PROCESS RESEARCH IN BUSINESS NETWORKS: A REVIEW OF LONGITUDINAL RESEARCH METHODS

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Keywords: business networks, research methods, longitudinal, process, literature review

ABSTRACT

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INTRODUCTION

In this paper we focus on process research as a potential methodology to conduct longitudinal research on inter-organizational networks. Scholars on broad front of interorganizational studies have called for more research on network processes (Brass et al., 2004; Ford & Håkansson, 2006; Hoang & Antoncic, 2003; Knoben, Oerlemans & Rutten, 2006; Parkhe, Wasserman & Ralston, 2006; Provan, Fish & Sydow, 2007). How such research is or could be conducted is, however, an intriguing issue. Over the past decades process research has been established as an important qualitative approach for the study of strategy and organizations (Burgelman, 2011; Langley, 1999, 2009; Pettigrew, 1997; Van de Ven and Poole, 2005). Yet, only a handful of network scholars have paid attention to the methodological aspects of longitudinal, qualitative network study. For example, on the basis of a literature review, Provan et al. (2007) raise the challenge of defining the unit of analysis (ego-networks or whole networks) and setting network boundaries (see also Dubois & Araujo, 2004; Bergenholtz & Waldstrøm, 2011). The choices and challenges that relate to the specification of the temporal window and the temporal orientation for data collection have also been discussed (Halinen and Törnroos, 2005; Bizzi and Langley, 2012). Most recently Halinen, Törnroos and Medlin (2012) proposed different approaches for the study of network processes. Other scholars have emphasized the need to combine qualitative and quantitative approaches to create insights into network development (Coviello, 2005; Provan et al., 2007). Nevertheless, beyond the above, no systematic or comprehensive analysis has been presented on how process research is or could be conducted in networks of organizational actors.

In general terms, an interorganizational network can be defined as a set of more than two organizations and the relationships between them, that is, a structure of interconnected relationships where knowledge is transferred, transactions are mediated and organizations get access to resources and power (Brass et al., 2004). In business network research, the focus is on companies and potential other organizations that interact with each other for the purpose of doing business. Business networks are complex systems of exchange relationships, where companies become connected to each other over time, and where various activity links, resource ties and actor bonds emerge between companies, creating interdependence and stability to the inherently dynamic system (Håkansson & Snehota, 1995). As complex and dynamic structures, networks constitute a specific kind of phenomenon for scientific inquiry and thereby deserve methodological attention on their own right (Borsch & Arthur, 1995; Halinen & Törnroos, 2005). Methods that are available to study single organizations or social (interpersonal) networks are not necessarily applicable as such to the study of networks of organizations (Bergenholtz & Waldstrøm, 2011). Hence, in this study we will focus on business networks as a specific interorganizational setting in order to learn how process research is conducted in a multi-actor, multi-level context.

There exists two major ways for learning about methods: 1) learning though the best practice described in methodology books and texts, and 2) learning through the common practice and potentially also innovative practice visible in conducted studies (Piekkari, Plakoyiannaki & Welch, 2010). Given that only a few methodology texts are available on how to conduct process research in interorganizational networks (Easton 2000; Halinen & Törnroos 2005; see also the special issue in Industrial Marketing Management, Vol. 41, No 2), we draw on research practice in this study. One way to look at practice is to present and analyze exemplary studies from the

field (e.g. Bizzi & Langley, 2012). Another is to make a systematic review of the methods used in extant studies (e.g. Bergenholtz & Waldstrøm, 2011). In order to provide an in-depth account of used methods we choose the latter and make a review of qualitative process research conducted on business networks over the period of 1991–2010.

The purpose of this study is to analyze the methodological choices researchers have made related to data collection and analysis while conducting process research in business networks. In order to learn about network process methodology and to elaborate on it, we will ask how researchers have addressed the challenges of longitudinal network study in practice. A systematic review of process research methods used in a sample of 39 business network studies is conducted.

The study contributes to current methodological knowledge in three ways. First, process research in business networks illustrates how longitudinal research can be conducted in interorganizational networks. Secondly, by conducting the review in a network setting, the study demonstrates the complexities that multi-organizational research potentially generates for a longitudinal investigation. Thirdly, with a particular view on business networks, the study offer important implications for the use of process methods in future research on business networks. It also offers methodological benchmark data for researchers in various other fields of interorganizational study.

The paper is organized in the following way. The first section describes the nature of process research and business networks as a specific setting for such an inquiry. The second section describes the strategy for literature search, the criteria for study selection, the development of analysis protocol and the review process. The third section presents the findings on the methods used in the sample of process studies on business networks. The final section provides conclusions and implications for future use of process research methods in the study of business networks.

PROCESS RESEARCH IN BUSINESS NETWORKS

Process research represents one type of qualitative longitudinal research that has been applied in the study of inter-organizational and business networks (for examples see Bizzi & Langley, 2012). Process research involves the study of how and why some significant temporally evolving phenomenon unfolds over time (Langley, 2009). Process research has progressed from 1980's to date and has become an established methodological approach within organization and strategy research. Special issues in acknowledged journals (Organization Science 1990, Scandinavian Journal of Management 1997 and 2007, Strategic Management Journal 1992) mark its advancement together with a number of influential articles in top journals of the discipline (e.g. Langley, 1999; Tsoukas & Chia, 2002; Van de Ven & Poole, 2005, for a compilation of articles see Huber & Van de Ven, 1995). In 2010 a new book series "Perspectives on Process Organization Studies" was launched to publish the latest thinking on organizational process research (Langley & Tsoukas, 2010).

Process research is by no means a monolithic methodological approach (Sminia, 2009; Van de Ven & Poole, 2005). It takes various science-philosophical emphases, and discussions have evolved around the definition of process in particular. The early definitions proposed by Van de Ven (1992) divided processes into three types: input-output, change and processual. Taking the starting point from the variance theory, the input-output definition views process as explanation, and the change perspective portrays process as a category of concepts and variables

through which change can be observed. The processual view examines process as developmental sequence of events and activities probing the question of how the process unfolds.

Pettigrew (1997, p. 338) defines process as "a sequence of individual and collective events, actions and activities unfolding in context over time" underlining the interdependence between context and action, the embeddedness of process in various contextual levels, and temporal interconnectedness of processes in relation to past, present and future. The more recent division into weak and strong process delves into the world view of researchers and differentiates studies on the basis of their ontological stance towards change (Tsoukas & Chia, 2002; Van de Ven & Poole, 2005). Weak process sees world as made of things and process as change in entities, while strong process views world as a process in which things are reifications of processes and in constant state of becoming (Tsoukas & Chia, 2002; Van de Ven & Poole, 2005).

These definitions also seem fit with the notion of business networks and the way network change has been perceived in IMP literature. Business networks have been considered as products of various processes and scholars have addressed processes at different levels of networks (or within networks) (e.g. Axelsson & Easton, 1992). Embeddedness of business networks (Halinen & Törnroos, 1998), the interplay of business actors with different contextual levels (Makkonen, Aarikka-Stenroos & Olkkonen, 2012) and the simultaneous existence of diverse and potentially intertwining processes (Hedaa & Törnroos, 2008) have been emphasized in conceptualizing network processes. Interconnectedness of business relationships imply that exchange in one relationship is likely to affect other relationships, and change potentially spreads through the relationships (Håkansson & Snehota 1995; Halinen et al. 1999). In such conditions, the processes so as the focal network in which processes are studied are difficult to delimit.

In this study we adopt a broad definition of process, accepting all kinds of process studies to be included in the review. It is important to note, however, that process research differs from the outcome-driven variance studies that focus on co-variation between independent and dependent variables. Process research is first and foremost preoccupied with temporal patterning of emerging events and activities (Van de Ven & Engleman, 2004; Bizzi & Langley, 2012). This means that studies using variance-methods in investigating change will be excluded from the analysis.

Next we will turn to the conduct of the literature review. For a study to count as a process study and to be included in the review, it has to imply a longitudinal design, where data is deliberately collected over time or at least with a view on a particular temporal orientation (past or future). In addition, it needs to address some significant process in and around networks with a focus either to the inputs and outputs of the process, change in the process, or the events and activities as they unfold over time.

METHODOLOGY OF LITERATURE REVIEW

The study applies systematic literature review as a methodology. It locates existing studies, selects and evaluates contributions, analyses and synthesizes data, and reports evidence in such a way that it allows conclusions to be reached about the used process methods (Denyer &Tranfield, 2009). Even if the strictest canons of the methodology could not be entirely fulfilled, the principles of systematic selection of studies and their systematic analysis were followed. We first selected a sample of thirty-nine process studies on business networks and then analyzed them focusing on the longitudinal data collection and analysis methods.

Literature reviews may take a deductive or inductive approach to the analysis (Hart, 2006). As our aim was to shed light to methodological practice and to learn about the methods used we adopted the data-driven, inductive approach. This decision was reinforced by the fact that methodological literature on process research on inter-organizational networks is scarce.

SELECTING THE STUDIES

The review is focused on empirical business network research, on one hand, and process research, on the other hand. The reviewed articles were located and selected through a stepwise process with two rounds of article search. The first round involved keyword-based search in three databases: Science Direct, Ebsco Econlit and ProQuest. The search was delimited to articles published between the years 1991 and 2010, which we knew, based on our research experience, to encompass the time of most intense interest in process research on business networks. (An extension of the review to years 2011-2013 is under way.) We searched for 'network change' and 'network dynamics' in the title, abstract or keywords and performed a search combining 'network' in the title, abstract or keywords with search for 'process research' in the full text. The last search was to find articles without emphasizing dynamics or change in their study. As a result 246 articles were identified. We then reviewed the titles and abstracts of each paper to evaluate if they handled business networks, i.e. networks between firms and other organizations for the purposes of doing business. Many of the articles dealt with social, infrastructural (e.g. transport) or technological networks and were therefore rejected. In the end, 59 articles fulfilled the selection criteria.

To ensure coverage of the research on business networks, another search process was conducted in Google Scholar with the search word 'business network'. The titles of the 500 most cited articles were read to uncover if they were likely to deal with the process aspects of business networks. Then the titles of the 1087 articles that cited the most cited article on business networks, Anderson, Håkansson & Johanson (1994), were checked. In the end, 152 articles were selected as likely to deal with processes in business networks. The final step was further reading of the resulting 211 articles from the two searches to develop the final sample. The selected articles needed to include: 1) examination of business networks (the required network context), 2) examination of network processes over time (the required focal phenomenon) and 3) the use of longitudinal data collection methods (the required methodology).

With respect to the first criterion, we excluded studies dealing with governmental and regional interventions to develop networks, e.g. science parks, research centers, programmes to enhance R&D or similar type of collaboration. These networks often deal with inter-firm relationships but they are still essentially inter-organizational, and policy-driven, not business-driven. The second criterion meant that the studies needed to examine and illustrate processes pertinent to networks. Several studies that focused on development process of a relationship (dyad) or had network only as one variable inducing change in some other aspect under study were excluded. We wanted to focus on networks and the complexity they potentially bring into the study of process. The third criterion was used to delimit the sample to empirical studies applying longitudinal process research designs. In order to qualify as longitudinal, the study needed to be based on data collected at more than one point in time or it had to demonstrate either a retrospective or prospective temporal orientation in data collection (Easton, 1995, p. 480; Halinen & Törnroos, 2005). The searches hit several reviews, editorials and theoretical and methodological articles that fulfilled the first two criteria but were not empirical and did not fulfill the third one.

With respect to the scope of the review, we acknowledge the problems in keyword-based searches that in our case mean that, for example, studies that have used some synonyms of the selected keywords are not covered. Similarly the citation-based search in the second round may delimit the study to certain reference-base and may exclude relevant studies. It is also important to note that the review covers only articles published in journals, and does not extend to a systematic search of books or book chapters. Although a deliberate choice, we recognize it as one that may have caused some influential contributions to be overlooked. Nevertheless, we see the delimitation defendable on the basis of the use of peer review process in journals and the good accessibility. These issues have an influence on the coverage of our review of the process research in business networks. However, we believe that the data entails a representative sample of such studies, and allows us to illustrate major emphases of methodological choices and variety in the used methods.

ANALYZING THE STUDIES

The thirty-nine articles included to our review were examined using content analysis, guided by a general level protocol that was used to map the methodological choices of the studies. The issues of interest fall into three categories:

1. Overall research agenda: primary research question, empirical research strategy, adopted process view, temporal focus of the study, unit of analysis.
2. Data collection issues: data collection method(s), unit(s) of observation, access point to process, temporal orientation of data collection.
3. Data analysis issues: methods used to analyze process, mode of analysis process.

Two authors analyzed the articles through an inductive, step-wise process. The analysis started with an initial recording of the characteristics of the articles in terms of the above three categories. To pilot the preliminary coding scheme, the researchers first coded ten articles independently and then discussed the feasibility and usability of the scheme. The interpretations of the choices made in the articles as well as the proper meaning of the coding categories were discussed in-depth. We soon noted that scholars seldom discussed the research strategy and the methodology of the studies using the specific vocabulary of process research. Therefore, for example, coding the articles in terms of their process view, temporal aspects of data collection or analysis methods often required a holistic interpretation of the analyzed study and a careful reading of the documentation of its empirical findings.

In the second stage, the two researchers independently coded the rest of the articles. Again, the interpretations were validated in a discussion between the researchers until agreement on the final amendments on the coding scheme and the classification of articles within it was reached. Given the inductive and interpretative approach, calculation of inter-rater reliability was considered meaningless. Finally, the descriptive recordings were transferred to a coding spreadsheet in which the articles were classified in terms of the agreed sub-categories of general research agenda, data collection and data analysis.

FINDINGS

We start the presentation of the results by describing the sample of articles to give an overview of process research conducted on business networks. Table 1 presents the research questions and empirical contexts of the studies. The variety of research questions is large but in general most studies aim to answer a primarily descriptive (how or what kind of) question about how the networks under examination changed. A few studies especially look for explanation or reasons

by asking why certain network changes took place (e.g. Hallen & Johanson, 2004b; Sminia, 2003).

The empirical contexts of the studies cover a wide variety of industries from food processing to the paper manufacturing, diamond and software industries. Manufacturing industries are clearly a dominant context. Services are examined only in a few studies (e.g. Gupta et al., 2005; Heikkinen et al., 2008; Knight & Pye, 2004; Salo et al., 2009) and logistics networks are examined in three studies (Andersson & Mölleryd, 1999; Hertz, 1999; Hertz & Mattsson, 2004). With respect to the timeline under examination the variety was large: the studies could extend over a century (Ford & Redwood, 2005), or over several decades (e.g. Alajoutsijärvi et al., 1999), or they could cover a change process over several years (e.g. Baraldi & Strömsten, 2009) or only a couple of months (e.g. Harrison & Prenkert, 2009). The studies typically focused on firms and networks in single countries or specific areas but taken together the geographical coverage ranged from Scandinavia to Central-Europe, Australia and North-America. Single studies dealt with African (Bångens & Araujo, 2002) and Asian firms (Chou & Zolkiewski, 2010).

Table 1. Reviewed process research on business networks.

Study	Research question	Empirical context
Ahlström-Söderling, 2003	How do strategic business networks emerge and develop?	Swedish food manufacturing sector in 1991-2000
Alajoutsijärvi et al., 1999	How is interaction between a business relationship and its immediate business network?	Paper manufacturing industry 1960-1990
Andersen 2003	How can the routine concept be applied into network embeddedness context?	Danish cases in dairy and machinery industries in 1990s
Andersen et al. 2004	How did a specific actor configure a network of influential partners and induced innovation activities?	Case on solar energy construction in the Sydney 2000 Olympics village
Anderson et al. 2001	What type of effects may acquisitions have on the existing relationships of the merging companies?	Acquisitions in Nordic graphics industry 1973-1998
Andersson & Mölleryd, 1999	What is the role of strategic change actions in channel systems?	Swedish mobile telephony distribution network 1971-1994
Bångens & Araujo 2002	How did the context within which the case firm operated shape the nature of its learning processes?	Development of a Kenyan wind pump manufacturer 1977-1994
Baraldi & Strömsten 2009	How are resources controlled and combined in biotech networks?	Development of a Swedish-US biotechnology firm 2000-2005
Bengtsson & Kock, 1999	What kind of are the relationships between competitors in business networks?	Swedish rack and pinion industry in 1980s and the lining industry in 1990s
Chou & Zolkiewski, 2010	How does the learning process at the arrival of a new technology impact on network evolution?	A Taiwanese media maker in optical recording media industry 1990-2004
Coviello, 2005	What is an appropriate method for analysis of network dynamics over time?	Development of a Canadian glass studio 1997-2001
Coviello, 2006	What are the structural and interactional patterns of network dynamics of INVs at stages of evolution?	Development of three software firms in New Zealand in early 2000s
Fletcher & Barrett, 2001	How do business relationships evolve in the context of firm's internationalization?	Australian manufacturing firm development from 1960s to 1990s
Fletcher, 2008	Which approach best explains the life cycle of	Australian manufacturing firm's

	firm's internationalization?	internationalization 1960-2000
Ford & Redwood, 2005	How is the development of a single business in interplay with evolving network of which it is part?	A British firm in a leather network 1860-1990
Gupta et al., 2005	What are the roles of the participants in the diffusion process of e-markets in networks?	Development of Australian b-to-b e-market firm 2000–2002 (18 months)
Gupta et al., 2010	What kind of are the dynamics of cartel network behavior as a result of external forces?	Two cartels in diamond industry analyzed pre-1980 and post-1980
Hallen & Johanson 2004a	How did transition to market economy change the relationships in business networks?	Russian printing industry 1985-1999
Hallen & Johanson 2004b	Why were relationships dissolved after the transition to market economy?	Russian printing industry 1985-1999
Hameri & Paatela, 2005	How does an industry evolve into supply networks?	Shipbuilding, construction and electronics manufacturing services in Scandinavia
Harrison & Prenkert, 2009	How do strategists consider the effects of network connections in the process of strategy change?	Strategizing of a cooperative in food industry June-December 2007 (7 months)
Havila & Salmi, 2000	How does change spread in networks as a result of critical events such as mergers and acquisitions?	Acquisitions in Nordic graphics industry 1990-1998
Heikkinen et al., 2007	What are the managerial action-based roles for managing in business nets?	New mobile service development in Finland November 2003-April 2004 (6 months)
Hertz & Mattsson, 2004	How do cooperation and competition drive the reconfiguration of markets under collective competition?	European freight-forwarding industry from 1970s to 2003
Hertz, 1999	How do changes in one relationship explain consecutive changes in other relationships?	European goods transport industry from 1980s onwards
Holmen et al., 2007	How do supply networks arise and change (initiation of change and structural consequences)?	Reorganizing supply base in Norwegian construction industry 1997-2003
Kamp, 2005	How are buyer-supplier networks formed and evolving?	Supplier networks of car assembly plants in Spain from early 1990s to 2001
Knight & Pye, 2004	How is the concept of network learning related to change and change management?	Professionalization of English prosthetics services industry from 1980s onwards
Kragh & Andersen, 2009	How is management agency related to change management in networks?	Implementation of Internet-enabled ICT by a Danish firm in furniture industry 2004-2005
Larson, 1992	How is control exercised in network organizational forms?	Alliances by 4 high-growth US firms in 1980s
Low, 1997	How do the business relationships and network positions interplay in a specific context?	The network position of an Australian buyer of telecom products and services 1988-1992
Low and Johnston, 2009	How and why is staying on the edge of technologies significant for businesses?	Telecom industry in 1990s and 2000s
Mainela & Puhakka, 2008	How and why does an IJV evolve as a continuous process of relating to its network context?	A Nordic-Polish IJV in water treatment industry 1989-2000
Salo et al. 2009	What kind of a process is a triadic relationship recovery?	Service provider-customer- end user triad in Finnish telecom services 2006-2007
Sminia 2003	Why a new venture failed to become a part of a business network?	Introduction and failure of a new sports channel December1995-December 1996
Welch & Wilkinson, 2002	How do firm's schemas shape the evolution of a business network?	British sugar imports in 1950-1990

Welch & Wilkinson, 2004	How does political embeddedness interact with marketing exchanges in international networks?	Networks of a British sugar exporter 1951-2000
Welch et al. 1996a	How do relationships and networks affect project marketing?	Australian China grain joint action group process September 1994-February 1995
Welch et al. 1996b	How does export grouping scheme affect an industrial network of which it is part?	Australian hay joint action group 1992-1995

To further explore the longitudinal process research practice in business network studies, we summarize the key methodological choices and their variations and frequencies in Table 2. The results related to how temporality is seen or is built in data collection and analysis, follows in Table 3. Although these Tables present frequencies of certain choices in the sample, we do not intend to claim that they would portray the whole picture of process research on business networks. The frequencies should not be interpreted as absolute measures of the use of certain methods. Instead, they should be seen to reflect some methodological tendencies in process research on business networks.

KEY METHODOLOGICAL CHOICES

All of the studies applied *case strategy*, which is well in line with earlier notions of the dominance of case research in industrial marketing studies (Easton, 2000; Piekkari et al., 2010) as well as in process studies of organizational change (Huber &Van de Ven, 1995). The single case design taking a holistic approach to case (Yin, 2003, p 40) is dominant (see Table 2). Process research is laborious and even more so when several network actors need to be studied intensively. Studying one or two network cases at a time is thus a natural strategy to adopt, or perhaps the only feasible option. Single case studies also allow for placing emphasis on the context of the case that is elementary for understanding process (e.g. Pettigrew, 1997). An in-depth study of process within a single case also allows identifying potential mechanisms that drive the processes in networks that have blurry boundaries, connectedness among actors and dynamic form (Easton, 2000).

A few studies applied other research strategies combined with the case approach. We identified four historical (Alajoutsijärvi et al., 1999; Ford & Redwood, 2005; Welch & Wilkinson, 2002; 2004), three participatory (Hameri & Paatela, 2005; Holmen et al., 2007; Knight & Pye, 2004) and two ethnographic case studies (Gupta et al., 2005; Larson, 1992). In some studies these labels were used by the authors without elaborating their meaning for the study any further. The study could also clearly include, for instance, participatory observation or researcher intervention, but the authors did not label their study as participatory or as action research. In such cases the researchers' interpretation determined the categorization.

In this review, a "case" might refer to a single firm (e.g. Bångens & Araujo, 2002), to certain kind of a relationship (e.g. competitor relationships in Bengtsson & Kock 1999; strategic alliances in Hertz & Mattsson 2004), a net of companies (e.g. triad in Salo et al., 2009; a joint action group in Welch & Wilkinson, 1996b); or certain types of networks (e.g. distribution networks in Andersson & Mölleryd, 1999; supplier networks in Hameri & Paatela, 2005). Some studies also defined the case as a process itself, like a learning episode in Knight & Pye (2004), an episode of strategizing in Harrison & Prenkert (2009), or a process of domino effects in Hertz (1998).

Given that the case strategy was universally used, *the data collection method* also followed the case study ideal of using several sources of data (see e.g. Yin, 2003, p. 14; Halinen

& Törnroos, 2005). In great majority of the studies, authors typically combined in-depth interviews, archival documents, and observational or other ethnographic material. Three studies mixed qualitative and quantitative data (Coviello, 2005; 2006; Kamp, 2005). Only six studies based the investigation on single type of data source (see Table 2). Out of the 39 studies, 33 utilized manager or employee interviews and 31 documents and/or archives. Only 9 studies made use of observations and experience from the industry was used as a primary data in two studies (Hertz, 1998; Low & Johnston, 2009).

Table 2. Key methodological choices of the studies.

Methodological choices		**n**	**%**
Type of case study	Single	29	74,4
	Multiple	10	25,6
	Holistic	35	89,7
	Embedded	4	10,3
Method of data collection	Single	6	15,4
	Combined	28	71,8
	Mixed	3	7,7
	N/A	2	5,1
Unit of analysis	Focal company in a net	19	48,7
	Dyad/triad in a net	7	17,9
	Whole net/network	9	23,1
	Other	3	7,7
	N/A	1	2,6
Unit of observation	Managers	10	25,6
	Company	2	5,1
	Managers and company	10	25,6
	Managers and group	2	5,1
	Managers, company and industry	7	17,9
	Other combinations	5	12,8
	N/A	3	7,7
Network coverage	One company	5	12,8
	Two companies	2	5,1
	Several companies	24	61,5
	N/A	8	20,5

Definition of *the unit of analysis* is crucial in studying processes in complex, multi-level structures like networks (e.g. Brass et al., 2004; Makkonen et al., 2012). The unit of analysis relates to how the network under study is delimited for analytical purposes and thus defines what the study is interested in. In this way the unit of analysis also should influence the level from which the data is collected, i.e. the unit of observation, and the coverage of data collection vis-à-vis the network.

In network research the unit of analysis can rarely be specified in terms of a single level of analysis, e.g. a company or a network. Research questions typically connect two levels of analysis, the assumption being that the one influences the other or interacts with it (Wilke & Ritter, 2006). While creating understanding of a process several levels of analysis are typically involved. In this respect, network research has distinguished four different approaches: a focal company view (or ego-network), dyad within a network view, micronet-macronet perspective

and the whole network perspective (Halinen & Törnroos, 2005; Provan et al., 2007). In the studied sample the view of a focal company operating in a network was dominant (see Table 2), although nine studies focused on analyzing a whole network (or a system) and seven examined a dyad or triad within a net. In comparison to a review of interorganizational network studies that included quantitative investigations (Bergenholtz & Waldstrøm, 2010), the proportion of the whole network studies found here was lower. Besides the problem of setting network boundaries (cf. Provan et al., 2007; Wilke & Ritter 2006), the access to qualitative data on whole networks clearly creates a challenge.

In a focal company or ego-net study, one organization is placed at the centre of the network and the focus is on how this firm relates to its context (Halinen & Törnroos, 1998). It includes the direct and the indirect relationships that are perceived as relevant by the persons representing the focal firm (Anderson et at., 1994). In the dyad-network view, the core dyad is examined as a part of a wider industrial network (Anderson et al., 1994; Halinen & Törnroos, 1998). This approach takes the view that actors perceive their embeddedness in networks in terms of their interaction with specific partners and each actor's network includes an actor who is considered as the most important counterpart at each moment (Halinen & Törnroos, 1998). In a micronet study (Halinen & Törnroos, 1998) several identifiable business actors form a distinct business activity. This micronet, for instance a triad (Fletcher & Barrett, 2001; Salo et al. 2009) can be set in the context of a macronet formed at the national and/or institutional level with business or non-business actors who have a strong influence on the micronet's activities. Finally, the whole network perspective defines a group of actors with a common goal (Provan et al., 2007, p. 482; see e.g. Welch & Wilkinson 2002; 2004), or an industry or a market as a network (e.g. Anderson & Mölleryd, 1999; Bengtsson & Kock, 1999).

The *unit of observation* in Table 2 indicates the level of data collection, i.e. from whom or where the data was collected (Wilke & Ritter, 1999). In the reviewed studies managers or employees (interviews), companies, industries and groups (archives and documents), and interactive situations between network actors (workshops and meetings) were used as sources of information. Different units of observation were typically used in combination: in many studies managers and the company were combined and potentially complemented with still another unit (e.g. industry).

The primary role of interviews with managers and employees emphasizes the role of individuals in the interorganizational network processes. While interaction between the connected companies forms the core of business networks (Ford & Håkansson, 2006), it is the human interaction between managers and individuals that sets up this interaction, and it is individuals who act as agents for organizations and consequently as primary drivers of network processes over time (cf. Borch & Arthur, 1995; Tsoukas & Chia, 2002). From this premise, the array of data sources seems surprisingly narrow. Interactive situations between companies and their representatives, e.g. workshops and meetings, or documents of business deals and interaction, e.g. contracts and correspondence, are reported as sources of data only in some rare cases (Ford & Redwood, 2005; Harrison & Prenkert, 2009; Heikkinen et al., 2007; Holmen et al., 2007). The use of managers as key informants would also provide opportunities for a more varied use of data collection methods. For instance, no study in the sample reported the use of informant-produced data, like diaries or written narratives, or utilized group-interviews.

The concept of network as a web of interconnected relationships between a number of actors calls for data collection on several actors and relationships. We focused on this issue by analyzing *the network coverage* that simply refers to the number of companies from whom data

was collected. We found that even if the analytical focus of the study was the whole network, data was not necessarily collected on all actors in the defined network. In the same vein, the focal company view on networks did not enforce data collection to the focal company only. The unit of analysis often differed from the actual breath of data collection. Yet, the number of studies collecting data on several companies and relationships formed the majority (61.5%). Surprisingly big portion of studies (20%) failed to report where data was collected, from one or several companies.

TEMPORAL ASPECTS OF DATA COLLECTION AND ANALYSIS

The temporal aspects of data collection and analysis are depicted in Table 3. In a process study the way process is defined has a crucial impact on the choice of methods and was therefore analyzed in the review. As described earlier three views on process have been widely applied in organization research: input-output, change and processual views (Van de Ven, 1992). In our sample, the processual and the change perspectives formed the great majority. In more than one third of the studies, process was seen as a flow of events and activities, and in one fifth of studies it was considered as change of something over time. Only one study could be interpreted as an input-output-study of process. It is more interesting, however, that almost a third of studies combined two process-views (either consciously or unconsciously) in creating understanding of the process. All kinds of combinations were found, with many studies using the input-output view in combination with either of the two other views.

Table 3. Temporal aspects of data collection and analysis.

Methodological choices	Subcategories	n	%
View on process	Input/output	1	2,6
	Change	9	23,1
	Process	17	43,6
	Combined	11	28,2
	N/A	1	2,6
Temporal focus of the study	Complete/long-term process	24	61,5
	Certain phase(s)	13	33,3
	Selected moment	2	5,1
Temporal orientation of data collection	Past	15	38,5
	Present	4	10,3
	Future	1	2,6
	Combined	15	38,5
	N/A	4	10,3
Access point to process	Continuous involvement	2	5,1
	Sequence	21	53,8
	Time point	2	5,1
	Several time points	2	5,1
	N/A	12	30,8
Data analysis methods	Narrative	26	66,6
	Structural mapping	25	64,1
	Analytical concept/model	21	53,8
	Temporal bracketing	15	38,5
	Event-based analysis or event mapping	8	20,5
	Quantitative analysis	3	7,7

	Other	5	12,8
Mode of analysis process	Experiencing	2	5,1
	Following and constructing	12	30,8
	Constructing afterwards	23	59,0
	N/A	3	7,7

The change perspective defines process in terms of change in some specific dimensions and the processual view looks at how the process advances through events and activities over time (Van de Ven, 1992). Still, the input-output view that draws on the variance-theory of explanation may be used as a heuristic device in creating understanding of, for instance, the key factors that affect the advancement of process like in the studies of Hallen and Johanson (2004b) and Chou and Zolkiewski (2010).

In process research, *the temporal focus of the study* may vary. Flick (2004) points out longitudinal qualitative studies may be interested in the past (retrospective studies), in the present (snapshots of current state or process) or the long-term follow up of a process (longitudinal studies). Whatever the temporal focus or boundary set for the study, it will have a crucial impact on the evolving interpretation of data (Dubois & Araujo, 2004). In our review we found three types of studies: 1) those that focused on studying a complete or a long-term process, 2) those that concentrated on a certain phase of an empirically or theoretically defined process and finally 3) those that investigated a state of a process at a selected moment. The first group accounted for 62% of the studies, while only two studies could be interpreted as cross-sectional investigations of a selected moment (Low & Johnston, 2009; Welch & Wilkinson, 1996b). In the long-term processes the temporal limits of the studied process were typically left open or defined on an ad hoc basis as, for example, a business history over 30 years (Alajoutsijärvi et al., 1999) or a company's involvement in M&As over a 25 year-period (Anderson et al. 2001). In studies of complete process, the temporal boundaries of study were more specifically determined as, for example, a strategizing process (Harrison & Prenkert, 2009) or as a failed venture process (Sminia, 2003). Finally, the studied phase could be, for instance, a period of economic transition (Hallen & Johanson, 2004a; 2004b) or a period of technological change (Chou & Zolkiewski, 2010).

In terms of its *temporal orientation* process research should take into account the past, the present and the future (Pettigrew, 1990). This is manifested in data collection being retrospective, real time or future oriented (Halinen & Törnroos, 1995), or backward and forward-looking (Langley, 2009a). Each approach involves particular strengths and weaknesses. The direction of viewing the process over time was typically retrospective (38%) or it combined real-time and retrospective data collection (38%). Only 10% of the studies employed real-time data only (see Table 3). One study took a future orientation presenting data on current situation and prospecting options for future development (Low & Johnston, 2009). This is somewhat surprising, given that companies that form the core of business network studies are interested in doing business in the future and are much less concerned with what has happened in the past.

Besides the temporal orientation, the access point to process complements the picture of empirical process investigation. *Access point to process* refers to the time frame of the fieldwork, i.e. how long the investigator is in contact with the phenomenon under study. Halinen, Medlin and Törnroos (2012) have distinguished three types of process research in business networks with respect to the access point: flow mapping, sequence mapping and point mapping. In flow mapping the researcher is continuously involved with the process in the field, tracking events and activities as they unfold. In sequence mapping the researcher is in contact with the process

over a selected time period, and in point mapping plunges into the process through several points in time or only takes a snapshot of the process by accessing the field once (Halinen et al., 2012).

Here the access point was typically a sequence. For more than half of the studies, data was collected over a defined period of time that extended from six months to seven years. On one hand, continuous involvement with the studied case, the researcher working close to the process (Baraldi & Strömsten, 2009; Knight & Pye, 2004) and on the other hand visit at one (Coviello, 2005; Sminia, 2003) or in two or three points in time (Fletcher, 2008; Mainela & Puhakka, 2008) were identifiable in only very few studies. It is noteworthy that even in one third of studies the authors did not report the access point at all and it was impossible for us to interpret it from the method description or data analysis.

Qualitative process researchers encounter a specific challenge of making sense of great volumes of non-numerical data that is eclectic, unstructured and even messy (Langley, 1999). Therefore, it is important to consider the ways to organize and unpack the process data during the analysis. We couldn't find methodological texts that would have been particularly discussing the *analysis methods* in relation to network processes. Therefore, we initially relied on the classification of analysis methods by Langley (1999) and looked for use of seven different strategies: narrative, visual mapping, temporal bracketing, quantification, alternate templates, grounded theory and synthetic strategy. We also expected to find studies using event-based analysis (see e.g. Hedaa & Törnroos, 2008).

As noted in the methodology section, the analysis methods were, in general, quite poorly reported and very few studies used any specific methodological labels in reporting the methods applied (exceptions are Hallen & Johanson, 2004a who mention narrative strategy, and Mainela & Puhakka, 2008, who apply narrative analysis, visual mapping and temporal bracketing with reference to Langley's classification). Therefore, we have largely interpreted the analysis methods from the documentation of research results, especially from the figures and tables provided in the analysis section of the articles. This led to the identification of seven types of data analysis methods that only partly overlap with Langley's categorization (1999). Two-thirds of the studies used narrative case descriptions in which a detailed story (a thick description) is constructed from the raw data and often a chronology of events is prepared (Langley, 1999). Almost the same amount of studies used structural mapping, which we interpreted to have been utilized if the network structure, involving the actors and the relationships between them, was mapped at least in one time period. This strategy was originally labeled as visual mapping and defined by Langley (1999) as use of various visual tools to present large quantities of data which she exemplified with the mapping of events and activities. In our sample, this form was used only in a few studies which made us combine these studies into event-based analysis -category (discussed below). Structural mapping of actors and relationships, typically as snapshots, is well fitted to business network research and this structural focus has been lately emphasized also by Bizzi and Langley (2012).

More than half of the studies used a specific analytical concept or analytical model to approach and make sense of the data. This seems to be an effective response to the problem of not knowing where to start and what to take into account in the analysis of complex and fine-grained process data (cf. Langley, 1999). Analytical models used in the sample include the actors-resources-activities model (Harrison & Prenkert, 2009; Welch & Wilkinson, 2002; Welch & Wilkinson, 2004) and venture development phases (Coviello, 2005; Coviello, 2006). Single concepts that were used as tools in the analysis included, for example, embeddedness (Fletcher &

Barrett, 2001; Flecher, 2008), network paradoxes (Ford & Redwood, 2005) and the role concept (Heikkinen et al, 2007).

The use of concepts and conceptual models can be related to pattern matching where an a priori theoretical proposition is confronted with the data (Yin, 2003; see also Coviello, 2006). In the studies reviewed, concepts and models were, however, used in a much looser manner. A priori propositions were posed in only two studies (Gupta et al., 2005; Hameri & Paatela, 2005) even though quite a number of studies theoretically chose a certain concept or model to be used to frame the analysis. The use of concepts and models can also be seen to share the basic idea of alternate templates as an analysis method defined by Bizzi and Langley (2012) as "top-down application of a priori theoretical lenses to a process data base" (p. 229). Langley's earlier thinking relates templates to metatriangulation or multiparadigm research (Lewis & Grimes, 1999), where several alternative interpretations of the same events are proposed based on "different but internally coherent sets of a priori theoretical premises" (Langley, 1999, p. 698). This kind of analysis was not discovered in the sample.

In temporal bracketing, data is decomposed into successive adjacent periods having certain continuity within each period and certain discontinuity at their frontiers. This enables the investigator to analyze how actions in one period lead to changes in subsequent periods (Langley, 1999). Almost 40 per cent of the studies used either data- or theory-based or some kind of an ad hoc temporal bracketing to divide the period of analysis into several episodes or phases. In data-driven bracketing, the periods were chosen to signify major shifts in the data that were meaningful from the studied topic's point of view. In theory-based bracketing the data was fitted to an existing phase model (Larson, 1992) and in ad hoc bracketing the periods were simply defined as decades (Fletcher & Barrett, 2001).

We also identified eight studies with event-based analysis where events are highlighted to be used as a purposeful analytic device. Three of the studies clearly mapped events over time (Chou & Zolkiewski, 2010; Salo et al, 2009; Sminia, 2003). Five studies chose specific types of events under analysis and focused on, for example, acquisitions (Anderson et al., 2001) or structural changes in networks (Hertz, 1998). Hedaa and Törnroos (2008) have proposed an event-network perspective to the study of network processes using the idea of connected events as the basic unit of analysis. However, this method was not directly traceable in the studies reviewed here. This would have involved tracing the events, i.e. "outcomes of human acts or changes caused by nature" (ibid: 323), affecting core actors and their acts and revealing the mechanisms of network change.

In quantification, the complex, qualitative data is gradually reduced into a set of quantitative time series data that are analyzed by statistical and mathematical methods. Three studies in our sample combined qualitative and quantitative analysis of networks over time. Coviello (2005) promotes the mixed method analysis as a useful approach for understanding network dynamics. In a later publication (Coviello, 2006) she presents three international new venture cases whose network development is analyzed both in terms of qualities and quantities of the network ties. Social network analysis is the method used in the quantification. Kamp (2005) develops a quantitative measure for the continuity of a business-to-business relationship referring to the time during which a buyer plant maintains a relationship with its various suppliers.

Finally, we classified the studies in terms of *the mode of analysis process* in relation to the character and timing of analysis within the longitudinal research process. In the business network context, Halinen, Medlin and Törnroos (2012) have identified three modes of analysis with respect to process data. Researchers can use a participatory research strategy where they

experience themselves what happens in the study context. Another alternative is to *follow events* during chosen phases and track events into the past through a period of closer interaction with informants. The third option is to use *historical reconstruction*, which means that the researcher reconstructs and deconstructs events and paths of events by rescuing primarily to informants' memories (Halinen et al., 2012). Besides being backward-looking the analysis may also look at the future, like in the rare case of Low & Johnston (2009). In our sample of studies, the authors seldom mentioned when and in which phases of the study process they made the analysis or how the iterative analysis processes advanced. In most studies analysis was done after the data collection, when all data was available (see Table 3). Often the same data was reinterpreted in light of some new concept or theme. In only two studies, the authors directly participated in the process under study, which made experiencing as the primary mode of analysis (Hertz, 1998; Low & Johnston, 2009).

DISCUSSION

Our analysis provides an overview of the methodological practice in qualitative process research in business networks that is summarized in the following description. A typical study is a holistic single case study. It uses multiple data collection methods, but still seldom mixes qualitative and quantitative data. The primary unit of analysis is a focal company in a network and understanding of networks from this perspective is typically searched for by interviewing managers and by analyzing company level documents and archives. As appropriate for network research, the data collection typically covers several companies in the network under study. A typical study also takes a processual approach to the phenomenon under examination focusing on the events, acts and activities that take place over time.

A particular aim of our review was to analyze how temporality is built into the data collection and data analysis methods of business network research. As might be expected from longitudinal research, the most common way to temporally delimit the study was to focus on a complete or a long-term process of network-embedded developments. Researchers tend to create access to the studied process by collecting data during a selected sequence and by tracking developments backward or by combining real-time data collection with retrospective accounts of the past. A typical study of this sort provides a case description of the studied process and complements it with structural mapping of the network. The analysis of the process is usually created after the events and the data collection by using a specific concept or theoretical model as an interpretative device.

The study reveals some methodological choices and challenges peculiar to business network studies. The most evident challenge relates to the setting of network boundaries. The focal company view on networks is probably the dominating perspective simply because of access problems. Collecting data on whole networks or several actors, dyads or triads is a formidable practical challenge. This also relates to the network coverage of data collection which often deviates from the chosen unit of analysis. For creating understanding of a network's development, for instance, data could be collected from a focal company only and not from the other actors of the network. It is obvious that network researchers are forced to make compromises in this respect, and actually the various analytic perspectives developed for network research (e.g. focal company view, dyad-network view, Halinen & Törnroos, 1998; Provan et al. 2007) can be seen as attempts to discern feasible and legitimate approaches to network study. Another characteristic of network studies relates to the methods of analyzing process data. When compared to methods used in organizational process research (Langley,

1999) the structural mapping of the network over time revealed a specific feature of longitudinal research on business networks. Studies typically focus on depicting the network structures instead of examining and visualizing the events, activities and processes occurring within the structure.

SHORTCOMINGS IN CURRENT RESEARCH AND RECOMMENDATIONS FOR FUTURE RESEARCH

The study revealed some evident shortcoming in process research on business networks where we wish to see improvements in the future. First of all, the specificity of reporting the methodological choices of the study, especially in relation to the temporal aspects of data collection and the methods of data analysis, varied a lot. The vocabulary that has long existed for process research is seldom used in the methodology descriptions of published work. In almost all cases we had to interpret from the study as a whole how the authors conceived the process, from a processual, change or an input-output perspective (Van de Ven, 1992). Even if the data collection methods were overall well reported the temporal aspects might not be clear. It is somewhat surprising that in 10% of the studies the temporal orientation of data collection was not at all reported and in a third of the studies, it was not possible to even interpret the timeframe of the field work from the published article. Andersson and Mattsson (2010) makes an important notion of the multiplex character of the temporal orientation pointing out that besides the direction of viewing, the time horizon of an investigator as short or long, and his/her vantage point for looking at the process being the past, present or future situation, both exert an important influence on the interpretation of the process. The same accounts for managers as informants as well as researchers as the analysts. Future research would greatly benefit from careful consideration of these temporal aspects and the epistemological and methodological challenges they pose to process research on networks.

With respect to the analysis methods, the reporting was equally poor. While reviewing the mode of analysis process including the timing of the analysis vis-a-vis the data collection, it was difficult to find needed information from the articles. The vantage point of the investigator (Andersson & Mattsson, 2010) in analyzing the data was not visible. Our findings support those of Piekkari, Plakoyiannaki and Welch (2010) showing that a great majority of case studies in industrial marketing barely report any methods of analysis they use. It seems that researchers are still employing some ad hoc tools or developing their own methods to design the analysis of process data.

Another shortcoming relates to the scant use of interaction-related data as source of evidence. The distinctive feature of networks is that their dynamics cannot be understood only by studying the actors but also the relationships and interaction between the actors. Workshops, meetings, correspondence and contracts would offer an important additional source of knowledge on network processes.

There are also other options for enriching the methodological repertoire of future process research in business networks. Some evident aspects of process research, like attention to time and timing, were practically missing from our sample. Some methods were present through one or two studies showing the potentials of the method for network study, while still some other rare cases exemplified innovative methodological practices (cf. Piekkari et al 2010). Based on our findings we suggest four major recommendations for future research.

First, the notion of time and timing could be more explicitly used in network studies. There is a need to treat time as a multi-dimensional concept; qualitative process research allows and even calls for such extensions (Halinen & Törnroos, 1995; Quintens & Matthyssens, 2010;

Pettigrew, 1990; Ven de Ven & Poole, 2005). Yet, we could not find any study that would have consciously integrated different time concepts into the study of network processes. In most cases time was not discussed in any way, but simply treated in its objective meaning, as chronological time, paying no attention to its subjective dimensions, such as individual or cultural time (Halinen & Törnroos 1995; Hassard, 1991). Typically time was used to indicate periods in the investigated process, e.g. growth period 1999–2003. Similarly, very little attention was paid to timing as an explanation to developments or change processes in networks. Timing should however be a relevant issue to consider in business networks, where processes are driven by interaction between intentional actors.

Secondly, the possibilities for comparison could be more effectively used and taken into account in both data collection and analysis. Longitudinal research designs even require comparison of data between or among periods (Flick, 2004; Menard 1991). This option was rarely used to its full potential in the reviewed studies that mostly accessed the process through a single time sequence, instead of visiting the field in several selected phases or points in time. The latter option would better allow for comparative approach in which the change is clearly depicted. The comparative approach would require additional attention from researchers to both the selection of the case and the timing of data collection. Studying critical cases might be more revelatory and make the mechanisms driving the developments under study more salient than typical or randomly chosen cases (cf. Eisenhardt, 1989). Critical cases might represent extreme situations or polar types in which the process of interest is especially well seen (Pettigrew, 1990). In our sample, the comparative approach became mainly visible in the structural mapping of networks over time. A clear cross-case analysis (Yin, 2003) was performed only in one study of the ten multiple case studies in our sample (Hameri & Paatela, 2005). Theory-based comparison of explanations in form of, for example, alternate templates analysis (see Langley, 1999) was wholly absent.

Thirdly, we urge researchers to examine network processes from the future perspective. Process research in business networks tends to look at the past instead of describing paths for companies and networks in their future development. In this respect we wish to raise up one innovative study from the sample. Low and Johnston (2009) examine how companies prepare themselves for emerging technologies and identify network positioning paths for companies from the present situation onwards. The temporal orientation of the study is in the future, which is exceptional in the sample. Looking network development with respect to the future would offer a wholly new and managerially valuable approach for understanding network processes. The methods of futures studies could be successfully applied in such endeavor.

As our last recommendation, we will encourage researchers to apply other research strategies besides the case study to create new insights into network processes both theoretically and managerially. Participatory approaches (e.g. Knight & Pye 2004) would be particularly valuable in revealing how networks are built, maintained and changed in practice and how the managers themselves make sense of business network development and evolution. Another promising approach would be the narrative strategy that is applicable in data collection, analysis and theorizing (e.g. Mainela & Puhakka, 2008). A typical case story rarely makes full use of the possibilities of the narrative approach that at its best captures the temporal dynamics of the network process, linking various network levels, events, activities and actors together into a temporal structured entity. Based on the most recent methodological contributions on narrative and participatory research in business networks (Makkonen, Aarikka-Stenroos & Olkkonen, 2012), we expect to see much more of these strategies used in the future.

CONCLUSIONS AND LIMITATIONS

Our intention was to produce an in-depth account of the methodological research practice in process research on business networks. The reliability of our analysis was challenged especially by the insufficient reporting with respect to the research approach and methodological choices of the studies. As a result we needed to reject some theoretically derived analytical dimensions that we originally considered as timely and relevant. For example, the selection of strong versus weak view to process was not deliberated in the articles and could not even be interpreted because of absent philosophical discussions. Vague reporting thus made it impossible to use a deductively derived coding scheme and to provide a full account of the methodological practice. Therefore our study should be seen as a data-driven, idea-generating endeavor that indicates emphases and shortcomings in research and identifies avenues for future research, instead of providing a generalizable description of the state of the art with absolute figures and frequencies.

Another limitation relates to the field of network study reviewed. The disciplinary context, its paradigms and subject matter, are likely to shape the methods and the way they are applied (Piekkari, Welch & Paavilainen, 2009). The results are therefore useful primarily for process researchers in business networks. However, the overview of process methods used in business network studies also provides valuable benchmark data for process researchers in other fields of interorganizational network study. Given that methodological knowledge on qualitative process research in interorganizational networks is scarce overall, the review is likely to be appreciated across disciplines. We hope the study serves in increasing researchers' awareness of methodological choices related to longitudinal qualitative study of networks and fosters the use of process methods in a more varied and instructed manner in the future.

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