

Contents lists available at [SciVerse ScienceDirect](#)

Research Policy

journal homepage: www.elsevier.com/locate/respol

Personal relationships and innovation diffusion in SME networks: A content analysis approach

Federica Ceci^{a,*}, Daniela Iubatti^b

^a DEA – Università G. d'Annunzio, Viale Pindaro 42, 65127 Pescara (PE), Italy

^b IESE Business School – University of Navarra, Avenida Pearson 21, 08034 Barcelona, Spain

ARTICLE INFO

Article history:

Received 3 November 2010

Received in revised form 3 October 2011

Accepted 9 October 2011

Available online 8 November 2011

Keywords:

Networks

Personal relationships

Innovation diffusion

Content analysis

ABSTRACT

Networks have been hailed as a third organizational form, between markets and hierarchies. One of the main characteristics of networks is the coexistence of different kinds of relationships, personal and professional among these. The presence of multiple types of relationships modifies inter-firm dynamics, creating a space where traditional innovation activities take place in an unusual way. The present paper investigates the role played by personal relationships within networks, addressing the following research questions: how do different types of relationships existing in a network of SMEs favour the development of economic activities? And do personal relationships play a role in supporting innovative activities? To answer our research questions, we analyzed qualitative data using content analysis methodology. Content analysis allows researchers to obtain an objective, systematic, and quantitative description of the manifest content of a communication. Based on this analysis, we conclude that the coexistence of personal and professional relationships shapes a unique context that alters the usual dynamics of innovation diffusion.

© 2011 Elsevier B.V. All rights reserved.

1. Introduction

A network has been defined as a hybrid coordination mechanism of economic activity that combines the advantages of both the traditional governance mechanisms of vertical integration and market exchanges (Brass et al., 2004; Faems et al., 2008; Grandori, 1997; Kogut, 2000; Powell, 1990). Due to its unique positioning between markets and hierarchies, an “a priori” definition of its characteristics is not possible. However, the past few years have witnessed a flourish of empirical studies, aiming to understand how economic activities occur in a networked structure (Brass et al., 2004; Faems et al., 2008; Grandori, 1997; Kogut, 2000; Powell, 1990; Tortoriello and Krackhardt, 2010). More specifically, innovation scholars have devoted their attention to the network dynamics that lead to the generation and diffusion of innovation within networks (Giuliani and Bell, 2007; Granovetter, 1985; Gulati, 1998; Iubatti et al., 2010; Kogut, 2000; Lorenzoni and Lipparini, 1999). Network and innovation literature has shown that firms belonging to networks are more innovative than isolated firms (Ahuja, 2000; Baptista, 2000; Baptista and Swann, 1998; Brass et al., 2004; Podolny and Stuart, 1995; Powell et al., 1996), identifying a series of factors that result in these positive associations: higher flexibility, greater ability to

change, more fluid knowledge flows and the presence of a large variety of relationships among members (Cooke, 2001; Dahl and Pedersen, 2004; Giuliani and Bell, 2005; Inkpen and Tsang, 2005; Padgett and Powell, 2011).

In the present work, we build upon the latter stream of research: different types of relationships coexist within networks and modify inter-firm dynamics, creating a space where traditional innovation activities take place in an unusual way. Multiple relationships lead to the existence of multidimensional links. Seminal contributions have highlighted that the dynamics of economic activities are largely influenced by the multidimensional characteristics of networks (Brass et al., 2004; Faems et al., 2008). Recently, Padgett and Powell (2011) focused their attention on how multidimensional links, in particular personal and professional links, contribute in different ways to the social and economic development of networks. Focusing on the personal aspects of relationships, we already know that economic decisions are largely influenced by the presence of trust between players (Granovetter, 1985; Gulati, 1995; Lawson et al., 2009; Uzzi, 1997). However, we still know very little about the impact that multiple domains have on innovation dynamics.

The present article investigates the role played by personal inter-firm relationships within networks, addressing the following research questions: how do different types of relationships existing in a network of SMEs favour the development of economic activities? Do personal relationships play a role in supporting innovative activities?

* Corresponding author.

E-mail addresses: f.ceci@unich.it (F. Ceci), diubatti@iese.edu (D. Iubatti).

We address these research questions through an empirical analysis of a consortium of SMEs located in Abruzzo (Italy) and composed of 15 SMEs operating in the automotive industry. The consortium is characterized by a large variety of relationships, horizontal as well as vertical, formal and informal, personal and professional. Within this consortium, personal and professional relationships are closely linked. This context represents a unique scenario within which we analyze the role that personal and professional relationships play in promoting the diffusion of innovation. We use content analysis methodology to examine the data in order to ensure the objective, systematic and quantitative description of the communication contents (Berelson, 1952; Krippendorff, 2003). Content analysis is a research method, initially diffused in social studies, that allows measuring the content of communication on the basis of textual analysis (interviews, political speeches, laws, books and newspapers). To reach high levels of objectivity and external validity, the analysis is implemented by following a coding procedure (Duriau et al., 2007; Insch et al., 1997; Morris, 1994; Zaheer and Soda, 2009). Although the use of content analysis in managerial studies is increasing, to our knowledge this is the first study that uses content analysis as a primary method. We use content analysis to analyze interviews and obtain quantitative information from qualitative data. In doing so, we strictly followed the guidelines provided by Krippendorff (2003).

Our results describe how the diffusion of innovation takes place and what the dynamics between activities and personal/professional inter-firm relationships are. The contributions of the present work are threefold: (i) the diffusion of innovation is enabled by personal relationships: the presence of trust, shared values and mutual objectives facilitates the commencement of a difficult and risky path, such as that characterizing the adoption of innovation; (ii) strategic and innovative activities take place in different networks of relationships: the *locus* of innovation is not the *locus* of strategy; (iii) innovative activities are widely diffused within networks, exploiting a large variety of relationships and involving multiple network dimensions. On a final note, we believe that this paper also makes a significant contribution in the field of managerial research, adopting a novel methodological approach in the analysis of text interviews. The remainder of the article is organized as follows. In Section 2, we review contributions investigating the role of network features and personal/professional relationships in the diffusion of innovation, Section 2.1 explores the characteristics of networks and Section 2.2 highlights the distinctive features of personal relationships in networks. Section 3 develops the analytical model that guides the analysis of the empirical evidences, Section 4 describes the empirical context in which the research is grounded, and Section 5 explains the methodology used in this study. The last two sections discuss our results, draw conclusions and describe the implications of the present research for practitioners and scholars.

2. Literature review and model development

2.1. Networks and the diffusion of innovation

Since the beginning of the 1990s, organizational scholars have enriched the traditional dichotomy between vertical integration and market exchanges by identifying the existence of networks as a third organizational form. Networks, defined by Powell and Smith-Doerr (1994) as “a set of nodes linked by a set of relations, such as friendship, kinship, political, etc.” (Powell and Smith-Doerr, 1994: p. 3), are seen as enabling the combining of the advantages of the two long-established traditional governance mechanisms (Brass et al., 2004; Coase, 1937; Powell, 1990; Williamson, 1975, 1979).

One of the first conceptualization of networks is ascribed to Marshall (1890) who identified industrial districts as an example of networks of firms that collaborate to produce the same output and operate in a restricted area (Becattini, 1986, 1990; Marshall, 1890). Asheim (2000) emphasized that the distinctiveness of industrial district is the combination of functional and territorial integration. Industrial districts reflect the socio-cultural and economic influence of the contexts in which they develop (Lundvall, 1992). Furthermore, such dimensions follow territorial dynamics that lead to the generation of a complex and geographically bounded systems of complementary specialized organizations (Amin and Thrift, 1994; Asheim, 2000; Storper, 1997). In such systems, innovation cannot be seen as a linear process but it must be analyzed as a social, non-linear and interactive process (Lundvall, 1992), in which territorial and socio-cultural variables play significant roles in shaping innovative outputs over time (Asheim, 2000; Whittington et al., 2009). Contributions in the field of industrial districts are crucial to understand the specificities of innovation dynamics taking place in a context of small and medium firms (SMEs) (Becattini, 1986, 1990; Marshall, 1890; Storper, 1997). Firms organized as an industrial district benefit from what Marshall (1890) called “industrial atmosphere”, which is constituted by a set of distinctive resources and relationships (personal as well as professional) between members of industrial districts, facilitating the acquisition of tacit knowledge and other types of informal skills (Asheim, 2000; Bellandi, 1989). The “industrial atmosphere” is thus a particular environment that enables the generation of innovation. In such contexts, innovation is facilitated by non-market and non-economic factors, such as trust, social capital (Putnam, 1993) and by the existence of effective information networks (Asheim, 2000; Garofoli, 1991). This allows a broader and faster circulation of information about markets, alternative production techniques, new raw materials, and components. Moreover, territorial closeness facilitates the inter-organizational transfer of tacit knowledge about labour process and production techniques. The interaction of those elements facilitates the diffusion of innovations in the whole district (Asheim, 2000; Becattini, 1990, 1991).

Other studies pointed out that SMEs collaborate in order to have some control over the external environment, leveraging on frequent and facilitated knowledge exchanges (Storper and Walker, 1989). In particular contexts, the creation of a network of SMEs is promoted by a large firm that identifies in a potential network, such as a network of sub-contractors or suppliers, a way to compete in changing global markets (Smith-Ring and Van De Ven, 1992). Scholars have largely devoted their attention to increasing their understanding of network dynamics, studying factors that enable the creation of networks, their inner characteristics, and the distinctive features that determine their unique ways of knowledge sharing and transfer (Deroian, 2002; Granovetter, 1985; Gulati, 1998; Knoke, 1990; Kogut, 2000; Smith-Doerr and Powell, 2004).

Numerous contributions, also from the sociology field, attest that firms belonging to networks are more innovative than isolated firms (Ahuja, 2000; Baptista, 2000; Baptista and Swann, 1998; Brass et al., 2004; Podolny and Stuart, 1995; Powell et al., 1996). Scholars have identified a series of factors that result in such a positive association. More specifically, given the flexibility provided by the smaller organizational units within the network itself, networks are able to rapidly evolve and adapt to changing environments, adopting the most appropriate structure (Cooke, 2001; Cooke and Wills, 1999; Dosi, 1988). Moreover, smaller units constituting a network relate to one another and enable the spread of knowledge. Within networks, flows of knowledge are facilitated and, therefore, the likelihood of adoption and diffusion of innovation increases (Dahl and Pedersen, 2004; Sorenson et al., 2006). This is due to the presence of a set of relationships established by professionals, called “business networks”, that enable localized learning and

knowledge sharing among firms (Giuliani and Bell, 2007; Keeble and Wilkinson, 1999). The learning processes of firms are expedited if firms are exposed to external sources of knowledge that enhance knowledge exchanges (Burt, 1992; Inkpen and Tsang, 2005; Knoke, 1990).

Finally, a significant body of literature has explored how the structure of networks, the presence of strong and weak ties, structural holes, and the position occupied by a firm in the network, can influence innovative outputs (Burt, 1992; Granovetter, 1983; Inkpen and Tsang, 2005; Krackhardt, 1992; Powell et al., 1996). The strength of a tie is defined as “a combination of the amount of time, the emotional intensity, [...] and the reciprocal services which characterize the tie” (Granovetter, 1973: p. 1361). Therefore, strong ties are associated with a mutual alignment in which knowledge flows in both directions (Hansen, 1999; Marsden and Campbell, 1984) while in weak ties “actors are less likely to be socially involved with one another” (Granovetter, 1983: p. 201). In order to better understand the characteristics of inter-organizational networks, Burt (1992) introduced the key concept of “structural holes”. Structural holes represent bridges between otherwise disconnected networks. They play an essential role in increasing knowledge exchanges and firm innovation effectiveness since their presence enhances diversity and knowledge variation within and between networks (Burt, 1992; Capaldo, 2007).

The structure of the network influences and shapes the types of relationships (strong or weak ties) between firms (Inkpen and Tsang, 2005; Powell et al., 1996). For example, in manufacturing networks, we can observe the presence of (i) strong ties within a small core and (ii) weak ties in the periphery of the same network (Burt, 1982; Gomes-Casseres, 2006; Tortoriello and Krackhardt, 2010). Often, a bigger organization represents the core of a network of smaller firms located in the periphery (Capaldo, 2007; Krackhardt, 1992). In such a context, in the relationships between core and periphery (vertical networks) the actors tend to develop strong ties, whereas in horizontal and competitive networks (within the periphery), firms rely on structural holes in order to exchange knowledge and increase their innovation performances (Capaldo, 2007; Park, 1996).

The contributions discussed above explored the types of networks and their characteristics in terms of network structure, knowledge flows and innovations within them. Literature suggests that different types of relationships are generated according to the characteristics of the network (Capaldo, 2007; Inkpen and Tsang, 2005; Park, 1996; Powell et al., 1996), which in turn have an important role in influencing innovation adoption and diffusion (Ahuja, 2000; Arora and Gambardella, 1990; Capaldo, 2007). Hence, the characteristics of relationships in networks, as discussed below, are essential in the deployment of economic activities.

2.2. Personal relationships in networks

Networks are composed of multidimensional links (Brass et al., 2004; Faems et al., 2008; Padgett and Powell, 2011). Padgett and Powell (2011) emphasize that those multidimensional links contribute not only to the social and economic development of networks, but also to knowledge sharing, to the development of new relationships among actors and to the generation of new sub-networks. In particular, social and personal relationships increase information flows within networks: when personal relationships exist, actors tend to enhance knowledge sharing because of the existence of trust. Lorenzen (2001) defines trust as “a cognitive coordination mechanism” (Lorenzen, 2001: p. 16), distinguishing between (i) dyadic and networked trust, characterized by mutual interest in exclusive networks of firms, and (ii) social trust, which is developed through local information spreading and social learning processes in industrial clusters. The former is particularly

important in small networks of firms, while the latter, enabling goal alignment, represents an effective coordination mechanism and prevents opportunistic behaviours (Lorenzen, 2001). In particular, social trust relies mainly on personal relationships (Granovetter, 1985; Lorenzen, 2001). Personal relationships, enabling partners to trust each other's behaviours, foster knowledge exchanges that are essential for the development of networks (Gulati, 1998; Mellewig et al., 2007). Clearly, professional relationships are based on trust and are driven by the firm's professional reputation in its business activities, while personal relationships trigger the coupling of trust with the sharing of common values (Lorenzen, 2001). Hence, personal and professional relationships are supported by different types of trust, namely emotive and capacity trust (Ettlinger, 2003), although they interact with each other. Emotive trust develops with positive personal feelings about others, while capacity trust is based on the competences of others in professional settings. In most cases, capacity trust is derived from emotive trust that is developed in a different context (Ettlinger, 2003). A consequence of the existence of multidimensional links in networks is that actors, on the basis of emotive trust previously developed, are inclined to cooperate and exchange knowledge with each other (Gulati, 1998; Padgett and Powell, 2011).

An important contribution to our understanding of the role of personal relationships in economic systems derives from Granovetter (1985, 1992), who argued that there is a “widespread preference for transacting with individuals of known reputation” (Granovetter, 1985: p. 490). This behaviour leads to the concept of embeddedness, which “stresses [...] the role of concrete personal relations and structures (or “networks”) of such relations in generating trust and discouraging malfeasance” (Granovetter, 1985: p. 490). Economic actions and outcomes are affected by a set of social relationships and the overall structure of networks in which they are embedded (Granovetter, 1985, 1992). Contributions on this topic explain that in networks characterized by embedded relationships, firms are motivated to pursue goals that could lead to an absence of immediate economic revenue and growth in order to attain the strengthening of the network (Powell, 1990; Provan et al., 2007; Smitka, 1991; Uzzi, 1996, 1997).

Networked firms intensify the embeddedness phenomena by developing different sets of personal relationships, which are likely to be supported by informal contacts with each other (Brown and Duguid, 2001). Personal relationships, when supported by informal contacts, enhance embeddedness, which in turn allows firms to obtain significant outcomes, such as knowledge sharing and the diffusion of innovation. In this case, trust works as a governance mechanism of embedded relationships (Granovetter, 1985; Lawson et al., 2009). Therefore, activities based on close personal relationships are facilitated through the development of a sort of “business friendship”, which motivates firms to go beyond their formal contracts when doing business together (Gilsing et al., 2008; Granovetter, 1985; Larson, 1992; Uzzi, 1997).

3. Analytical model development

Studies on networks demonstrate that one of their essential characteristics is identified in the types of relationships among all the members that trigger knowledge exchanges. Moreover, the different types of relationships influence knowledge sharing in various ways (Brown and Duguid, 2001; Padgett and Powell, 2011). Starting from the current state of the art, we wanted to go a step further in the network field and explore how personal relationships among members enable the diffusion and adoption of innovation as essential key effects of knowledge exchanges (Breschi and Lissoni, 2001; Cowan and Jonard, 2004; Patrucco, 2003). In order to conduct

our research, we analyzed empirical data through the lens of an analytical model that we will describe herewith following.

3.1. Personal and professional relationships

To investigate the role of relationships, we classified the relationships among networked members into personal and professional relationships. According to Lincoln (1990), personal relationships are those that produce “relations of trust, obligation, and custom” (Lincoln, 1990: p. 281) among formally independent nodes, while professional relationships are identified in terms of the various connections that bring people together to do business in order to pursue economic goals. Personal relationships are based on trust and mutual obligations, rely on personal embeddedness among actors and go beyond immediate economic gain (Dore, 1987; Larson, 1992).

In our study, we categorize personal relationships as: (i) familiar and friendship, (ii) geographical and (iii) other trust-based relationships. Family and friendships are characterized by pre-developed and close relationships among individuals that operate in the firms of a network (Cross and Borgatti, 2000; Padgett and Powell, 2011; Powell, 1990). Cooley (1909) defined a family as a primary group characterized by “intimate face-to-face association and cooperation” (Burt, 1980; Cooley, 1909: p. 23), supported by current interactions that shape the structure of the networks (Smith and Stevens, 1999). Furthermore, friendship relationships positively affect “the process of communication in producing uniformity of attitudes, opinions and behaviour” (Festinger et al., 1950: p. 175), thus increasing knowledge exchanges between individuals since they are also used in seeking advice and collecting information (Adler and Kwon, 2002; Burt, 1987).

Geographical proximity is an enabler of personal relationships since the reciprocal closeness of networked members, working in the same geographical area, allows the development of relationships that are not solely related to the professional dimension (Lissoni, 2001; Rallet and Torre, 1999). However, geographical proximity is not the only variable that enables the development of personal relationships; previous work identified other types of proximity (cognitive and social proximity among those) as elements facilitating such relationships (Boshma, 2005). In fact, the development of personal relationships is enabled not only by spatial closeness, but also by (i) knowledge proximity, which provides opportunities and sets constraints for further improvement (Boshma, 2004, 2005), and (ii) socially embedded relationships, which involve trust and tacit knowledge exchange (Boshma, 2005; Maskell and Malmberg, 1999). Hence, geographical proximity can be complementary to other types of proximity in building and strengthening personal relationships (Audretsch and Stephan, 1996; Boschma, 2005; Harrison, 1992; Hausmann, 1996): closely located firms have more possibilities to develop face-to-face interactions and can build up trust and shared recognized shared values more easily than long-distance related firms (Harrison, 1992). Therefore, geographical proximity, constitutes an important variable for the development of personal relationships, although excessive proximity, be it geographical, cognitive or social, may generate lock-in phenomena in embedded relationships, constraining firm competitiveness (Boshma, 2005, 2004; Morgan, 2004).

Finally, we define personal relationships according to the existence of personal trust and obligation. Among the “other trust-based relationships” we identified political relationships as an important category. Political relationships are trust-based links that go beyond formal and codified rules and enhance the speed and quality of knowledge sharing among members of a network (Edquist, 1997; Gulati, 1998). Moreover, the presence of stable relationships with local public authorities constitutes an important framework for any activity, economic as well as social: personal

contacts with local institution members favour the creation of new network dimensions (Edquist and Johnson, 1997; Padgett and Powell, 2011).

Professional relationships rely on specific business-related knowledge exchanges. Referring to Lincoln's (1990) definition, professional relationships are mainly fostered by the firm's aim to manage business activities. Numerous authors have focused their attention on the management of business activities through what they call ‘business relationships’ (Achrol et al., 1983; Baker, 1990; Holm et al., 1999), defining them as “relationships where two partners coordinate a number of exchange and production activities” (Holm et al., 1999: p. 469) to increase their joint economic performance. Professional interactions among firms generate interdependent capabilities and routines with regard to production, logistics and quality management, and facilitate the coordination and allocation of resources to improve joint productivity (e.g. Anderson et al., 1994; Cunningham and Homse, 1986; Johanson and Vahlne, 2003; Johnston and Lawrence, 1998; Petersen et al., 2003). These relationships occur with clients, suppliers, potential partners and competitors. Accordingly, professional relationships in our model are classified as follows: (i) association-related relationships, such as relationships with other members of any industrial association, (ii) relationships with clients, (iii) relationships with competitors, and (iv) relationships with suppliers.

3.2. Economic activities

In our conceptualization of networks, relationships among members are seen as a vehicle to facilitate the deployment of economic activities. We divide economic activities into three types, namely: (i) innovative, (ii) strategic and (iii) operational activities. To define innovative activities we refer to the concept of innovation. Scholars have largely debated this concept, once confined to mere technological changes. Over the last decades, this concept has been widely enlarged to include new perspectives. In fact, innovation has been defined as “new combinations” of pre-existent resources and knowledge as well as new organizational and institutional structures that enable the economic development of firms (Edquist and Johnson, 1997; Lundvall, 1993; Malerba and Orsenigo, 2000). In our model, innovative activities are operationalized into three categories: (i) product and process innovations, (ii) organizational innovations and (iii) innovations related to the introduction of ITs. We paid particular attention to the use of ITs, conceived as organizational tools that enable economic development, since their adoption is a key issue for SMEs. Due to the delay in their adoption, the use of these technologies is considered an important innovative process for SMEs (Bayo-Moriones and Lera-Lopez, 2007; Pantjadarma, 2004; Passiante, 2010).

The second type of activities relates to firm strategy. Rumelt (1984) defined strategy formulation as “the constant search for ways in which the firm's unique resources can be redeployed in changing circumstances” (Rumelt, 1984: p. 569). A better use of resources and adaptation to changing environments constitute the main challenges in achieving a competitive advantage, both in terms of growth and sustained profitability (Castanias and Helfat, 1991). From this perspective, networked firms are engaged in a wide array of strategic activities. In some specific networks, the joint development of strategic activities can be considered as the main driver of their growth (Dittrich and Duysters, 2007; Grandori and Soda, 1995; Walker et al., 1997). The strategic dimension of firm activities must be evaluated by considering the environmental context where those activities take place. Focusing on SME networks, we identified three subcategories: (i) growth related activities, (ii) marketing activities and (iii) activities that supported the development of a shared culture. Growth-related and marketing activities are included as subcategories due to their central

purpose of helping firms in the network gain a competitive advantage (Swaminathan and Moorman, 2009). In fact, belonging to a network enhances firm activities as internal relationships contribute significantly to their growth and economic success. Their small size does not allow them to face competitive environments. Conversely, acting as a single economic actor, networked firms gain access to both specific contexts and competitive advantage (Doz, 1987; Larson, 1992; Walker, 1988). The development of a shared culture is a strategic network asset. Mutual commitment and reciprocal trust enforce the firm's involvement in network goals, supporting other members' performances and growth. Therefore, a shared culture is an essential prerequisite for the achievement of any goal (Pfeffer and Salancik, 1978; Thompson, 1967).

Finally, we include firm operative activities in the model. Operative activities are defined as ongoing activities such as (i) budgeting and planning, (ii) design and engineering, (iii) purchasing, and (iv) sales (Larson, 1992). Day-to-day exchanges are mostly supported by relationships that do not require strong mutual commitment; these types of iterative relationships render operative activities successful, allowing their incremental development over time (Larson, 1992).

3.3. Model development

The contributions of scholars exploring the importance of relationships within networks highlight the different impacts of personal and professional relationships on economic activities. However, we still know very little about how personal relationships support these activities. In fact, no differences have so far been identified in network and innovation literature on what types of activities are better supported by personal relationships. With the aim of understanding network dynamics further, we test the analytical model reported in Fig. 1. On the left hand side, personal and professional relationships are shown and linked to the three types of activities discussed above and positioned on the right hand side of the graph. In particular, through the analysis of empirical data, we wanted to explore the strength of the support fostered by the different types of relationships in association with the three types of activities.

4. The empirical context: CISI consortium

The empirical context of this study is the CISI consortium (Conorzio Italiano Subfornitura Impresa), constituted by 15 SMEs operating in the automotive industry. The CISI consortium is located in Val di Sangro (Abruzzo, Italy), an important industrial area specialized in the mechanical sector. It comprises the subsidiaries of a major global automotive player, Honda Italia, which has a production plant located in the same area. In the late 1970s, the management of Honda Italia encouraged the creation of captive suppliers in order to implement just-in-time procedures with local firms that experienced significant growth. 13 of these suppliers decided to group together to create a consortium of SMEs. The CISI consortium was founded in 1992, comprising 15 members in 2007 with over 800 employees in total and annual revenues of 100 million Euros. 14 out of 15 members are located in 8 towns in the same administrative area (see Table 1 for further details) and are (on average) 20 km from the main client (Honda Italia). The firms are positioned in an area of over 1.000 km². Only one firm is family owned (general partnership), 2 firms are public limited companies and the remaining 12 are private limited companies. They are not part of any national or multinational group.

Although the firms were born as captive suppliers of Honda Italia, CISI members have expanded their client base to include the following multinational companies: ABB (Sweden), Aprilia (Italy),

BMW (Germany), BRP (Canada), Ducati (Italy), Fiat (Italy), Honeywell (USA), KTM (Austria), Moto Guzzi (Italy), Piaggio (Italy), Rotax (Austria), Trigano (Italy), Triumph (United Kingdom), Yamaha (Japan). In addition, the supplier base of the CISI consortium is international: components and raw materials are bought in different parts of the world such as China and the Far East (raw material and small components), in Europe (components and semi-finished products) and in Japan (original components from Honda Trading).

The aim of the consortium is to overcome the size limitations of individual members, leveraging on their shared vision of business that is based on Honda's philosophy. The consortium developed common marketing activities such as participation in expos and specialized events—activities that could not have been undertaken by the firms individually. The CISI consortium comprises a large variety of relationships, both horizontal and vertical, as well as formal and informal. Moreover, friendship and business relationships are closely linked within CISI. In this context, the analysis of the role that personal and professional relationships play in enabling the diffusion of innovation, such as the adoption of new ITs, is particularly interesting.

The presence of a dominant leader, generally a large firm, influencing the creation and direction of supplier networks, is well known in management literature. Toyota is a key example of the Japanese philosophy: it promotes the generation of a network of suppliers through the development of common routines and capabilities, playing the central role of “convenor” of the entire network (Dyer and Singh, 1998; Gray, 1989). In our empirical context, Honda Italia implemented the same common governance mechanism, but an important difference must be highlighted. Toyota is the “ego” of the whole network (Everett and Borgatti, 2005), fostering communication among suppliers and setting the rules of knowledge exchange processes, whereas Honda Italia is the promoter of the CISI Consortium, leaving its members free to interact and develop their own routines independently. Honda Italia is CISI's main client, which in turn has developed autonomously over time.

5. Method

5.1. Methodological approach to the network analysis

Galaskiewicz (2007) observed the beginning of the diffusion of network analysis in the USA in the 1970s, when it grew in popularity as a direct reaction against survey research approaches to studying human behaviour. Network theory was attractive because it offered a rigorous, quantitative method for studying individuals and organizations in relationships with each other (Galaskiewicz, 2007; Granovetter, 1985). Provan et al. (2007) undertook a complete review of studies on inter-organizational networks, analysing 26 empirical studies published in academic journals from 1985 to 2005. Departing from the studies identified by Provan et al. (2007), we examined the method used to obtain a general overview of the most-used methodological approaches. Social network analysis (SNA) appears to be the preferred method to analyze networks (Borgatti and Foster, 2003; Burt, 1997; Krackhardt, 1987; Wasserman, 1994) but other methodologies are also considered in the scientific community.

SNA was described by Scott (1988) as an instrument that “depicts agents – individual or collective – as embedded in webs of connections, and the task of the sociologist is to describe and explain the patterns exhibited in the connections” (Scott, 1988: p. 112). With the help of dedicated software (Borgatti et al., 2002), SNA maps and measures formal and informal relationships to understand what facilitates or impedes the knowledge flows that bind interacting units; i.e., who knows whom, and who shares what

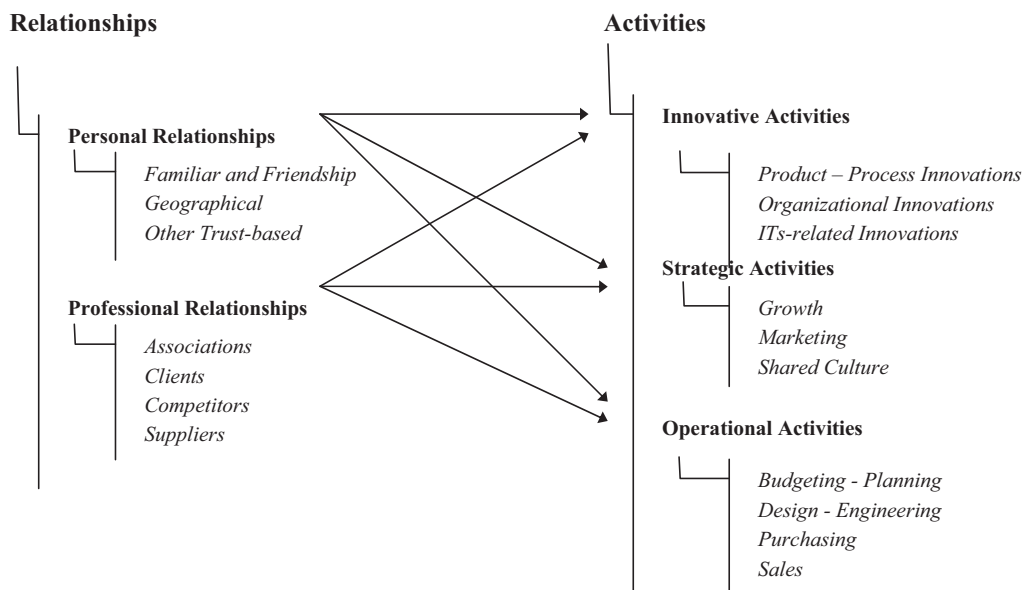


Fig. 1. Analytical model.

information and knowledge with whom, by what communication media.

As anticipated above, qualitative approaches are often used. In particular, case study methodology is appropriate for explorative analysis because it allows identifying and understanding the different dimensions that characterize a phenomenon (Eisenhardt, 1989; Leonard-Barton, 1990; VanMaanen, 1998; Yin, 1994). In the case of networks, this approach is preferred if there is no prior research that allows conducting more broad-based data collection and analysis (Bazzoli et al., 1998) or if the boundaries between the context and the phenomenon are blurred (Van Raak and Paulus, 2001; Yin, 1994). The use of case studies is also appropriate if researchers are involved in data collection as participant observers (Knight and Pye, 2005). Furthermore, some studies use computer-aided programs (e.g. NUD.IST) to analyze data collected through interviews and documental data (Araujo and Brito, 1997).

In the present work, we use the content analysis technique to analyze our data, constituted by the transcripts of open-ended interviews. Content analysis is a “research technique for the objective, systematic, and quantitative description of the manifest content of a communication” (Berelson, 1952: p. 18). This

method was developed in social studies and investigates the content of communications. The initial applications were political speeches, laws, books and newspapers. The advantages of this research method are its high levels of objectivity and external validity. Because of the diffusion of ad-hoc software, this method demonstrated its potential and has increasingly been used since the 1980s (Duriau et al., 2007; Insch et al., 1997; Morris, 1994; Zaheer and Soda, 2009). Through the use of content analysis, for example, Gebauer et al. (2008) identified the factors that users find important in mobile devices; the results from the content analysis were then analyzed with the use of structure equation modelling. A recent study by Sonpar and Golden-Biddle (2008) enhanced the value of content analysis as an instrument that facilitates theory elaboration.

5.2. Data collection and questionnaire administration

In this study we used a qualitative research approach, data were obtained through interviews and integrated with secondary data. Open-ended interviews constitute our principal source of data. In this type of interview, researchers ask questions on

Table 1 Characteristics of the firms in the sample.

	Company	Location	Employees	Established in	Core production	Company form	Distance from Honda
1	Ca Stampi	Treglio (CH)	30	1977	Moulds and mechanical equipments	s.r.l. ^a	21 km
2	Cams	Fara F.P. (CH)	39	1975	Moulds design and production	s.p.a. ^b	36 km
3	Comest	Filetto (CH)	35	1986	Moulds and parts for cars and motorcycles	s.r.l. ^a	27 km
4	Cometa	Casoli (CH)	100	1980	Mechanical parts and accessories	s.r.l. ^a	16 km
5	Europainting	Atessa (CH)	150	1984	Industrial painting	s.r.l. ^a	0 km
6	F.I.Se.M.	Atessa (CH)	58	1989	Seats and plastic items	s.r.l. ^a	0 km
7	Galvanica Di Torino	Spoltore (PE)	11	1967	Galvanic coating and finishing	s.n.c. ^c	62 km
8	Igea	Lanciano (CH)	20	1975	Adhesive films, shapes and logos	s.r.l. ^a	15 km
9	Marplastica	Lanciano (CH)	65	1987	Plastic technical products	s.r.l. ^a	12 km
10	Me.Ga.	Arielli (CH)	50	1991	Galvanic treatments	s.r.l. ^a	38 km
11	Palena	Atessa (CH)	80	1953	International transport	s.r.l. ^a	0 km
12	TA	Casoli (CH)	40	1978	Assembly and electrical wiring	s.r.l. ^a	15 km
13	Taumat	Atessa (CH)	35	1987	Industrial mechanical parts	s.r.l. ^a	0 km
14	Tecnomeccanica Slid	Fara F.P. (CH)	97	1981	Turning, milling, moulding and mechanical products	s.p.a. ^b	30 km
15	T.M.C.	Vasto (CH)	50	1987	Mechanical products	s.r.l. ^a	33 km

^a s.r.l. (società a responsabilità limitata) = general partnership.

^b s.p.a. (società per azioni) = public limited company.

^c s.n.c. (società in nome collettivo) = general partnership.

specific topics, including the particular point of view of the interviewee (Oppenheim, 2000). The interviews were based on a semi-structured questionnaire, divided into three parts. The first section asked for a description of the workflow in the firm and, for each phase, a description of all the firm's relationships with third parties. Special attention was paid to the description of content and frequency of personal and professional relationships with individuals operating in other organizations (firms, associations or similar) within and outside the consortium. The second part of the questionnaire focused on the role of information technologies (ITs) in business activities. In this section, researchers specifically investigated the impact of ITs on their relationships. The third part of the questionnaire focused on the characteristics of the firm's external environment, to capture any special feature or contingency that would render the firm's operating context unique or interesting. The questionnaire can be found in [Appendix A](#).

We personally contacted all the consortium members and 14 out of 15 agreed to be interviewed. We conducted a total of 25 interviews, 12 with general managers or CEOs and 13 with those responsible for other functions (e.g. sales, purchasing, and ITs). A list of interviewees and their positions is provided in [Appendix B](#). Interviews lasted between 30 and 75 min and were conducted onsite between February and April 2007. All the interviews were digitally recorded and transcribed in their entirety to retain all the details of the conversations and to ensure the suitability of the data for the content analysis procedure.

5.3. Content analysis procedure

Following the guidelines provided by Krippendorff (2003), we identified sampling and context units of analysis. Sampling units are “units that are distinguished for selective inclusion in an analysis” (Krippendorff, 2003: p. 98). These units must be independent from each other. In inferential statistics, sampling units are called observations. We selected firms as sampling units: in our research context, firms are the units that can assure independence among observed variables since firms are independent of each other. Context units are “units of textual matter that set the limits on the information to be considered in the description of recording units” (Krippendorff, 2003: p. 101): we identified the sentence as the context unit. The choice to use the sentence was motivated by a holistic approach to the text, requested by the specificities of the Italian language used in the interviews. Italian is rich in synonyms and many words have ambiguous meanings that cannot be understood without reference to the entire sentence. In Italian, as in other languages, the meaning of a word typically depends on its syntactical role within a sentence.

Once the units of analysis were defined, on the basis of the list of activities and relationships reported in our analytical model, researchers elaborated a set of rules that minimized the possibility that findings would reflect the analysts' subjective predisposition rather than the content of the documents under analysis (Kassarjian, 1977). These rules are represented by dictionaries, constructed as a list of words that interviewees used to refer to specific concepts (either an activity or a relationship). The dictionaries were constructed as follows: we extracted a list of words appearing more than 10 times in the texts, using the NVivo7 software. The list comprised 776 words; after the elimination of articles, auxiliaries, and prepositions, and grouping singulars and plurals, a list of 141 words remained (see [Appendices C and D](#)). We assigned to each concept (activity or relationship) the relevant words from among the 141 identified. To construct an exhaustive list of words we used an Italian dictionary of synonyms and antonyms (Gabrielli, 2000) for each word and included the related and relevant synonyms and antonyms in our dictionary (see [Appendix E](#)).

Two coders, working independently, proceeded to code the relevant sentences using the text search function in the NVivo7 software. They manually checked the entire text to capture coding errors due to the multiple possible meanings of words or to negative sentences. In [Appendix F](#) we report the list of concepts investigated with the number of sources and references coded for each. Sources are the number of sampling units (i.e., the firms) where the concepts were observed and references are the context units (i.e., the sentences).

5.4. Statistical analysis

The output of the content analysis is the Word-Count matrix ([Table 2](#)). The Word-Count matrix counts the number of words that were used in the text while referring to a specific concept and is generally used to compare items and identify patterns. The construction of the Word-Count matrix is the starting point of the analysis since we focused on the interconnections between activities and relationships. The concepts were considered in isolation as well as in their interaction effects, noted with an * in the table: e.g. personal * professional, meaning that the number of words reported in the matrix were tagged as part of a personal as well as a professional relationship; in other words, these categories were created by counting the number of words used to describe professional relationships as well as personal relationships (i.e., the number of words in the sentences coded as mentioning both professional and personal relationships). We further explored our results using the data reported in the Word-Count matrix to perform statistical analysis (such as correlations). To enhance the clarity of the discussion, we report a description of the analysis in the next section, together with the discussion of the results.

6. Results

6.1. Role of clients and key clients in diffusing innovation

The analysis of evidence collected demonstrates that Honda Italia has a central role in professional activities. Looking at the list of the most frequent words in interview texts ([Appendix C](#)), we notice that the word “Honda” appears 273 times (second in the ranking). We explored the role of this key client as the enabler of activities and found that, despite the large number of operational activities carried out in CISIs relationships with Honda Italia, this client also played a central role in the diffusion of organizational innovations ([Table 2](#)). The matrix reports 992 words related to organizational innovations and client relationships, and 822 words for organizational innovations and the CISI–Honda relationships. In particular, we refer to the just-in-time practice (JIT) adopted by Honda Italia and diffused among all its contractors. The central role played by Honda Italia in encouraging the adoption of JIT procedures is recognized in many interviews. According to one interviewee: “We follow a just-in-time approach, and the client [Honda Italia] decides its production needs. . . We have to follow our customer's requirements; this is the game.” Another notes: “We do not have storage anymore: we ship to Honda up to 3 times per day. This is what Honda requires to lower [their] cost, and we have to follow it.”

On the basis of the data in the Word-Count matrix, we constructed [Table 3](#) that depicts the impact of each relationship on economic activities: strategic, innovative and operational. We did not include in the table those relationships that support only one activity. Looking at the relationships that promote the diffusion of innovation, among the seven relationships with a frequency over 25%, four involve clients: personal * other clients (43%); personal * clients (30%); other clients (30%); clients (26%). Consistently

Table 2
Word-Count matrix: activities * relations.

	Strategic activities				Innovative activities				Operational activities				TOT
	Growth	Marketing	Shared culture	TOT	Product-process innovations	Organizational innovations	IT's related innovations	TOT	Budgeting-planning	Design-engineering	Purchasing	Sales	
Professional relationships	151	668	753	1497	143	-	295	438	15	48	537	828	1368
Associations	151	668	753	1497	143	-	295	438	15	48	537	828	1368
Consortium	157	157	-	157	-	-	-	-	-	-	-	-	-
Other associations	666	1107	1107	2166	1046	922	2757	4659	1612	1846	2213	7413	11,248
Clients	547	363	1107	1942	429	822	1407	2692	761	971	1188	5362	7455
Honda	591	120	178	889	683	255	1745	2583	851	894	1107	3502	5263
Others clients	18	18	-	18	-	114	129	243	-	312	586	451	1263
Competitors	121	190	256	567	32	304	653	1023	706	181	4252	687	4893
Suppliers	70	-	166	236	182	121	79	343	-	140	218	374	600
Personal relationships	-	-	-	-	182	-	-	182	-	140	-	142	282
Familiar-friendship	70	-	-	70	-	39	79	79	-	-	132	171	171
Geographical	-	-	166	166	-	82	-	82	-	-	86	61	147
Trust	-	-	-	-	-	-	-	-	-	-	-	-	-
Personal * professional	70	-	166	236	182	82	40	304	-	140	174	299	481
Personal * associations	-	-	166	166	-	-	-	-	-	48	-	-	48
Personal * consortium	-	-	166	166	-	-	-	-	-	48	-	-	48
Personal * other ass.	-	-	-	-	-	-	-	-	-	-	-	-	-
Personal * clients	70	-	166	236	182	82	40	304	-	140	174	299	481
Personal * Honda	70	-	166	236	-	82	40	122	-	140	79	166	306
Personal * other clients	70	-	-	70	182	-	-	182	-	-	95	133	175
Personal * competitors	-	-	-	-	-	-	-	-	-	140	-	-	140

Table 3
Word frequencies in percentages divided by activities.

	Innovative activities	Operational activities	Strategic activities
Personal relationships	29%	51%	20%
Friendship + familiar	45%	55%	0%
Geographic	25%	53%	22%
Trust	21%	37%	42%
Professional relationships	25%	63%	12%
Personal * professional	30%	47%	23%
Associations	14%	41%	45%
Consortium	14%	41%	45%
Personal * consortium	0%	22%	78%
Clients	26%	62%	12%
Personal * clients	30%	47%	23%
Honda	22%	62%	16%
Personal * Honda	18%	46%	36%
Other clients	30%	60%	10%
Personal * other clients	43%	41%	16%
Suppliers	16%	75%	9%
Competitors	16%	83%	1%

with that affirmed by Pavitt in his seminal paper (1984), innovation in the automotive sector is driven by clients and is developed in collaboration with them, falling into the category of specialized suppliers.

6.2. Strategic activities are enabled mostly by consortium-related associations

Focusing on the analysis of strategic activities and relationships supporting them (third column in Table 3) we note that the relationships with the higher percentages are association-related: personal * associations (78%), consortium (45%) and associations (45%). This is consistent with the nature of associations in general and with that of the CISI consortium in particular. CISI was born with the aim of supporting the growth of its members: its activities focus on actions that cannot be carried out by SMEs in isolation, such as broad-scale marketing efforts. The small size of consortium members does not allow them to participate in big events, but working together they increase their contractual power and exploit economies of scale. As one interviewee pointed out: "If we want to go and participate in an exposition, we have to invest 30,000 Euros. None of us has the power to invest such amounts of money without being sure of the effective returns. If there are 10 of us, we spend 3000 Euros each and we can easily participate. This is an incredible opportunity to meet new potential clients". The creation of the consortium also increased the SMEs' power in the local economic system. Another interviewee noted: "Now we are the third [largest] organization in Val di Sangro. We are a consortium with 1100 employees and revenues of 130 million Euros. After Sevel and Honda, there is no organization as large as ours. We, as a company, were born in a church, and now, with the consortium, can have discussions with multinationals and we have an important role in the regional economic system."

6.3. The role of personal relationships in enabling innovation

Analyzing how relationships support innovative activities, four out of the five percentages over 30% (Table 3) are represented by personal relationships: friendship and familiar (45%); personal relationships * clients – excluding Honda (43%); personal relationships * clients (30%); personal * professional relationships (30%). As we discussed in the previous section, relationships with clients are the main enablers of innovative activities: the personal aspect of those relationships increases their innovative potential. This is an interesting result since it provides support in further understanding how innovations are diffused and adapted within networks. As

Table 4
Correlation table.

	Operational activities	Strategic activities	Innovative activities
<i>Operational activities</i>			
Pearson correlation	1	−0.855**	0.007
N	22	22	22
<i>Strategic activities</i>			
Pearson correlation	−0.855**	1	−0.525*
N	22	22	22
<i>Innovative activities</i>			
Pearson correlation	0.007	−0.525*	1
N	22	22	22

* Significant at the 0.05 level (2-tailed).

** Significant at the 0.01 level (2-tailed).

one interviewee pointed out: “. . . (when talking about clients) we know each other already, we developed trust over years of working together, they know how we work and they trust our quality. For this reason, they often invite us to collaborate, to develop new products and implement new processes. With other clients it is not the same, they send us the order and we produce following their guidelines”. Personal elements in a relationship reinforce links among members and facilitate the disclosure of sensitive information and advice, such as that related to the adoption of innovations within and between CISI members. Another interviewee pointed out: “I have delegated everything that is related to ITs to my brother. After the initial decisions taken by myself, dating back to 1984 when we implemented the first software for industrial design, he is now in charge”. The perceived risk involved in innovative activities is mitigated by personal involvement and trust in the relationships.

A deeper analysis of how personal relationships support the diffusion of innovation led us to note that all the typologies of personal relationships actively enable innovative activities. With the aim of further exploring the importance of multiple channels in supporting activities, we calculated the Herfindahl–Hirschman concentration index to study the dispersion of activities among different networks. The formula we used is the following (1):

$$HHI = \sum (x_i)^2 \quad (1)$$

where x_i is the percentage of the word count for each variable. The HHI index can range from 0 to 10.000, the lower the value, the less concentrated the phenomenon. Using the data from the Word-Count matrix, we obtained the following results: operative activities HHI = 3.621; innovative activities HHI = 3.917; strategic activities HHI = 5.827. The low values associated with innovative and operative activities suggests that those activities are more widespread throughout personal network channels, while strategic activities take place in few networks, mainly dominated by trust. The results also suggest the existence of similar patterns between operative and innovative activities and different patterns in the case of strategic activities. We will explore this further in the following section.

6.4. Negative correlation between strategic activities and innovative activities

The last analysis performed on the data was the construction of a correlation table among the three types of activities (Table 4). A significant negative correlation exists between operational and strategic activities (−0.855), and between innovative and strategic activities (−0.525). We interpret these results as follow: the types of relationships required for operational and innovative activities differ from those necessary for developing strategic activities: strategic activities involve different types of relationships

compared to the other two activities. One interviewee pointed out: “innovative technologies are very sector-specific, if you have a close relationship with a competitor, then you can obtain knowledge and information. In the case of the consortium, we seldom talk about technologies; we focus mainly on organizational or market analysis tools. We work together in organizing expos, particular marketing activities that involve all members”. Consequently, strategic activities take place in different relationship networks. In fact, dissimilar sets of relationships, with a distinctive nature and development patterns, support them.

7. Discussion and conclusion

Innovation is diffused and adopted within networks following paths that are difficult to identify and thoroughly comprehend. Previous contributions largely explored this topic by providing a crucial understanding of the role of networks in diffusing innovation and studying their critical components, such as network compositions, position of networked members, the role of knowledge flows, trust and embeddedness (e.g. Deroian, 2002; Granovetter, 1985; Gulati, 1998; Kogut, 2000; Laursen et al., 2011; Padgett and Powell, 2011; Smith-Doerr and Powell, 2004; Uzzi, 1997). Starting from these seminal contributions, we moved forward in the understanding of innovation dynamics that occur within networks, in particular, exploring the role played by personal relationships.

The empirical context selected for the study is a consortium of SMEs (CISI consortium), located in central Italy. The context is particularly appropriate since it comprises a large variety of relationships, both horizontal and vertical, personal as well as professional. Moreover, the presence of a dominant leader, Honda Italia in our case, that influences the creation and the direction of this network is an important element that gives us a useful lens with which to analyze the phenomenon. We analyzed qualitative data collected with personal interviews using an original method, the content analysis procedure, which guarantees a high level of objectivity and external validity (Berelson, 1952; Kassarjian, 1977; Krippendorff, 2003).

The analysis of the results suggests that personal relationships play a pivotal role in facilitating contacts among networked members. Moreover, our data also describes how the diffusion of innovation takes place and what the dynamics occurring between activities and personal/professional relationships are. The results confirm the central role that the main client plays within the network (in line with existing literature, see: Everett and Borgatti, 2005; Pavitt, 1984) and unveil partially unknown dynamics. Our contributions can be summarized as follows: (i) the diffusion of innovation is enabled by personal relationships; (ii) strategic and innovative activities take place in different networks; the *locus* of innovation is not the *locus* of strategy: actors, relationships and rationales involved are different, confirming the existence of multidimensional links, characterized by different functions; (iii) on the one hand, innovative activities are widely diffused within networks exploiting a large variety of relationships and involving multiple network dimensions; on the other hand, strategic activities depend on fewer dimensions and, also in this case, have dynamics that differ from those that characterize innovative activities. Our work yields important implications for scholars as well as management practitioners and policy makers, which are discussed in the next section.

7.1. Implications for theory

Our first finding contributes to the research stream exploring the role of personal relationships in economic contexts. The presence

of trust, shared values, and mutual objectives facilitates the commencement of a difficult and risky path, such as that characterizing the adoption of innovation. Our empirical evidence shows that if personal relationships exist alongside professional relationships, the likelihood of starting innovative activities increases. The uncertainty that characterizes innovation processes is mitigated by a firm's increased trust in its partners; trust lowers the risk of opportunistic behaviours that could endanger the success of its business. Leveraging upon previous contributions that explored the role of trust (Ettlinger, 2003; Lorenzen, 2001; Uzzi, 1997), we support the centrality played by the personal dimension in relationships and, with this finding, reinforce the role of personal relationships in diffusing innovation. Previous studies have suggested its importance, but none has thus far proved its centrality and the superior innovation potential of personal-based relationships. We believe that this contribution will shed further light on the social understanding of innovation, also indicating interesting avenues for future research that will be discussed in the next section.

The second contribution addresses interrelations among multiple networks. We found a negative correlation between strategic activities and operational and innovative activities. This indicates that such activities occur in different settings. The contexts in which strategies are discussed and executed differ from those in which operational and innovative activities take place: channels of communication, locations, and social environments are distinct. This finding reinforces previous contributions in the area (e.g. Sammarra and Biggiero, 2008) and broadens our understanding of the interrelations between knowledge, activities and networks. Strategic and innovative activities take place in different settings: the *locus* of innovation is not the *locus* of strategy. Different actors, relationships and rationales involved in strategic, operational and innovative activities confirm the existence of a network of multidimensional links. Each set of links is characterized by different functions. With this finding we gain further understanding of the multidimensional structure of networks (Padgett and Powell, 2011). Hence, each dimension plays a different role and, according to its own characteristics, is more appropriate in supporting specific activities.

The third finding contributes to the role that multiple actors in networks play in affecting innovation dynamics. Innovative activities are sponsored by multiple actors; they are widely diffused within networks, exploiting a large variety of relationships and involving multiple network dimensions. On the other hand, strategic activities depend on fewer dimensions, showing also in this case that the network dynamics affecting them differ from those that characterize innovative activities. The data suggests that strategic decisions are supported by a limited number of relationships and few actors influence strategic activities. The implications of these findings are particularly important because they expose structural differences on how networks support activities in different ways, broadening current understanding of collaborations and network structures in business environments. Moller et al. (2005) pointed out the importance of understanding not only how business networks are structured, but also how they should be managed. Previous studies have already investigated why some innovations are diffused slower than others (Deroian, 2002). We believe that the diffusion of innovative activities within networks is a possible cause. The multidimensionality of networks speeds up the diffusion of innovations: innovations supported by multiple networks are more likely to be adopted and diffused faster.

In addition to the theoretical contributions discussed so far, positioned in the current debate on innovation and network, this work also contributes to the research methodology field. In fact, we analyzed data using content analysis, a research method scarcely deployed in management and economic literature (Duriou et al., 2007; Sonpar and Golden-Biddle, 2008). Until now, this approach has been primarily used for the analysis of speeches and interviews

in the sociology and psychology fields. The use of this technique presents advantages, especially in terms of reliability and exploration of data. In applying this method, we followed strict guidelines to limit arbitrary judgments and personal decisions: the use of vocabularies, list of nodes, coding procedures and word count tools enhanced objectivity and, thus, the reliability of our study (Krippendorff, 2003). We made extensive use of the Word-Count matrix, a powerful tool to disclose dynamics and evidences that could be overlooked when using different research tools. We objectively measured the strength of the relations existing between concepts, as expressed in the spoken interviews, investigating qualitative data from a different perspective. We had the opportunity to explore and identify new research hypotheses and gather empirical evidence, making inferences from interview texts, also when interviewees did not explicitly state those relations. Paraphrasing Berelson (1952), we described in an objective, systematic, and quantitative way the manifest content of communications.

7.2. Implications for management practitioners and policy makers

The understanding gained on the dynamics of innovation diffusion is particularly significant for managers willing to promote the diffusion of innovative practices and for policy makers wanting to develop appropriate strategies to increase the innovativeness of firms.

The importance of personal relationships in favouring the adoption of innovations is a key aspect that managers should consider when encouraging their business partners (e.g. clients or suppliers) to adopt new technologies or new productive processes. We found that, in these cases, the existence of personal relationships between partners facilitates the success of the diffusion and adoption of innovation, increasing the firms' competitiveness. Moreover, to increase the likelihood of the adoption of an innovative practice, information on new practices could be offered in those settings in which operational activities are performed. Thus, to be effective, communication and diffusion should take into account the role of the workers who perform operational activities, since, as our findings demonstrate, operational and innovative activities are likely to occur in the same working context.

7.3. Limitations and research agenda

Nevertheless, this study has certain limitations arising from the case study methodology followed. The research involves a single case study, which limits our ability to generalize our findings. To enhance the generalizability of the results, a replication of the case study using the same methodology is suggested. Such a replication would allow researchers to determine whether the results of the present study are due to specific contingencies of firm operating contexts or are generalizable to different contexts. To increase the generalizability of the results, it may also be possible to structure quantitative data collection (e.g. by means of a survey) in order to capture the characteristics of the same phenomenon on a larger basis, in different sectors and geographical contexts. The risk is losing some of the advantages and the wealth of detail obtained through the use of interviews, but it would be possible to test the validity of the findings via a different methodological approach.

A second set of limitations is due to the characteristics of the chosen empirical context. Most of the firms are located in a close area, and operate in the same sector (automotive). Moreover, most of the firms were born as Honda Italia captive suppliers, sharing similar visions and missions. In such a setting, a shared culture characterizes the industrial model and this might affect the generalizability of the study. This limitation reinforces the importance of replicating the study in different settings.

Finally, this study also indicates avenues for future researches. The multidimensionality of networks and the central role of personal relationships in innovation diffusion dynamics call for new studies aimed at investigating the importance of these phenomena. In fact, the authors believe that the paper sheds lights on crucial dynamics that deserve further attention: under which circumstances do personal relationships express their role as facilitators of the diffusion of innovation? And what are the external and internal contingencies that may limit their efficacy? To what extent do the activities of multiple networks overlap? How can this overlap be exploited by policy makers who want to increase the diffusion of innovation and the competitive advantage of networks of firms? These are only a few of the questions that may arise from this present study and we believe deserve further investigation.

Acknowledgments

Author's names are in alphabetical order. The authors acknowledge the financial support of the Italian Ministry for Education, Universities and Research (FIRB, RBNE05FKZ2: TEKNE – Towards Evolving Knowledge-based interNetworked Enterprise).

The authors want to thank Micheal Hobday, John Padgett, Andrea Prencipe for their valuable advices on earlier versions of the manuscript; Dajana D'Andrea, Francesca Masciarelli and the participants to the PDW on Firms, Ecosystems and Innovation organized by Rahul Kapoor and Anne Parmigiani at AOM 2010 in Montreal for their comments and encouragement; Alberto Simboli for the help in the collection of the data. They are also grateful to the editor Martin Kenney and the two anonymous reviewers for their precious feedback that really increased the value of the work. All errors remain the author's own.

Appendix A. Questionnaire.

Introduction

1. Could you please describe your firm's history and activity?
2. Please explain your firm's working processes, from raw material purchases to sales and post-sale services, such as maintenance activities (if any).

Relationships

For each phase of the working process, please explain:

3. Which firm/individual do you/your firm/your employees relate to?
4. How often?
5. Which type of relationships (e.g.: formal, informal, contractual)?
6. How do you/your firm/your employees interact with third parties (e.g.: phone, email, letters, face-to-face)?
7. How long do the meetings last?

In particular, describe your relationships with:

8. Occasional suppliers
 9. Preferred suppliers
 10. Clients
 11. Other members of the consortium
 12. Competitors
 13. Other relevant relationships
- #### Information technology
14. Do you use ITs? Which? (e.g.: ERP, Internet, email, . . .)
 15. Do any of your processes require ITs support?
- Do you use ITs to relate with:
16. Clients?
 17. Suppliers?
 18. Other members of the consortium?
 19. Other?
 20. Could you please describe how you use them?

External environment

21. What are the variables of your competitive context that differentiate your firm from the other firms of the consortium?
22. And from other firms in the automotive industry?
23. Have some of those variables influenced the adoption of ITs? Will some of them influence the adoption of ITs?

Appendix B. Interview information. Data collected by Federica Ceci (FC), Alberto Simboli (AS), and Daniela Iubatti (DI).

	Name of the interviewee	Role	Company	Location	Interviewer
1	Pietro Rosica	General Manager	Cometa	Atessa	AS-FC
2	Gabriele Scalzi	Marketing & Sales	Cometa	Atessa	AS-FC
3	Mario Di Cintio	Sales and Planning	Cometa	Atessa	AS-FC
4	Palmerio Giuseppe	Purchasing	Cometa	Atessa	AS-FC
5	Mario Lorenzi	General Manager	Taumat	Atessa	AS-DI
6	Maurizio Sciocchetti	Sales Manager	Me.ga.	Arielli	AS-DI
7	Vito Pocetti	General Manager	Igea	Lanciano	FC-DI
8	Giuseppe Giancristofaro	Quality Manager	Igea	Lanciano	FC-DI
9	Ettore Liberatoscioli	CEO	La Tecc.	Fara F. P.	FC-DI
10	Donato Di Nardo	Sales Manager	Comest	Filetto	FC-DI
11	Gabriele Tumini	General Manager	TMC	Vasto	AS-DI
12	Sergio Di Campli	Purchasing	TMC	Vasto	AS-DI
13	Luciano Tilli	Sales and Planning	TMC	Vasto	AS-DI
14	Lucio Palena	General Manager	Palena	Atessa	AS-DI
15	Annacarla Palena	Administration	Palena	Atessa	AS-DI
16	Andrea Casalanguida	General Manager	Ca stampi	Rocca s.g.	AS
17	Florideo Panaccio	General Manager	Cams	Fara F.P.	AS-FC
18	Maurizio Cocco	General Manager	TA	Casoli	FC-DI
19	Barbara Madonna	Administration	TA	Casoli	FC-DI
20	Fabio Di Tommaso	Purchasing	TA	Casoli	FC-DI
21	Alfonso Trozzi	CEO	Fisem	Atessa	AS-DI
22	Rosanna di Nuzio	Sales	Fisem	Atessa	AS-DI
23	Antonello Di Tonno	General Manager	Galvanica	Spoltore	AS-FC
24	Michele Romagnoli	General Manager	Europainting	Atessa	AS-FC
25	Francesco Raho	Production Manager	Europainting	Atessa	AS-FC

Appendix C. Words appearing more than 10 times in the interview text.

Word	Count	Word	Count	Word	Count	Word	Count
acquist*	61	domanda	14	Marplastica	10	riunioni	11
attrezzature	29	fabbisogno	10	material*	88	Rosica	12
aziend*	243	fattori	20	materie	34	Sap	10
bene	54	fatturato	45	Mega	12	Scioli	10
bolla	18	fatture	11	membri	23	serigrafia	14
Bologna	13	fax	48	mentalità	10	server	13
cablaggio	24	ferro	11	mercato	54	servizio	23
Cams	28	Fiat	25	Milano	12	settore	72
capannone	10	fiducia	12	modell*	30	Sevel	26
cart*	32	fiera	11	moto*	65	sistemi	35
certificazione	10	filosofia	14	nuovo	43	sito	14
Cina	13	fornitor*	232	occasionali	19	soci*	37
CISI	98	fornitura	23	offerte	11	società	23
client*	385	gestionale	21	ordin*	116	software	14
Comest	17	gestire	27	padre	10	stamp*	105
Cometa	67	Giappon*	40	Palena	10	stampaggio	12
commerciale	27	gruppo	10	partiti	11	sviluppo	32
commess*	38	Guardiagrele	11	PC	10	taglio	14
competitivo	11	Honda	273	pezz*	120	Taumat	11
competizione	12	impianti	20	Pietro	16	tecniche	11
computer	30	impres*	49	plastica	15	tecnici	15
comunicazion*	26	incontri	17	portal*	45	tecnologi*	144
concorrenti	40	informatic*	87	presidente	18	Tecnomeccanica	34
concorrenza	15	informazioni	34	prezz*	35	telefono	25
connettori	12	insieme	32	problem*	129	territorio	12
consegne	12	interfaccia	19	processo	60	TMC	22
consorzio	186	internet	22	prodott*	188	Torino	14
contatto	11	Italia	39	produzione	137	trasporto	16
controllo	19	just-in-time	22	progett*	62	trattament*	24
cost*	41	lavorazion*	46	programmazione	17	vendita	19
database	11	lotto	11	programmi	18	Verlicchi	18
dati	42	macchin*	45	qualità	75	verniciatura	24
dipendenti	19	magazzino	36	quantità	11	zincatura	15
disegn*	46	mail	110	relazion*	136		
ditt*	26	manodopera	10	rete	28		
documenti	16	manutenzione	11	ricerca	21		

Appendix D. Translation in English of Appendix C.

Word	English	Word	English	Word	English	Word	English
acquist*	buying	domanda	demand	Marplastica	–	riunioni	meeting
attrezzature	facilities	fabbisogno	requirements	material*	material	Rosica	–
aziend*	company	fattori	factors	materie	material	Sap	Sap
bene	goods	fatturato	turnover	Mega	–	Scioli	–
bolla	delivery note	fatture	invoices	membri	member	serigrafia	serigraphy
Bologna	bologna	fax	fax	mentalità	mentality	server	server
cablaggio	wiring	ferro	iron	mercato	market	servizio	service
Cams	–	Fiat	–	Milano	Milan	settore	sector
capannone	warehouse	fiducia	trust	modell*	model	Sevel	–
cart*	paper	fiera	fair	moto*	bike	sistemi	system
certificazione	certification	filosofia	philosophy	nuovo	new	sito	website
Cina	china	fornitor*	supplier	occasionali	occasional	soci*	member
CISI	–	fornitura	provision	offerte	offer	società	company
client*	client	gestionale	managerial	ordin*	order	software	software
Comest	–	gestire	to manage	padre	father	stamp*	mould
Cometa	–	Giappon*	Japan	Palena	–	stampaggio	moulding
commerciale	commercial	gruppo	group	partiti	parties	sviluppo	development
commess*	job shop	Guardiagrele	–	Pc	Pc	taglio	to cut
competitivo	competitive	Honda	–	pezz*	piece	Taumat	–
competizione	competition	impianti	facilities	Pietro	–	tecniche	techniques
computer	computer	impres*	firm	plastica	plastic	tecnici	technicians
comunicazion*	communication	incontri	meetings	portal*	web portal	tecnologi*	technology
concorrenti	competitor	informatic*	ict	presidente	president	Tecnomeccanica	–
concorrenza	competition	informazioni	information	prezz*	price	telefono	telephone
connettori	connectors	insieme	together	problem*	problem	territorio	territory
consegne	delivery	interfaccia	interface	processo	process	TMC	–
consorzio	consortium	internet	internet	prodott*	product	Torino	Turin
contatto	contact	Italia	Italy	produzione	production	trasporto	transport
controllo	control	just-in-time	just-in-time	progett*	project	trattament*	treatment
cost*	cost	lavorazion*	manufacturing	programmazione	planning	vendita	selling
database	database	lotto	batch	programmi	programs	Verlicchi	–
dati	data	macchin*	machinery	qualità	quality	verniciatura	painting
dipendenti	employees	magazzino	warehouse	quantità	quantity	zincatura	zinc-coating

Word	English	Word	English	Word	English	Word	English
disegn*	design	mail	mail	relazion*	relationship		
ditt*	company	manodopera	workforce	rete	network		
documenti	documents	manutenzione	maintenance	ricerca	research		

Appendix E. Interview text dictionary.

Constructs	Dictionary	English translation
<i>Innovative activities</i>		
Product–process innovations	<i>brevett*, innovazion*, sviluppo, ricerca, nuovo</i>	<i>patent, innovation, development, research, new</i>
Organizational innovations	<i>jit, just, time, certificazione, iso, vision</i>	<i>jit, just, time, certification, iso, vision</i>
ITs-related innovations	<i>programm*, software, server, database, sap, computer, internet, pc, gestionale, interfaccia, mail, posta elettronica, informatic*, dati, sit*, cad, porta*1</i>	<i>programme, software, server, database, sap, computer, internet, pc, management, interface, mail, e-mail information, data, site, cad, portal</i>
<i>Strategic activities</i>		
Growth	<i>crescita, sviluppo, aumento, incremento</i>	<i>growth, development, increase</i>
Marketing	<i>marketing, fier*, sit*</i>	<i>marketing, fair, site</i>
Shared culture	<i>cultura, filosofia, mentalità, modo di pensare, punto di vista</i>	<i>culture, philosophy, mentality, way of thinking, point of view</i>
<i>Operational activities</i>		
Budgeting–planning	<i>controllo, programm*, programmazione*, pianificazion*, pian*</i>	<i>control, programme, scheduling, planning, plan</i>
Design–engineering	<i>disegn*, progett*, progettazion*, design, cad, cam</i>	<i>design, scheduling, planning, cad, cam</i>
Purchasing	<i>ordin*, commission*, ordinativ*, acquist*, prezz*, forniture*, boll*, fattur*, logistica, ingresso, sollecit*, accettazione</i>	<i>order, commission fee, indent, purchasing, price, provision, delivery note, invoice, logistic, inbound, reminder, acceptance</i>
Sales	<i>offerta*, ordin*, commission*, consegn*, ordinativ*, commercial*, commess*, prezz*, forniture*, vendit*, boll*, fattur*</i>	<i>offer, order, commission fee, delivery, indent, commercial, job, price, provision, sale, delivery note, invoice</i>
<i>Personal relationships</i>		
Familiar and friendship	<i>parent*, suocer*, nipot*, zi*, padre, madre, figli*, moglie, marito, cognat*, famili*, amicizia, amic*, cen*</i>	<i>parent, nephew, uncle, father, mother, son, wife, husband, sister, brother, famil*, friendship, friend, dinner</i>
Geographical	<i>territori*, Sangro, Atessa, Abruzzo, Guardiagrele</i>	<i>territory, Sangro, Atessa, Abruzzo, Guardiagrele</i>
Other trust-based	<i>fiduci*, politic*, partit*</i>	<i>trust, politics, party</i>
<i>Professional relationships</i>		
Associations (consortium)	<i>cisi, consorzio, associazione, assemble*, soci*, consorziat*, presidente, membr*, incontr*, riunion*, assemble*</i>	<i>cisi, consortium, association, convention, partner, president, member, meeting, assembly</i>
Associations (other)	<i>associazione*, assemble*, riunione*</i>	<i>association, convention, meeting</i>
Clients (Honda)	<i>Honda, Di Lorenzo</i>	<i>Honda, Di Lorenzo</i>
Clients (other)	<i>client*, acquirent*, comprator*, Sevel, Fiat, Bmw, Rotax, Iguzzini, Ducati, Toyota, Faaq, Pilkinton</i>	<i>client, buyer, purchaser, Sevel, Fiat, Bmw, Rotax, Iguzzini, Ducati, Toyota, Faaq, Pilkinton</i>
Competitors	<i>concorrent*, competitor*, competitiv*, concorrenz*, competizion*</i>	<i>concurrent, competitor, competitive competition</i>
Suppliers	<i>fornitor*</i>	<i>supplier*</i>

Appendix F. Sources and references coded (CISI consortium).

	Sources	References
<i>Innovative activities</i>	14	192
Product–process innovations	11	24
Organizational innovations	12	22
ITs-related innovations	14	151
<i>Strategic activities</i>	12	45
Growth	6	11
Marketing	9	21
Shared culture	8	15
<i>Operational activities</i>	14	237
Budgeting–planning	9	37
Design–engineering	12	58
Purchasing	13	95
Sales	14	101
<i>Personal relationships</i>	13	45
Familiar and friendship	8	15
Geographic	10	14
Other trust-based	8	16
<i>Professional relationships</i>	14	314
Associations	14	85
Consortium	14	80
Other	4	8
Clients	14	192
Honda	14	123
Other	14	100
Competitors	14	37
Suppliers	14	81

References

Achrol, R.S., Reve, T., Stern, L.W., 1983. The environment of marketing channel dyads: a framework for comparative analysis. *Journal of Marketing* 47, 55–67.

Adler, P.S., Kwon, S.W., 2002. Social capital: prospects for a new concept. *The Academy of Management Review* 27, 17–40.

Ahuja, G., 2000. Collaboration networks, structural holes, and innovation: a longitudinal study. *Administrative Science Quarterly* 45, 355–425.

Amin, A., Thrift, N., 1994. Living in the global. In: Amin, A., Thrift, N. (Eds.), *Globalization, Institutions and Regional Development in Europe*. Oxford University Press, Oxford.

Anderson, J.C., Håkansson, H., Johanson, J., 1994. Dyadic business relationships within a business network context. *Journal of Marketing* 58, 1–15.

Araujo, L., Brito, C., 1997. Agency and constitutional ordering in networks: a case study of the port wine industry. *International Studies of Management & Organization* 27, 22–46.

Arora, A., Gambardella, A., 1990. Complementarity and external linkages: the strategies of large firms in biotechnology. *Journal of Industrial Economics* 38, 19.

Asheim, B.T., 2000. Industrial districts: the contributions of Marshall and beyond. In: Clark, G., Feldman, M., Gertler, M. (Eds.), *The Oxford Handbook of Economic Geography*. Oxford University Press, Oxford, pp. 413–431.

Audretsch, D.B., Stephan, M., 1996. Spillovers and the geography of innovation and production. *American Economic Review* 86.

Baker, W., 1990. Market networks and corporate behavior. *American Journal of Sociology* 96, 589–625.

Baptista, R., 2000. Do innovations diffuse faster within geographical clusters? *International Journal of Industrial Organization* 18, 515–535.

Baptista, R., Swann, P., 1998. Do firms in clusters innovate more? *Research Policy* 27, 525–540.

Bayo-Moriones, A., Lera-Lopez, F., 2007. A firm-level analysis of determinants of ICT adoption in Spain. *Technovation* 27, 352–366.

Bazzoli, G.J., Harmata, R., Chan, C., 1998. Community-based trauma systems in the United States: an examination of structural development. *Social Science & Medicine* 46, 1137–1149.

Becattini, G., 1986. Small firms and industrial districts: the experience of Italy. *Economia Internazionale* 39, 98–103.

- Becattini, G., 1990. The Marshallian industrial districts as a socio-economic notion. In: Pyke, F. (Ed.), *Industrial Districts and Inter-firm Co-operation in Italy*. International Institute for Labour Studies, Geneva.
- Becattini, G., 1991. The industrial district as a creative milieu. In: Benko, G., Dunford, M. (Eds.), *Industrial Change and Regional Development*. Belhaven Press, London, pp. 102–116.
- Bellandi, M., 1989. The industrial district in Marshall. In: Goodman, E., Bamford, J. (Eds.), *Small Firms and Industrial Districts in Italy*. Routledge, London, pp. 136–152.
- Berelson, B., 1952. *Content Analysis in Communication Research*. Free Press, Glencoe, IL.
- Borgatti, S.P., Everett, M.G., Freeman, L.C., 2002. UCINET for Windows: Software for Social Network Analysis. Harvard Analytic Technologies 2006.
- Borgatti, S.P., Foster, P.C., 2003. The network paradigm in organizational research: a review and typology. *Journal of Management* 29, 991.
- Boschma, R., 2005. Proximity and innovation: a critical assessment. *Regional Studies* 39, 61–74.
- Boschma, R., 2005. Proximity and innovation: a critical assessment. *Regional Studies* 39, 61–74.
- Boschma, R.A., 2004. Competitiveness of regions from an evolutionary perspective. *Regional Studies* 38.
- Brass, D.J., Galaskiewicz, J., Greve, H.R., Tsai, W., 2004. Taking stock of networks and organizations: a multilevel perspective. *Academy of Management Journal* 47, 795–817.
- Breschi, S., Lissoni, F., 2001. Knowledge spillovers and local innovation systems: a critical survey. *Industrial and Corporate Change* 10, 975–1005.
- Brown, J.S., Duguid, P., 2001. Knowledge and organization: a social-practice perspective. *Organization Science* 12, 198–213.
- Burt, R.S., 1980. Models of network structure. *Annual Review of Sociology* 6, 79–141.
- Burt, R.S., 1982. A note on cooptation and definitions of constraint. In: Marsden, P.V., Lin, N. (Eds.), *Social Structure and Network Analysis*. Sage Publications, Beverly Hills, pp. 219–233.
- Burt, R.S., 1987. Social contagion and innovation: cohesion versus structural equivalence. *The American Journal of Sociology* 92, 1287–1335.
- Burt, R.S., 1992. *Structural Holes: The Social Structure of Competition*. Harvard University Press, Cambridge, MA.
- Burt, R.S., 1997. A note on social capital and network context. *Social Networks* 19, 355–373.
- Capaldo, A., 2007. Network structure and innovation: the leveraging of a dual network as a distinctive relational capability. *Strategic Management Journal* 28, 585–608.
- Castanias, R.P., Helfat, C.E., 1991. Managerial resources and rents. *Journal of Management* 17, 155–171.
- Coase, R.H., 1937. The nature of the firm. *Economica* 4, 386–405.
- Cooke, P., 2001. Regional innovation systems, clusters, and the knowledge economy. *Industrial and Corporate Change* 10, 945–974.
- Cooke, P., Wills, D., 1999. Small firms, social capital and enhancement of business performance through innovation programmes. *Small Business Economics* 13, 219–234.
- Cooley, C.H., 1909. *Social Organization*. Schocken, New York.
- Cowan, R., Jonard, N., 2004. Network structure and the diffusion of knowledge. *Journal of Economic Dynamics and Control* 28, 1557–1575.
- Cross, R., Borgatti, S.P., 2000. The ties that share: relational characteristics that facilitate knowledge transfer and organizational learning. In: *INSNA Social Networks Conference*, Vancouver, Canada.
- Cunningham, M.T., Homse, E., 1986. Controlling the marketing-purchase interface: resource development and organisational implication. *Industrial Marketing and Purchasing* 1, 3–25.
- Dahl, M.S., Pedersen, C.R., 2004. Knowledge flows through informal contacts in industrial clusters: myth or reality? *Research Policy* 33, 1673–1686.
- Deroian, F., 2002. Formation of social networks and diffusion of innovations. *Research Policy* 31, 835–846.
- Dittrich, K., Duysters, G., 2007. Networking as a means to strategy change: the case of open innovation in mobile telephony. *Journal of Product Innovation Management* 24, 510–521.
- Dore, R., 1987. *Taking Japan Seriously*. Stanford University Press, Stanford, CA.
- Dosi, G., 1988. Sources, procedures and microeconomic effects of innovation. *Journal of Economic Literature* 36, 1126–1171.
- Doz, Y.L., 1987. Technology partnerships between larger and smaller firms: some critical issues. *International Studies of Management and Organization* 17, 31–57.
- Duriau, V.J., Reger, R.K., Pfarrer, M.D., 2007. A content analysis of the content analysis literature in organization studies: research themes, data sources, and methodological refinements. *Organizational Research Methods* 10, 5–34.
- Dyer, J.H., Singh, H., 1998. The relational view: cooperative strategy and sources of interorganizational competitive advantage. *The Academy of Management Review* 23, 660–679.
- Edquist, C., 1997. *Systems of Innovation: Technologies, Institutions and Organizations*. Pinter/Cassell, London.
- Edquist, C., Johnson, B., 1997. Institutions and organisations in systems of innovation. In: Edquist, C. (Ed.), *Systems of Innovation: Technologies, Institutions and Organizations*. Pinter/Cassell Academic, London.
- Eisenhardt, K., 1989. Building Theories from Case Study Research. *Academy of Management Review* 14, 532–550.
- Ettlinger, N., 2003. Cultural economic geography and a relational and microspace approach to trusts, rationalities, networks, and change in collaborative workplaces. *Journal of Economic Geography* 3, 145–171.
- Everett, M., Borgatti, S.P., 2005. Ego network betweenness. *Social Networks* 27, 31–38.
- Faems, D., Janssens, M., Madhok, A., Van Looy, B., 2008. Toward an integrative perspective on alliance governance: connecting contract design, trust dynamics, and contract application. *The Academy of Management Journal* 51, 1053–1078.
- Festinger, L., Schacter, S., Back, K.W., 1950. *Social Pressures in Informal Groups*. Stanford Univ. Press, Stanford.
- Gabrielli, A., 2000. *Dizionario dei Sinonimi e Contrari*. Loescher Editore.
- Galaskiewicz, J., 2007. Has a network theory of organizational behavior lived up to its promises? *Management and Organization Review* 3, 1–18.
- Garofoli, G., 1991. *Modelli Locali di Sviluppo*. Franco Angeli, Milano.
- Gebauer, J., Tang, Y., Baimai, C., 2008. User requirements of mobile technology: results from a content analysis of user reviews. *Information Systems and E-Business Management* 6, 361–384.
- Gilsing, V., Nootboom, B., Vanhaverbeke, W., Duysters, G., van den Oord, A., 2008. Network embeddedness and the exploration of novel technologies: technological distance, betweenness centrality and density. *Research Policy* 37, 1717–1731.
- Giuliani, E., Bell, M., 2005. The micro-determinants of meso-level learning and innovation: evidence from a Chilean wine cluster. *Research Policy* 34, 47–68.
- Giuliani, E., Bell, M., 2007. Catching up in the global wine industry: innovation systems, cluster knowledge networks and firm-level capabilities in Italy and Chile. *International Journal of Technology and Globalisation* 3, 197–223.
- Gomes-Casseres, B., 2006. How alliances reshape competition. In: Shenkar, O., Reuer, J.J. (Eds.), *Handbook of Strategic Alliances*. Sage, Thousand Oaks, CA, pp. 39–53.
- Grandori, A., 1997. Governance structure, coordination mechanism and cognitive models. *Journal of Management and Governance* 1, 29–47.
- Grandori, A., Soda, G., 1995. Inter-firm networks: antecedents, mechanisms and forms. *Organization Studies* 16, 183–214.
- Granovetter, M., 1973. The strength of weak ties. *American Journal of Sociology* 78, 1360–1380.
- Granovetter, M., 1983. The strength of weak ties: a network theory revisited. *Sociological Theory* 1, 201–233.
- Granovetter, M., 1985. Economic action and social structure: the problem of embeddedness. *American Journal of Sociology* 91, 481–510.
- Granovetter, M., 1992. Problems of explanation in economic sociology. In: Nohria, N., Eccles, R. (Eds.), *Networks and Organizations*. Harvard Business School Press, Boston, pp. 25–56.
- Gray, B., 1989. *Collaborating: Finding Common Ground for Multiparty Problems*. Jossey-Bass, San Francisco, CA.
- Gulati, R., 1995. Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *The Academy of Management Journal* 38, 85–112.
- Gulati, R., 1998. Alliances and networks. *Strategic Management Journal* 19, 293–317.
- Hansen, M.T., 1999. The search-transfer problem: the role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly* 44, 82–111.
- Harrison, B., 1992. Industrial districts: old wines in new bottles. *Regional Studies*, 26.
- Hausmann, U., 1996. Neither industrial district nor innovative milieu: entrepreneurs and their contexts. An actor-oriented framework and case studies from Greater London and Zurich. In: *36th European Congress of the RSA, Zurich, Switzerland*.
- Holm, D.B., Eriksson, K., Johanson, J., 1999. Creating value through mutual commitment to business network relationships. *Strategic Management Journal* 20, 467–486.
- Inkpen, A.C., Tsang, E.W.K., 2005. Social capital, networks, and knowledge transfer. *Academy of Management Review* 30, 146–165.
- Insch, G.S., Moore, J.E., Murphy, L.D., 1997. Content analysis in leadership research: examples, procedures, and suggestions for future use. *The Leadership Quarterly* 8, 1–25.
- Iubatti, D., Masciarelli, F., Simboli, A., 2010. Inter-organizational design: exploring the relationship between formal architecture and ICT investments. In: Passiante, G. (Ed.), *Evolving Towards the Internetworked Enterprise*. Springer, US, pp. 163–174.
- Johanson, J., Vahlne, J.-E., 2003. Business relationship learning and commitment in the internationalization process. *Journal of International Entrepreneurship* 1, 83–101.
- Johnston, R., Lawrence, P.R., 1998. Beyond vertical integration: the rise of the value-adding partnership. *Harvard Business Review* 66, 95–101.
- Kassarjian, H., 1977. Content analysis in consumer research. *Journal of Consumer Research* 4, 8–18.
- Keeble, D., Wilkinson, F., 1999. Collective learning and knowledge development in the evolution of regional clusters of high technology SMEs in Europe. *Regional Studies* 33, 295–303.
- Knight, L., Pye, A., 2005. Network learning: an empirically derived model of learning by groups of organizations. *Human Relations* 58, 369.
- Knoke, D., 1990. *Political Networks: The Structural Perspective*. Cambridge University Press, New York.
- Kogut, B., 2000. The networks as knowledge: generative rules and the emergence of structure. *Strategic Management Journal* 21, 405–425.
- Krackhardt, D., 1987. Cognitive social structures. *Social Networks* 9, 109–134.
- Krackhardt, D., 1992. The strength of strong ties: the importance of Philos in organizations. In: Nohria, N., Eccles, R.G. (Eds.), *Networks and Organizations: Structure, Form and Action*. Harvard Business School Press, Boston, pp. 216–239.

- Krippendorff, K., 2003. *Content Analysis: An Introduction to its Methodology*. Sage Publications.
- Larson, A., 1992. Network dyads in entrepreneurial settings: a study of the governance of exchange relationships. *Administrative Science Quarterly* 37.
- Laursen, K., Masciarelli, F., Prencipe, A., 2011. Regions matter: how localized social capital affects innovation and external knowledge acquisition. *Organization Science*, doi:10.1287/orsc.1110.0650.
- Lawson, B., Petersen, K.J., Cousins, P.D., Handfield, R.B., 2009. Knowledge sharing in interorganizational product development teams: the effect of formal and informal socialization mechanisms. *Journal of Product Innovation Management* 26, 156–172.
- Leonard-Barton, D., 1990. A dual methodology for case studies: synergistic use of a longitudinal single site with replicated multiple sites. *Organization Science* 1, 248–266.
- Lincoln, J.R., 1990. Japanese organizations and organizations theory. In: Cummings, L., Staw, B. (Eds.), *Research in Organizational Behavior*. JAI Press, pp. 255–294.
- Lissoni, F., 2001. Knowledge codification and the geography of innovation: the case of Brescia mechanical cluster. *Research Policy* 30, 1479–1500.
- Lorenzen, M., 2001. Tie, trust, and trade. Elements of a theory of coordination in industrial clusters. *International Studies of Management and Organization* 31, 14–34.
- Lorenzoni, G., Lipparini, A., 1999. The leverage of interfirm relationships as a distinct organizational capability. *Strategic Management Journal* 20, 317–338.
- Lundvall, B.-Å., 1992. *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. Pinter Publishers, London.
- Lundvall, B.A., 1993. Explaining interfirm cooperation and innovation. In: Grabher, G. (Ed.), *The Embedded Firm: On the Socioeconomics of Industrial Networks*. Routledge, London/New York.
- Malerba, F., Orsenigo, L., 2000. Knowledge, innovative activities and industrial evolution. *Industrial and Corporate Change* 9, 289–314.
- Marsden, P.V., Campbell, K.E., 1984. Measuring tie strength. *Social Forces* 63, 482.
- Marshall, A., 1890. *Principles of Economics*. Macmillan, London.
- Maskell, P., Malmberg, A., 1999. The competitiveness of firms and regions. 'Ubiquitification' and the importance of localized learning. *European Urban and Regional Studies* 6.
- Mellewigt, T., Madhok, A., Weibel, A., 2007. Trust and formal contracts in interorganizational relationships—substitutes and complements. *Managerial and Decision Economics* 28, 833–847.
- Moller, K., Rajala, A., Svahn, S., 2005. Strategic business nets—their type and management. *Journal of Business Research* 58, 1274–1284.
- Morgan, K., 2004. The exaggerated death of geography: learning, proximity and territorial innovation systems. *Journal of Economic Geography* 4, 3–21.
- Morris, R., 1994. Computerized content analysis in management research: a demonstration of advantages & limitations. *Journal of Management* 20, 903–931.
- Oppenheim, A.V., 2000. *Questionnaire Design, Interviewing and Attitude Measurement*. Pinter, London.
- Padgett, J., Powell, W., 2011. *The Emergence of Organizations and Markets*. Princeton University Press.
- Pantjadarma, D., 2004. The potential role for an ICT entrepreneur in accelerating SME development in Indonesia: the case of the metal working industries in Tegal. *Journal for International Business and Entrepreneurship Development* 2, 17–24.
- Park, S.H., 1996. Managing an interorganizational network: a framework for of the institutional mechanism for network control. *Organization Studies* 17, 795–824.
- Passiante, G., 2010. *Evolving Towards the Internetworked Enterprise*. Springer, US.
- Patrucco, P.P., 2003. Institutional variety, networking and knowledge exchange: communication and innovation in the case of the Brianza technological district. *Regional Studies* 37, 159–172.
- Pavitt, K., 1984. Sectoral patterns of technical change: towards a taxonomy and a theory. *Research Policy* 13, 343–373.
- Petersen, K.J., Handfield, R.B., Ragatz, G.L., 2003. A model of supplier integration into new product development. *Journal of Product Innovation Management* 20, 284–299.
- Pfeffer, J., Salancik, G.R., 1978. *The External Control of Organizations*. Harper and Row, New York.
- Podolny, J., Stuart, T., 1995. A role-based ecology of technological change. *American Journal of Sociology* 100, 1224–1260.
- Powell, W., 1990. Neither market nor hierarchy: network forms of organization. *Research in Organizational Behaviour* 12, 295–336.
- Powell, W.W., Koput, K.W., Smith-Doerr, L., 1996. Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology. *Administrative Science Quarterly* 41, 116–145.
- Powell, W.W., Smith-Doerr, L., 1994. Networks and economic life. In: Smelser, N.J., Swedberg, R. (Eds.), *The Handbook of Economic Sociology*. Princeton University Press, pp. 368–402.
- Provan, K.G., Fish, A., Sydow, J., 2007. Interorganizational networks at the network level: a review of the empirical literature on whole networks. *Journal of Management* 33, 479–516.
- Putnam, R.D., 1993. The prosperous community: social capital and public life. *The American Prospect* 13, 35–42.
- Rallet, A., Torre, A., 1999. Is geographical proximity necessary in the innovation networks in the era of global economy? *Geographical Journal* 49, 373–380.
- Rumelt, R.P., 1984. Towards a strategic theory of the firm. In: Lamb, R.B. (Ed.), *Competitive Strategic Management*. Englewood Cliffs, New Jersey.
- Sammarra, A., Baggio, L., 2008. Heterogeneity and specificity of inter-firm knowledge flows in innovation networks. *Journal of Management Studies* 45, 800–829.
- Scott, J., 1988. Social network analysis. *Sociology* 22, 109.
- Smith, T.S., Stevens, G.T., 1999. The architecture of small networks: strong interaction and dynamic organization in small social systems. *American Sociological Review* 64, 403–420.
- Smith-Doerr, L., Powell, W.W., 2004. Networks in economic life. In: Smelser, N.J., Swedberg, R. (Eds.), *The Handbook of Economic Sociology*. Princeton University Press and Russell Sage Foundation, Princeton.
- Smith-Ring, P., Van De Ven, A.H., 1992. Structuring cooperative relationships between organizations. *Strategic Management Journal* 13, 483–498.
- Smitka, M., 1991. *Competitive Ties: Subcontracting in the Japanese Automotive Industry*. Columbia University Press, New York.
- Sonpar, K., Golden-Biddle, K., 2008. Using content analysis to elaborate adolescent theories of organization. *Organizational Research Methods* 11, 795–814.
- Sorenson, O., Rivkin, J.W., Fleming, L., 2006. Complexity, networks and knowledge flow. *Research Policy* 35, 994–1017.
- Storper, M., 1997. *The Regional World: Territorial Development in a Global Economy*. The Guilford Press.
- Storper, M., Walker, R., 1989. *The Capitalist Imperative: Territory, Technology, and Industrial Growth*. New York.
- Swaminathan, V., Moorman, C., 2009. Marketing Alliances, Firm Networks, and Firm Value Creation. *Journal of Marketing* 73, 52–69.
- Thompson, J., 1967. *Organizations in Action*. McGraw Hill.
- Tortoriello, M., Krackhardt, D., 2010. Activating cross-boundary knowledge: the role of Simmelian ties in the generation of innovations. *Academy of Management Journal* 53, 167–181.
- Uzzi, B., 1996. The sources and consequences of embeddedness for the economic performance of organizations: the network effect. *American Sociological Review* 61, 674–698.
- Uzzi, B., 1997. Social structure and competition in interfirm networks: the paradox of embeddedness. *Administrative Science Quarterly* 42, 35–67.
- Van Raak, A., Paulus, A., 2001. A sociological systems theory of interorganizational network development in health and social care. *Systems Research and Behavioral Science* 18, 207–224.
- VanMaanen, J., 1998. *Qualitative Studies of Organizations*. Sage.
- Walker, G., 1988. Network analysis for cooperative interfirm relationships. In: Contractor, F.J., Lorange, P. (Eds.), *Cooperative Strategies in International Business*. Lexington Books, Lexington, MA.
- Walker, G., Kogut, B., Shan, W., 1997. Social capital, structural holes and the formation of an industry network. *Organization Science* 8, 109–125.
- Wasserman, S., 1994. *Social Network Analysis: Methods and Applications*. Cambridge University Press.
- Whittington, K.B., Owen-Smith, J., Powell, W.W., 2009. Networks, propinquity, and innovation in knowledge-intensive industries. *Administrative Science Quarterly* 54, 90.
- Williamson, O., 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. Free Press, New York.
- Williamson, O., 1979. Transaction Cost Economics: The Governance of Contractual Relations. *The Journal of Law and Economics* 22, 233–261.
- Yin, R.K., 1994. *Case Study Research: Design and Methods*. Sage Publications, Thousand Oaks, CA.
- Zaheer, A., Soda, G., 2009. Network evolution: the origins of structural holes. *Administrative Science Quarterly* 54, 1–31.