

Network management: A review of an emerging cross-disciplinary field

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ABSTRACT

This paper reviews and synthesizes literature on network management, with an aim of integrating explanations for network management behavior across research fields. Through a systematic analysis of 65 academic research articles published during a 25-year period, the paper identifies and categorizes constructs and their relationships upon which the arguments, and thus theory of network management has been built. In addition, gaps in the literature are identified in order to guide further theory development. The study contributes to network management literature in following ways: 1) presents a state of the art review of the emerging field of network management from a network rather a dyadic perspective; 2) identifies and describe three process perspectives and three property perspective for examining network management; 3) links the identified management dimensions to their antecedents and consequences discussed in the selected literature; 4) identifies gaps in current knowledge and suggests directions for future theory development. Implications of the study are discussed to the industrial marketing and business literature.

Keywords: network management, contingency theory, institutional theory, strategy, literature review

Competitive paper

INTRODUCTION

Inter-organizational networks are a prevailing phenomenon in the modern landscape of businesses, public administration, non-profits, and cross-sector issues. It has been recognized and well documented that operating in, and nurturing networks is an important source of success in any organization (e.g. Håkansson & Snehota 1989, Kanter 1994, Powell et al. 1996). In line with this notion, researchers have increasingly adopted a managerial approach for studying inter-organizational entities, seeking to answer how to design and manage networks (Grabher and Powell 2004: xiii). This has been of particular interest also in recent industrial marketing and business literature (e.g. Håkansson et al. 2009, Järvensivu & Möller 2009, Ritter et al. 2004).

Along with this development, different ideas and views on how companies (should) interact and manage in network settings have emerged and been proposed in a variety of research fields and related network contexts, including studies on industrial marketing and purchasing (Ford et al. 2003, Håkansson & Ford 2002), supply network management (e.g. Svahn & Westerlund 2007, Harland & Knight 2001), strategic networks and alliances (Gulati 2007, Möller et al. 2005, Child et al. 2004, Doz & Hamel 1998), public administration (Klijn 2008, Agranoff 2007, Kickert et al. 1997), innovation networks (Dhanaraj & Parkhe 2006), cross-sector collaboration (Bryson et al. 2006, Austin 2000), and others. As a result, the literature on management of inter-organizational networks has become rich, however, at the same time, scattered into a contextual and disciplinary jungle with different levels of analyses (Hibbert et al. 2008) and ontological assumptions about networks in general (Järvensivu & Möller 2009). From the industrial marketing and business point of view, we believe the different insights from various fields could foster further development of the industrial network management theory. However, we lack uniform vocabulary and analytical frameworks that would help us integrate findings and explanations from different research fields.

As mentioned, one challenge in the studies of network management is the level of analysis. Many network researchers have adopted a dyad-level of analysis when attempting to examine management behavior and activities in networks (e.g. Håkansson 1982, Gulati 1995). On the other hand, it has been suggested already by Achrol (1997) that there is a fundamental shift in business marketing and management in the 21st century from a dyadic perspective of inter-organizational exchange relationships towards a network perspective of value creation involving different types of network organizations. A similar argument has been proposed by Provan et al. (2007) who claimed the following: *“Only by examining the whole network can we understand such issues as how networks evolve, how they are governed, and, ultimately, how collective outcomes might be generated.”* (Provan et al. 2007: 480). Whereas the dyadic approach to network management emphasizes relationship management activities, the network perspective extends the focus to whole network or portfolio management (Möller et al. 2005: 1278), i.e. how individual organizations, network members, or a collection of network members act in order to induce an effect at the network level.

Another challenge relates to the underlying assumptions about networks and their management in general. Depending on these ontological assumptions, researchers adopt differing views about organizations' capability to manage the network, i.e. exert coordination and control over their surrounding network of organizations. Two main perspectives can be identified, including views of networks as markets and as organizations (Achrol 1997, Achrol & Kottler 1999). The 'networks as markets' view assumes networks as emergent

structures that cannot be managed by any single actor (Håkansson& Ford 2002, Ford et al. 2003). Instead, actors are interdependent, and thus have limited discretion to act or to build independent strategy. Rather than managing, actors interact with each other influencing, and being influenced by others when pursuing their goals (Ford et al. 2003: 189). Those who perceive ‘networks as organizations’ adopt a more strategic orientation in which hub firms can, or should be able to exert a relatively strong power over actors, using network resources as strategic assets (Jarillo 1988, Kanter 1994, Parolini 1999, Gulati et al. 2000, Möller et al. 2005, Möller&Rajala 2007). According to this view, just as companies manage, monitor, and measure their physical resources, so should they actively manage, monitor, and measure their network resources (Gulati 2007, Knight and Harland 2005). Recently, it has been proposed that the emergent and designed views of networks and their management are not substitutes but complementary, and the extent to which actors can manage networks depends on certain network-level contingencies (Järvensivu&Möller 2009).

In summary, interest in managerial aspects of networking is fairly new and diverse (Ritter et al. 2004). While network scholars have generated valuable insights into the literature and ‘the emerging theory’ of network management, the research field has remained quite fragmented (Järvensivu and Möller 2009: 654), and current understanding on network management is somewhat limited (Ritter et al. 2004: 181). Across disciplines, it is argued that a deeper understanding is needed concerning the behavior and management of inter-organizational networks (e.g. Achrol 1997, Ritter et al. 2004, Möller&Rajala 2007, Rethemeyer&Hatmaker 2008). We would argue, in line with Söderlund (2011), that by categorizing research findings across the different research fields could improve our understanding on network management, contribute to sophistication of the network management theory, and possibly yield new perspectives and analytical frameworks. Although many such efforts to assess and synthesize literature have been made on networks in general¹, few systematic assessments have so far been conducted on the managerial aspect to networks².

This paper sets out to conduct this task by assessing studies on network management with a systematic literature review. The aim is to identify the key constructs of network management and relationships between them, forming a body of knowledge about the explanations and arguments on network management behavior proposed in literature. In addition, gaps in the literature are identified and discussed in order to guide further theory development. In our analysis, we follow a research agenda for network management proposed by McGuire (2002: 599), including (1) identification of network management behaviors, or choices, (2) explanations of why such choices are made, and (3) an evaluation of these choices. Thus, the study aims to answer to the following research question: Which are the building blocks of the network management theory in terms of management mechanisms, their antecedents, and their consequences as found in extant literature?

¹For recent reviews on network literature, see, e.g., Provan et al. (2007), Brass et al. (2004), Grabher and Powell (2004), Borgatti and Foster (2003)

²One of the exceptions is the study by Järvensivu and Möller (2009), which used studies from a variety of research streams in developing a meta-theoretical framework of network management. Another example is an assessment of literature on management of inter-organizational entities by Hibbert et al. (2008). However, their focus was to assess the different perspectives and levels of analysis in extant literature, rather than building frameworks of the different findings in these studies.

We acknowledge the high ambition of the effort, and possible limitations that may occur. Thus, following choices were made and boundaries set for the review. First, rather than focusing on one or few, well-known and established streams of literature, the study draws from a cross-disciplinary sample of literature that examines managerial issues in networks. Thus, instead of using pre-selected journals, we used EBSCO Business Source Complete as a data source for compiling a sample of academic articles from a variety of research fields. Second, for better understanding the features of management in inter-organizational arrangements above single relationships, the study focuses on studies that examine management from a 'whole' network perspective, instead of dyadic inter-organizational relations. Third, in this paper, we do not distinguish between the two ontological assumptions about networks and their management, and force our literature search in either one of the perspectives. Rather, we assume that some sort of management takes places in networks and let the different management mechanisms, their antecedents, and consequences emerge from the literature.

These ways, for our purposes, we believe the review is able to capture a more coherent view of network management behavior, related explanations and predictions than by focusing on any single paradigm or world-view, contributing to the development of an emerging research field. The following sections of this paper will discuss the method of conducting the review and present key findings. The paper concludes by discussing implications of the findings to the industrial marketing and business research, and network management studies in general.

METHODOLOGY

Research reviews are a means for providing readers with a synthesized and analyzed comprehension of a targeted area's state-of-art research (Cooper 1998). It has been suggested, that a categorization of research traditions may contribute to the sophistication and further elaborations of existing knowledge and theories. It may also, if properly done, draw attention to new and evolving perspectives and analytical frameworks (Söderlund 2011: 2). Fink (2009) emphasizes the key virtues for a literature review being systematic, explicit, comprehensive, and reproducible. These four virtues are being respected when the reviewer defines clearly what is targeted and where, evaluates data and results with a critical stance, and documents the process.

This study offers a systematic review of literature on network management, hitherto. The paper reviews all identified literature relating to management of inter-organizational networks that has used the terms 'network' and 'management' simultaneously either in a title, as a keyword, or in the abstract of an article. Thus, this study does not attempt to present a random sample of recognized streams from the vast but scarce literature on networks and inter-organizational relations in general. Instead, the study takes a sample of conceptual and empirical studies which focus on managerial aspects of networks, and which has adopted the term 'network management' in its essential vocabulary.

In analogy with empirical research, literature review processes are being structured into five stages, i.e. formulating a research problem, searching literature, reading literature and evaluating data for an inclusion, analyzing eligible references, and designing and writing a report (Cooper 1998). Next, we present the process of our review, including literature search, evaluation of data for inclusion, as well as analysis of the selected literature.

Data collection

Hart (1998) and Cooper (1998) define the principles of selectivity and neutralism as the success factors for a research review. Selectivity refers to limiting the potentially original scope of a targeted review by selecting basic criteria for eligible concepts and defining a unit of review. Primarily, criteria for selection should be considered to ensure a functional, minimum size of a targeted concept population and its sub-populations, to describe the economic and societal context, and to determine the language(s) and the period (years) of publication. The principle of neutralism, on the other hand, protects the validity of a review from biases such as preferring only one of paradigms of methodology, research traditions, business or market contexts, or ways of assessing the theoretical advancement and practical applicability of concepts. Neutralism is closely related to following the pre-decided selectivity. Key objective criteria for a study should be the only factor for including or excluding concepts, not a reviewer's own preferences. Key criteria should remain unchanged during a review process and not be subject to alteration to support e.g. a certain minimum number of a sub-group or a simultaneous side study. In addition, a pluralistic approach covering generic and specific industry contextual research will result in a wider understanding of the topic than a narrower industry targeted approach.

Following the principle of neutralism, the literature search was conducted with EBSCO Business Source Complete database, which is the largest database for business, management, and organization literature, and regarded to include most of the influential scholarly journals in the relating fields. The initial criteria guiding the literature search included that the papers needed to discuss networks as inter-organizational arrangements, as well as management aspects of such constellations. Further, since we were especially interested in management of network structures, instead of dyadic relationship structures, only articles adopting a 'whole' network perspective were selected to the final sample.

According to the principle of selectivity, the search terms were "network" and "management" appearing simultaneously in title, keyword, and abstract. Limiting the search for only titles, keywords, or abstracts ensured that the topic 'network management' was essentially related to the research problem and design, not only a side notion in some parts of the whole text. The overall population from which the sample was drawn was then "network management" appearing in all text, which consisted of 1,670 publications. The literature search was conducted in 2011, and thus we limited the end boundary of our search to the last complete year, in this case 2010, and with no limit for the first year.

The two keywords for search were selected because we were especially interested in reviewing literature from a network perspective, with a particular focus on managerial issues in networks. Other possible keywords for search could have been 'governance' instead, or supplementary to 'management'. However, the term 'governance' has been used extensively in another meaning than managing in the network context, namely discussing networks as governance structures between markets and hierarchies (Williamson 1985, Powell 1990), thus representing a different perspective to studying networks than the "governance of networks" (Grabher & Powell 2004: xiii) in which we were interested. For avoiding this confusion, we rather used the keyword 'management' to emphasize the more managerial approach to studying networks.

The literature search yielded a total of 330 articles. The abstracts of the articles were read through in order to remove publications that did not relate to organizational networks, but discussed other types of networks, such as computer networks. A total of 106 articles remained in the sample. These 106 articles were fully read through. From the articles, as much as 41 research papers did not correspond with the criteria of discussing inter-organizational arrangements, but discussed intra-organizational issues, such as management of subsidiaries by a multinational corporation. In addition, although an organization perspective were chosen in some papers, especially within operations and supply chain management, the actual analysis and resulting findings discussed management of other than social networks, such as manufacturing practices or service logistics, and thus were removed from the sample. Finally, from the remaining articles, two discussed only management of network dyads and could not be included in the sample. The final sample used in further analysis consisted of 65 scholarly journal articles published between years 1986 and 2010. From the sample, 21 articles were conceptual and 44 empirical. A complete list of the publications is presented in Appendix 1.

From the final sample, the following information was collected of each article (Table 1). Items 1-6 in Table 1 are the basic information of each article, used for identification and sorting the data. Items 7-8 were used to verify that the article discusses network management and that networks are considered as inter-organizational arrangements. Item 9 reveals the purpose of the article and the phenomenon under the topic “network management” it discusses. Item 10 is used for getting an overall view of the theoretical basis and key literature that the studies address. Items 11-16 were used to describe the overall nature of the field for descriptive purposes. Finally, items 17-20 were used in the main analysis for identifying the dependent and independent variables, and relating arguments that build basis for the network management theory. In addition, based on all the information in different items, we verified that the selected articles discussed network management from a network, instead of a dyad perspective.

The collected data were stored in an excel-sheet into a 65x20 matrix, each article occupying one row, and each item having its own column. Whenever possible, the data collected from the articles were in their original form, in order to prevent misinterpretations. In those cases where relevant data for individual items were scattered along the entire article, for instance, arguments in conceptual articles, we numbered the pieces of original text in order of appearance and combined them into a single column of arguments. Finally, for each column, we created a new excel-sheet, enabling us to sort the data without mixing the original database.

Table 1 Items of data collected from the sample of articles

<i>No.</i>	<i>Item</i>	<i>No.</i>	<i>Item</i>
1	Year	11	Approach (qualitative/quantitative)
2	Journal	12	Method (e.g. case study)
3	Author(s)	13	Field / Context
4	Title	14	Sample
5	Keywords	15	Data type and collection
6	Type of article (conceptual/empirical)	16	Methods of analysis
7	Topic	17	Hypotheses (if available)
8	Definitions of network and network management	18	Variables (if available)
9	Purpose/Aim(s)	19	Key findings
		20	Key arguments

Overview of analyzed articles

Fields of study We first coded descriptive statistics from our database, in order to get an overall picture of the field based on the sample. Following descriptive features were revealed in network management research (Table 2). First, we can see a trend, though modest, in the increase of utilization of the term 'network management' since 1986 when Strategic Management Journal published Hans Thorelli's seminal article on networks as a distinct form of organizing between markets and hierarchies (Thorelli 1986). Second, the research is dispersed into several different forums. The reviewed 65 research papers were found in 43 different scholarly journals within the fields of business, management and organizational studies, marketing, public administration and policy studies, operations management, innovation and entrepreneurship, economics, as well as a number of journals dedicated to some specific empirical context. While most of the journals have published, obviously, only one article that matches our search criteria, three journals seem to have adopted network management as a research agenda and as its essential terminology somewhat more generally. These include Industrial Marketing Management, Journal of Public Administration Research and Theory, and Public Management Review, covering one fourth of the sample.

Purposes of the studies Based on the sample, the purposes of the studies vary from describing, exploring, explaining, and developing methodology, to integrating a number of existing studies for creating new or improving existing theoretical frameworks, models, or conceptualizations. The predominant line of research is either to explore (32.8%) or to describe (18.8%) phenomena, followed by attempts to unify existing literature into a coherent whole (10.9%). The most used approach for achieving especially the exploration and descriptive objectives in network management research is to develop frameworks (20.3%). Approximately one fourth of the reviewed papers are conceptual, addressing and combining prior knowledge on networks, governance, governance networks, network management, as well as a wide range of established theories relating to managing in networks, such as dynamic capabilities, resource and knowledge-based views, and resource dependency, among others. The remaining three quarters consists of empirical studies in a wide variety of contexts. The contexts include environment, high technology, education, public administration, construction, manufacturing, retail, housing, mobile services, and other minor fields in terms of number of publications (only one publication per field). In addition, a few studies addressed management of networks with a sample from multiple industries, while some discussed cross-sector issues.

Contexts Nine different types of studied network settings can be identified from the sample. These include business networks, governance networks, referring to networks in public administration, policy networks, supply networks, innovation and R&D networks, a project network, a regional network, and an industry network, or a cluster. In addition, some studies examine management in horizontal networks, which may well overlap the other mentioned categories, in this case retail business networks (Wegner & Padula 2010) and regional tourism networks (Björk & Virtanen 2005). Business networks, extended with supply networks, cover close to half of the studies, followed by networks in public administration and policy making with over a one-fourth proportion.

Methodology Relating to the dominant exploratory and descriptive objectives, almost three quarters of the empirical studies in the sample were qualitative (72.7%), less than one fifth

quantitative (15.9%), and the remaining 10 percent a mix of qualitative and quantitative inquiries. Half of the empirical studies were case studies, using either single- or multiple-case design, followed by surveys and focus groups. Half of the studies used multiple sources of evidence, a third a single source of evidence, and in rest of the studies the data sources were not reported clearly. The most dominant source of primary data was interviews, often semi-structured, followed by questionnaires, participant observation, and archives. The most commonly used supplementary data source for primary data was archives, followed by an equal use of questionnaires, interviews and participant observation. A great amount of studies used cross-sectional data, only 10 percent having collected longitudinal research data. Finally, a number of different qualitative and quantitative methods for analyzing data are used, not reported in the table due to space limitations. Most studies use rather conventional methods of analysis, such as case descriptions, biographies or content analysis for qualitative data, and regression or factor analyses for quantitative data. Noteworthy is that although the studied objects are different types of networks, the appearance of social network analysis in only one publication, having a methodology development objective, arises some questions why the managerial research cannot apply the techniques the method offers for network research.

Analysis: Identifying and constructing conceptual categories and their relations

Conceptual research reviews produce syntheses, quantitative analyses, qualitative comparisons, and conclusions along the generic view as well as any notable exceptions to it (Cooper 1998). The main analysis of the study aimed to identify and formulate constructs, or conceptual categories that the arguments of network management are built upon. Further, we identified the links between these categories as explanations for the relations between the constructs. The analysis consisted of three subsequent parts.

First, we formed a database of arguments, based on the hypothesis, variables, results, and arguments presented in the studies. From items 17-20 we coded the dependent and independent variables that the studies aimed to explore, describe or explain, whenever at least one of them was related to management of networks. As a result, we received three lists, one with some type of management mechanisms as dependent variables and some other factors as independent variables (antecedents), a second one with management as the independent variable and other factors as dependent variables (consequences) and a third one with management mechanisms both as dependent and independent variables. We combined the results into a table of antecedents, management mechanisms, and consequences that the studies discussed relating to management of networks.

Second, we sorted the data for each item –antecedents, management mechanisms and consequences – in order to identify more abstract conceptual categories for each item that the different concepts could be grouped into based on their similarities and differences. As a result, we identified six categories, or dimensions for the management mechanisms, seven for the antecedents and six for the consequences that could be distinguished from each other. We could further divide the management dimensions into process and property perspectives, the antecedent categories to structural contingencies, strategic choices, and institutional characteristics, and the consequence categories to performance and evolution (see Figures 1-4).

Third, we identified the links between the constructs, and constructed frameworks that present all the connections between the different categories proposed in the studies, as shown in

Figures 1-3, as well as a framework that presents relations that have not been explored between the categories (Figure 4). We weighted the connections for revealing which connections had received more explanatory power in terms of the type of research from conceptual (Figure 1), qualitative (Figure 2), and quantitative (Figure 3) as the strongest support for the relation. For the purposes of answering to our research question, the following three sections elaborate the identified constructs and their relations with illustrative examples of studies, and discuss identified gaps in the literature.

DIMENSIONS OF NETWORK MANAGEMENT

Like many other social phenomena, network management is a multi-faceted and multi-layered concept. Network management, its antecedents and consequences, have been studied from many perspectives, or what we call here dimensions of management. Our first task was then to identify and categorize the different dimensions that the term network management includes and which have been the focus of past inquiries. Six dimensions of network management can be identified that are covered in the network management literature. These include (1) management functions, (2) network and management strategies, (3) management tasks, (4) management structures, (5) network and management roles, and (6) management capabilities. Whereas the first three – management functions, strategies and tasks – refer to different types of management processes, management structures, roles, and capabilities relate to properties in the network or of the manager. We next elaborate each of the process and property dimensions, respectively.

Management functions

Management functions in networks are among the most studied aspects of network management. Management functions represent key requirements for managing value creation in any modern value system (Järvensivu & Möller 2009). Some of the studies explore the variety of network management functions, while others focus on some specific function. In their introductory article for a special issue on networks and their management, Möller and Halinen (1999) proposed a conceptual framework for different levels of managing business networks. The four levels include network visioning, managing focal networks and network positions, relationship portfolio management, and management of dyadic business relationships management. Another type of conceptualization is proposed by Klijn et al. (1995) who identified two forms of management that enable government organizations to benefit from networks: game management, referring to managing interactions within networks, and network structuring, referring to changing the institutional arrangements that make up the network. Agranoff and McGuire (2001) and McGuire (2002) further develop the conceptualization by proposing four management behaviors in networks, including activating, framing, mobilizing, and synthesizing. Finally, some studies have developed suggestions for management behaviors in specific contexts, such as fostering corporate social responsibility (Murillo and Lozano 2009) and influencing policy networks in regional development (Sotarauta 2010).

Studies that focus on specific areas of management functions include management of network formation process (Heikkinen and Tähtinen 2006), identifying a key network (Ojasalo 2004), effective coordination, communication, and research and development (Rampersad et al. 2010), or knowledge and information management (Sotarauta 2001).

Focusing more on the network-environment relationship, Meier and O'Toole (2003) utilize their previously created conceptualization and measurements for network management, including management's contribution to organizational stability through additions to hierarchy and structure, management's efforts to exploit the environment, and management's effort to buffer environmental shocks.

Network and management strategies

Network and management strategies refer to the strategic intents and choices that guide managerial action and activities taken by network managers and members of the network. The elaboration of network and management strategies varies in abstraction. Some discuss network management strategies in general (Klijn and Koppenjan 2006, Klijn et al. 2010b, Ruokonen et al. 2006), while others focus on strategies related to some specific functions, such as content, connecting, arranging and process strategies (Klijn et al. 2010), or network coordination strategies (Herranz 2009, 2008), or outsourcing strategies (Hsiao et al. 2010). Some studies focus their evaluation on specific strategy-pairs, such as proactive or reactive management strategies (Goerdel 2006, Knight and Harland 2005), and between recursive and linear strategies (McGuire 2002).

Another line of strategy discussion focuses on the strategic orientations of implementing network management. These refer to studies of collaborative network management and multi-sector engagement (Ruffin 2010), or relationship-based management strategies (Keast & Hampson 2007). Finally, Meier and O'Toole (2001) examined the 'strategies' of individual managers to devote energy and effort to networking in general.

Management tasks

Management tasks refer to the activities that are taken by network managers to perform different management functions according to the management strategies and within the prevailing management structure. As with strategies, management tasks are studied both at a general and a function-specific level. The former discusses a variety of management tasks and mechanisms (Järvensivu and Möller 2009, Czischke 2007), or management practices and methods (Schnell & Saxby 2010, Cross et al. 2009, Goerzen 2005, Ojasalo 2004). The latter address management tasks related to a specific management function, including framing and reframing tasks (McGuire 2002), or tasks related to developing groupware and cohesion (Agranoff and McGuire 2001). Many, if not most, of the studies examine practices and methods of specific tasks in the network, such as interaction and informal networking processes between network participants (Klijn and Koppenjan 2000), knowledge sharing, transfer, and creation (Möller and Svahn 2004), coordination and control (Möller and Rajala 2007), as well as conflict and risk management (Klijn and Koppenjan 2000).

Management structures

Management structures refer to the governance structures, or agency, in the network. Agency in particular describes well the content of this dimensions, since governance can be either actor-based, institutional, or both. While the actor-based governance structure describes the distribution, possession and use of power in the network, the institutional agency refers to

organizational rules and routines that guide behavior within the network. Management structures are here used as synonym for the more extensively used governance structures in network literature. This terminology is used for avoiding confusion of this category's meaning with an extensive literature on 'networks as governance structures' as a distinct form of organizing between markets and hierarchies (Williamson 1985, Powell 1990). Management structures relate to various differing aspects from autonomy of professional network managers' freedom of action (Wegner and Padula 2010, Heen 2009) to type and duration of supply network initiatives (Holmen et al. 2007). Both informal and formal management structures are discussed, the former relating to institutional design rules (Johnson 2005), the latter to organizational arrangements (Möller et al. 2005), or involvement of vertical and horizontal actors (Agranoff and McGuire 2003). Some discuss a mixture of these involving activities to broadening actor base, broadening the relations between policy arenas, promoting informal involvement, and reducing formal governance (Albrechts&Lievois 2004).

Network and management roles

Network and management roles have been recognized early on as a fruitful perspective for understanding organizational and management behavior in networks. In his prominent article about networks as a form of organizing between markets and hierarchies, Thorelli (1986) did not yet discuss about network roles, but positions that companies occupy in a given network for obtaining influence over the network. Later studies, building on classics on organizational roles, such as Mintzberg (1975) and Miles and Snow (Snow et al. 1992), have begun to elaborate different management roles that organizations occupy in a given network (Heen 2009, Heikkinen et al. 2007, Harland & Knight 2001).

Management capabilities

Management capabilities refer to properties of either individual actors, that reside between the actors, or are embedded in the network, and which are needed for performing management as well as other network activities. Thus, studies on management capabilities within the network discuss either capabilities of individual organizations (Capaldo 2007, Möller and Svahn 2006, Möller et al. 2005, Möller and Svahn 2003, Ritter 1999, Thorelli 1986, and of individual managers (Agranoff and McGuire 2003, 1999), or routines, competencies and abilities that exist within the network (Evanschitzky et al. 2007).

Identified gaps in literature

As revealed, research has identified a wide variety of management behaviors, management tasks one the most miscellaneous of the categories. Rather than identifying a variety of tasks, future studies could distinguish between general and network- or context-specific tasks for assisting researchers and practitioners alike to further categorizing them. In addition, more studies could address the relations between the different categories and the mechanisms explaining these relations.

The six dimensions of management form the basis for building theoretical explanations about management of inter-organizational networks. The question then is, what explains and

predicts the content of these different dimensions, and what can be explained and predicted when adopting them. Current knowledge about these issues based on our sample and gaps in knowledge are next elaborated.

ANTECEDENTS OF NETWORK MANAGEMENT

The contents of, or practices within the six network management dimensions vary, as described in the previous section. What affects on, or determines the different contents or practices is explained by different types of antecedents of network management. Thus, the antecedents of network management mainly refer here to explanations that are given for variance in practices within the different management dimensions. They may also describe requirements for different management practices, or in some cases, the antecedents may function as contingencies that affect the relation between different management practices and their consequence. The explanations for the contents of the six management dimensions can be classified into three antecedent categories. The antecedents include (1) structural contingencies, (2) strategic choices, and (3) institutional characteristics. In addition to these “exogenous” antecedents, many of the management dimensions are shown to be interrelated one functioning as antecedent for the adoption of another, as shown especially in Figure 3.

Structural perspective

The most utilized antecedents for explaining management behavior in the six management dimensions relate to structural properties of the organizations, the network, and the environment or the relation between the network and its environment. In addition, structural issues include characteristics of the outcome, product or service, as well as other network members’ behavior and expectations in the network. This category refers strongly to a structural contingency perspective (e.g. Burns & Stalker 1961, Lawrence & Lorsch 1967, Drazin & Van de Ven 1985, Donaldson 2001) for explaining organizational behavior. We give insights into studies of the three most used antecedents, network, environment and organizational characteristics, respectively. However, it needs to be noticed that most of the studies do not limit in studying only one type of antecedent, but address multiple factors from different categories.

In our sample, the most studied structural antecedent for network management behavior is network characteristics. A strong interdependence exists between the character of the network and how it is managed (Heen 2009). Different types of networks, referring to the difference in structural patterns of the network and their underlying value creation logic, require different types of organizational arrangements (Möller et al. 2005) and management tasks (Järvensivu and Möller 2009, Möller and Rajala 2007), which further require different sets of capabilities (Möller and Svahn 2003, Ritter et al. 2004, Svahn and Westerlund 2007). The different networks are also characterized by different values making them responsive to respective managerial strategic orientations (Herranz 2008). Other network contingencies affecting management behavior include network setting and its fragmentation (Harland and Knight 2001, Heen 2009), the stage of development of a collaborative endeavor (Keast and Hampson 2007), power distribution, trust, reciprocity and conflict between network participants (Rampersad et al. 2010), other actors’ interpretations of the behaviors in the network (Heikkinen et al. 2007), and many others.

Besides network characteristics, environment characteristics have been used in nearly all dimensions, most extensively to explain management tasks. McGuire (2002) argues that the nature of the operating environment affects network management behavior. He found that network managers employ linear strategies when operating in a largely technical environment involving clear objectives, broad-based support, and ample resources, and recursive strategies in institutional environments, where immediate goal achievement is impossible due to a lack of goal consensus, or undesirable if the network must build long-term linkages within a community (McGuire 2002: 608). In similar lines, Herranz (2008) examined sector-based differences in mixed-sector workforce development networks in Boston, founding that sector-based managerial differences matter in network behavior just as they do in organizational behavior.

The third essential category relates to organizational antecedents and their relation to management behavior in networks. Already in his seminal introductory SMJ-article on the network form of organization, Thorelli (1986) identified several organizational factors that affect the network roles and capability or power to influence the network of an organization. He suggested that the position a company occupies in a given network depends on, at least, the domain of the company, the position of the company in other networks, and the power of the company relative to other participants in the focal network. He further proposed that the organizations' economic base, technology, expertise, trust, and legitimacy are significant sources of power to assert influence over the network. Later studies have supported the notion of organizational antecedents to affect organizations' network behavior. Ruokonen et al. (2006) suggest that the selection of a suitable network strategy should be based on a thorough evaluation of the company's products, its own resources, and its requirements for potential partners. Relating to management capabilities, Ritter (1999) identified organizational preconditions of a company's network competence, including availability of resources, network orientation of human resource management, integration of intra-organizational communication, and openness of corporate culture account for the development and establishment of network competence within the networking company. Also some studies discussing activities of public managers in networks show that the ability to manage is related to the internal condition of the manager's primary organization, involving technical, legal, political, and cost dimensions (Agranoff and McGuire 1999).

Strategic perspective

The strategic choice perspective has been raised as a competing explanation for the structural contingency argument to explain variance in organizational structures (Child 1972). The core argument is that instead of changing structure to regain fit with the contingency, as argued in the structural contingency explanation, organizations can change their contingency to regain fit. Thus, some degree of choice can enter at several stages in the process of adapting the organization to the requirements of the environment (Donaldson 2001: 133). Strategic choices in our sample of network management literature refer to strategies, expectations, and behaviors of individual members of the network and their influence on the use of different management practices. For instance, Cross et al. (2009) described how leaders and their groups in organizations deliver innovation and high performance through networks. Based on their studies of 10 years of network analysis studies relating to the success of various leaders and their groups at over 100 organizations, they discovered that leaders who are most successful in obtaining a multiplier effect on their organization's talent manage networks in a

far more strategic way. Tight coupling of the management practices to strategic goals and distinctive organizational competencies means that they yield far superior performance payoffs. Also Goerzen (2005) adopted a strategic management perspective in his characterization of the various organizational responses to alliance network management. He suggests that a firm's strategic intent and motives appear to provide overarching coherence to the different processes and structures of alliance network management.

Institutional perspective

The institutional perspective relates to the neo-institutional argument on organizational behavior. One of the core arguments withholds that it is not only the strategy-structure fit that organizations pursue, but that institutions – regulatory, normative, and cultural-cognitive – work both to constrain and empower social behavior (Scott 2008) through coercive, mimetic, and normative processes without necessarily making organizations efficient within an organization field (DiMaggio & Powell 1983). Thus, the different institutions inherent in the environment may determine organizational structure, possibly decoupling it from firms' strategic intents (Meyer & Rowan 1977). In a network management context, the institutional characteristics may refer to institutionalized routines and rules within the network (Klijn and Koppenjan 2006), the cognitive dimension of the network and the symbolic elements of the network culture (Czischke 2007), as well as the institutionalized nature of the networks' environment (McGuire 2002).

The neo-institutional argument for explaining management behavior is mainly adopted by scholars in the public administration and policy domain. In their study of the role of co-operatives in poverty reduction from a network perspective, Simmons and Birchall (2008) argue that undertaking different management tasks depends on the institutional characteristics, along with structural properties of goal congruence and the use of power, in the network. Klijn and his colleagues studied institutional rules that guide the behavior of actors within networks in the policy network domain. They argue that explanations for the development of interaction processes in networks are found both in institutional characteristics – the resources and the rules – and in the characteristics of the interaction situation – the players, their stakes and their strategies (Klijn and Koppenjan 2000). Further, the choice of institutional design strategies will depend on the institutional characteristics of networks as well as imitation behavior and dominant discourses in or outside the networks (Klijn and Koppenjan 2006). Finally, in her study of the evolution of the network of European social housing providers network, Czischke (2007) stresses the role played by the cognitive dimension of the network and the symbolic elements of the network culture to explain the endurance and evolution of the network.

Identified gaps in literature

The antecedents of network management behavior can be seen as a continuum from strategic, structural and to institutional perspectives on network management behavior. The analysis revealed that the structural contingencies are mostly utilized to explain behavior in the different management dimensions, network characteristics receiving the most attention and support. On the dependent variable side, management strategies, tasks, and roles have received most attention, leaving much room for future studies to explain the other three – management functions, structures and capabilities.

Scholars from different disciplines seem to emphasize different ends of the continuum. Operations management scholars combine strategic and structural explanations, political scientists address also the institutional end of the continuum, and others remain somewhere in the middle. Particularly, the institutional explanations are only used by a handful of political scientists, arising a question whether studies in industrial network management could also complement the deterministic contingency perspective with institutional theory considerations.

CONSEQUENCES OF NETWORK MANAGEMENT

While the antecedents explain variance in network management behavior or practices, the consequences of network management describe the outcomes that follow from the choice and use of different management practices, or of different management properties. The studies seek to explain the relation between the different dimensions of network management and two types of consequences: performance and network evolution. Performance can be further divided into four categories: network effectiveness, network efficiency, organizational performance, and effectiveness of management. The network evolution category includes the evolution or development of network structures and network processes.

Performance

Effectiveness and efficiency are the basic conditions of existence of networks (Jarillo 1988: 36). An organization is effective if it achieves the desired end and efficient if it does so by offering more inducements to the members of the organization than efforts they have to put into it. In the sample of studies, network effectiveness is the most discussed consequence in relation to different network management dimensions. For instance, in their study of two Australian high technology industries, Rampersad et al. (2010) found evidence supporting the significant impact that communication and R&D efficiencies have in achieving network effectiveness. In a similar vein, Klijn et al. (2010a, b) used a dataset of 337 survey respondents involved in environmental projects in The Netherlands to argue that network management is strongly related to outcomes, reporting a difference in effectiveness between network management strategies to facilitate and guide interaction in governance networks. In addition, a number of mechanisms have been identified through which firms can create and appropriate additional network-based value (Goerzen 2005) and respond to the management challenges in a network, thus gaining and sustaining the network's competitive advantage (Evanschitzky et al. 2007).

To come into existence and to survive a network must be efficient (Jarillo 1988). In their study of retailer networks, Wegner and Padula (2010) report that there is a trade-off, in which member firms of a network agree to delegate greater decision making power to managers, referring to the choices in management structures, in exchange for greater network efficiency and competitiveness. Sotarauta (2001) examined urban development networks and how their efficiency can be promoted by network management and by modern information systems. Based on case study evidence he argues that networks need management that is creative and seeks directions so that the networks can rise above the interests and goals of individual organizations.

Besides performance of the networks, in terms of effectiveness and efficiency, some studies discuss how different management practices promote or restrain management performance in networks. Ospina and Saz-Carranza (2010) studied the management of whole networks of organizations, focusing on how leaders of organizational networks use various practices to help manage the contradicting demands of networks as organizational forms. Others have studied key processes for gaining influence over a network (Sotarauta 2001), factors affecting the effectiveness of role performance in supply networks (Knight and Harland 2001), or the actor's capability to influence the network depending on its network role (Heikkinen et al. 2007).

An organization's performance as a consequence of managing inter-organizational relations or networks is one of the most studied topics in network research (e.g. Jarillo 1988, Kanter 1994, Powell et al. 1996, Gulati and Nickerson 2008). Not surprisingly, the studies in this category quite often adopt a strategy perspective for network management. Cross et al. (2009) argue that leaders who are most successful in obtaining a multiplier effect on their organization's talent target their efforts to develop productive networks rather than building ever-larger networks. Others to address this issue are the studies of Meier and O'Toole (2001, 2003) that analyzed performance of networks and network management in the execution of public policy. Their study of more than 500 U.S. school districts in Texas shows the relation between network management to overall organizational performance and that networking outward with multiple actors and with frequency strengthens educational program performance in the short run and builds a baseline for future enhancements. Goerdel (2006) conducted a similar type of study longitudinally, examining the influence of proactive management on organizational performance within networked environments. Using a survey data from superintendents in Texas school districts pooled for six years, she found that proactive management contributes positively to higher performance outcomes, especially when it comes to average overall pass rates and the pass rates for low-income and minority students. Finally, in his study of the Italian furnishing industry, Capaldo (2007) examined the lead firm's capability to sustain its innovativeness, arguing that they can achieve it by creating and managing the overall architecture of its network, the proportion of weak and strong ties, over time.

Network evolution and development

Studies addressing network evolution and development as consequences of network management behavior discuss changes in network structures and processes. The evolution may relate to the 'physical' structure of the network, such as the overall network composition or the number of members and growth of the network, to the 'invisible' structure, such as prevailing rules, and to the processes – actions or interactions within the networks. Thus, network evolution as a consequence relates closely also to the changes in network management structures discussed earlier. For instance, Wegner and Padula (2010) examined the micro-governance and management of inter-organizational retail networks and the changes in the management structure of these networks over time from lead, shared, and to external governance. An exploratory case study of public health care in the UK by Knight and Harland (2005) also provided evidence of a range of pro-active behaviors that effectively influenced network structure and actions. In his study of workforce development networks, Herranz (2009) found that different network coordination approaches are associated with differences in the balance of informal and formal processes of network development. Whereas a network with more formal processes is related to more stable network

development, a network with more informal processes is related to more flexible network development. Finally, Klijn and Koppenjan (2006) identified management strategies aimed at changing institutional rules within networks. The strategies for changing network structure and processes in terms of prevailing rules included direct interventions through reframing strategies and indirect interventions by influencing the perceptions and thus creating long-term changes in interaction patterns.

Identified gaps in literature

Based on our sample of literature, network effectiveness, i.e. the networks' ability to fulfill its aims, has received the most interest as an outcome of network management in almost all management dimensions. Less attention and empirical support has been given to organizational performance and development of network processes. Especially the lack of studies addressing organizational performance as a consequence may be explained by difference of managing networks to managing relationships. While both strategic and industrial management is interested in optimizing networks of relationships to increase firm performance, management of a whole network aims first and foremost to improve the whole network's performance where benefits of individual members are not necessarily obvious or easily quantifiable. The interpretation follows the distinction in worldviews addressed by Ford and Håkansson (2006) about a single actor view instead of a relationship and interaction view. One interesting, although methodologically challenging issue for future studies would be to assess both the network effectiveness, and individual members' gains within the network, an issue that ultimately is one important aim for the members to be involved in a network.

Regarding the independent variables, management functions and strategies are used most extensively as independent variables to explain performance measures. In line with the view that networks are not managed directly but through different roles actors occupy in the networks (e.g. Snow et al. 1992), network or management roles and management capabilities are increasingly discussed as 'resources' that distinguish actors in their capability to have influence over their networks. However, their connection to different types of network or organizational outcomes have remained thin, a fruitful avenue for future research.

Finally, although much research gives support for the relation between different network management practices and outcomes, the evidence is featured by its qualitative nature. Only a few studies have utilized quantitative measures and data for supporting their arguments about the relations between management behavior and outcomes. Particularly, the management task level has received much qualitative inquiries and propositions that could be tested with further quantitative studies. Future studies should address this gap for improving the explanatory power of the explanations and predictions that the theory of network management is built upon.

DISCUSSION OF THE FINDINGS

The in-depth analysis of 65 research articles, published mostly during the past 10 years, reveals that studies on network management are mainly based on considerations of the relation between the different management dimensions and network performance, and the structural contingencies that affect management practices in these dimensions. Thus, we

perceive a strong structural contingency approach in which the overarching hypothesis is that organizational effectiveness results from fitting the characteristics of the organization to contingencies that reflect the context of the organization (e.g., Lawrence & Lorsch 1967, Drazin & Van de Ven 1985, Donaldson 2001).

In addition to the structural contingency argument, some studies discussed the relation between network management mechanisms and strategies, individual perceptions, or expectations. This refers more to the strategic choice argument, which has been presented as a competing view to the deterministic structural contingency argument in explaining organizational structures and processes (Child 1972, Donaldson 2001: 132), in this case, network management practices. The third category revealed in our analysis holds an institutional argument (e.g. Meyer & Rowan 1977, DiMaggio & Powell 1983, Scott 2008[1995]), referring here to the institutional characteristics in the network or in the environment and their relation to management mechanisms. In our sample, this view was mostly presented by political scientists within public administration and policy research.

Particularly the last finding is interesting from the industrial marketing and purchasing perspective to network management which shares the same basic assumptions of actors' limited ability to exert coordination and control over networks with the ones in public network management research. Rather than managing, actors may influence other actors in the network and facilitate interaction instead of controlling it (Kickert et al. 1997: 11), resulting in bargaining games between actors (Klijn and Koppenjan 2006). Thus, one way of managing in networks is managing the different policy games (Klijn et al. 1995). The notion of institutional design rules and games could easily be adapted to the industrial network context, whenever the assumption corresponds with the ones that network managers lack the right to impose sanctions directly (Rethemayer and Hatmaker 2008), and that the manager's decisions and outcome is more loosely coupled than within organizations that have a clear line of command (Heen 2009). In general, the institutional perspective and theories of institutionalization as a process (e.g. Tolbert & Zucker 1996) could yield valuable insights and further theoretical grounding for the interaction as process perspective of economic action (Ford & Håkansson 2006: 253).

For the designed, strategic perspective to network management, the findings suggest a complementary institutional approach for understanding management dynamics in networks. Particularly, the contingency-based view to network management (Järvensivu & Möller 2009) could be further developed by, not only discussing structural and strategic characteristics in networks as determinants for different management functions and tasks, but the effect of the institutional environment (e.g. McGuire 2002), or institutional characteristics in networks (Klijn & Koppenjan 2006) affecting their adoption. Furthermore, examining the extent to which the contingency and institutional arguments actually explain variance in network management practices could improve our understanding on the adoption of different practices (cf. Ketokivi & Schroeder 2004). This assessment of the different explanations could also contribute to the discussion about the extent to which organizations can, or try to strategically manage their networks (e.g. Knight and Harland 2005), or whether the strategic intent of organizations is decoupled from practice (e.g. Meyer & Rowan 1977), thus supporting the more emergent, interactive view of management in networks.

In addition to the antecedent-practice-performance discussion, the study reveals attempts to examine the relation between network management practices and network evolution, which again has two implications for the contingency view of network management. First, evolution

in network processes may include direct changes in management behavior in networks. Whether intentional or emergent actions, the studies support the traditional contingency argument that organizations aim to adapt their structures and processes to the contingencies in order to achieve acceptable performance (Donaldson 2001: 138). Second, evolution of network structures may change the contingencies in network characteristics. This, on the other hand, suggests a reverse causality, in which practices that change network structure or processes actually change the network level contingencies. For further developing the contingency view of network management, the direction of causality should be both conceptually and empirically assessed. Another alternative for future studies would be to take a systems approach, that combines both different types of structural contingencies as well as these internal consistencies inherent in network management practice (Drazin & Van de Ven 1985: 519).

Finally, the study confirms the fact that network management has been studied in various disciplines and in multiple network contexts, enabling rich empirical evidence. From a methodological point of view, featuring for network management studies, based on our sample, is its inheriting qualitative nature with over 70 percent of all studies using qualitative research approaches and methods. Particularly, although blooming in qualitative evidence, no quantitative studies were identified that would have tested and explained the choices and consequences of management at a task-level. Further, we did not find studies showing statistical evidence on the consequences of adopting different management roles either in organizational or the whole network's performance, showing a fruitful avenue for future research.

CONCLUSIONS

The study assessed literature on network management with a systematic review in order to reveal the constructs and their relations that 'the emerging theory' of network management has been built upon. The study contributes to the literature on industrial network management by developing a framework of the explanations built around the different dimensions of network management that complements commonly discussed contingency considerations with institutional explanations of management behavior in networks. In addition, the study reveals important questions as directions for further development of the emerging field in network management studies (Figure 2, Appendix 2). From our point of view, the most important future research opportunities include (1) supplementing the dominant structural contingency perspective with an institutional perspective; (2) exploiting findings and theoretical arguments across the identified disciplinary boundaries; and (3) improving the explanatory power of the arguments with more quantitative studies on the relations between the antecedents, management dimensions, and their consequences.

The review has at least two noticeable limitations. First, the strength of the paper and its methodology is that, for the first time, it systematically examines a sample of studies of network management in a variety of disciplines and contexts. At the same time, the limitation is that our literature search with specific keywords 'network' and 'management' leaves some of the recognized literature on management of *inter-organizational relations* and *network governance* outside the scope of the study because of different terminology used. In the former category, such studies include especially proponents of the Nordic IMP thinking, while the latter is utilized by North American scholars studying networks in businesses (e.g. Gulati et al. 2000), or public and non-profit sectors (e.g. Provan & Kenis 2008). This is a clear

limitation in the study when considering the assessment of the entire field of network management. However, considering our aim to review literature on network management across different research fields and discuss its implications to the industrial marketing and business literature, we do not feel that missing direct IMP literature with the selection of keywords fails us to achieve our goal. Rather, by reviewing other than industrial marketing and purchasing related publications, we could identify findings in the rest of the field and look at their possible extensions to the industrial network management theory. It should be also noticed that many of the reviewed articles used the approaches and perspectives developed in the industrial marketing and purchasing domain as their theoretical lens, and thus included the related assumptions in their studies.

Second, since the paper does not analyze the articles by theory groups, it does not address in-depth the use of theoretical backgrounds, addressed literature or possible cross-citations between studies, and therefore cannot draw strong conclusions about the similarities and difference in theoretical backgrounds and assumptions between the different disciplines. A bibliometric analysis of the (extended) sample of studies could provide with identification of all the different disciplines, more fine-grained information about their use of different theoretical groundings, and possible (lack of) cross-fertilization between them.

Despite of the limitations, we believe that the study offers for researchers and practitioners alike valuable insights of the key constructs in network management literature to be utilized in future theory developing and testing, as well as evaluating and developing network management practices of organizations. As it has been noticed already in the early studies, network management involves a multifaceted effort (e.g. Thorelli 1986). The paper aimed to capture some of the multi-facetedness by identifying the different management dimensions, their antecedents and consequences, as well as their interrelations, clarifying the essence of current network management theory.

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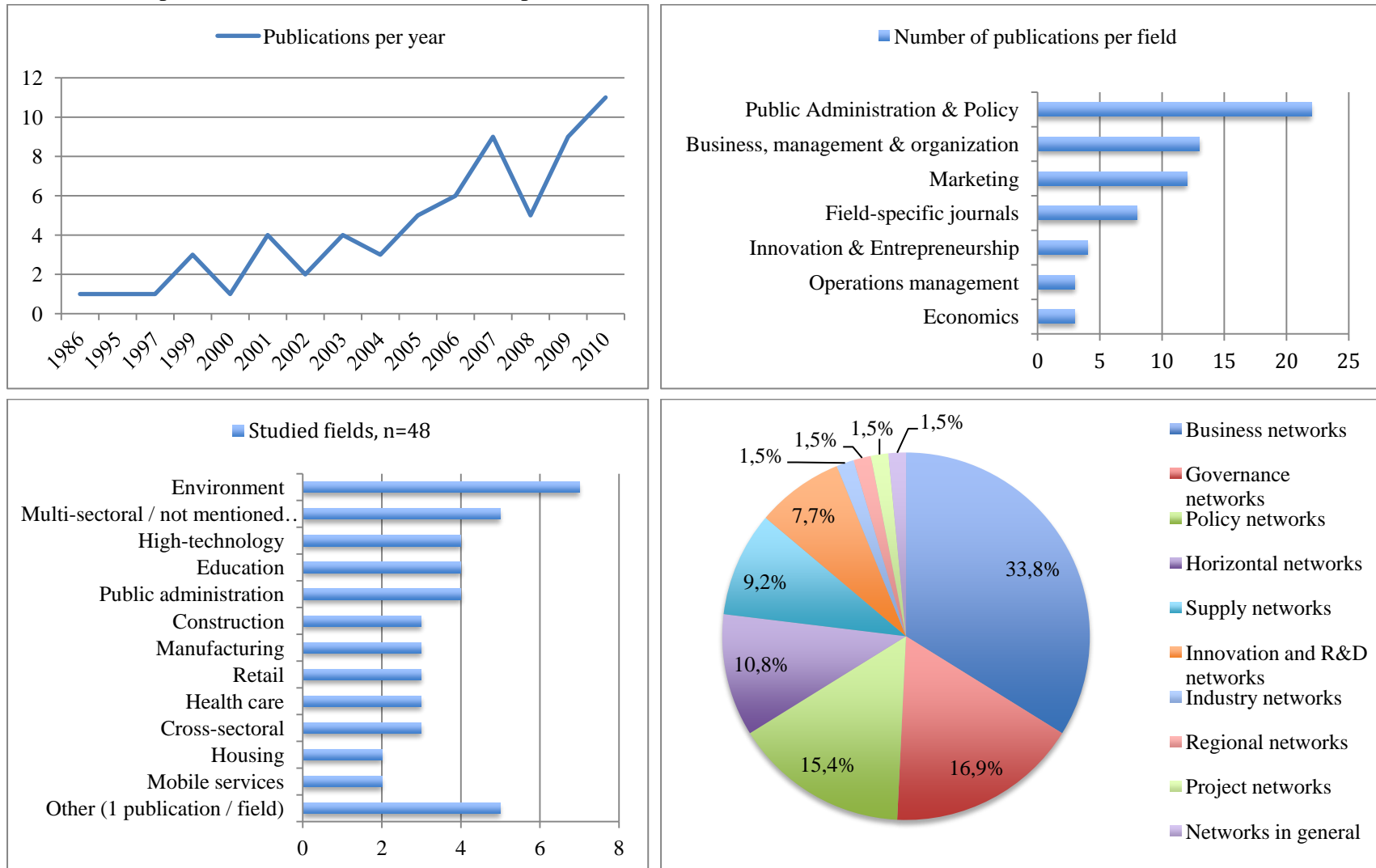
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Appendix 1 List of articles according to research field and year

Year	No.	Author(s)	Research field – Journal
			Public administration and policy
2010	1	Klijn, E-H., Steijn, B., Edelenbos, J.	Public Administration
	2	Klijn, E-H., Edelenbos, J., Steijn, B.	Administration and Society
	3	Ospina, S., Saz-Carranza, A.	Administration and Society
	4	Ruffin, F.A.	Public Performance and Management Review
	5	Snell S., Saxby, J.	Public Administration and development
2009	6	Heen, H.	Public management review
	7	Herranz, J.	International Public Management Journal
2008	8	Herranz, J.	Journal of Public Administration Research and Theory
	9	Klijn E-H.	Public Management Review
	10	Rethemeyer, R.K., Hatmaker, D.M.	Journal of Public Administration Research and Theory
2006	11	Goerdel, H.T.	Journal of Public Administration Research and Theory
	12	Klijn, E-H., Koppenjan, J.F.M.	Public Management Review
2005	13	Johnson, C.	International Journal of Public Sector Management
2003	14	Agranoff, R., McGuire, M.	International Journal of Public Administration
	15	Meier, K., O'Toole, L.	Public Administration Review
2002	16	Keast, R., Brown, K.	Public Management Review
	17	McGuire, M.	Public Administration Review
2001	18	Agranoff, R., McGuire, M.	Journal of Public Administration Research and Theory
	19	Meier, K., O'Toole, L.	Journal of Public Administration Research and Theory
2000	20	Klijn, E-H., Koppenjan, J.F.M.	Public Management
1999	21	Agranoff, R., McGuire, M.	Policy studies review
1995	22	Klijn, E-H., Koppenjan, J., Termeer, K.	Public Administration
			Business, management & organization
2010	1	Wegner, D., Padula, A.D.	International Journal of Business and Management
2009	2	Cross, R., Vertucci, L., Cowen, A., Thomas, R.J.	Organizational Dynamics
	3	Murillo, D., Lozano, J.M.	Business Ethics: A European Review
2008	4	Dilk, C., Gleich, R., Wald, A.	Management Decision
2007	5	Boojhawona, D.K., Dimitratosb, P., Young, S.	International Business Review
	6	Capaldo, A.	Strategic Management Journal
	7	Evanschitzky, H., Ahlert, D., Blaich, G., Kenning, P.	Management Decision
2006	8	Möller, K., Svahn, S.	Journal of Management Studies
2005	9	Goerzen, A.	Academy of Management Executive
	10	Knight, L., Harland, C.	European Management Journal
	11	Möller, K., Rajala, A., Svahn, S.	Journal of Business Research
2003	12	Kinder, T.	Research Policy
1986	13	Thorelli, H.	Strategic Management Journal

			Marketing
2010	1	Rampersad, G., Quester, P., Troshani, I.	Industrial Marketing Management
	2	Roseira, C., Brito, C., Henneberg, S.C.	Industrial Marketing Management
2009	3	Järvensivu, T., Möller, K.	Industrial Marketing Management
	4	Terho, H.	Journal of Business-to-Business Marketing
2007	5	Heikkinen, M., Mainela, T., Still, J., Tähtinen, J.	Industrial Marketing Management
	6	Holmen, E., Pedersen, A-C., Jansen, N.	Journal of Business and Industrial Marketing
	7	Möller, K., Rajala, A.	Industrial Marketing Management
2004	8	Möller, K., Svahn, S.	Industrial Marketing Management
	9	Ojasalo, J.	Industrial Marketing Management
2003	10	Möller, K., Svahn, S.	Marketing Theory
1999	11	Möller, K., Halinen, A.	Industrial Marketing Management
	12	Ritter, T.	Industrial Marketing Management
			Field-specific journals
2010	1	El-Sheikh, A., Pryke, S.	Construction management and economics
	2	Sotarauta, M.	European Urban and Regional Studies
2009	3	Mullins, D. Walker, B.	European Journal of Housing Policy
2007	4	Czischke, D.	Housing, Theory and Society
	5	Keast, R., Hampson, K.	Journal of construction engineering and management
2005	6	Björk, P., Virtanen, H.	Scandinavian Journal of Hospitality and Tourism
2004	7	Albrechts, L., Lievois, G.	European Planning Studies
2001	8	Sotarauta, M.	European Planning Studies
			Innovation & Entrepreneurship
2007	1	Pickernell, P., Rowe, P.A., Christie, M.J., Brooksbank, D.	Entrepreneurship and regional development
2006	2	Heikkinen, M., Tähtinen, J.	International Journal of Innovation Management
	3	Tikkanen, J., Renko, M.	International Journal of Entrepreneurship and Innovation Management
	4	Ruokonen, M., Nummela, N., Puumalainen, K., Saarenketo, S.	International Journal of Entrepreneurship and Innovation Management
			Operations management
2010	1	Hsiao, H.I., Kemp, R., van der Vorst, J., Omta, S.	International Journal of Production Economics
2007	2	Svahn, S., Westerlund, M.	Supply Chain Management: An International Journal
2001	3	Harland, C.M., Knight, L.A.	International Journal of Operations and Production Management
			Economics
2009	1	Czako, W.	Journal of Economics and Management
	2	Zieger, T.	International Advances in Economic Research
2008	3	Simmons, R., Birchall, J.	The Journal of Socio-Economics
<i>SUM</i>	65		

Table 2 Descriptive statistics of the literature sample



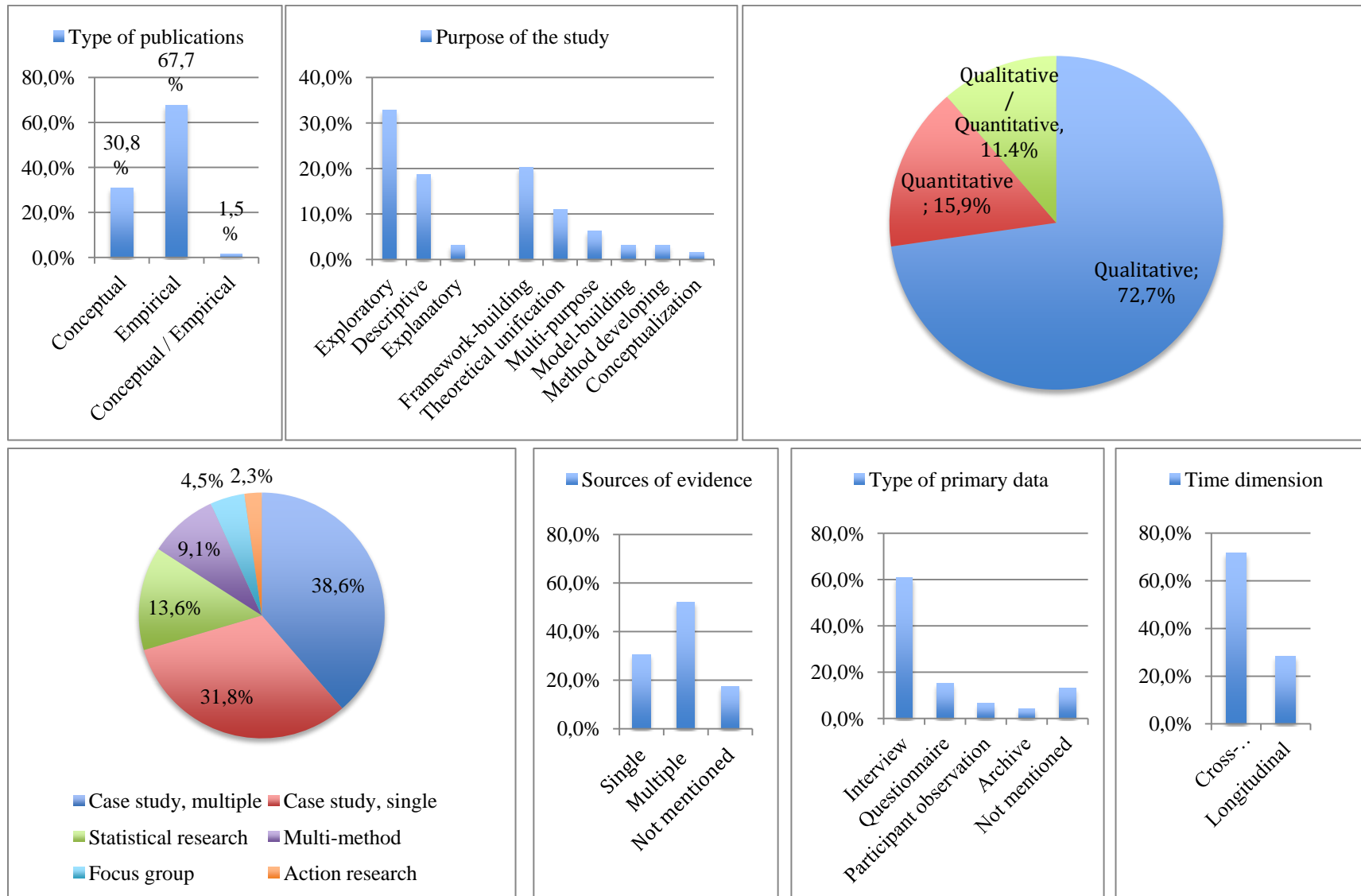


Figure 1 Only conceptual studies

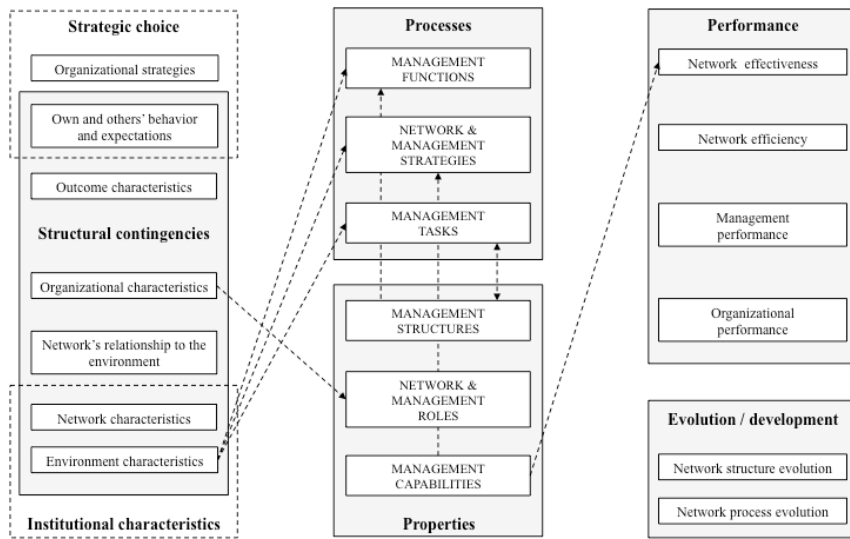


Figure 2 Only qualitative evidence (and possible conceptual studies)

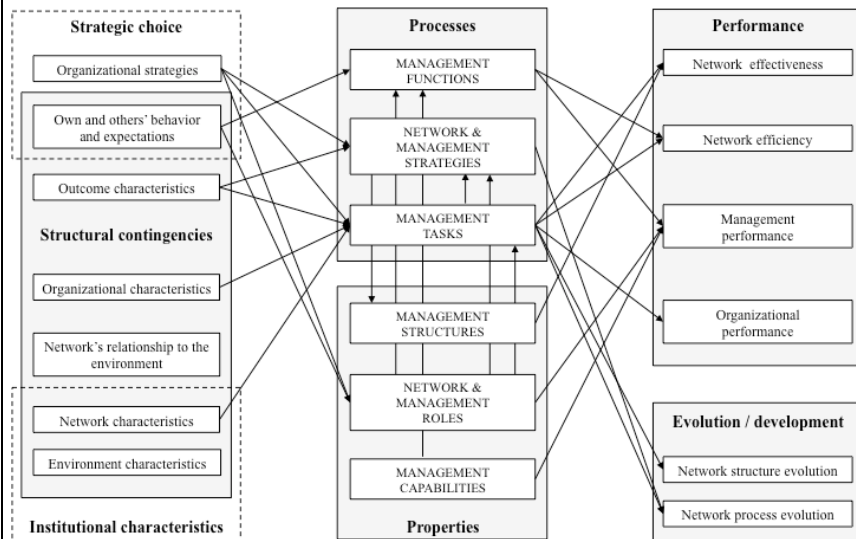


Figure 3 At least quantitative evidence

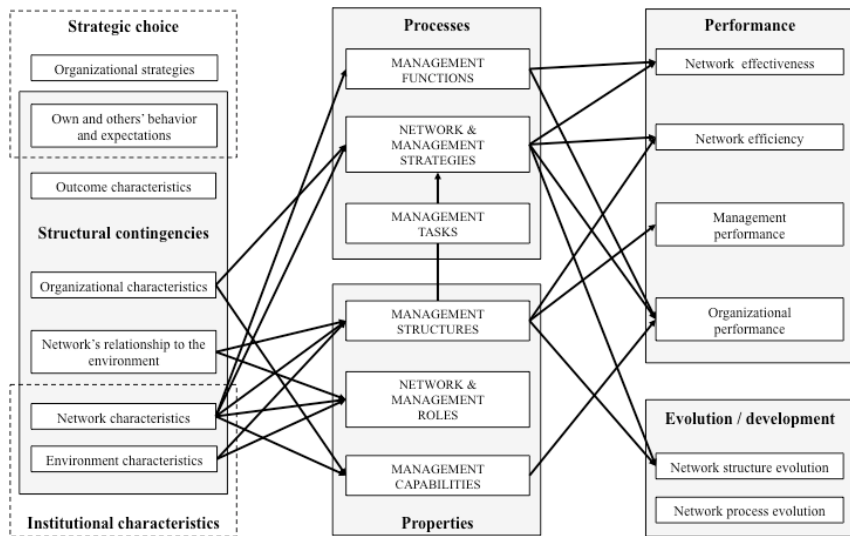
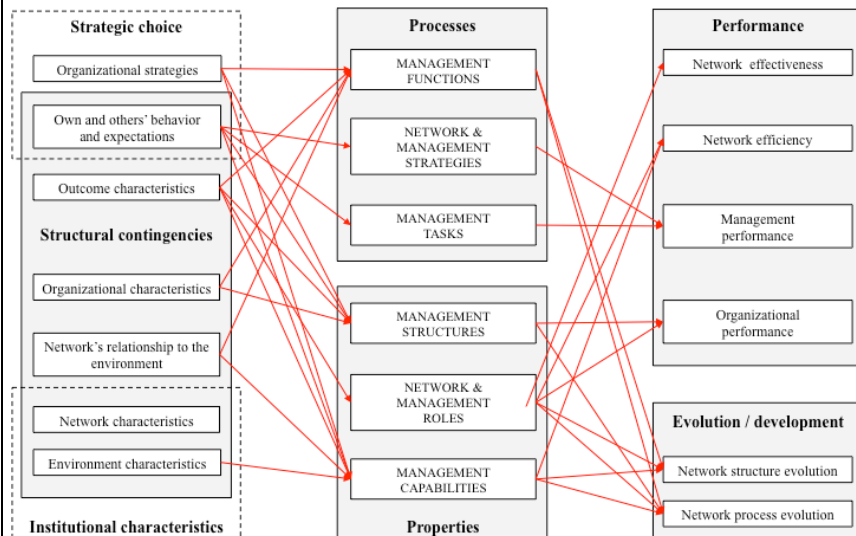


Figure 4 No studies



Appendix 2 Network management research opportunities

Research area	Important questions to be explored	Key variables of interest
<i>Management dimensions</i>		
Management functions& Management structures	<ul style="list-style-type: none"> • What explains the adoption of different network management functions and structures in different network settings or external conditions? 	<ul style="list-style-type: none"> • Empirical explanations for management functions and structures
Management tasks	<ul style="list-style-type: none"> • Which management tasks are general and which network or context specific? 	<ul style="list-style-type: none"> • Context-specificity of management tasks
Network and management roles	<ul style="list-style-type: none"> • Do different constellations of network roles relate to network consequences? • Does the use of some roles yield superior network performance over others and in which conditions? 	<ul style="list-style-type: none"> • Role benefits
Management capabilities	<ul style="list-style-type: none"> • Which antecedents, other than network or organizational characteristics, affect on requirements for management capabilities? • Do different management capabilities mediate the relation between the different antecedents and management dimensions, or management and network performance? 	<ul style="list-style-type: none"> • Capabilities as a key contingency between management and outcomes
<i>Management dimensions in general</i>	<ul style="list-style-type: none"> • <i>How are the various management dimensions causally related to each other? Which mechanisms explain these relations?</i> 	<ul style="list-style-type: none"> • <i>Relations between management dimensions</i>

Appendix 2(cont.)

Research area	Important questions to be explored	Key variables of interest
<i>Antecedents</i>		
Strategic contingencies	<ul style="list-style-type: none"> What processes happen between own and others' behaviors and expectations in networks that lead to different management practices? 	<ul style="list-style-type: none"> Strategy processes in networks
Structural contingencies	<ul style="list-style-type: none"> How do the characteristics of the network outcome (e.g. product vs. service business) influence on management behavior? 	<ul style="list-style-type: none"> Outcome characteristics
Institutional contingencies	<ul style="list-style-type: none"> How do institutional properties of the network's environment affect the choice of management practices? Which type of institutional effects can be identified in a business network management context? Are findings relating to institutional characteristics in public networks applicable also to industrial networks? 	<ul style="list-style-type: none"> Institutional properties as environment characteristics Acknowledgement of institutional properties and processes
<i>Antecedents of network management in general</i>	<ul style="list-style-type: none"> <i>Which antecedents are the most important or crucial?</i> <i>How are the various antecedents causally related to each other?</i> 	<ul style="list-style-type: none"> <i>Antecedents as endogenous variables</i>
<i>Consequences</i>		
Performance	<ul style="list-style-type: none"> What consequences on organizational performance does different network management practices have, particularly roles that the organization adopts in the network? Which management practices influence simultaneously (positively or negatively) on network and individual organizational outcomes? 	<ul style="list-style-type: none"> Organizational performance Network vs. individual outcomes
Network evolution and development	<ul style="list-style-type: none"> What management practices affect (positively or negatively) on the development of network processes? 	<ul style="list-style-type: none"> Development of network processes