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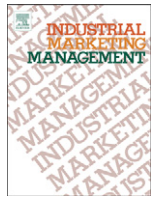This version is available at http://eprints.hud.ac.uk/id/eprint/21129/

Conceptualizing and validating organizational networking as a second-order formative construct

Sabrina C. Thornton [a,b,*], Stephan C. Henneberg [c,1], Peter Naudé [b,2]

[a] University of Huddersfield Business School, Queensgate, Huddersfield HD1 3DH, UK
[b] mIMP Research Group, Manchester Business School, Booth Street West, Manchester M15 6PB, UK
[c] Business Ecosystem Research Group, Queen Mary University of London, School of Business and Management, The Bancroft Building, Mile End Road, London E1 4NS, UK

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ABSTRACT

Based on an existing conceptualization in the literature, this study operationalizes the construct of organizational networking, through a rigorous two-stage scale construction and validation process. Organizational networking refers to firm behaviors, i.e. the activities/routines/practices, which enable an organization to make sense of and capitalize on their networks of direct and indirect business relationships. We conceptualize the measurement model as a second-order formative construct with four first-order reflective constructs based on a four-dimensional view of organizational networking comprising information acquisition, opportunity enabling, strong-tie resource mobilization and weak-tie resource mobilization. The scale validation was undertaken at the first- and second-order levels. The result confirms the four distinct first-order measurement models. At the second-order level, a MIMIC (multiple indicators and multiple causes) model was employed to assess the validity of the formative measurement model. The results suggest that all four components significantly contribute to the overarching construct of organizational networking, with strong-tie resource mobilization being the most important contributor. Thus, our operationalization confirms the uniqueness of the different dimensions of organizational networking that should be configured as a strategy of sensing and seizing opportunities in the network. The organizational networking scale will provide future research with a basis to explore different strategic patterns of networking behaviors in varying contexts, and its role in relation to other organizational behaviors and outcome variables, such as firm performance.

1. Introduction

The implications of firms being embedded in business networks have been well established in the literature, suggesting that the business relationships, which make up these networks, enable firms to identify opportunities, access rich information, and undertake effective and efficient knowledge transfer and resource mobilization (Achrol & Kotler, 1999; Möller & Rajala, 2007; Uzzi, 1996). From a network structure perspective, achieving a 'beneficial' network position that allows firms to explore business opportunities is critically important and a main strategic aim of firms (Baum, Cowan, & Jonard, 2013; Hagedoorn, Roijakkers, & Van Kranenburg, 2006). However, understanding organizational behaviors, i.e. how a firm can increase its competitiveness through consciously changing its network position and utilizing resource synergies identified in its network, is a complex and under-researched issue. Given the importance of this topic and its

potential implications for practitioners operating in business markets, there is surprisingly little in the current literature when it comes to empirical studies that investigate the scope and the content of such active strategic network management.

Academics in business-to-business marketing have attempted to conceptualize and operationalize different perspectives of network management from the vantage point of a focal firm; this was mostly based on a dynamic capability perspective (e.g. Mitrega, Forkmann, Ramos, & Henneberg, 2012; Ritter, 1999; Walter, Auer, & Ritter, 2006). This approach has deepened our understanding of how firms can efficiently and effectively manage their relationship portfolio (and therefore their network position) by developing and establishing internal processes to deal with multiple *direct relationships* simultaneously. However, there is an underdeveloped and yet steadily growing stream of research focusing on the strategic aspect of outward-facing networking behaviors, aimed at *indirect business relationships* as well. These behaviors are employed by firms to understand the wider network dynamics and capitalize on them based on their perceptions of the network (Håkansson, Ford, Gadde, Snehota, & Waluszewski, 2009). In this wider context the concept of *organizational networking* becomes important.

From a conceptual perspective, a better understanding of the definition as well as the dimensions of organizational networking is needed.

* Corresponding author at: University of Huddersfield Business School, Queensgate, Huddersfield HD1 3DH, UK. Tel.: +44 1484 472565.
E-mail addresses: s.thornton@hud.ac.uk (S.C. Thornton), s.henneberg@qmul.ac.uk (S.C. Henneberg), peter.naude@mbs.ac.uk (P. Naudé).
[1] Tel.: +44 20 7882 8570.
[2] Tel.: +44 161 275 7782.

Recent studies have contributed to the conceptualization of organizational networking, which established the essence of such focal firm behaviors that are aimed at the wider network context through the theoretical lens of the industrial network approach (INA) (Ford & Mouzas, 2010, 2013; Håkansson et al., 2009). In addition, economic sociology embedded in the wider social exchange theory has provided some evidence to indicate the strategic implications of utilizing different types of relationships in relation to firm performance from a structuralist perspective (Granovetter, 1985; Uzzi, 1996). However, further research is needed to understand the implications of a focal firm being embedded in a network, and its strategic organizational behaviors in terms of networking in response to a networked environment. To date research in this area remains largely conceptual, and it is still in need of empirical and quantitative research to further advance our understanding of organizational networking.

Such conceptual considerations are linked to issues around operationalization: a scale for measuring organizational networking behavior is needed, which will enable future studies to advance our understanding of the implications of such a construct in relation to other existing organization behavioral constructs and outcome variables (e.g. firm performance). In addition, since existing studies identify different aspects of organizational networking, specific justification needs to be provided for specifying organizational networking as a measurement model, for example as an overarching higher-order construct that includes different aspects of networking. In short, a conceptually derived and empirically tested measurement model specification for organizational networking is needed. This will also provide useful managerial implications, as firms operating in business markets will benefit from a clear framework of how they might be able to sense and seize network opportunities embedded in direct and indirect business relationships, which will help them to interact more responsively and effectively with their partners in the business network.

Our argument will provide such a conceptually derived and empirically tested measurement model specification for organizational networking. Based on the above issues, this paper is organized as follows. First, we review, compare and contrast the existing organizational networking studies in the literature. Secondly, a two-stage research design for the scale development as part of the measurement model will be introduced, and the data analyses regarding scale purification and testing, as well as the empirical results will be presented. Finally, we will conclude with a discussion of our findings, contributions to the existing literature, as well as identifying limitations and future research direction.

2. The construct of organizational networking

Networking as a concept has been commonly used at a personal level to reflect the set of social skills of a person (e.g. owner of a firm) to leverage social relationships in order to benefit from them (e.g. Chetty & Campbell-Hunt, 2003; Ferris et al., 2007; Jaklic, 1998; Semrau & Sigmund, 2010). As such, the ability to realize benefits that arise from the network structure and the web of different types of relationships can be seen as an actor's social capital (Coleman, 1990). However, we focus our discussion on *organizational networking*. We are interested in the strategic aspect of organizational networking (in line with the INA), and therefore we refrain from studying personal networking in business (such as in the area of entrepreneurship and SMEs) (e.g. Ferris et al., 2007; Semrau & Sigmund, 2010).

In this context of organizational networking, the perspective of our study is a focal firm embedded in its business network which consists of various types of direct and indirect business relationships that link this firm to the wider network context (Anderson, Håkansson, & Johanson, 1994; Pfeffer & Salancik, 1978). The position of the firm in the network is therefore related to these relationships and provides unique opportunities as well as threats. The set of available resources, which can be mobilized by the firm, is linked to its network position, i.e. derived from its web of relationships and the wider context (Burt,

2000; Zaheer & Bell, 2005). As such, the focal firm's behaviors and decisions are influenced and shaped by the dynamics derived from its web of relationships (Astley, 1984). In line with the INA it is posited that companies affect their network position by certain strategic activities, such as behaviors aimed at instigating new business relationships, changing existing ones, as well as ending some interactions with business partners (Mitrega et al., 2012). These strategic activities are subsumed under the concept of *networking* as part of Ford, Gadde, Håkansson, and Snehota's (2003) theory of managing in business networks. However, while the concept is well introduced in studies of business marketing and supply chain management, there exists only very limited empirical research on aspects of organizational networking (Ford & Mouzas, 2013). Therefore, in this section we first position the construct, i.e. organizational networking, in relation to the relevant research area, i.e. network management. This allows us to proceed to a critical appraisal of the relevant studies that specifically focus on aspects of organizational networking.

2.1. Differentiating organizational networking

The literature provides a number of studies that focus on conceptualizing and operationalizing different aspects of network management, which are conceptually related but different from the construct of organizational networking. For clarification purposes we provide a concise summary of the key differences based on a detailed analysis by Thornton, Henneberg, and Naudé (2013). The conceptualization and operationalization of *network competence* by Ritter (1999) signify the need for a firm to develop routines and practices in response to the embedding multi-firm network. Such competence allows a firm to execute relationship-specific tasks. Based on this initial conceptualization of network management, various studies follow this perspective, often using a dynamic capabilities perspective (Teece, Pisano, & Shuen, 1997). For instance, *networking capabilities* consider a firm's ability to manage and utilize business relationships (Mitrega et al., 2012), with particular attention to the completeness of the relationship life cycle. The key components of networking capabilities are relationship initiation, development and termination. The above studies deepen our understanding of how a firm can manage its web of *direct* relationships by establishing certain internal organizational practices. Based on Day's (1994) categorization of organizational capabilities, such conceptualizations of network management capture the *inside-out practices*, which are established as internal processes to deal with the efficiency of a firm's relationship portfolio.

Following the logic of Day (1994), organizational networking on the other hand should be viewed as the *outside-in capabilities* of organizations, which are related to network sensing and strategizing (Holmen & Pedersen, 2003). The focal point of these practices is therefore externally focused. In contrast to research in network management, organizational networking captures the strategic intent of a firm in relation to its embedding business network (Thornton et al., 2013). Organizational networking goes *beyond* managing direct relationships. Instead, the structure of the network, related to a firm's network position, gives rise to the patterns of interactions by the focal firm (Ford & Mouzas, 2013). These interactions are not only with directly connected counterparts of a firm, but also indirectly connected ones. Within this context, direct relationships of a firm serve not only as the means to capture resources (Zaefarian, Henneberg, & Naudé, 2011), but also as the bridge for mobilizing the resources that are embedded in indirect relationships (Mouzas & Naudé, 2007).

In contrast to existing research on network management, organizational networking is a relatively underdeveloped construct (Ford & Mouzas, 2013). Existing studies, which contextualize and conceptualize the construct, provide limited empirical evidence to suggest what constitutes organizational networking (Thornton et al., 2013). We therefore collated studies that specifically focus on the conceptualization of organizational networking to form the basis for the discussion and analysis.

Table 1
Conceptualization of organizational networking.

Definition	Dimension(s)	Level of network	Empirical base
Networking as changing relationship patterns (Smith & Laage-Hellman, 1992) *Connections that are governed by the actor's own will, attitude, ambitions and perceptions.*	• Transformation patterns 1. Avoidance 2. Flanking 3. Combination 4. Bridge 5. Displacement 6. Separation 7. Blocking	• Relationship • Small world	• Single-case study with single-unit of analysis • Case: an engineering consumables supplier in the UK
Networking as managing relationship portfolio (Ebers, 1997) *A particular form of organizing, or governing, exchange relationships among organizations.*	• The content of relationships • Relationship governing mechanisms	• Relationship	• Conceptual
Networking as coordinating multiple parties in a network (Holmen & Pedersen, 2003) *The ability of a firm to initiate and react to changes in the network in such a way that the firm keeps on being valuable to the network.*	• Mediating functions of a firm's direct counterparts 1. Joining 2. Relating 3. Insulating	• Relationship • Small world	• Single-case study with multiple units of analysis • Case: an electronics manufacturing firm in Scandinavia • Multiple informants (16)
Networking as positioning in the network (Hagedoorn, Roijakkers & Van Kranenburg, 2006) *Firm-specific partnering capabilities that enable a company to place itself in a particular position in a broader network of partnerships with multiple companies.*	• Strategic centrality-based network capabilities (network positioning) • Strategic efficient-based network capabilities (network transforming)	• Relationship • Small world	• International pharmaceutical biotechnology industry • Secondary quantitative data of 1325 R&D partnerships from 230 companies.
Networking as changing the nature of interactions (Ford & Mouzas, 2013) *Business networking is the conscious problem-driven attempts of one or more business actors to change or develop some aspect(s) of the substance of interaction in relationships in which they and others are involved.*	• Confront/conform within single relationships • Create/consolidate between different relationships • Coerce/concede in relationships	• Relationship • Small world • Wider world	• Single-case study with single-unit of analysis • Case: Procter & Gamble (P&G) in Germany
Networking as sensing and capitalizing on the network (Thornton et al., 2013) *Activities/routines/practices, which enable firms to make sense of and capitalize on their networks of direct and indirect relationships.*	• Information acquisition • Opportunity enabling • Strong-tie resource mobilization • Weak-tie resource mobilization	• Relationship • Small world • Wider world	• Single-case study with multiple units of analysis • Case: UK manufacturing sector • Multiple firms (15) – multiple informants (2-3)

Table 1 contains an overview of the conceptual and empirical studies on organizational networking as well as some closely related concepts, such as strategic network capabilities (Hagedoorn et al., 2006) and network strategizing (Holmen & Pedersen, 2003). While most of the studies concerning organizational networking are built on the theoretical foundation provided by the INA, the empirical study by Hagedoorn et al. (2006) draws on the extant literature in strategic management, and Thornton et al. (2013) utilize the INA coupled with the notion of embeddedness linked to economic sociology.

The following discussion will juxtapose the relevant conceptualizations based on the proposed definitions and dimensions of organizational networking, their use of the network context (i.e. the level of network characteristics included in the definition), and their empirical base. Through this analysis, relevant studies related to organizational networking are assessed conceptually and empirically, which serves as a prerequisite for the purpose of rigorously operationalizing the construct at hand (Churchill, 1979).

2.2. Definitions and dimensions

Organizational networking has been conceptualized in slightly varying forms by the studies listed in Table 1. Smith and Laage-Hellman (1992) and also Ford and Mouzas (2013) see networking in a similar vein and conceptualize it as actors' attempts to change the content and pattern of their interactions with business partners (also see Ford & Mouzas, 2010; Håkansson et al., 2009). They do, however, differ in the dimensions identified to capture organizational networking. The former utilizes a triadic approach to illustrate different types of connection patterns as the result of actor-centered efforts to change the relationship formation, while the latter predominately focuses on the idea of networking as a means for 'problem-coping' by changing the pattern of the business interactions. Thus, Ford and Mouzas (2013) define networking as *"the conscious problem-driven attempts of one or more*

business actors to change or develop some aspect(s) of the substance of interaction in relationships in which they and others are involved" (p. 436). Networking is thus the process of making choices regarding their business relationship portfolio when firms are faced with problems of dealing with complex networks. They further argue that *"the conscious attempts to change the structure or process of interaction and the unplanned outcomes"* (p. 436) should be clearly distinguished. Within the INA, organizational networking is a problem-driven process without specific outcomes that can be pre-specified.

On the other hand, Ebers (1997), Holmen and Pedersen (2003) and Thornton et al. (2013) provide an overlapping view in their conceptualization of organizational networking. These three studies explicitly incorporate strategic intent as a driver of organizational networking in their conceptualization, thereby emphasizing resource mobilization and information gathering as the key motives of networking (Pfeffer & Salancik, 1978; Zaefarian et al., 2011). Therefore, such a perspective of organizational networking, based on a focal firm's strategic intent, takes into account the cognitive processes of actors as they consciously act/react, with certain anticipated effects in mind. Firms thus consciously interact with their direct, indirect or new business counterparts. This way of thinking about organizational networking has some conceptual similarity to the argument by Hagedoorn et al. (2006). Their study, adopting a dynamic capabilities approach coupled with a social network perspective, proposes two key dimensions for capturing a focal firm's strategic networking, which mainly tap into network positioning and relationship portfolio management for the purpose of maximizing useful information and resources afforded by its network. However, the actor's cognitive process and the interactive nature of organizational networking are not at the center of their conceptualization.

We partly agree with Ford and Mouzas (2013) that networking outcomes are unpredictable, but contend that firms act or react based on the anticipated outcome of networking, rather than using networking

purely as a coping device. Although the strategic intent, which is guiding networking behaviors, does not necessarily force the *anticipated outcomes* to be realized, networking behaviors are nevertheless planned and thus based upon actors' perception of the network dynamics and the anticipated effects they wish to achieve (or wish to avoid). In addition, the recent study by Thornton et al. (2013) incorporates the idea of tie strength, originating from economic sociology, in their conceptualization of organizational networking. This has resulted in different yet complementary dimensions of organizational networking being identified, compared to those of Ebers (1997) and Holmen and Pedersen (2003). Thornton et al.'s (2013) empirical data suggests that strong- and weak-tie relationships have different benefits for a focal firm, and these differences are reflected in the distinct networking dimensions they identified, namely information acquisition, opportunity enabling, strong-tie resource mobilization and weak-tie resource mobilization. These four dimensions encapsulate *"activities/routines/practices, which enable firms to make sense of and capitalize on their networks of direct and indirect relationships"* (p. 1155). Although these activities are all based on the interactions that take place in either established or less established relationships, the authors argue that the four dimensions are conceptually distinct from one another, and that the different purposes guide firms to undertake different forms of networking.

2.3. Level of network characteristics

Ford and Mouzas (2013) propose a three-level framework for the context of organizational networking, namely relationship, small world and wider world. At the relationship level, the unit of analysis is dyads, whereas the small world includes interconnected direct and indirect relationships. In addition, the wider world taps into those areas of the network that go beyond a firm's small world, and are less 'visible' to the firm and form a kind of amorphous 'environment'. This approach echoes Hagedoorn's (2006) three levels of embeddedness (i.e. dyadic, interorganizational, including direct and indirect relationships, and environmental embeddedness) with the exception that the environmental embeddedness is further divided into macro (e.g. country) and meso (e.g. industry) levels.

The above studies have deepened our understanding of firms' behavioral patterns within the context of being embedded in the network (Zaheer, Gözübüyük, & Milanov, 2010). However firms themselves act and react to network changes based on their perception of the network (Corsaro, Ramos, Henneberg, & Naudé, 2011; Henneberg, Mouzas, & Naudé, 2006; Ramos & Ford, 2011). Academics using an INA approach argue that actors have limited cognitive ability, and therefore they can only understand the complex network in an idiosyncratic manner, which implies that they choose their own 'network theories' (Johanson & Mattsson, 1992; Wilkinson & Young, 2002). This makes the boundary or horizon of individual firms' perceived networks somewhat arbitrary (Anderson et al., 1994; Holmen & Pedersen, 2003). However, firms are usually more aware of their close network context compared to aspects further afield, and there is always an 'unknown' (or less-known) part of the network. Nevertheless, through interacting with their counterparts, firms can develop an understanding even of those unexplored areas of the network (Jack, 2005; Thornton et al., 2013). It is therefore important to assess the organizational networking studies based on their conceptualization, incorporating the network structure characteristics, such as the interconnectedness and embeddedness. We thus determine at which level(s) these organizational networking studies are operating, which will allow us to form a picture of how these studies have contributed to the concept of organizational networking.

As outlined in Table 1, most studies cover a dyadic perspective as well as 'small world' organizational embeddedness, except Ford and Mouzas (2013) and Thornton et al. (2013). We note that although Ford and Mouzas (2013) suggest that it is possible to look at organizational networking at all different network levels, their proposed

definition and the suggested dimensions do not seem to include the multi-level view and the wider network context. On the other hand, the definition and the dimensions of organizational networking by Thornton et al. (2013) capture a wider network context, at least including the meso level (i.e. industry) of the wider network context suggested by Hagedoorn (2006). Thornton et al. (2013) identify some networking behaviors that firms utilize to understand and influence the shaping of the industry through interacting with various parties, particularly with those that are not in close proximity and that are not trading with them (i.e. weak-tie relationships).

2.4. Empirical base

The main objective of our study is to operationalize the construct of organizational networking. It is therefore critically important to assess the research design of already existing conceptualizations, in order to evaluate whether the proposed definitions and the dimensions are suited for the purpose of developing a measurement model (i.e. an operationalization). This reasoning is in line with the scale development process proposed by Churchill (1979). To form a comparable analysis regarding the research design of the studies listed in Table 1, we put less emphasis on the study by Hagedoorn et al. (2006) due to the fact that it has a very different methodological base (i.e. quantitative analyses based on secondary data) and it focuses on the construct of organizational networking to a far lesser extent than the other studies. Similarly, we also put less emphasis on the purely conceptual study by Ebers (1997) as it does not provide any evidence beyond conceptual reasoning for its concept definition of organizational networking, which leaves the four remaining empirical case studies to form the basis for the following discussion. According to Yin (2009), to judge the quality of the research design of an exploratory case study, one must understand its *construct validity, external validity* and *reliability.*

First, construct validity in the case study sense is related to the definition of the constructs under study and the identification of key themes of the constructs. All four studies satisfy the first criterion by explicitly defining organizational networking. As far as the second criterion of satisfying construct validity is concerned, only two studies discuss construct validity related to the key themes or operational measures in a qualitative sense. Holmen and Pedersen (2003) used multiple sources of evidence, such as interviews and observations, to form their findings. Thornton et al. (2013) utilized an abductive approach in an iterative process of data collection and analysis (see Dubois & Gadde, 2002), using multiple researchers to interpret the data.

Secondly, external validity is related to the extent to which the research findings can be generalized analytically. As three out of the four studies have chosen a single focal firm as their subject of study, they do not display a strong external validity. It is not clear how they *"generalize a particular set of results to some broader theory"* (Yin, 2009, p. 43). Although Holmen and Pedersen (2003) utilized a replication logic of multiple interviews with different individuals, it does not contribute to the study's external validity as the construct being studied is at a firm level, rather than the personal level. Thornton et al. (2013) chose the UK manufacturing sector as a single-case with 31 executives from 15 firms embedded within the case. They also use a replication logic of a multiple informant approach to cross-validate the themes identified across two or three informants within each firm. The research findings thus have some degree of generalizability.

Thirdly, reliability is related to the extent to which the procedure of a case study can be repeated and generate the same findings. Only Holmen and Pedersen (2003) and Thornton et al. (2013) provide a detailed description of the way in which the researchers carry out their investigation, such as recruiting participant firm(s), the sources of evidence, data collection process and data analysis.

2.5. Operationalizing organizational networking

Based on the critical appraisal of these studies' empirical base, we conclude that the study by Thornton et al. (2013) has demonstrated a suitable foundation for further operationalization of the construct of organizational networking. First, the definition and dimensions identified by their empirical study encapsulate the cognitive processes by conceptualizing the construct of organizational networking as an anticipated-outcome driven interaction. Secondly, the conceptualization covers direct and indirect relationships as well as the meso level of the wider network context. Finally, the research results have an adequate level of construct validity, external validity and reliability, which is a prerequisite for operationalizing any constructs (Churchill, 1979). Based on the above discussions, we therefore adopt their definition and the suggested dimensions as a starting point for our operationalization of organizational networking. The construct of organizational networking is thus defined as *"activities/routines/practices, which enable firms to make sense of and capitalize on their networks of direct and indirect relationships"* (Thornton et al., 2013, p. 1155). This definition captures the strategic intent of organizational networking by focusing on sensing the network and anticipating the inherent opportunities and threats.

Four key dimensions of anticipated-outcome driven networking behaviors are information acquisition, opportunity enabling, strong-tie resource mobilization and weak-tie resource mobilization. Each dimension reflects its manifested behaviors, which captures a distinct way in which firms utilize their business relationships in an attempt to achieve their anticipated goals (see Appendix A for definitions and descriptions of the four dimensions of organizational networking). Given that Thornton et al.'s (2013) conceptualization of organizational networking was developed within the context of the UK manufacturing sector and the distinctions between the four dimensions have only been evaluated qualitatively, our study aims at furthering their research findings in order to develop a rigorous measurement model and to establish its validity across both manufacturing and service firms.

3. Operationalization methodology

The research design entails a two-stage empirical process, which is detailed in Fig. 1. The first stage involves the generation and the qualitative pretest of an item pool based on the conceptualization by Thornton et al. (2013) to form a scale for organizational networking, which is detailed in Section 3.1. In stage two, the scale is subjected to a series of quantitative tests through a resulting web-based survey, which is outlined in Section 3.2. This research design allows us to test the reliability, validity and generalizability of the first-order four-dimension measurement model as well as the validity of the specified second-order formative measurement model. For the purpose of clarity, each step within each stage is labeled in Fig. 1 using its corresponding subsection.

3.1. Stage 1: scale construction

3.1.1. Measurement model conceptualization

We conceptualize organizational networking as a formative second-order construct that is created by four first-order constructs, namely information acquisition, opportunity enabling, strong-tie resource mobilization and weak-tie resource mobilization. These are assumed to be reflective in nature. We use the terminology of a formative second-order measurement model in line with Petter, Straub, and Rai (2007) and Diamantopoulos, Riefler, and Roth (2008). This measurement structure is what Diamantopoulos et al. (2008) classify as a Type II measurement model. It is necessary to allow these two levels (orders) of abstraction in order to understand the characteristics of the key construct, i.e. organizational networking. Mackenzie, Podsakoff, and Jarvis (2005, p. 715) state that a second-order formative measurement model *"faithfully represents all of the conceptual distinctions that the researcher believes are important, and it provides the most powerful means of testing and evaluating the construct"*.

In light of the continued debate about the validity and applicability of formative measurement models in recent special issues in the Journal of Business Research (2008 & 2013) and the Academy of Marketing Science Review (2013), the conceptualization of the measurement model addresses two key issues highlighted in the literature. The first issue is related to the conceptualization of a formative measurement model. While some scholars argue that no construct is inherently reflective or formative (Baxter, 2009; Wilcox, Howell, & Breivik, 2008), others suggest that a construct must be either reflective or formative based on its conceptual meaning (Diamantopoulos & Winklhofer, 2001; Jarvis, Mackenzie, & Podsakoff, 2003; Podsakoff, Mackenzie, Jeong-Yeon, & Podsakoff, 2003). We take the stance of the latter view on the basis that the construct in question has a clear definition and specified dimensions, which were established through a qualitative research. This conceptualization indicates a formative nature.

We based our conceptualization of the formative measurement model on two conceptual criteria suggested by Bollen and Bauldry (2011). First, if the set of indicators is indeed causal to the latent variable, then they should be "*essential*" to the latent variable (p. 272). Secondly, a change in any indicators must also result in a change in the latent variable. According to the results of their empirical research, Thornton et al. (2013, p. 1162) conclude that *"these four types of*

1ˢᵗ **Stage: Scale Construction (*3.1*)**

- Measurement model conceptualization (3.1.1)
- Item generation (3.1.2)
- Qualitative pretests (3.1.3)

2ⁿᵈ **Stage: Scale Validation (*3.2*)**

- Second-order measurement model validation (3.2.3)
- First-order measurement purification & validation (3.2.2)
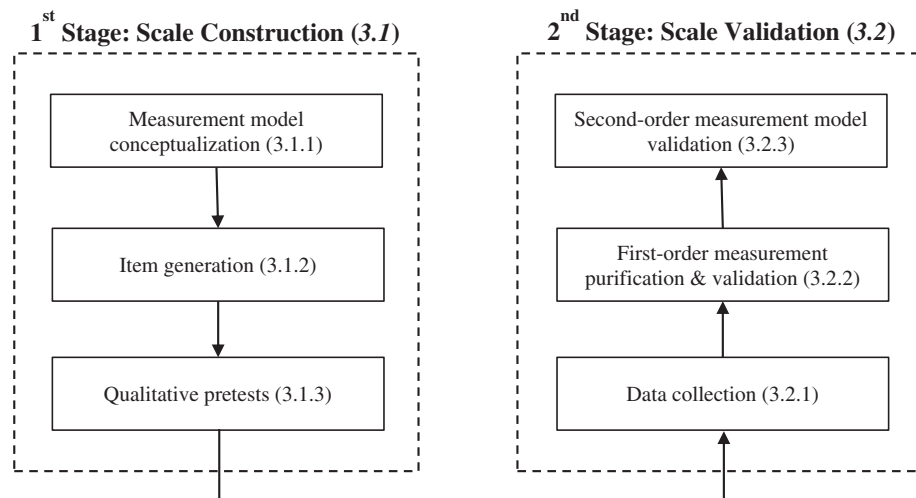- Data collection (3.2.1)

Fig. 1. Two-stage scale development process.

networking behaviors are essential [emphasis in original]" to firms in order to strategize in the network. This implies that organizational networking is *formed* by these four types of behaviors, and that each type contributes independently to the totality and the configuration of a firm's organizational behaviors. From a measurement perspective, each first-order construct has its unique property that is distinct from others and therefore the removal of any component *"is omitting a part of the construct"*, which will substantially change the meaning of the second-order formative construct (Bollen & Lennox, 1991, p. 308). Thus, it is posited that when one component of organizational networking changes, organizational networking itself as the overarching latent construct will change accordingly. For instance, we infer that when a firm changes its interaction patterns in its strong-tie relationships, this is likely to change the way they network overall. On the other hand, each first-order construct is reflected by the manifested networking behaviors as represented by its specific measurement items, which overlap and are interchangeable within their corresponding construct. Within this measurement conceptualization organizational networking can thus be seen as an overarching construct that serves to represent four dimensions, and the higher level of abstraction is "*theoretically meaningful and parsimonious*" (Law, Chi-Sum, & Mobley, 1998, p. 741).

The second key issue is that a formative measurement by nature is sensitive to its outcome variables (Lee & Cadogan, 2013; Wilcox et al., 2008). The path coefficients of the causal indicators and the disturbance term (error term) of the formative measurement respond to different outcome variables used. This implies that using the same formative measurement to predict different outcome variables would to some extent change the nature of the formative construct. This has been argued as being a major hindrance for formative measurement to advance theory building (Blalock, 1982). Bollen and Bauldry (2011) suggest that causal indicators should demonstrate a stable tendency toward their formative latent variable vis-à-vis different outcome variables of that formative latent variable. However, one can only realize this by subjecting the formative measurement model to empirical tests (Diamantopoulos, 2013; Diamantopoulos & Temme, 2013; Petter et al., 2007). This implies that a step-wise approach needs to be taken by initially conceptualizing the structure of the measurement model, and then subjecting it to empirical tests to determine whether the data does fit the specified model, as suggested by Bollen and Bauldry (2011). More importantly, the validity of such a measurement model needs to be examined in future research.

3.1.2. Item generation

For the operationalization of the first-order measurement models with reflective indicators, we follow Churchill's (1979) scale development procedure by first generating several overlapping measurement items that capture the key aspect of each first-order construct to form an exhaustive pool of items. The initial pool was refined before we arrived at a preliminary list of 37 measurement items. We paid particular attention to the clarity of the statements. It is already necessary at this stage to ensure the content validity of these items, which will in turn strengthen the overall construct validity (Peter, 1981).

3.1.3. Qualitative pretests

A three-step qualitative pretest was carried out to ensure that the construct of organizational networking is clearly captured by the measurement items developed. We first checked with two senior academics, whose research domain is in business-to-business marketing, regarding the face validity of the measurement items. They both supported our conceptualization of the four dimensions of organizational networking being distinctive and different from a theoretical perspective. They also suggested some minor changes to ensure the clarity of the suggested items. Secondly, we recruited five executive managers for in-depth interviews. The purpose of these interviews was to corroborate whether our interpretation of the measurement items is in line with organizational networking in practice. We compared all the points

raised by the five managers and focused particularly on those items that were frequently questioned by the managers. We amended the item pool accordingly. Lastly, the amended scales were then tested on a small group of 30 experienced MBA students with business-to-business management experience from a leading business school in the UK. This test was administered in the form of a questionnaire, the purpose of which was to further purify the scales before they were subjected to a large scale survey. After the last step of the qualitative pretest, we arrived at an initial item pool of 37 items (see Appendix B).

3.2. Stage 2: scale validation

In the scale validation stage, we conducted a web-based survey using Qualtrics, an integrated platform for survey design and data collection, and subsequently subjected the collected data to a series of validation tests, in particular to ascertain whether organizational networking is best represented as a formative second-order construct with four reflective first-order constructs. The fact that organizational networking is a higher-order construct means that the measurement assessment needs to be undertaken at two levels after an initial scale purification using exploratory factor analysis (EFA). First, at the first-order construct level construct validity, including internal indicator consistency, convergent validity and discriminant validity of the measurement model of the four first-order dimensions, will be assessed using confirmatory factor analysis (CFA) (Churchill, 1979; Gerbing & Anderson, 1988). In addition, a measurement invariance test is employed, using multi-group CFA to cross-validate the measurement structure for the two sub-groups of manufacturing and service firms (Steenkamp & Baumgartner, 1998).

Secondly, at the second-order construct level, the proposed relationships between the first-order constructs and the second-order construct need to be assessed in terms of their *"significance and strength"* (Mackenzie et al., 2005, p. 727). We follow the procedure of evaluating a formative measurement model provided by Diamantopoulos and Winklhofer (2001) and Mackenzie et al. (2005). The evaluation requires the usage of a multiple indicators and multiple causes (MIMIC) model in order to identify the model due to the fact that a formative measurement model is naturally not identified (Diamantopoulos & Winklhofer, 2001). Fig. 2 depicts the MIMIC measurement model that is subjected to a validity test. This approach requires the construct, which includes four formative components, to be measured additionally by at least two reflective indicators that serve as the effects of the construct (ON1–3 in Fig. 2).

3.2.1. Data collection

Not only the measurement items for the four dimensions of organizational networking were included in the questionnaire, but also other relevant existing scales (see Appendix C for the full list of items), which will be used to assess the nomological validity of the final measurement model of organizational networking. A seven-point Likert scale (labeled at the two endpoints, 1 = 'completely disagree' and 7 = 'completely agree') was used for all the items of the substantive constructs. We utilized a sampling frame of 3500 managers from a proprietary international database.

An invitation was initially sent to all potential respondents in November 2012, followed by three reminders at one-week intervals. At the end of the survey period 1249 responses were recorded, including partially completed responses. After deleting 460 unfinished responses, the survey resulted in 789 completed responses, which yields a response rate of 23%. However, to ensure the quality of the dataset, we further eliminated responses completed in less than 15 min, which gives 603 valid responses for the subsequent analyses. The threshold of 15 min was decided as the cut-off point of a 'valid' response based on a pretest which showed that faster results indicated 'pattern responses' (Fricker, Galesic, Tourangeau, & Ting, 2005).
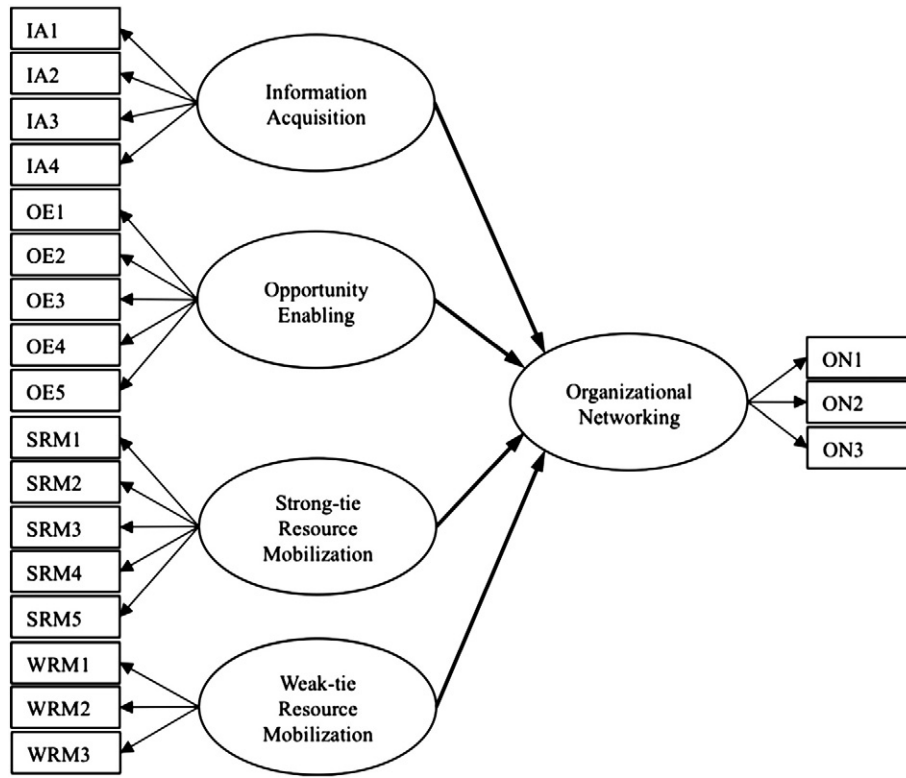
Fig. 2. The MIMIC measurement model.

Table 2 summarizes the profile of the respondents and their organizations. A total of 45.1% of 603 respondents come from service industries, while 30.7% work in the manufacturing sector (public sector: 3.8%, and others: 20.4%). In terms of their organization size, the three largest groups by the number of employees are ≥5001 (32.7%), 51–250 (15.4%) and 751–2500 (14.9%). With regard to respondent characteristics, the majority of the respondents are at a position of either middle to high management (67.1%) or top-level director (15.3%) in their organizations. In addition, 40.2% of the respondents have 6–10 years of managerial experience, followed by 3–5 years (31.6%) and 11–15 years(12.3%).

3.2.1.1. Assessing non-response bias. The literature suggests three methods for estimating nonresponse bias, namely a comparison with known values for the population, subjective estimates and extrapolation methods (e.g. comparing early and late responses) (Armstrong & Overton, 1977). We chose to use two methods, (1) comparing early and late responses and (2) comparing survey results with known values for the population, to help assess the possible nonresponse bias in our data.

First, as we had four waves of responses (based on the initial invitation letter, and the three reminders) we compared the responses collected before the first reminder letter with the responses after the third reminder letter was sent. The former group represents the early respondents, and the latter group represents late respondents (and are assumed to approximate those who did not respond at all, i.e. non-respondents). We assess non-response bias for all the measurement items of networking behaviors, and the respondent characteristic variables. Chi-square tests were performed for assessing whether these two groups of respondents gave significantly different responses. The results show that there is no significant difference in the respondent characteristics, as well as in most of their responses for the organizational networking items. We further examined the four variables (one item in Dimension 1 and three items in Dimension 2), which show

Table 2
Profile of the respondents.

Firm profile	Frequency	Percentage (%)	Respondent profile	Frequency	Percentage (%)
Industry			*Job position*		
Services	272	45.1	CEO	7	1.2
Manufacturing	185	30.7	Owner or joint-owner	15	2.5
Public sector	23	3.8	Managing director	19	3.2
Others	123	20.4	Other top-level director	92	15.3
Number of employees			Middle/high level manager	404	67.1
1–10	20	3.3	Others	65	10.8
11–25	23	3.8	Years of managerial experiences		
26–50	45	7.5	0–2	62	10.3
51–250	93	15.4	3–5	190	31.6
251–750	79	13.1	6–10	242	40.2
751–2500	90	14.9	11–15	74	12.3
2501–5000	56	9.3	16–20	18	3.0
5001 and above	197	32.7	21 and above	16	2.7

significant differences between early and late responses. Across all four items the responses from the early respondents have a significantly higher mean than those from the late respondents. However, these four items are similar to other items in their corresponding dimensions and the assessment of the respondent characteristics and the responses in the majority of the variables in these two groups indicate no significant differences. We conclude that the differences that exist in these four variables are not a result of differences in early and late respondents.

Secondly, we compared via Chi-square tests of known values such as industry sectors for the population with our survey sample. Nonsignificant Pearson's Chi-squares suggest that the survey respondents are not dissimilar from the overall population. The results of these two tests allow us to conclude that nonresponse bias is not a concern for our data.

3.2.2. First-order measurement purification and validation

3.2.2.1. Two-step purification. In order to purify the measurement items, an EFA was performed using principal components as an extraction method with varimax rotation, using SPSS 19.0. A seven-factor model initially fits the data with sums of squared loading at 62.11%, which displays an adequate level of explanatory power. The item pool originally contained 37 items, which were reduced to 28 items after eliminating items that are cross-loading (cut-off point of 0.32) and that have low factor loadings (lower than 0.5) on their factors. Note that this process is not completely data driven. We checked the item descriptions for further consideration to assess the importance of those items for their corresponding latent construct (Clark & Watson, 1995; Hinkin, 1995). We thus took the integrity of the conceptualization and operational definition of the constructs into account during the item elimination process. After an iterative process a six-factor solution resulted: 21 out of 28 items loaded on their corresponding dimensions, which corroborate the four-dimension measurement, while the other 7 items appear to form two distinctively separate factors.

A close examination of these two factors was needed in order to determine whether the adopted conceptualization of organizational networking has comprehensively captured all the key aspects. Five out of those seven items related to organizations attending trade events, including taking part in trade shows, seminars and meetings. We investigated the possible reasons for them to load on a separate factor rather than their supposed corresponding factor. Out of these five items two (items 31 and 32, Dimension 1, see Appendix B) are behaviors regarding gathering information, while the other three items (11, 13 and 14, Dimension 2, see Appendix B) are about opportunity sensing. These two purposes in some way overlap in this context, as sensing opportunities can be interpreted as gathering information regarding business opportunities at a trade event.

The channels through which firms can sense and seize opportunities in their networks are not defined in the definition of organizational networking. However, firms in general utilize an array of behaviors to network for various purposes through two main channels, i.e. established relationships and non-established indirect relationships. Trade events can be defined as a stage for firms to interact as part of such relationships. We can further infer that the reason why the five items depart from their originated constructs is that trade events are *an occasion* for interactions to take place rather than interactions within and across different types of relationships, the latter of which is the core of organizational networking. When considering the integrity and parsimony of the overarching organizational networking construct, we decided to eliminate these five items. Furthermore, by eliminating all items related to trade events, the resulting scale is more universally useful to various industries (i.e. also those where trade shows are less common, as in the service sector), and at the same time it still captures the importance of sensing the market by interacting with business partners and business

contacts, both of which in some way include those firms they would meet during trade events.

In addition, items 21 and 22 in Dimension 2 (see Appendix B), i.e. interactions with regulatory bodies, are important for several firms, particularly in the industries where offerings have to comply with regulations set by governing bodies, or if customers are in the public sector. Furthermore, being able to lobby seems to require certain resources or being in a strategic position where a firm can interact with such regulatory bodies. Thornton et al. (2013) note in their study that only relatively large companies (in specific industries) find themselves benefiting from lobbying in order to change or create demand in their favor, whereas smaller companies do not lobby in a way, which would generate comparable benefits that would warrant such resource investments. The survey data seems to confirm this point as the relevant items are separated from the factor they originated from. We examined the correlation between company size and these two items (21 and 22, Dimension 2, see Appendix B), and it shows that both of them correlate significantly with company size ($r = 0.178^{**}$ and 0.195^{**}, $p < 0.05$ respectively), while most of the items in the original factor display no such correlation. This partly explains why the factor does not fit the data as expected. Based on our observations in the qualitative data from Thornton et al. (2013) and evidence from our quantitative survey, we thus decided to eliminate these two items from the scale in order to preserve the integrity of the conceptualization and the generalizability of the scale.

After the elimination process, we arrived at a four-factor solution with 21 items. As far as the adequacy of the sample size for assessing this measurement model is concerned, the KMO (Kaiser–Meyer–Olkin) measure of sample adequacy of 0.92 indicates that the number of responses ($n = 603$) is sufficient for the purpose of model assessment. The final measurement model explains 60.58% of the variance of the underlying construct, which shows a good level of explanatory power. Each factor under the overarching construct also displays fair to good levels of reliability. Information acquisition, opportunity enabling, and strong-tie resource mobilization have Cronbach's α of 0.86, 0.89 and 0.84 respectively, while weak-tie resource mobilization has a slightly lower reliability with Cronbach's α at 0.74, which is still above the cut-off point of 0.70 (Nunnally, 1978). Next, the final solution resulted from the EFA is subjected to a CFA, using Lisrel 8.8. Initially, the measurement model achieves an acceptable model fit (RMSEA = 0.05, SRMR = 0.054, NFI = 0.97, CFI =0.98, IFI = 0.98, GFI = 0.91, AGFI = 0.88).

However, the slightly low AGFI (0.88) and high χ^2 (458.29, $df = 183$, $p < 0.001$) indicate the possibility of further improvement. We eliminated a further four items from the measurement model (EFA solution): Dimension 1 (item 11), Dimension 3 (item 12) and Dimension 4 (items 12 and 22) (Appendix B) based on the cross examination of factor loadings and model diagnostics, i.e. path estimates, modification indices and standardized residuals (Hair, Black, Babin, & Anderson, 2008). Note that the elimination of these items does not affect the integrity of the factors as we only eliminated items, which were covered to a large extent by other (overlapping) items as well. The elimination of these items improved all model fit indices. Although χ^2 is still significant ($p < 0.001$), it has been substantially improved ($\Delta\chi^2 = 242.62$, $\Delta df = 70$, $p < 0.001$). Hair et al. (2008) suggest that when the sample size is more than 250 ($n = 603$ in the CFA analysis) and the observed variables are between 12 and 30 (the resulting number of indicators is 17), a significant χ^2 can be expected and still indicates a good model fit. We therefore conclude that the fit of the measurement model is deemed to be satisfactory, given the excellent fit indices after the second purification process (RMSEA = 0.039, SRMR = 0.046, NFI = 0.98, CFI = 0.99, IFI = 0.99, GFI = 0.94, AGFI = 0.92).

3.2.2.2. Convergent and discriminant validity. Convergent validity is concerned with whether or not a set of items share a high proportion of common variance. Hair et al. (2008) suggest the following criteria for

satisfying acceptable convergent validity: (1) factor loadings should be above 0.5, (2) average variance extracted (AVE) should reach 0.5 as a minimum, and (3) composite reliability (CR) should be above 0.6–0.7. All the items have factor loadings above 0.6 (0.63–0.90) with the exception of one item at 0.57, which is still above the cut-off point of 0.5. All four factors have an AVE value that is above 0.5, and they all show very good levels of internal consistency, as their CR are between 0.76 and 0.89 (see Table 3). Based on the above evaluation, we conclude that the measurement model has satisfied the criteria of convergent validity.

Secondly, discriminant validity is the extent to which a construct distinctly differentiates from others. In this context, we assess whether the four factors are different from one another by testing whether the square root of the AVE for any given two factors is greater than the correlation between these two factors (Fornell & Larcker, 1981). According to Table 3 this is the case, leading us to conclude that these four factors, derived from theory, have distinctive properties that capture different aspects of organizational networking.

3.2.2.3. Measurement invariance test. The conceptualization of organizational networking we employ was originally developed based on interview data gathered from UK manufacturing firms (Thornton et al., 2013). Our operationalization, on the other hand, is aimed also at service firms. Although these two sectors are different in terms of the offerings they produce, they are often mixed in a business network, and they both interact with direct counterparts as well as indirect ones (Batt & Purchase, 2004; Gummesson, 1987). We do not expect the way in which service firms network to be substantially different from that of manufacturing firms. However, from a measurement validation perspective there is still a need to understand the extent to which this scale is applicable to the service sector. We thus undertake two invariance tests with nested competing multi-group (services vs. manufacturing) models in order to assess the applicability of the scale across manufacturing and service firms. A full matrix invariance test is executed to answer the question as to whether the managers from manufacturing and service firms interpret and use the scales in a same way (Hair, Black, Babin, Anderson, & Tatham, 2007). Finally, a scalar invariance test provides the answer to the question of whether or not these four dimensions of networking have the same meaning to manufacturing and service firms (Hair et al., 2007).

Table 4 summarizes the results of the full matrix invariance test and scalar invariance test. The baseline model specifies the hypothesized structure of the measurement model that has been confirmed in Section 4.1 and allows all parameters to be freely assessed in both groups. It is meant to confirm that the measurement model contains the same number of latent constructs and the observed variables associated to them across two groups. It displays a good level of model fit based on the suggested fit indices for assessing competing models, such as RMSEA (0.041), PNSI (0.80) and CFI (0.99) (Hair et al., 2007). Next, two competing models are created with the constraints of (1) factor loadings and (2) factor loading and inter-factor covariance being set to equivalence across the two groups. These two models represent different levels of constraint with (1) being the more constrained than the baseline model, and (2) being more constrained than (1). Each model was compared against the baseline model (without constraint)

to see whether the increase of degree of freedom (Δdf) would substantially worsen the model fit ($\Delta \chi^2$) (Byrne, 1998). Based on the results of the metric invariance test in Table 4, the scale demonstrates equal measures in factor loadings ($\Delta \chi^2 = 12.43$, $\Delta df = 13$, p = 0.49) and inter-construct relationships ($\Delta \chi^2 = 24.52$, $\Delta df = 19$, p = 0.18) across service and manufacturing sectors.

The scalar invariance test indicates the invariance of the observed variable intercepts (means) on their associated latent constructs ($\Delta \chi2 = 24.40$, $\Delta df = 26$, p = 0.55), which allows for a meaningful comparison for the construct means of the four factors across the two groups. The result suggests that manufacturing firms and service firms network similarly based on the four dimensions. The Kappa parameters were estimated for the service group (i.e. latent construct mean differences compared to manufacturing group), which are −0.14 (t = −1.62, p = 0.11), −0.04 (t = −0.34, p = 0.71), −0.19 (t = −1.88, p = 0.06) and −0.18 (t = −1.79, p = 0.08) for information acquisition, opportunity enabling, strong-tie resource mobilization and weak-tie resource mobilization respectively. Although service firms show lower means in all four dimensions, none of the differences are statistically significant.

3.2.3. Second-order MIMIC measurement model validation

An essential assessment for any formative measurement model relates to establishing whether multicollinearity is present among the formative components. High levels of multicollinearity will make it difficult to assess the unique contribution from each component (Diamantopoulos & Winklhofer, 2001). The variance inflation factors (VIF) among the four components range from 1.334 to 1.657, which is well below the suggested threshold of 10 (e.g. Hair et al., 2008), and within the more stringent cut-off point of 3 (Petter et al., 2007). Multicollinearity therefore does not pose a problem for the formative measurement model operationalization. Next, we proceed to assess the MIMIC model as depicted in Fig. 2, using structural equation modeling (LISREL 8.8). Given that the reflective measures of the four first-order components are deemed satisfactory, now the focus turns to the assessment of the proposed relationships of these four components as part of organizational networking. Three extra reflective indicators were used to measure organizational networking: the tendency to acquire useful information through relationships, the effectiveness of resource mobilization among relationships, and fast response to competitors' actions. The first two items were developed for this study specifically to capture the construct in question. We were also able to make use of one item (response to competition) from the existing scale of competitor orientation, originally developed by Narver and Slater (1990).

There is an on-going debate regarding how the weights of formative components and the error term of the formative construct should be specified, either allowing them to be freely assessed (Diamantopoulos, 2013; Diamantopoulos & Temme, 2013) or predefined by the researcher (Lee & Cadogan, 2013). In light of the debate we provide two solutions for the MIMIC measurement model in the overall sample, the results of which are presented in Table 5. We performed the alternative measurement model assessments by constraining the weights of the first-order constructs to be equal at 0.25 (1 divided by number of formative components) and the disturbance (error term) of the second-order construct to be 0 (Diamantopoulos & Temme, 2013; Lee & Cadogan, 2013).

Table 3
Statistics for convergent and discriminant validity.

	α	CR	AVE	1	2	3	4	5	6
1. Information Acquisition	0.86	0.88	0.64	**(0.80)**					
2. Opportunity Enabling	0.89	0.89	0.62	0.56	**(0.78)**				
3. Strong-tie-approach Resource Mobilization	0.84	0.83	0.50	0.46	0.65	**(0.70)**			
4. Weak-tie-approach Resource Mobilization	0.74	0.76	0.52	0.45	0.58	0.57	**(0.72)**		
5. Relationship Coordination	0.86	0.86	0.56	0.55	0.68	0.69	0.55	**(0.75)**	
6. Competitor Orientation	0.86	0.86	0.60	0.36	0.54	0.63	0.53	0.67	**(0.78)**

The numbers on the diagonal (bold in parenthesis) are the square root of AVE for each factor.

Table 4
Testing for invariance factorial structure of scores from a measuring instrument.

	Metric invariance			Scalar invariance
	Factor structure equivalence (baseline)	Factor loading equivalence	Factor loading and inter-factor covariance equivalence	Zero-intercept terms equivalence
RMSEA	0.041	0.040	0.041	0.039
PNFI	0.80	0.85	0.87	0.89
CFI	0.99	0.99	0.99	0.99
$\chi 2$	313.52 (P = 0.00010)	325.95 (P = 0.00016)	338.04 (P = 0.00007)	337.92 (P = 0.00024)
df	226	239	245	252
$\Delta\chi^2$		12.43	24.52	24.4
Δdf		13	19	26
Sig.		Non-sig. (p = 0.49)	Non-sig. (p = 0.18)	Non-sig. (p = 0.55)

Type I error rate = 0.05.

As expected the standardized parameters (standard MIMIC model) for the four formative components are all significant. Strong-tie resource mobilization ($\lambda = 0.42$) is the most important component that contributes to the overall organizational networking, followed by information acquisition ($\lambda = 0.29$), opportunity enabling ($\lambda = 0.28$) and lastly, weak-tie resource mobilization ($\lambda = 0.18$). The four components explain 90% of the variance in organizational networking. Overall, the MIMIC model displays a very good fit (RMSEA = 0.041, SRMR = 0.048, NFI = 0.98, CFI = 0.99, IFI = 0.99, GFI = 0.93, AGFI = 0.91).

With regard to the constrained measurement model, the disturbance term at the second-order construct level is set to 0, and the weights of all four first-order constructs are set to be equal at 0.25 as there is no a priori rule that could guide us on predefining the weights

(Diamantopoulos & Temme, 2013). Contrary to the findings of Diamantopoulos and Temme (2013), the fit indices of our constrained MIMIC model show that the constraints did not cause the model fit to deteriorate drastically. Their study also demonstrated that the predefined weights are not the cause for the substantial drop in fitness, but the fixed error terms are. As the four components explained 90% of the variance, the relatively small error term might have been the reason why our model fit does not decrease drastically when the constraint on the error term was imposed.

Lastly, nomological validity is concerned with the extent to which a construct is related to other existing relevant constructs. Organizational networking is assumed to provide important implications to management practice in business-to-business markets, e.g. in terms of how it

Table 5
MIMIC model statistics.

2nd order formative MIMIC model	All (n = 603)	
Organizational Networking		
1st order component with reflective indicators	Standardized parameter (λ)	Standardized parameter with constraints[a] (λ')
Information acquisition (IA)	**0.29*****	**0.26**
IA1	0.65	0.64
IA2	0.81	0.81
IA3	0.89	0.89
IA4	0.82	0.82
Opportunity enabling (OE)	**0.28*****	**0.36**
OE1	0.75	0.73
OE2	0.82	0.82
OE3	0.86	0.85
OE4	0.80	0.80
OE5	0.67	0.67
Strong-tie resource mobilization (SRM)	**0.42*****	**0.34**
SRM1	0.70	0.69
SRM2	0.68	0.69
SRM3	0.82	0.82
SRM4	0.65	0.65
SRM5	0.64	0.64
Weak-tie resource mobilization (WRM)	**0.18****	**0.26**
WRM1	0.56	0.52
WRM2	0.80	0.80
WRM3	0.77	0.77
Reflective indicators		
ON 1	0.51	0.57
ON 2	0.56	0.52
ON 3	0.58	0.57
Fit indices (fit indices with constraints)[a]		
$\chi 2$, df, p	319.73, 160, 0.00	330.51, 165, 0.00
R^2	0.9	1.0
RMSEA	0.041	0.041
SRMR	0.048	0.055
NFI	0.98	0.98
CFI	0.99	0.99
IFI	0.99	0.99
GFI	0.93	0.93
AGFI	0.91	0.91

*p < 0.05, **p < 0.01, ***p < 0.001.
[a] The disturbance term (ζ) is set to 0. The weights of all four formative 1st order constructs are set to be equal at 0.25.

fosters or amplifies other important organizational capabilities. We establish the nomological validity based on two hypotheses. First, organizational networking increases a firm's ability to coordinate among their portfolio of relationships. Through networking a firm understands better how to allocate resources vis-à-vis specific business partners, and therefore, it will be able to better organize and coordinate these relationships based on this understanding (Håkansson et al., 2009; Holmen & Pedersen, 2003). Secondly, organizational networking increases a firm's competitor orientation, because it allows a firm to gauge its competitors' actions more effectively, and respond to them in a timely and appropriate manner (Tsai, 2001). Fig. 3 shows the structural model that we propose to test the relationships between organizational networking and the two dependent constructs. We utilized existing scales for relationship coordination (Walter et al., 2006) and competitor orientation (Narver & Slater, 1990), both of which have Cronbach's α of 0.86. We assess the discriminant validity of the six constructs in the proposed model, shown in Fig. 3 (Fornell & Larcker, 1981). The result shows that the discriminant validity for the given six constructs is satisfactory (see Appendix D).

The results of the structural equation model show that the two structural paths emanating from organizational networking are significant with the standardized coefficient of organizational networking on relationship coordination at 0.89 (p < 0.001) and competitor orientation at 0.75 (p < 0.001). The overall model displays a good fit (RMSEA = 0.038, SRMR = 0.050, NFI = 0.98, CFI = 0.99, IFI = 0.99, GFI = 0.91, AGFI = 0.89). In addition, organizational networking explains 60% and 43% of the variances of relationships coordination and competitor orientation respectively, which shows a considerable explanatory power (see Fig. 3). The results support the nomological validity of organizational networking as a second-order formative construct (for the standardized coefficients of each indicator in the model please see Appendix D).

4. Discussion and implications

Organizational networking as a construct has implications in four areas: theory, conceptualization, measurement and practice. We organize the discussion around these areas.

4.1. Theory building in organizational networking

We utilize three criteria to critically review a small body of literature focusing on the strategic aspects of organizational networking based on their definitions and dimensions, the network characteristics and the empirical base. These three 'qualifiers' provide insights into the state of literature on organizational networking, which is still in need of more empirical research. We concluded that the definitions and the dimensions need to reflect explicitly the strategic intent of a focal firm in order to capture its motives for initiating different ways of networking behaviors, because these are largely driven by anticipated outcomes (even if these subsequently do not materialize). In addition, the definition and the used dimensions of organizational networking also need to reflect the level(s) of network structures, because organizational networking is the way in which firms learn about their surroundings and accordingly, reap the benefit from them or mitigate potential harmful network effects. Without considering all three levels of network embeddedness, i.e. dyadic, organizational and environmental embeddedness as suggested by Hagedoorn et al. (2006), organizational networking as a firm-centered construct cannot be fully understood and conceptualized. Finally, for the purpose of operationalizing the scale for the construct by utilizing dimensions provided by one of these existing empirical studies, we assess their empirical base by examining the construct validity, external validity and reliability in a qualitative sense (Yin, 2009). This is critically important when developing a scale from a conceptualization based on qualitative studies (Churchill, 1979).

4.2. The Conceptualization of organizational networking

Our empirical study corroborated and further advanced the organizational networking typology developed by Thornton et al. (2013). We conceptualize organizational networking as a second-order formative construct that is created from four reflective first-order constructs, information acquisition, opportunity enabling, strong-tie resource mobilization and weak-tie resource mobilization. The quantitative results suggest that these four dimensions, driven by firms' anticipated
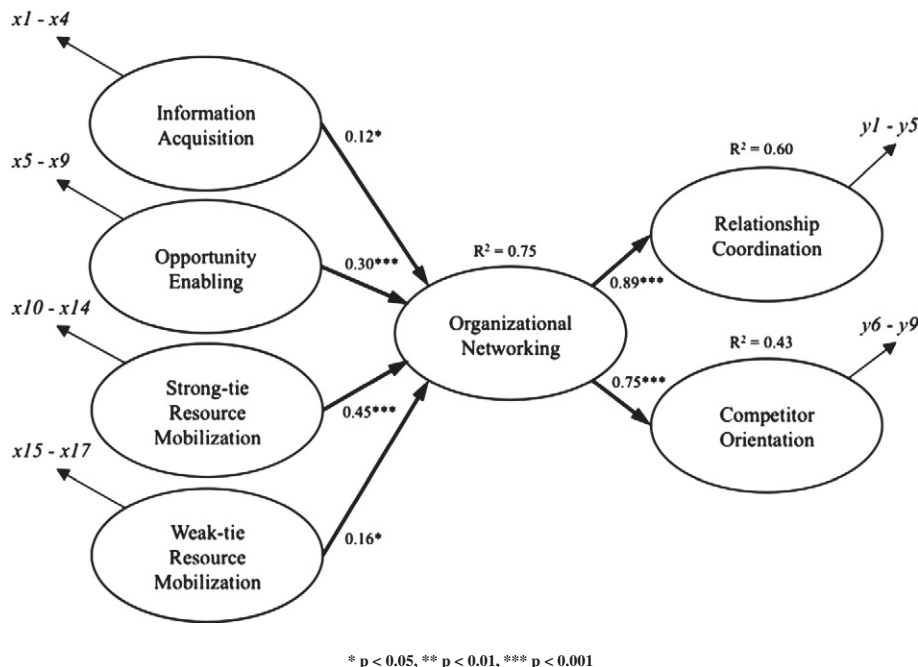

* p < 0.05, ** p < 0.01, *** p < 0.001

Fig. 3. Structural model for nomological validity assessment.

outcomes, are a valid way of conceptualizing organizational networking. Individually, they are distinct from each other (based on their discriminant validity), and together, they cover almost the entire breadth of organizational networking ($R^2 = 90\%$). Although each of them makes a significant contribution to explain organizational networking, strong-tie resource mobilization is the most important component of all. Strong-tie relationships can be utilized relatively effectively compared to weak-tie relationships for information sharing and resource mobilization, due to the fact that trust serves as catalyst to facilitate problem solving and cooperation between firms (Uzzi, 1996). However, without other components, organizational networking as a whole is not complete from a conceptual perspective (Thornton et al., 2013). This echoes our proposition regarding the theoretical considerations outlined above in that organizational networking needs to include actors' actions toward different levels of network embeddedness, which bring about different types of activities firms make use of for different purposes, based on their own idiosyncratic understanding and definition of the network.

4.3. The operationalization and measurement model specification

We implemented a thorough two-stage scale construction and validation process. We posit that the measurement model for organizational networking consists of four first-order reflective constructs, which cause the overarching second-order formative construct. The two-stage validation process was designed to purify the items and validate the measurement model at the first- and second-order levels respectively. At the first-order level the results suggest that the measurement model displays an excellent model fit, and that the four first-order constructs are indeed distinct from each other. The measurement model also withstands an invariance multi-group test at its strictest level, which makes it applicable in both manufacturing and service contexts. At the second-order level, the causal relationships of the four reflective first-order constructs on the second-order construct were examined using a MIMIC model proposed by Diamantopoulos and Winklhofer (2001). The MIMIC model, which we specified for organizational networking shows a very good model fit, and it also exhibits adequate nomological validity. The results show that organizational networking positively affects competitor orientation and relationship coordination and explains much of their variances ($R^2 = 43\%$ and 60%).

In light of the on-going debate regarding the validity of formative measurement models and whether or not the weights of the causal relationships should be predefined, we also provided an alternative solution to reflect this discussion (i.e. constrained weights and error term at the second-order construct level). The results are not comparable to those of Diamantopoulos and Temme (2013). However, our position on the matter of whether or not to pre-define weights for formative components is in agreement with Diamantopoulos and Temme (2013) and Petter et al. (2007) in that the relationships between first- and second-order constructs and the components of a formative construct need to be subjected to hypothesis tests, rather than purely based on a researcher's discretion. Since organizational networking captures the way in which firms utilize different types of interactions with their counterparts in order to achieve their anticipated goals, it follows that predefining how important a certain type of networking is in relation to the total networking portfolio is not reasonable. More specifically, the 'fixed' approach would compromise a deeper understanding of how firms network in different contexts, such as different industries and varying levels of technological turbulence.

4.4. Managerial implications

Since the measurement assessment confirms that organizational networking is formed by the identified four components of Thornton et al. (2013), firms operating in business-to-business markets need to consider and plan their networking efforts based on these components.

The results show that although the four components of networking are all significant contributors toward the overall organizational networking, strong-tie resource mobilization remains the most important way of networking for firms operating in business-to-business markets. This gives rise to the importance of maintaining strong-tie relationships as a focus within the available resources that can be used to generate synergies for firms. This also implies that the assessment of the investment level aimed at each relationship has to be placed in a wider picture of the relationship portfolio as resource mobilization of this kind often involves pooling resources from various partners (Cui, 2013; Roseira, Brito, & Henneberg, 2010). Although less important, information acquisition, opportunity enabling and weak-tie resource mobilization remain significant in relation to the overall networking portfolio. As networking allows firms to both sense and seize, i.e. utilize their network of direct and indirect relationships, these two aspects of networking should inform each other. This means that information acquisition and opportunity enabling allow firms to learn about their network. Simultaneously, the internalization of this knowledge serves as a foundation, which allows firms to mobilize resources in a way that is difficult for competitors to imitate. Such a rationale hints at the fact that these dimensions have to be seen as a configuration, i.e. a constellation of different aspects of organizational networking, which interact with each other, in line with Gestalt theory (see Dess, Newport, & Rasheed, 1993; Wertheimer, 1938).

5. Limitations and future research directions

Our study has its limitations mainly related to the sample we chose for the scale development. We utilized experienced international mangers from a wide variety of industries to test the new scale. At the first-order construct level, although the resulting scale has a certain level of generalizability due to the sample characteristics, we cannot be fully confident of generalizability unless the test is repeated and applied in different populations. It is equally true to say that we cannot be certain whether the results will hold if the survey is to be applied in a specific industry setting, e.g. high technology industries. Therefore, the resulting scale from this study provides the basis for future research to implement it in various settings to generate further insights and establish stronger evidence of generalizability. At the second-order construct level, the issue regarding the sensitivity of formative measurement models to different outcome variables potentially offers a promising research avenue for theory building in organizational networking. We used outcome variables that are closely related to the concept of market orientation and relationship coordination in this study. Future research can follow this line of research to replicate the model and thereby allow for a comparison of the stability of the formative measurement model. Furthermore, it is interesting in itself to see how the dimensions of organizational networking vary in different settings, and what kind of different configurations may help firms achieve certain outcomes in certain contexts. For instance, is there a best mix of these four components that would facilitate firms' innovation efforts in high technological turbulence environments? Are there different configurations, which all provide superior outcomes, e.g. does equifinality exist?

Another future research direction relates to the role that organizational networking plays in relation to other organizational behavioral constructs and different performance constructs, such as relationship outcomes, firm performance and innovation success. From the results of the nomological validity assessment, we can infer that organizational networking has a positive impact on firms' competitor orientation and relationship coordination, but there is still a need for a deeper understanding of how organizational networking impacts upon the development of other organizational capabilities, e.g. relational capabilities, and whether organizational networking has a positive indirect impact on firm performance mediated by other organizational capabilities.

Appendix A. Dimensions of networking behavior and their sub-types

Dimensions of Networking Behavior	Observed behaviors	Descriptions
Networking Behavior Type I **Information Acquisition** The activities/routines/practices that firms employ to acquire necessary/desired information for helping make informed decisions.	1. Acquiring via business partners (trading relationships) 2. Acquiring via business contacts (non-trading relationships) 3. Acquiring via trade events	Firms utilize their business partners, such as important customers and suppliers, as the source of information. Firms utilize their business contacts, such as organizations operating in different industries, as the source of information. Firms utilize trade events, such as trade shows, trade-specific meetings and seminars, and trade organizations as the source of information.
Networking Behavior Type II **Opportunity Enabling** The activities/routines/practices that firms employ to sense the opportunities and build their reputation by consciously interacting with relevant parties in their business sphere.	1. Sensing through networking events 2. Sensing/influencing through lobbying 3. Signaling self-perceived network identity	Firms attempt to interact with various counterparts in order to sense the opportunities. Firms attempt to influence the legislations in their favor by interacting with relevant governmental bodies and trade organizations. Firms attempt to build their reputation as an attractive partner by consciously working with well-regarded partners and by signaling their ability that matches their intended partners' needs.
Networking Behavior Type III **Strong-tie Resource Mobilization** The activities/routines/practices that firms employ to mobilize resources that are linked to their direct/established relationships.	1. Mobilizing through adjusting resources 2. Mobilizing through transferring resources 3. Mobilizing through pooling resources	Firms adjust the level of relational investments based on the assessment of their overall relationship portfolio and the future benefit of maintaining the level of investment. Firms transfer resources across different relationships by using the synergies that they have built over a period of time with their important partners. Firms pool resources among two or more relationships in order to solve an identified issue or improve a process/offering.
Networking Behavior Type IV **Weak-tie Resource Mobilization** The activities/routines/practices that firms employ to mobilize resources that are linked to their indirect/less established/new relationships.	1. Mobilizing through bridging weak-tie relationships 2. Mobilizing through bypassing-flanking 3. Mobilizing through bypassing-avoidance	Firms utilize a weak-tie relationship, such as a newly formed relationship with a partner in a new market, to get access to its local knowledge and its established web of relationships. Firms utilize a weak-tie relationship, such as an influential party to their targeted customers, to gain insight into customer preference and to influence demands. Firms identify and interact with potential partners through bypassing important network members, such as competitors.

Source: Thornton et al. (2013).

Appendix B. Scale purification

Initial item pool	Items dropped	Items kept
Dimension 1: Information acquisition (8)		
11 We ask our business partners when we need information regarding any of the following: new business opportunities, competition or technology developments in the market.	2	
12 Our business partners share sensitive information (in line with anti-competition law) with us.	1a	
13 Information provided by our business partners is helpful for us to make an informed decision.		IA1
21 By speaking to our business contacts, we are able to obtain the information that is crucial to us.		IA2
22 We recognize that information from our business contacts is useful for us.		IA3
23 Information from our business contacts who work in a similar market can be useful for us.		IA4
31 We attend important trade events for gathering information.	1b	
32 We attend important meetings and seminars held by industry-specific organizations for gathering information.	1b	
Dimension 2: Opportunity enabling (11)		
11 We proactively take part in various trade events.	1b	
12 We proactively interact with trade associations, trade committees or regulatory bodies.	1a	
13 We encourage our employees to 'go out there' to trade events to seek out new opportunities.	1b	
14 We ask our business partners to refer/guide us to the right person(s)/organization(s) that can help our business grow.	1b	
21 We lobby to influence/shape the relevant legislations in our favor by interacting with regulatory bodies (e.g. politicians, parliament and local councils).	1b	
22 By actively being involved in the industry-specific trade organizations (e.g. committees and associations), we can put our weight on shaping the development of our industry.	1b	
31 We make every effort to go out and network in order to increase our reputation in the market.		OE2
32 We recognize that the value of working well with our business partners adds to the reputation of our products or services.		OE3
33 We invest in building up our reputation in the market by networking with our business partners.		OE4
34 We work toward becoming an effective business partner for other companies in the market (e.g. potential customers or suppliers).		OE5
35 We recognize the benefit of word-of-mouth among our business partners.		OE6
Dimension 3: Strong-tie resource mobilization (10)		
11 Our investments in strategic relationships are linked to the relationships' long-term value.	1a	
12 We assess our overall supply chain (i.e. the suppliers of our suppliers) in order to ensure our offering is suitable	2	
21 The experiences we have had with certain strategic business partners are useful in other relationships.	1a	
22 Being able to pool resources (e.g. know-how, information, people and assets) among different customers and utilize them is crucial for our success.	1a	
23 We plan our business strategies based on the assessment of the strategic importance of the customers.	1a	
31 Matching our suppliers' capacity to the demands of our customers has been an important practice in our organization.		SRM1
32 Our suppliers' ability is critical for us to satisfy our customers.		SRM2
33 Having good relationships with both suppliers and customers has enabled us to adapt to changes in the market place.		SRM3

Appendix B (*continued*)

Initial item pool	Items dropped	Items kept
34 When necessary, we coordinate between our business partners in order to resolve a particular issue/problem or improve the performance of a process.		SRM4
35 Our customer-focused approach is communicated to suppliers, so that they are aware of how we serve our customers and can contribute to the success of delivering the offerings.		SRM5
Dimension 4: Weak-tie resource mobilization (8)		
11 We continuously look to work with new business partners who could bring about new opportunities.	1a	
12 We often use agents/local representatives to penetrate a new market by utilizing their network of relationships.	2	
13 We initiate relationships with new business partners to gain local knowledge in a new market.	1a	
21 Understanding our customers' environment enables us to improve our offerings.	1a	
22 We interact with the customers of our customers.	2	
23 We need to work closely with influential parties who have relationships with our direct customers to stimulate demand.		WRM1
31 We approach our competitors' customers when we think the time is appropriate.		WRM2
32 Identifying our competitors' major customers helps us to getting to know the needs and requirements of potential customers.		WRM3

Items dropped: 1a = in the initial round of the first-step purification; 1b = in the second round of the first-step purification; 2 = in the second-step purification.

Appendix C. Scales used for the second-order MIMIC measurement model validation

Information acquisition (developed as part of this study)
IA1.   Information provided by our business partners is helpful for us to make an informed decision.
IA2.   By speaking to our business contacts, we are able to obtain the information that is crucial to us.
IA3.   We recognize that information from our business contacts is useful for us.
IA4.   Information from our business contacts who work in a similar market can be useful for us.

Opportunity enabling (developed as part of this study)
OE1.   We make every effort to go out and network in order to increase our reputation in the market.
OE2.   We recognize that the value of working well with our business partners adds to the reputation of our products or services.
OE3.   We invest in building up our reputation in the market by networking with our business partners.
OE4.   We work toward becoming an effective business partner for other companies in the market (e.g. potential customers or suppliers).
OE5.   We recognize the benefit of word-of-mouth among our business partners.

Strong-tie resource mobilization (developed as part of this study)
SRM1.   Matching our suppliers' capacity to the demands of our customers has been an important practice in our organization.
SRM2.   Our suppliers' ability is critical for us to satisfy our customers.
SRM3.   Having good relationships with both suppliers and customers has enabled us to adapt to changes in the market place.
SRM4.   When necessary, we coordinate between our business partners in order to resolve a particular issue/problem or improve the performance of a process.
SRM5.   Our customer-focused approach is communicated to suppliers, so that they are aware of how we serve our customers and can contribute to the success of delivering the offerings.

Weak-tie resource mobilization (developed as part of this study)
WRM1.   We need to work closely with influential parties who have relationships with our direct customers to stimulate demand.
WRM2.   We approach our competitors' customers when we think the time is appropriate.
WRM3.   Identifying our competitors' major customers helps us to getting to know the needs and requirements of potential customers.

Reflective indicators for organizational networking
ON1.   As a company we constantly seek useful information from various channels, for example, other companies, relevant contacts or from the public domain (developed as part of this study)
ON2.   Our established relationships with important business partners have enabled us to pool and utilize the resources between those relationships (developed as part of this study)
ON3.   We target customers where we have an opportunity for competitive advantage (Narver & Slater, 1990).

Relationship coordination (Walter et al., 2006)
RC1.   We analyze what we would like to achieve with different business partners.
RC2.   We match the use of resources (e.g. know-how, information, people and assets) to the individual relationship.
RC3.   We inform ourselves of our business partners' goals, potentials and strategies.
RC4.   We judge in advance which possible business partners to talk to about building up relationships.
RC5.   We appoint coordinators who are responsible for the relationships with our business partners.

Competitor orientation (Narver & Slater, 1990)
CO1.   We rapidly respond to competitive actions that threaten us.
CO2.   Top management regularly discusses competitors' strategies.
CO3.   We target customers where we have an opportunity for competitive advantage.

Appendix D. Nomological validity of organizational networking

2nd order formative MIMIC model	All (n = 603)			
Organizational networking				
1st order component with reflective indicators	α	CR	AVE	Standardized parameter (λ)
Information acquisition (IA)	**0.86**	**0.87**	**0.64**	**0.12***
IA1				0.65
IA2				0.81
IA3				0.89
IA4				0.82
Opportunity enabling (OE)	**0.89**	**0.89**	**0.61**	**0.30***
OE1				0.75
OE2				0.81
OE3				0.86
OE4				0.80
OE5				0.67
Strong-tie resource mobilization (SRM)	**0.84**	**0.82**	**0.49**	**0.45***
SRM1				0.71
SRM2				0.67
SRM3				0.81
SRM4				0.65
SRM5				0.64
Weak-tie resource mobilization (WRM)	**0.74**	**0.76**	**0.52**	**0.16***
WRM1				0.56
WRM2				0.81
WRM3				0.76
Outcome variables				
Relationship coordination	**0.86**	**0.86**	**0.56**	**0.89***
RC1				0.82
RC2				0.76
RC3				0.78
RC4				0.75
RC5				0.62
Competitor orientation	**0.86**	**0.86**	**0.60**	**0.75***
CO1				0.77
CO2				0.80
CO3				0.81
CO4				0.71

$*p < 0.05, **p < 0.01, ***p < 0.001.$

Acknowledgment

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Sabrina C. Thornton is a Lecturer in Marketing at the University of Huddersfield Business School, UK, and a PhD candidate at Manchester Business School, UK. Her main research interests lie in the area of business relationships and strategic network management.

Stephan C. Henneberg is Chair Professor of Marketing and Strategy at Queen Mary University of London, UK. He is also the Director of the Business Ecosystem Research Centre. His main research interests are in the areas of strategic marketing, business relationships and networks.

Peter Naudé is Professor of Marketing at Manchester Business School, UK. His research interests focus on the application of quantitative methodologies in industrial marketing.