson & Snehota, 1989; Möller, 2013; Provan, Fish, & Sydow, 2007). However, ecosystems do not include only the actors that are directly or indirectly connected to a network, but also the actors, technologies, and institutions that are interdependent with less formal and looser manner. Such interdependence can take place through identification and shared institutional values and logic (Autio & Llewellyn, 2014; Vargo et al., 2015), “shared purpose” (Moore, 2013), shared intentions (Taillard et al., 2016), affiliation (Adner, 2017), or a technological platform providing connectivity (Gawer & Cusumano, 2014; Wareham et al., 2014). Ecosystems are open social systems (see, e.g., Anderson, 1999) and are subject to constant inflows and outflows. Therefore, ecosystem boundaries are oftentimes blurred, and actors can belong to several systems at the same time (e.g., Hausman, Johnston, & Oyedele, 2005). For example, in healthcare and environmental related businesses the relevant activities increasingly span conventional industry borders and requires involvement of diverse actors from different social and technological systems, making traditional boundaries of industry sectors blurred and crossed. Such increasing ambiguity of market and industry structures leads to the creation of overlapping and parallel industry networks. Thus, an analysis of the boundaries and composition of the “ecosystem” can enable capturing the studied phenomenon in a comprehensive manner.

Indeed, the increasing involvement of broader boundaries and a more heterogeneous composition allow for new types of analysis of B2B relationships and networks. For instance, many papers question the clear boundary between B2B and business-to-consumer (B2C) markets; scholars using the ecosystem approach see value creation as being embedded in B2B and B2C networks and the institutional systems surrounding them (e.g., Anderson et al., 2012; Canhoto, Quinton, Jackson, & Dibb, 2016; Frow et al., 2016; Letaifa, Edvardsson, & Tronvoll, 2016). Similarly, analyses increasingly have involved regulators (e.g., Lacoste, 2015; Aarikka-Stenroos et al., 2014; Letaifa & Rabeau, 2013; Todd, Javalgi, & Grossman, 2014) and other “untypical and therefore peripheral actors” (e.g., Anderson et al., 2012; Gyrd-Jones & Kornum, 2013; Mele & Russo-Spena, 2015; Verganti & Öberg, 2013). Furthermore, there is increasing use of information systems and socio-technological perspectives in B2B research. For example, research on digitalization and the rapid increase in social media has highlighted phenomena such as crowdsourcing and online interactions (e.g., Simula & Ahola, 2014; Gyrd-Jones & Kornum, 2013), as well as the rise of large powerful global tech leaders with competitive platforms, such as Microsoft, Apple, IBM, and Amazon.com (e.g., Henneberg, Gruber, & Naudé, 2013; Lampel & Germain, 2016; Ritala, Golnam, & Wegmann, 2014; Tunisini & Sebastiani, 2015; Van Bockhaven, Matthyssens, & Vandembemt, 2015b). These developments, among others, serve as drivers that have changed the focus of the analyses to incorporate broader boundaries of relevant actors connected through these technological systems and platforms.

### 3. Methodology

#### 3.1. Research design for the literature review

Because our research aim is to analyze how the ecosystem approach has been reflected in B2B marketing research and what its implications

are for managing it in business and innovation networks, the first stage was to identify research articles in this field that utilize the concept “ecosystem.” This resulted in two methodological choices. First, we chose to concentrate solely on the search term “ecosystem” and conduct a conceptual analysis instead of analyzing broadly diverse phenomena that include systemic features. Second, we chose to conduct the search in established B2B-focused journals rather than in a broader research database (such as EBSCO) or more broadly among general journals in the field of marketing. In addition to selecting this B2B focus, we considered the quality of the journals to be relevant (cf. Singh, Haddad, & Chow, 2007). Hence, we conducted a systematic search in four major B2B journals: *Industrial Marketing Management*, *Journal of Business Research*, *Journal of Business and Industrial Marketing*, and *Journal of Business-to-Business Marketing*. Several general “business ecosystem reviews” have already been conducted (e.g., Järvi & Kortelainen, 2017; Valkokari, 2015). Instead of replicating these types of general review approaches, we purposefully framed the current review to provide a focused contribution on how the ecosystem approach has been applied in B2B research.

#### 3.2. Analysis of the articles

A search within the full texts of the selected journals for the key term “ecosystem” resulted in 240 hits. These hits covered B2B studies, several of which have applied innovation network or business network perspectives. Next, we conducted the first round of the content analysis of each full paper to make further delimitations. We skimmed through all the identified articles and excluded those focusing on biological and natural ecosystems (N = 61), editorials and book reviews (N = 17), and buzzword-type and other irrelevant hits (e.g., where “ecosystem” was mentioned in survey questions or in a context that was outside of our research scope, such as “brands need to provide authentication via means that are completely internal to their ecosystem,” N = 33). This analysis round narrowed the amount of papers to 129 articles published between 1999 and 2016. We then conducted a second round of content analysis of each full article. Based on this reading, we further narrowed the eventual thematic focus of this review on a subset of articles that – based on our assessment – provided clear added value by to B2B and business network literature by applying the ecosystem concept to explain conventional and contemporary B2B phenomena (such as innovation, business models, industry structures and co-creation). The delimitations above generated a dataset of 71 articles. The articles forming the core data set were thoroughly examined: they were analyzed, coded, and categorized, and they formed the basis of the results reported in this study (all 71 are also cited in this paper). The hits and delimitations for each journal are reported in Appendix A.

We conducted a structured content analysis of the 71 selected papers in terms of their topics, key drivers, contexts, definitions or use of the ecosystem concept, and relation to management, as well as other emerging issues, such as explicit and implicit remarks about the implications for theory and methods. Content analysis is an established method that allows minimal interference by the researcher with the phenomenon studied and enables large volumes of data to be examined (Krippendorff, 2012). This method enables the employment of both quantitative and qualitative textual analyses (Weber, 1990). Our emphasis was on the latter. We used structured methodology because we conducted detailed systematic searches, described above, among the target journals’ archives and sorted article contents thematically in tables to refine and deepen the analysis. In this process, we used researcher triangulation, where both authors independently familiarized themselves with the literature and held several discussions regarding the content and contribution of the articles to the use of the ecosystem concept.

Based on an analysis of these articles, we developed thematic categorizations for research themes and ecosystem approaches in B2B research (e.g. Table 2 and Fig. 1) and a framework for the network

**Table 2**

Selected B2B research articles utilizing ecosystem approach: identified research themes and the roles of “ecosystem”.

Research themes linked to ecosystems	The role of ecosystem in the field of study	Examples of the role of the ecosystem approach in focal research and references
Markets and industries	<p>An ecosystem is a way in which a market is structured; it is a dynamically evolving structure.</p> <p>Firms learn, discover, and acquire information from the “market,” that is, the “ecosystem.”</p> <p>The market orientation implies that “the whole ecosystem” is a source of information.</p>	<ul style="list-style-type: none"> <li>• The ecosystem relates to a layer of “institutional systems and their dynamics (e.g., distribution channels and networked ecosystems)” (Möller, 2013, p.324).</li> <li>• The market ecosystem has balance and symmetry, but this can be disrupted via market shaping and scripting as an actor introduces new ideas or new business model elements to which “the market ecosystem” responds by seeking to recover and create a stasis once more (Storbacka &amp; Nenonen, 2011).</li> <li>• An ecosystem enables “discovering opportunities” and “market learning” (Storbacka &amp; Nenonen, 2015).</li> <li>• Knowledge acquisition from the internal and external actors of a value co-creation ecosystem via social media and a market orientation strategy builds a firm's competitive advantage (Nguyen, Yu, Melewar, &amp; Chen, 2015).</li> <li>• “Market sensing” is the ability of a firm to “anticipate [the] future evolution of markets and detect emerging opportunities based on information collected from its business ecosystem” (Mu, 2015, p.154).</li> </ul>
Value (co-) creation	Value is (co-)created in a systemic way by diverse actors.	<ul style="list-style-type: none"> <li>• Multiple stakeholders or actors contribute to value co-creation in the ecosystem via their divergent resources and resource integration practices (Ekman, Raggio, &amp; Thompson, 2016; Frow et al., 2016; Pera, Occhiocupo, &amp; Clarke, 2016; Singaraju et al., 2016; Storbacka, Brodie, Böhmman, Maglio, &amp; Nenonen, 2016).</li> <li>• There is a systemic perspective on value co-creation rather than isolated investigations on one level (Meynhardt, Chandler, &amp; Strathoff, 2016).</li> </ul>
Value chain and value networks	An ecosystem is close to a value network: the firm chooses and operates a network of collaborating actors who help provide an offering.	<ul style="list-style-type: none"> <li>• Ecosystems are hub-, firm-, or product-centric value chains or networks with vertical, horizontal, and diagonal relationships (Søilen, Kovacevic, &amp; Jallouli, 2012).</li> <li>• A firm “chooses an ecosystem” that comes with both opportunities and risks and either enables or challenges survival (Töytäri, Rajala, &amp; Alejandro, 2015).</li> <li>• An ecosystem is related to value chain transformations (Lampel &amp; Germain, 2016).</li> </ul>
Business models	Business models are embedded in an ecosystem context. Firms' business models and ecosystems co-evolve. Competition and collaboration occur on an ecosystem level.	<ul style="list-style-type: none"> <li>• Business models differ in terms of how firms relate to the surrounding ecosystem, that is, other players (Benson-Rea, Brodie, &amp; Sima, 2013).</li> <li>• Firms must constantly develop their business models, taking into account the co-evolution of the business model and ecosystem; dynamics are emphasized (Muzellec, Ronteau, &amp; Lambkin, 2015).</li> <li>• Competition, collaboration, and co-opetition occur on the ecosystem level, and business models can be designed to create and appropriate value in this context (Ritala et al., 2014).</li> </ul>
Innovation and R & D	<p>Ecosystem actors are contributors to innovation.</p> <p>New tools and methods are needed to enable “ecosystem” actors to contribute.</p> <p>Market innovations are the result of “co-creation” and institutionalization by ecosystem actors.</p> <p>Radical innovation requires a (business) ecosystem, though this is often absent.</p>	<ul style="list-style-type: none"> <li>• Interpreters, for example, designers, who are outside of or distant from the focal ecosystem can question conventions and thus trigger innovation and change (Verganti &amp; Öberg, 2013).</li> <li>• Knowledge from business ecosystems is relevant to open innovation processes and R &amp; D (Lind, Holmen, &amp; Pedersen, 2012).</li> <li>• The ecosystem approach puts forward new approaches such as crowdsourcing (e.g., Simula &amp; Ahola, 2014) and various other tools and methods to enable dispersed actors' contributions (Van Bockhaven, Matthyssens, &amp; Vandembemt, 2015a).</li> <li>• Market innovation requires the institutionalization of new practices and the emergence of common templates reflecting shared problems and solutions. Problems and inconsistencies in an ecosystem trigger the emergence of new solutions that create change, but the institutions in the ecosystem can also help in achieving and realizing institutional change (Kjellberg, Azimont, &amp; Reid, 2015).</li> <li>• Innovation is a process that unfolds through changes in the institutional arrangements that govern resource integration practices in ecosystems (Koskela-Huotari et al., 2016)</li> <li>• Innovation can be considered a social process in the ecosystem “by a group of actors in which a company's borders and the distinction between the internal and external disappear,” and thus, innovation is co-created by all actors through a set of practices (including symbolic, linguistic, and material practices) and resource integration (Mele &amp; Russo-Spena, 2015, p.43).</li> <li>• The main external innovation barrier for radical innovation is a lack of support from an ecosystem (Sandberg &amp; Aarikka-Stenroos, 2014).</li> <li>• In cases of radical innovation, ecosystems must be created (Yami &amp; Neme, 2014) or modified (Aarikka-Stenroos &amp; Lehtimäki, 2014).</li> <li>• The ecosystems around innovative start-ups (Baraldi, Ingemansson, &amp; Launberg, 2014; Boehm &amp; Hogan, 2013; Purchase, Olaru, &amp; Denize, 2014), universities (Jahannmir, 2016; Janeiro, Proença, &amp; da Conceição Gonçalves, 2013), and investors (Lutz, Bender, Achleitner, &amp; Kaserer, 2013) are studied as innovation ecosystems.</li> <li>• Clusters created by economic policies are less prone to innovation than the spontaneous ecosystems that emerge from private entrepreneurial initiatives (Letaifa &amp; Rabeau, 2013).</li> </ul>
Start-ups and entrepreneurship	<p>A new business requires support from multiple actors and institutions.</p> <p>Ecosystems, as industry clusters, support entrepreneurship.</p>	<ul style="list-style-type: none"> <li>• The ecosystems around innovative start-ups (Baraldi, Ingemansson, &amp; Launberg, 2014; Boehm &amp; Hogan, 2013; Purchase, Olaru, &amp; Denize, 2014), universities (Jahannmir, 2016; Janeiro, Proença, &amp; da Conceição Gonçalves, 2013), and investors (Lutz, Bender, Achleitner, &amp; Kaserer, 2013) are studied as innovation ecosystems.</li> </ul>
Branding and legitimacy	The social processes that occur between multiple stakeholders in an ecosystem are meaningful.	<ul style="list-style-type: none"> <li>• Brand and “goodwill” are earned in ecosystems that include multiple stakeholders; firms must relegitimize their businesses within their ecosystems (Sheth &amp; Sinha, 2015).</li> <li>• Multiple stakeholders, even those that are distant, opposing, and at the periphery</li> </ul>

(continued on next page)

Table 2 (continued)

Research themes linked to ecosystems	The role of ecosystem in the field of study	Examples of the role of the ecosystem approach in focal research and references
		<p>of an ecosystem, can contribute to the co-creation of a brand (online and offline) via their values, cultural complementarities, and valuable adjustments at the core of the ecosystem (Gyrd-Jones &amp; Kornum, 2013).</p> <ul style="list-style-type: none"> <li>• Multiple actors realize the transition occurring in the service ecosystem (Letaifa et al., 2016).</li> </ul>

management in the era of ecosystems. We adopted a critical, integrative approach because it is useful for analyzing new and emerging topics that would benefit from a synthesis of the literature to date (Torraco, 2005). In the following sections, we discuss our findings regarding how B2B research and business, industrial, and innovation network research has employed and characterized the ecosystem concept and what this implies for management.

#### 4. Results: ecosystem approach within B2B research

In the following sections, we discuss the results of the systematic review. In Section 4.1, we introduce the major themes and conceptualizations that were linked to the ecosystem approach within the reviewed B2B research (first research objective). Then, in Section 4.2, we present four identified B2B research categories that apply the ecosystem approach (second objective). Finally, in Section 4.3, we examine the management issues and challenges brought about by ecosystems in B2B research (third objective).

##### 4.1. Major themes and conceptualizations of the “ecosystem” in B2B research

First, we developed an overview of the B2B and business network research that uses the ecosystem concept. The earliest relevant article mentioning the term ecosystem is “Cooperation and Competition in Relationships Between Competitors in Business Networks” by Bengtsson and Kock (1999), published in the *Journal of Business & Industrial Marketing*; this article references Moore’s (1993) earlier conceptualization of the business ecosystem. The most rapid expansion of the ecosystem approach in this literature, however, dates from 2010, with a significant number of new articles published in 2015 and 2016 (including one special issue with an ecosystem emphasis in the *Journal of Business Research*). In terms of diverse ecosystem streams, it is noteworthy that most of the selected studies used the ecosystem conceptualization loosely and metaphorically, referring to a complex and broad system of multiple actors, without referring to any particular ecosystem stream or set of ecosystem studies. The most often cited type of ecosystem was the emergent service ecosystem stream, described by Vargo and Lusch, who have strongly pushed for integrating the ecosystem analogy, B2B research, and service-dominant logic (see, e.g., Vargo et al., 2015; Lusch et al., 2016). Seminal work on business ecosystems by Moore (1993), Iansiti and Levien (2004), Adner and Kapoor (2010), and Gawer and Cusumano (2002) was also applied, but surprisingly, it was infrequent. Explicit references to other ecosystem approaches were also quite limited. For example, “innovation ecosystem” was mentioned in multiple articles, but this was used metaphorically, without reference to the innovation ecosystem or innovation systems literature. Also, the work of Teece (2007), which uses business ecosystems as a relevant environmental context to analyze firms’ dynamic capabilities, was mentioned on several occasions.

We also identified several explicit remarks regarding an ecosystem approach or comparative comments on the difference between ecosystem and network conceptualizations. For example, some authors have noted that business ecosystems differ from business networks in their composition or goals (de Reuver & Bouwman, 2012; Lacoste, 2015); while on the other hand, many authors (Hausman et al., 2005;

Hillebrand & Biemans, 2003; Holmen, Aune, & Pedersen, 2013; Möller, 2013; Wilkinson, Young, Welch, & Welch, 1998) have suggested that a business ecosystem is similar to a business net(work). For example, Holmen et al. (2013) wrote that “[a]lthough Teece (2007) conceptualizes companies’ outer context as an ecosystem, the logic of sensing and searching in ecosystems may be applied to business networks as well” (p. 141). Also, Wilkinson and Young (2013) noted that by relying on the work of Iansiti and Levien (2004) and others, firms can develop a collaborative advantage “through the development of cooperative relations with other organisations in the business ecosystem of which [they are] a part and positioning [themselves] in these systems” and that the “relations and networks in which a firm is embedded, its business ecosystem, can be seen as an extension of the firm, an extended enterprise, by which firms gain access to key resources and information and extend their sensing, action and response potential” (p. 401). These studies show that the inherent utility of the ecosystem concept is sometimes highlighted while at other times, it is used as a convenient analogy with which to describe the increased connectivity of firms’ business environments, relationships, and networks (see Oh et al., 2016 for similar findings in innovation studies).

Our review demonstrates that the ecosystem concept has been linked to various topics—both established and emergent—in the area of B2B research. As Table 2 shows, major topics included market creation, market shaping, and market innovation, equating markets with ecosystems; value chain issues, indicating that a firm chooses and operates within a network of collaborating actors that constitute an ecosystem; business models that create and capture value in an ecosystem context; value-creation in systemic business contexts; branding, which highlights how the end users engage with a brand and therefore build the ecosystem around the brand; innovation, indicating that the supporting ecosystem improves, or even enables, innovation development and commercialization; and start-ups, entrepreneurs, and triple-helix models, indicating that ecosystems support new business via start-ups and small entrepreneurs.

##### 4.2. Four major ecosystem research approaches in B2B research

Because the current B2B research has used the ecosystem term in quite different ways, we categorized these approaches into four major categories: (a) competition and evolution; (b) emergence and disruption; (c) stable business exchange; and (d) value co-creation (Fig. 1). The categories are not mutually exclusive. However, we were able to derive important underlying features of the themes through which ecosystems have been examined. The categories are separated according to two dimensions (see axis labels): interaction focus and system dynamics focus, based on the thematic review of the literature.

The *interaction focus* axis refers to whether interactions between the ecosystem actors are focused on organizing the market structure of the ecosystem or on customer and stakeholder value creation (Fig. 1). This distinction is rooted in two strong underlying thematic groups in the reviewed literature. First, many studies are interested in how ecosystems are organized as *market structures*, where actors, technologies, and institutions interact and co-evolve. This could refer to analyses of competition and collaboration within the ecosystem (Ritala et al., 2014) or to how markets are structured to involve dispersed communities of actors (Simula & Ahola, 2014; Nguyen et al., 2015). Thus, from this

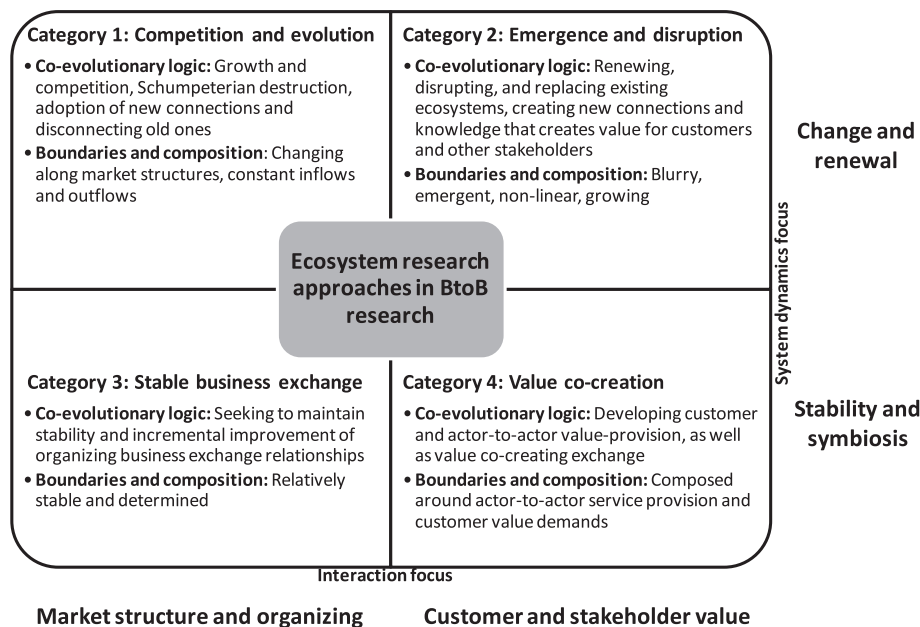


Fig. 1. Four major categories applying the ecosystem approach in B2B research.

perspective, the ecosystem concept is used to understand and explain the structure and structuration of the market environment for relevant business and innovation activities and interactions. Second, the creation of *customer and stakeholder value* is a very strong undercurrent in B2B marketing and business networks literature, and this also broadly appears in the reviewed ecosystem approaches. Customers and other stakeholders are seen as the actors in ecosystems, where value is created via multipolar interactions of services, resources, and activities (Lusch et al., 2016; Pera et al., 2016; Vargo et al., 2015). Therefore, these types of B2B research focus on interactions that are fundamentally linked to customer and stakeholder value, as well as the system's components and processes that facilitate its increase, modification, or destruction.

The *system dynamics focus* axis refers to two counterforces, change and stability, which we found characterize the ecosystem approaches adopted in the reviewed studies. It is noteworthy that these counterforces also have roots in business networks literature, which has examined the emergence and construction of new business fields, as well as the maintenance of more stable systems and networks for business exchange (for discussion, see Möller, 2013). *Stability and symbiosis* relate to the pursuit of sustaining relatively stable system dynamics among actors, technologies, and institutions. Stability is largely maintained through different processes of institutionalization. These themes were mentioned, for example, in relation to institutionalized systems such as technologies (Möller, 2013; Vargo et al., 2015), institutionalized structures such as market configurations (cf. Storbacka & Nenonen, 2011), and sociocultural meaning systems (Verganti & Öberg, 2013). This symbiotic approach to dynamics resembles the collaborative interactional approach traditionally associated with IMP-school business network studies (Turnbull, Ford, & Cunningham, 1996). *Change and renewal* relate to system dynamics that tend to change, disrupt, and replace existing systems, creating opportunities for new actors, technologies, and institutions to emerge. Research using an ecosystem approach has indicated that individual firms must reposition themselves because of constant change or work to sustain their positions (Sheth & Sinha, 2015; Van Bockhaven et al., 2015b) and that business models must be dynamic and evolve as business networks and ecosystems evolve, and vice versa (Muzellec et al., 2015). Firms can also disrupt the balance with new offerings or business model elements that drive the market ecosystem and its actors to seek a new balance (e.g., Storbacka & Nenonen, 2015), and business

models evolve over time by bringing in new actors, such as competitors, through technological platforms (Ritala et al., 2014). Finally, technologies and institutions also change, for instance, through actors such as designers, who perform the role of “interpreter” and can question existing systems, providing an alternative interpretation, thus challenging the status quo (Verganti & Öberg, 2013).

#### 4.2.1. Category 1: competition and evolution

Studies in this category highlight dynamic, market-based competition and collaboration within and across business ecosystems, often highlighting strategic management aspects in regional and global markets (cf. Teece, Pisano, & Shuen, 1997), coming close to the seminal description of business ecosystems by Moore (1993). *The co-evolutionary logic* follows growth and competition trajectories. Related studies revolve around dominant players, ecosystem leadership, and the means with which to coordinate ecosystem relationships and activities (Ritala et al., 2014). The focus of the analysis is also more broadly in the evolutionary forces, pinpointing the linkages between underlying market changes and ecosystem evolution. Thus, such studies indicated that firms must constantly develop their business models (Maglio & Spohrer, 2013; Muzellec et al., 2015), competitive and collaborative activities and relationships (Bengtsson & Kock, 1999; Ritala et al., 2014), and business ecosystems (Letaifa, 2015; Low & Johnston, 2010; Todd et al., 2014). *The boundaries and composition* of ecosystems are seen to be subject to the constant inflows and outflows of actors and resources, loosely determined through ecosystem leaders and their business models (e.g., Benson-Rea et al., 2013; Ritala et al., 2014). In this regard, the analyzed ecosystem actors include the relevant actors attached to the business and markets (i.e., an industry or a technological field) or across industries.

#### 4.2.2. Category 2: emergence and disruption

This type of B2B research focuses on ecosystems that are related to the development of new businesses, technologies, and innovations that create new types of value for customers and stakeholders. Here, mastering the knowledge and relationships that enable innovation and development is the focus, and such studies often build on integrating B2B literature with diverse innovation and new product management research (see, e.g., Aarikka-Stenroos et al., 2014). *The co-evolutionary logic* is associated with different ways of how customer and stakeholder value emerges and is then disrupted by creating new connections and

knowledge within ecosystems that generate new types of value for customers and stakeholders. In the B2B literature, numerous studies have adopted this approach, focusing on early innovation development and regional collaborations for innovation and development to create new clusters or welfare for society (Boehm & Hogan, 2013; Baraldi et al., 2014; Letaifa & Rabeau, 2013; Janeiro et al., 2013; Lutz et al., 2013), tools that enable renewal and innovation (Van Bockhaven et al., 2015b; Wang, Hsiao, Yang, & Hajli, 2016), or extensive collaborations to generate new business fields. Here, the focus is primarily on technology and then on business processes, though social processes have been increasingly emphasized (e.g., Mele & Russo-Spena, 2015). *Ecosystem boundaries and composition* are very blurry, and ecosystem growth is seen to happen in a nonlinear fashion because development trajectories are emergent rather than strictly controlled. The reviewed articles have underlined the fact that innovation can be improved by involving divergent ecosystem actors in the process: innovation can be better institutionalized if it is “co-created” by ecosystem actors. Actors in an ecosystem can support the envisioning of innovation opportunities (e.g., Kjellberg et al., 2015; Mu, 2015), developing (Lind et al., 2012), commercializing, and disseminating them (Aarikka-Stenroos et al., 2014). Very diverse actors and “distant stakeholders” from an ecosystem can also contribute to this (Öberg & Shih, 2014; Aarikka-Stenroos et al., 2014).

#### 4.2.3. Category 3: stable business exchange

This type of B2B research has identified ecosystems that attempt to retain stability and determination in the business exchange and, in so doing, maintain business exchange relationships over time. *Co-evolutionary logic* is thus maintenance-oriented, and the evolutionary trajectories are symbiotic, rather than discontinuous and disruptive. This involves long-term ecosystem partnerships determined by strong central actors, brands, and market configurations (e.g., Eloranta & Turunen, 2016; Storbacka & Nenonen, 2011), as well as by gradual improvements in the supply and delivery channels and platforms (e.g., Makkonen, Vuori, & Puranen, 2016). *Boundaries and composition* are relatively stable and determined, in that actors, technologies, and institutions have rather clear roles that change only slightly over time. The focal actors are diverse and take part in value networks or value chains; the relevant studies have focused on, for example, “supplier ecosystems” (Makkonen et al., 2016) or vertical, horizontal, and diagonal relationships within the value network (de Reuver & Bouwman, 2012; Sjøilen et al., 2012). However, because there are typically many interdependent actors, maintaining a level of stability can be considered an ongoing pursuit. In a strict sense, stability conditions (e.g., related to the number of actors, supply, and demand) are typically not met at any specific point, but ecosystems can still be seen as relatively stable over time, given their tendency to seek stability in exchange relationships (cf. Storbacka & Nenonen, 2011).

#### 4.2.4. Category 4: value co-creation

These types of B2B research address value (co-)creation in ecosystems, and the joint theme is how services and value are created and delivered to the customers and stakeholders. One stream that focuses strongly on this perspective is “service ecosystems” (Lusch et al., 2016; Vargo et al., 2015), but other ecosystem studies have also adopted this focus (e.g., Pera et al., 2016). Here, the process of value creation in an “ecosystem” is seen to extend beyond the firms’ conventional operational activities (see, e.g., Meynhardt et al., 2016). *The co-evolutionary logic* is centered on actor-to-actor and customer value creation, as well as service provision. Actors include both consumers and divergent actors beyond the business (such as governments, universities, associations, and non-governmental organizations), obvious actors, and more distant ones, who may have institutional effects and more indirect, nonlinear “butterfly effects” on value creation (Lacoste, 2015; Singaraju et al., 2016). Hence, the *boundaries and composition* of such ecosystems are determined around value and value creation, involving all relevant

actors, technologies, and institutions. In this process, value is co-created with the customers and with “generic actors” (Ekman et al., 2016) through the institutionalization of shared intentions and goals (Koskela-Huotari et al., 2016). Thus, this approach highlights the complexity of markets and the importance of understanding various levels of interaction to better grasp the socioeconomic processes related to customer value creation (see, e.g., Vargo et al., 2015). Noteworthy is that value creation is present in all types (for example, in Category 1, competition is shaped by the ecosystem’s actors’ ability to create value), but in this category, value co-creation is the primary focus around which the ecosystem analysis takes place.

#### 4.3. Shifts in management opportunities and challenges in the ecosystem era

Based on the discussed constituents and underlying drivers, as well as the identified categories, we can highlight four identifiable shifts in management opportunities and challenges in business and innovation networks: to wider collaboration; in processes for managing exchange; in methods and tools; and in pace. These are discussed next in detail.

##### 4.3.1. Shift to wider collaborations to be managed

Instead of merely choosing partners, key relationships, relationship portfolios, and nets, firms must also consider and choose between wider entities, that is, networked or competitive ecosystems that include both vertical and horizontal relationships. Therefore, organizations must understand how to adapt to existing ecosystems, change existing ecosystems, or create new ecosystems (e.g., Aarikka-Stenroos & Lehtimäki, 2014; Möller, 2013). In the reviewed studies, actors needed to “choose [an] ecosystem” (in Töytäri et al., 2015) or “build supplier ecosystems” (in Makkonen et al., 2016). Furthermore, these considerations about wider collaborations necessitates an understanding of institutions, regulators, users, and other actors that have more distant, yet crucial, impacts on an organization’s potential success and survival (Mele & Russo-Spena, 2015; Wang et al., 2016; Frow et al., 2016). This shift can also be reflected through the previously identified categories of ecosystem research. For example, when “competition” is the focus, firms’ competitive strategies move from industry competition to ecosystem-level competition, in which firms choose between rival ecosystems. Regarding “emergence and disruption,” firms need to involve diverse ecosystem actors to contribute to development and innovation and support the co-creation and institutionalization of innovation. Moreover, firm’s extending networks of internal and partner relationships call for new views on managing wider collaborations. For example, buyers must manage their key suppliers in extensive ecosystem-like contexts and must therefore assess and revise their portfolios, for example, by using network pictures that reveal the congruence between the buyer’s network picture of key suppliers and the key suppliers’ own network pictures (Holmen et al., 2013).

##### 4.3.2. Shift in processes relevant for managing exchange

The ecosystem approach invites a search for a larger set of relevant domains and processes regarding managing. Managing actors, technologies, and institutions and their interactions requires coordination on the part of the focal actors, while understanding the parallel processes of self-organization and emergence throughout the ecosystem (e.g., Pera et al., 2016; Taillard et al., 2016). Such interactions might occur between very diverse participants who exchange ideas, knowledge, and expertise and who integrate competences, something which can even resemble a collective learning process (cf. Storbacka & Nenonen, 2015; Wang et al., 2016; Xu et al., 2016). This diversity is also linked to the increased breadth and scope of relevant knowledge. Here, when the focus is on “value co-creation,” absorbing and managing diverse information collected from the entire ecosystem in to upgrade value creation becomes a must. There is also a shifting in processes between business and technology regarding systems focusing on “disruption and emergence,” particularly because radical and



disruptive innovation requires—but initially lacks—a business ecosystem around it (e.g. Ansari et al., 2016). Therefore, firms pursuing radical or disruptive innovation should consider putting effort into resolving business ecosystem issues early on.

#### 4.3.3. Shift in methods and tools in managing

Because of the complexity and extensive boundaries of the ecosystem, multiple types of knowledge can, and should be, derived from the ecosystem. This shift is made possible thanks to the availability of the developing methods and tools for managing business relationships and maximizing ecosystem actors' contributions (e.g., social media, crowd-sourcing, and virtual forums). These include applying social media in knowledge acquisition for market and technology development (e.g., Nguyen et al., 2015), connecting ecosystem actors together via platforms and interfaces (Eloranta & Turunen, 2016; Muzellec et al., 2015; Ritala et al., 2014), as well as analyzing the increasingly accessible and growing data on customer preferences and value creation (e.g., Mu, 2015; Simula & Ahola, 2014).

#### 4.3.4. Shift in pace

Because of co-evolution and increased dynamics, the variability in the pace of interactions generates new challenges regarding management. Therefore, managing broad collaborations, industry networks, relationship portfolios, or dyadic relationships requires adaptation to increased dynamics and rapid change, as well as co-evolution. The shift in pace challenges firms to consider how to conduct business activities among diverse collaborating and complementing players that represent different positions in constantly changing ecosystems (e.g., Nguyen et al., 2015; Ritala et al., 2014). The increased pace pushes firms to constantly reposition actors and update business models to survive in an evolving ecosystem environment (Muzellec et al., 2015); therefore, being agile and fast becomes a critical competence in the ecosystem (cf. Chen, 2010; Verganti & Öberg, 2013).

### 5. Ecosystem as layer and perspective: network management framework

It is evident that the ecosystem concept and its implications in managing business relationships cannot be disregarded. After analyzing the use of concepts and synthesizing the ecosystem approaches in current B2B research, particularly business network research, two interpretations emerge: (a) *ecosystem as a new layer*, which results in an extension of the business network frameworks and (b) *ecosystem as a novel perspective to business networks*, which involves providing an update to current business network frameworks. Both interpretations have important implications for management and managing in networks.

In terms of the first interpretation, we suggest a *new layer* beyond the widely cited framework of Möller and Halinen (1999); see also Möller, Rajala, & Svahn, 2005) that discussed dyadic relationships, relationship portfolios, nets, and networks and their management. As described in the categorization displaying ecosystem variants in B2B and business network research (Fig. 1), applying the term “ecosystem” has major implications for management and manageability, which differ in many ways from the implications found in business and innovation networks. In this perspective, an ecosystem is a broader societal system environment and layer, in which business networks are embedded. As discussed in this study, “ecosystem” includes two specific constituents—co-evolutionary logic and boundaries and composition—that also determine the essence of the ecosystem layer. *Co-evolutionary* logic shifts the focus from the evolution and exchange of a business network to system co-evolution. This makes the relevant managerial context broader and more forward looking, requiring an extended understanding of what it means to manage and be managed, as well as an analysis of competitive and collaborative co-evolutionary forces between actors. There are two dimensions to consider in co-evolution: spatial and temporal. For the spatial dimension, it is relevant

to analyze the interdependent forces among societal, technological, and institutional actors, networks, and individual relationships. For the temporal dimension, it is important to understand how events and activities in a given time and place are interdependent on other activities and with broader trajectories that unfold over time in the ecosystem. Furthermore, at the ecosystem layer, *boundaries and composition* are even more elusive and open-ended, further increasing interdependency, dynamism, and instability. This and the identified shifts mean that the management of ecosystems—or being managed in ecosystems—requires a more far-reaching understanding of the relevant key actors, technologies, and institutions. This also means that key organizing choices should include ecosystem engagement and building.

As for the second interpretation, “ecosystem” is a *perspective* that updates and informs current B2B and business network research, related theories, and management. This originates directly from B2B and business network researchers' work: an extensive set of researchers, representing strategic network, industrial/IMP network, and service-dominant logic streams, have applied the ecosystem approach. The overarching implication is that an ecosystem perspective affects managing within business networks, and this has implications across the four distinct levels of Möller and Halinen's (1999) network management framework, namely, industries as networks, nets of interlinked firms, relationship portfolios, and dyadic exchange relationships.

Overall, we argue that in an “ecosystem era,” the management of business and innovation networks faces major changes. The developments, expansions, and shifts discussed in the current study have implications for business networks in terms of what is relevant in managing relationships. In this regard, Table 3 summarizes both the layer and the perspective interpretations of the ecosystem approach and suggests implications using an extended perspective to the network management framework.

### 6. Conclusions and implications

The ecosystem approach shows promise for examining management that spans value chains, networks, and industry boundaries. However, the existing literature contains scattered and diverse perspectives, and the added value of an ecosystem approach for B2B and business network research is not always evident. Thus, given the rapid rise in the application of the ecosystem approach, we provided a critical overview of ecosystem studies in four leading B2B journals.

This systematic review study generated new knowledge regarding how the ecosystem approach is applied in the current B2B research. We started by identifying the theoretical constituents of ecosystem approach and related underlying drivers. Then, we reviewed B2B studies that have applied the ecosystem concept, mapped the major themes and conceptualizations (Table 2), developed a categorization of four B2B research types applying the ecosystem approach (Fig. 1), and retraced essential shifts for management. Finally, we also crafted a framework viewing ecosystem as both an analytical layer and a perspective, with implications for management in business and innovation networks, and developed related guidance for managers (Table 3). These findings generate three main theoretical contributions for network management in the era of ecosystems.

#### 6.1. Theoretical contributions

##### 6.1.1. Ecosystems—a new layer or new perspective in B2B research with implications for management

Ecosystem approaches have expanded rapidly in B2B research and business network studies. We found that this emerges from a broader transformation of the current B2B marketing paradigm, where conventions, such as the division between B2B and B2C markets or industry borders, are being challenged, along with who and what constitutes “business actors” and processes relevant in business networks. These remarks resonate strongly with recent studies (e.g., Frow et al., 2016)

**Table 3**  
Ecosystem as a layer and a perspective: extension and update to the network management framework.

	Key characteristics	Implications for management and managing
Ecosystem as new layer beyond business networks	<p>Open social systems encompassing a diverse range of actors, institutions, and technologies that provide the systemic context for the exchange in the business and innovation networks</p> <p>Focus on the co-evolutionary processes between ecosystem actors, viewing exchange relationships as temporally interdependent, but also across levels and entities</p>	<ul style="list-style-type: none"> <li>● Perception of the ecosystem boundaries as constantly evolving, blurry, and interdependent on the networks embedded in them</li> <li>● Perception of the ecosystem's composition as an embedded set of networks, their actors, and institutions and individuals affiliated with the ecosystem</li> <li>● Interdependence as a temporal feature of co-evolution: analyzing exchange across events and activities that unfold over time, linking to broader development trajectories within the ecosystem</li> <li>● Interdependence as a spatial feature of co-evolution: analyzing exchange across levels and entities in society, networks, and relationships</li> </ul>
Ecosystem as a perspective to business networks (i.e., the four layers identified by Möller and Halinen, 1999)	<p>Ecosystems cross industry boundaries, connecting various types of business and innovation networks in an exchange that is embedded in an institutional and socio-technical environment</p> <p>Net management aiming to mobilize and coordinate the other actors' resources and activities is embedded in rapidly evolving and interdependent systems environment. Perception of the boundaries is constantly evolving and blurry.</p> <p>Relationship portfolios consist of loosely coupled set of interdependent network actors. They are connected to the focal actor via formal, activity-based, and affiliation-based linkages.</p> <p>Exchange relationships are both deliberate and emergent. They are constantly formed and dissolved, developed, and iterated.</p>	<ul style="list-style-type: none"> <li>● Network actors as a loosely coupled set of interdependent entities affiliated to or acting within the network</li> <li>● Identifying and building relationships over conventional industry borders to sense and adapt to the dynamics of the focal industry and to foresee the changes and trends that occur and flow across industries</li> <li>● Sensing opportunities to link institutional actors, technological developments, and network actors in value-creating ways</li> <li>● Identifying, building, and organizing the right set of vertical, horizontal, and diagonal relationships while taking into account their embedded nature to the broader institutional environment</li> <li>● Compiling value creating nets in an agile way from increasingly diverse actors</li> <li>● Utilizing the developing methods, interfaces, and platforms that enable strategizing and management in networks</li> <li>● Being aware, sensing, and searching for novel relationships, with business, technology, and societal and regulative actors</li> <li>● Scanning change and opportunities by using systematic tools that generate insights into how to manage the dynamics and interdependence of relationship portfolios not only in the present, but also for future trajectories</li> <li>● Considering an exchange relationship as a source of diversified resources and different roles in rapidly evolving contexts characterized by interdependence</li> <li>● Involving, mobilizing, and remaining open to resources and inputs from a range of actors; absorbing and aggregating knowledge from diverse actors are crucial</li> <li>● Focusing on interconnection and changes between different types of relationships and increasing efforts to coordinate both inter- and intra-organizational (business) relationships</li> </ul>

that have explicitly highlighted that business network conceptualizations do not fully capture many recent phenomena.

Our review identifies two responses and interpretations for this transformation; an ecosystem is a layer that extends business network frameworks and a perspective with implications for business networks, which updates and informs current business network frameworks. This contribution responds particularly to the network management framework created by Möller and Halinen (1999) because our identified key drivers and constituents, as well management issues and shifts, underline novel challenges that must be addressed by contemporary businesses. Our findings and revised network management framework both update and extend the analyses and management of business relationships and networks.

It is noteworthy that all ecosystems in all cases are comprised of networks; therefore, the ecosystem approach resonates well with established business network streams. For example, industrial/IMP networks have long conceptualized “markets as networks” (e.g., Mattsson, 1997), which resemble how the ecosystem functions as a layer. IMP shares the overall holistic systems view and provides a structured approach of dynamic phenomena (Olsen, 2013), but it does not generally take the end consumer into account, and it barely addresses the factor of increasing actor diversity (Frow et al., 2016; Mele & Russo-Spena, 2015). Furthermore, service-dominant logic has recently adopted the service ecosystem approach and elaborated on the shared institutional logic of value creation and service exchange (e.g., Vargo & Lusch, 2011; Koskela-Huotari et al., 2016). “Ecosystem” also resonates with the strategic business network stream, highlighting focal-actor ecosystems

(e.g., Ritala et al., 2013; Rohrbeck et al., 2009).

Manageability is a key topic across B2B and business network literature (e.g., Håkansson & Ford, 2002; Möller & Svahn, 2006; Ritter, Wilkinson, & Johnston, 2004; Rampersad, Quester, & Troshani, 2010). Therefore, the question, “Can ecosystem-level entities be managed?” is a relevant one. Our observation is that the answer depends on how the term “ecosystem” is defined, and the reviewed studies indeed took different stances. For instance, some articles indicated that managing a business in an ecosystem environment involves the integration of dispersed business, technological, and cultural and societal knowledge (e.g., Gyrd-Jones & Kornum, 2013; Mele & Russo-Spena, 2015; Wilkinson & Young, 2013), whereas other studies adopted a strategic network mindset regarding management, showing how particularly strong players or “hubs,” such as Nokia, Microsoft, Eriksson, Apple, and Amazon.com, “manage their ecosystems,” ensure leadership, and provide the stability of the system because of their legitimacy, relevance, and bargaining power in the system. Thus, the debate on manageability continues at the ecosystem level, with approaches indicating the merits of ecosystem leadership by powerful players (e.g., Li, 2009; Ritala et al., 2014), as well as the importance of multipolar ecosystems and market structures (e.g., Canhoto et al., 2016).

Our findings on ecosystem approaches in B2B research develop an understanding of established business network streams, such as strategic networks and industrial networks, as well as the service-dominant logic stream.

### 6.1.2. Major applications of “ecosystem” in B2B research and business network studies

As our second contribution, we identified four major categories of B2B research applied to the ecosystem approach. Each of these types highlights different aspects: (a) *competition and evolution* highlight dynamic, market-based competition and collaboration within and across business ecosystems; (b) *emergence and disruption* focus on ecosystems and collaborations that develop new, emerging, and sometimes disruptive developments; (c) *stable business exchange* highlights the attempts to maintain stability and determination via organization-oriented logic; and (d) *value co-creation* refers to a focus on enhancing customer value creation and an actor-to-actor service provision.

This clarification and mapping has been called for in earlier studies that implicitly or explicitly discussed the similarities and differences between ecosystems and business networks (e.g., Lacoste, 2015; Holmen et al., 2013; Wilkinson & Young, 2013; Hillebrand & Biemans, 2003; Bengtson & Kock, 1999; Frow et al., 2016). We believe our framework is a useful starting point with which further studies can apply different ecosystem approaches in B2B literature.

### 6.1.3. “Ecosystem” as a theoretical concept and conceptual metaphor in the B2B field: Toward increased theoretical rigor

We witnessed two types of cognitive usages of “ecosystem”: as a theoretical concept and as a metaphor. Therefore, our contribution positions ecosystems within the discussions calling for theoretical development and theory mapping in the B2B area (Möller, 2013; Wilkinson & Young, 2013).

First, because theoretical concepts are key components of theory, our review of ecosystem approaches in B2B research clarifies and structures the field, but also reveals the pitfalls of overusing the concept or using it too loosely. Although ambiguity in the use of concepts is typical of emerging and rapidly growing research areas situated at the intersection of various research streams, our study underlines the necessity of developing coherent conceptualizations, theorizing, and applications for ecosystem studies (for discussion, see also Oh et al., 2016; Ritala & Almpantopoulou, 2017). Researchers studying stability-seeking business exchange systems would benefit from building on business ecosystem research that emphasizes collaboration and supply chain factors (e.g., Adner & Kapoor, 2010; Iansiti & Levien, 2004). Research on competing business systems could build on business ecosystem studies in this field (e.g., Moore, 1993). Researchers studying emergent and disruptive systems could benefit from the knowledge developed in innovation and entrepreneur and start-up ecosystem studies (e.g., Clarysse et al., 2014; Fukuda & Watanabe, 2008; Isenberg, 2010; Ritala et al., 2013; Rohrbeck et al., 2009). Because digital technologies and platforms are changing the dynamics of several types of businesses, insights from platform ecosystem studies (e.g., Gawer & Cusumano, 2014; Wareham et al., 2014) are likely to clarify multi-sided market dynamics for various types of ecosystems. Finally, B2B studies on “value co-creation systems” already rely strongly on Vargo and Lusch’s (2011; see also Vargo, 2009) work, but we would also like to encourage researchers to extend their readings more broadly and include other streams of ecosystem studies (as well as systems studies) to incorporate different perspectives and research problems.

Second, “ecosystem” is often used as a metaphor to express systemic features and linkages. A conceptual metaphor, according to prominent work by Lakoff and Johnson (2008), is a fundamental mechanism of mind and a means to structure and embody understanding of an idea and shape thought. In metaphorical concepts, objects are understood and structured in terms of other objects (see Lakoff & Johnson, 1980). For example, networks might be examined through the “ecosystem” metaphor as a representation of a system comprising a group of interconnected elements and interactions among actors and between actors and their environment. Thus, by recognizing this usage of “ecosystem” in B2B and business network research as a perspective to networks rather than as a separate theoretical concept or layer, we build on

studies that have examined or discussed other useful metaphors in the B2B field (Wilkinson et al., 1998; Hunt & Menon, 1995; Leroy, Cova, & Salle, 2013; Letaifa, 2015).

### 6.2. Limitations

We acknowledge that our paper has some limitations. First, our study covers research articles from four purposefully selected B2B journals; some B2B and business network studies that apply the ecosystem concept but have been published in other outlets were not included; this is also the case for influential ecosystem studies from other fields of management literature. However, we believe that these carefully chosen leading B2B journals provide a comprehensive depiction of the current state of ecosystem research in the field, and the inclusion of other journals would probably not have radically changed this. We also deliberately focused on the ecosystem concept and excluded other potential terms that could be used to capture systemic entities. This decision allowed us to focus on the emergence of ecosystem approaches very concretely, but it may have excluded some relevant studies. Furthermore, we acknowledge that the content analysis of the relevant articles was subjective in certain respects. For example, because many scholars did not position their work and use the term “ecosystem” without literature references, we employed implicit and explicit cues to interpret and position their research, which may have been different than how the authors would position their work. In this sense, the responsibility for interpretation remains with the authors of the current study. However, researcher triangulation and explicit coding rules increased the trustworthiness of the results. All in all, despite these limitations, we believe that our study provides researchers and managers with a better understanding of the rapidly expanding ecosystem approaches in B2B research.

### 6.3. Future research avenues

A rigorous application of the ecosystem concept requires careful definitions, research design, data gathering and analysis methods, and measurements. Our study opens the way for a number of future research questions and avenues.

First, future research could benefit from cross-disciplinary theoretical work because ecosystems include multiple actors and perspectives, as well as multiple interactions and links (e.g., technology, cultural, and business interactions). For instance, adopting insights from systems sciences and complexity theory (Allen, 2001; Anderson, 1999) and integrating those insights with more field-specific theories and approaches would be valuable in bringing the research forward (for discussion, see Lusch et al., 2016).

Second, in future studies, there is a need to extend the analysis level and scope of the investigation. As a concrete example, researchers could move from network processes to ecosystem processes and from network pictures (e.g., Ramos & Ford, 2011) to “ecosystem pictures.” It has been argued that many business network studies do not attempt to capture the multiple perspectives of the involved actors or stakeholders to the necessary extent (cf. Aarikka-Stenroos et al., 2014) and that the application of the ecosystem layer creates an increased need to involve multiple perspectives and examine their diverse interactions, complicating the ontology and methods of research (see e.g., Leroy et al., 2013; Spohrer, 2011). Therefore, these methodological challenges require researchers to carefully consider the scope and the limitations of focal studies.

Third, to fully realize the potential of an ecosystem approach, it is crucial to develop research and data collection methods with which to understand ecosystem-based business and innovation activities and their management. More empirical research with carefully planned research designs in various contexts is needed to generate a deeper understanding of the dynamics and co-evolution, as well as the open and evolving boundaries, of “ecosystem” entities. For example, in

qualitative studies, an ecosystem approach requires the consideration of more extensive and longitudinal cases, whereas quantitative studies can apply various types of formal metrics to analyze the interactions and relationships of actors in ecosystems. For instance, recent studies using network analysis methods have shown that large ecosystems can be analyzed using various structured data collection, analysis, and visualization techniques (e.g., Still, Huhtamäki, Russell, & Rubens, 2014). Furthermore, the usage of computational social science methods and simulation studies provides opportunities to address the complexity and scope of ecosystems (for further discussion, see Anderson, 1999; Battiston et al., 2016). Such methods have been used to analyze broad social systems (Heckbert, Costanza, & Parrott, 2014), as well as regional ecosystems (Parrott, Chion, Gonzalès, & Latombe, 2012). Utilizing these and other computational methods to study ecosystems in B2B markets can provide valuable research opportunities and helpful guidance for

## Appendix A

The article database and analysis procedure.

Articles with term “ecosystem” 20.10.2016		Excluded			Selected for analysis
		Natural ecosystem	Editorial or book review	Buzz word, or irrelevant	
IMM	96	14	5	9	68
JBR	110	40	6	21	43
JBIM	23	5	5	2	16
JBBM	11	2	6	1	2
Total	240	61	17	33	129 (of which 71 articles formed the core set)

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