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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).

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