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I NEED YOU, BUT DO I LOVE YOU? STRONG TIES AND INNOVATION IN SUPPLIER–CUSTOMER RELATIONS.

Abstract:

Research on supplier–customer relationships has attracted a great deal of attention, as such relationships can positively impact firms' knowledge acquisition and innovation. Within this stream of research, strong ties with customers have been explored with attention to their beneficial and detrimental effects, presenting a paradox to be addressed. To contribute to this debate, we suggest focusing on how tie strength is measured, and accordingly, we return to the seminal definition of tie strength by Granovetter (1973), who defines it as a combination of behavioural and affective components. We acknowledge that the two components have different characteristics and dynamics, which urges us to unbundle the two components and measure their separate impacts on knowledge acquisition and innovation. To further investigate the role of tie strength in innovation, we hypothesize and test the mediating role of knowledge acquisition. We test our hypothesis in vertical partnerships between small- and medium-sized enterprises (SMEs) located in a high-tech cluster and their key customers. We show that the unbundled components of strong ties have a direct positive impact on the knowledge acquisition of high-tech SMEs and an indirect positive impact on innovation, with knowledge acquisition mediating the effect. Our study contributes to the debate on the paradox of tie strength in supplier–customer relations by providing and empirically testing a research approach that might complement the previous approaches and by shedding light on

the important role of the affective component of tie strength in knowledge acquisition and innovation.

Keywords: Supplier–Customer Relationship; Knowledge Acquisition, Innovation, Strong Ties

1. Introduction

Studies in the area of innovation management have dedicated a great deal of attention to the impact of supplier–customer relationships on the acquisition of knowledge and innovation (Dyer & Singh 1998; Dyer & Nobeoka 2000; Ritala et al. 2015; Kale et al 2000; Inkpen & Tsang 2007). Within this area, there is a stream of research that has nurtured the debate on the positive and negative impacts of strong inter-organizational ties on partners' capability to access and exploit knowledge to innovate. For some authors, strong ties enable the development of trust between the buyer and the supplier and can favour the exchange of complex and tacit knowledge (Yli-Renko et al., 2001; Martinez-Cañas et al, 2012); however, for many others, they are detrimental to knowledge acquisition and limit innovation (Granovetter, 1973; Burt, 1992; McEvily & Zaheer, 1999). With strong ties considered both as a resource and a liability, some researchers envisage a paradox that firms should address (Danneels, 2003). The empirical evidence on the impact of strong ties is contradictory. Some researchers have addressed the paradox by predicting an inverted U-shaped relation between the level of tie strength and innovation (Granovetter, 1973; Uzzi, 2006; Tomlinson & Fai, 2016). These results have not always been confirmed (Lowik et al., 2012). Other authors address the paradox suggesting that some contingency factors (e.g., the nature of customer participation and the degree of product newness) might interact with tie strength and produce

different impacts on knowledge acquisition and innovation (Bonner & Walker, 2004; Fredberg & Piller, 2011. If these different approaches suggest useful paths to cope with contradictions, their results are still preliminary, and the debate is far from closed.

The aim of this study is to contribute to the debate by suggesting a further approach that might eventually complement the previous approaches. We suggest focussing on how tie strength is measured, and accordingly, we go back to the seminal definition of tie strength by Granovetter (1973, p.1361), who defines it as a "combination of the amount of time, the emotional intensity, the intimacy (mutual confiding) and the reciprocal services which characterize the tie". Granovetter's definition of strong ties disentangles the two components of strong ties: the behavioural component, referring to the amount of time and the reciprocal services that characterize the tie, and the less investigated component of tie strength, the affective elements of strong ties, referring to the emotional intensity and the intimacy (mutual confiding) at the interpersonal level. The affective component is considered by Granovetter (1973) to be a strong motivation for investing time and resources in sharing any kind of knowledge. Not surprisingly, Granovetter's approach greatly influenced innovation studies, where the role of tie strength is evaluated in terms of the knowledge acquisition and innovation of individuals and organizations.

Although the behavioural component has been investigated in different studies, the affective component has rarely been considered with reference to knowledge acquisition and innovation (Krackardt 2003), and in these few cases, it was always analysed in a bundled way, with the affective and the behavioural components considered in the same construct (Kale et al., 2000; Kautunen et al., 2010; Lowik et al 2012; Ebers & Maurer 2014). We find an exception in the industrial marketing literature, where tie strength in its two components

is considered with reference to the degree of resistance of a supplier–customer relationship to disruption (Wilson & Mummalaneni, 1986) and to its impact on trust and commitment among partners (Rodriguez & Wilson, 2002) and on customer loyalty (Berry & Parasuraman, 1991). The behavioural component of tie strength is based on the task interdependencies between the supplier and the customer and reflects investments, contractual conditions, obligations and expectations. It represents the degree to which certain ties link and hold a customer and a supplier together in an economic, strategic and organizational sense, regardless of personal–emotional matters (Rodriguez & Wilson, 2002). On the other hand, the affective component of tie strength refers to the degree to which a relationship between a buyer and a seller is linked closely in a personal sense through friendship, familiarity, social support, regular contact, self-disclosure and any other interpersonal interactions (Han, 1991; Rodriguez & Wilson, 2002). In supplier–customer relationships, personal contacts occur between various individuals and groups and at different hierarchical levels. These studies have been particularly interested in shedding light on the role of the affective component of tie strength. A merit of these studies is their evidence that the two components might exert heterogeneous influence on different performance indicators. However, they do not investigate the separate impact of these components on knowledge acquisition and innovation.

According to these studies and Granovetter (1973), we believe that although the two components are interrelated, they may vary in different ways. We recognize that the behavioural component tends to develop first and that the affective component does not always develop at the same pace as the behavioural component. Affective interpersonal relations might not always develop smoothly, and they could even become negative. Only by

unbundling the two components, we can acknowledge their different characteristics and dynamics. This brings to the fore our main research question: with reference to supplier–customer relations, what is the impact of the different components of tie strength on knowledge acquisition? To further investigate the role of tie strength in innovation, we hypothesize and test the mediating role of knowledge acquisition between the behavioural and affective components of tie strength and innovation.

The empirical setting consists of high-tech small- and medium-sized entrepreneurs (SMEs) belonging to a geographical cluster located in Tiburtina Valley in central Italy. We focus on the vertical strategic partnerships between these firms and their key customers located both within and outside the cluster.

This study is intended to contribute to the literature in two ways. First, we contribute to the debate on the paradox concerning the role of strong ties in supplier–customer relations, providing a further research approach, in addition to the one based on the contingent factors interacting in the relationship between tie strength and knowledge acquisition and innovation. We claim that the impact of tie strength can also depend on how we define and measure it, and we thus unbundle its components, recognizing their characteristics and dynamics and considering their separate roles.

A second contribution is related to the explicit evaluation of the role of the affective component of tie strength in knowledge acquisition and innovation, which has not previously been investigated in empirical studies of supplier–customer relations.

The paper is structured as follows: we review previous research on the topic and propose hypotheses. Then, the empirical setting and results are described. Finally, the findings are

discussed, including implications for theory, practitioners and institutions, limitations, future research and conclusions.

2. Theoretical framework

Research on supplier–customer relationships has attracted a great deal of attention, as these relationships can positively impact firms' knowledge acquisition and innovation. Within this stream of research, strong ties with customers have been explored with attention to their beneficial and detrimental effects. In Table 1, we summarize the major advantages and disadvantages of strong ties identified in innovation studies.

With strong ties in supplier–customer relations considering both as assets and liabilities, a paradox for firms is identified (Danneels, 2003). Scholars have found a curvilinear relationship with knowledge acquisition by firms (Uzzi, 1996) and theorized about the benefits of a dual network structure combining both strong and weak ties (Capaldo, 2007). Tomlinson & Fai (2016) found that strong ties with suppliers have a curvilinear relation with product innovation, but not with process innovation, while they found that the relationship between tie strength with customers and innovation (both product and process) was always positive. Other authors have found evidence of a persistent positive relationship between strong ties at the dyad level and knowledge acquisition even within networks rich in weak ties (Lowik et al., 2012; Rost, 2011). Similar contrasting results can also be found in studies adopting the social capital approach to innovation, where Granovetter's seminal contribution to tie strength was deeply assimilated (Yli-Renko et al., 2001; Martinez-Canas et al., 2012;).

The paradox regarding the link of strong ties with knowledge acquisition and innovation and the contradictory results have been addressed considering the interactive role of different

factors. Fredberg & Piller (2011), in a qualitative study, found that Adidas's strong ties with customers supported both incremental and radical innovation, but only high levels of customer involvement resulted in the development of a new product with a radically different product architecture. Bonner & Walker (2004) predicted that the positive relationship between tie strength and innovation is negatively moderated by the level of product newness. Their study did not confirm this prediction, and a strong positive relationship was found between tie strength and innovation for incremental projects.

TABLE 1 ABOUT THERE

Although encouraging, this approach is still at a preliminary stage, and the debate is far from closed. We suggest a further approach that might complement the previous approach. We focus on how tie strength is measured, and accordingly, we go back to the seminal definition of tie strength by Granovetter (1973, p.1361), which disentangles the two components of strong ties, considering both the behavioural component of strong ties – that is, the amount of time and the reciprocity that are characteristics of the tie – and the less investigated component of tie strength, the affective component of strong ties – intimacy, mutual confiding and emotional intensity at the interpersonal level.

The affective component is considered by Granovetter (1973) to be a strongly motivating factor for investing time and resources in sharing any kind of knowledge. As a result, organizational scholars recognize that the informational and knowledge benefits of strong ties are a consequence of the affective link between them (Tsai & Goshal, 1998). Krackhardt (2003, p.217) calls for studies that recognize both the behavioural and the affective components of tie strength, claiming that "we seldom see the affective dimensions in the operationalization of strong ties". With the majority of innovation studies focussed on the

behavioural component of strong ties (mainly measured in terms of length of relationships and/or frequency of interaction), the affective component is not considered or addressed in a bundled way (Kale et al., 2000; Kautunen et al., 2010; Rost 2011; Lowik et al., 2012; Ebers & Maurer, 2014): behavioural and affective ties are measured and combined in an individual construct, which hinders the possibility of considering their possibly heterogeneous implications.

However, not surprisingly, industrial marketing scholars have considered both the behavioural and affective components of tie strength in supplier–customer relations and disentangled their role (Wilson, 1995). In business-to-business relationships, the role of key account managers in managing relationships with customers is recognized, and the affective relationship of personal interfaces is considered an important element of relational bonding with customers. Relational bonding is what tie strength is called in these studies. From this perspective, the starting point to address the relationship between two firms is the interdependence between them. Interdependence is based on the need to access the resources, knowledge and capabilities of other organizations, which are delivered in the form of products or services. Within this framework, the development of supplier–customer relationships can be seen as an evolutionary process in terms of increasing experience, reduction of uncertainty, perceived commitment, and formal and informal adaptations and investments.

A key contribution of these studies is the recognition of the possible different characteristics and dynamics of the two components of tie strength. Incremental investments and adaptation activities may create relational bonding between suppliers and customers (Han, 1991; Rodriguez & Wilson 2002). A component of tie strength that tends to develop first is called

"task bonding" or "structural bonding" (Han 1991; Wilson & Mummalaneni, 1986). When developed, it tends to influence the creation of affective ties among managers (McAllister, 1995; Nielson, 1998). It entails the multiplicity of economic, strategic and functional factors that develop during a relationship and involve explicit business benefits through technology and markets. Structural bonding reflects irretrievable investments in the relationship, social pressures to maintain it and contractual barriers. It is fundamentally linked to economic exchange and defined by negotiated transactions. The point highlighted here is the behavioural component of tie strength – the frequency of interaction and reciprocal services – at the organizational level.

The other component of tie strength in such studies is the bond that develops at the interpersonal level (called "social bonding"), which maintains customer loyalty through interpersonal friendship at the interpersonal level. It tends to develop later and grows not always at the same pace as the behavioural component. Social bonding may not develop smoothly, and it can even become negative. Chen (1995) described how friendship with service providers could lead customers to stay within a service firm. Marketers at this level stress staying in touch with their customers and expressing their friendship, rapport and social support (Berry, 1995). Interpersonal bonds, also investigated in customer-to-customer interactions (Lin et al., 2003), can thus be considered an expression of the affective component of tie strength between collaborating partners, including emotional intensity and intimacy at the interpersonal level.

From the industrial marketing perspective, the impact of tie strength in its two disentangled components is appreciated with reference to the degree of resistance of a relationship to disruption (Wilson & Mummalaneni, 1986) and its impact on trust and commitment among

partners (Rodriguez & Wilson, 2002) and customer loyalty (Zeithaml, et al., 1996). In these studies, the results are not homogeneous for both components of tie strength. For example, differences were discovered for the role of the affective component with respect to the role of the behavioural component in supplier–customer relationships depending on firms' nationality and the interpersonal orientation of the country (Williams et al., 1998; Rodriguez & Wilson, 2002). These studies, however, did not evaluate the role of the two unbundled components in knowledge acquisition and innovation, which is our major interest.

3. Research hypothesis development

We believe that by disentangling the two components and exploring their separate impacts on knowledge acquisition and innovation, it is possible to contribute to the still flourishing debate on tie strength, knowledge acquisition and innovation, redirecting scholars' attention to the implications of a more informed measure of tie strength based on the possible different characteristics and dynamics of its two components.

3.1 The role of the behavioural component of tie strength in knowledge acquisition

The behavioural component of tie strength is based on the task interdependences between the supplier and the customer, and it reflects formal aspects, such as contractual conditions, investments, commitments and prospects. In the case of a customer and a supplier together, this component represents the degree to which ties connect and hold them together in the business, strategic and organizational dimensions, regardless of the emotional dimension (Ryais & Knox, 2001). These effects are recognized to increase the efficiency and effectiveness in operations and lead to value co-creation (Rodríguez & Wilson, 2002).

Extending this reasoning to innovation studies in supplier–customer relationships (Svare et al., 2015; Presutti et al., 2013; Flor et al., 2019), we claim that a high level of the behavioural component may motivate and enable an organization to access and acquire external knowledge. Additionally, it may trigger the supplier to address the customer's needs, and therefore, it may stimulate the supplier to identify and access all the information and knowledge needed from that customer (Dyer & Nobeoka, 2000; Rowley, et al., 2000). Moreover, as a firm becomes highly interdependent with a customer, a high level of the behavioural component develops knowledge-enhancing practices that favour the transfer, recombination and creation of knowledge. This was found to be true for different firms at both the dyad and network levels (Lipparini et al., 2014). We expect that the stronger the supplier's tie with the customer is in terms of the behavioural component, the more likely the supplier is to acquire knowledge from the customer. We formally express this as follows:

Hypothesis 1: *The greater the level of the behavioural component of tie strength is between a firm and its customer, the greater the knowledge that the firm acquires from the customer*.

3.2 The role of the affective component of tie strength in knowledge acquisition

The affective component of tie strength refers to the degree to which a relationship between a buyer and a seller is narrowly linked in a personal manner through friendship, familiarity, social support and any other interpersonal interactions (Granovetter, 1973; Han, 1991; Rodriguez & Wilson, 2002). In business-to-business relations, the role of key account managers in managing relationships with customers is recognized, and an affective relationship of personal interfaces is considered an important element of relational bonding with customers. In supplier–customer relationships, personal connections occur between

various individuals and groups and at various levels of hierarchy. Through these personal contacts, information is exchanged, negotiations are performed, adaptations are settled and crises are overcome. Buyers and sellers who have strong interpersonal relationships are more committed to maintaining their relationship than less socially bonded partners (Kachra & White, 2008). The information and knowledge exchange between social actors depend on the degree of emotional intimacy among them (Krackhardt, 2003), and this emotional closeness allows partners to reinforce trust (Rindfleisch & Moorman 2001), build expectations of reciprocity (Kachra & White, 2008), and transfer complex, sensitive and even tacit knowledge (Hansen, 1999).

Although the constraints of the supplier's behaviour may induce path dependency and inertia and limit the ability to pursue new opportunities (Portes & Sesenbrenner, 1993), we believe that the affective component allows the creation and maintenance of the proper conditions for knowledge exchange, exerting a positive impact on the transmission of tacit knowledge and on joint problem-solving arrangements. We suggest that this effect can overcome other possible negative consequences, thereby enabling knowledge acquisition by the supplier. Consequently, we propose the following hypothesis:

Hypothesis 2: *The greater the level of the affective component of tie strength is between a firm and its customer, the greater the knowledge the firm acquires from the customer.*

3.3 Knowledge acquisition and innovation

External knowledge acquisition creates new knowledge by providing opportunities for integration with a firm's internal existing knowledge (Yli-Renko et al. 2001), thus enlarging and improving the firm's knowledge base (Galunic & Rodan, 1998). Knowledge acquisition

also allows the identification and assimilation of significant knowledge in companies. In particular, ideas and insights are needed to improve the generation of new innovations and to improve the efficiency and effectiveness of their exploitation (Cohen & Levinthal, 1990). In fact, external knowledge acquisition positively affects innovative performance, combined with existing knowledge (Dyer & Singh, 1998; Lane & Lubatkin, 1998), particularly in terms of product innovation (Yli-Renko et al., 2001; Ritala et al., 2015). We consider this causal relationship as a baseline hypothesis due to its usefulness in completing our conceptual framework. We express the positive impact of knowledge acquisition by the supplier on innovation as follows:

Hypothesis 3: *The knowledge acquired from customers is positively associated with a firm's innovative performance.*

3.4 The mediating effect of knowledge acquisition

According to hypotheses 1 and 2, we expect that tie strength, in its two components, will facilitate the exchange of knowledge between the partners in a relationship. However, tie strength might not be a sufficient condition to enhance innovation. In fact, tie strength might be just a prerequisite for knowledge acquisition (Capaldo, 2007; Martinez-Cañas et al., 2012; Lipparini et al., 2014). Firms show diverse abilities to understand and exploit the advantages of strong ties, and they present different capacities by valuable knowledge acquisition and learning in their relationships. For instance, Fredberg & Piller (2011) argued that a strong tie does not automatically lead to better innovation: increased innovative performance depends on the firm's co-creation capabilities. We expect that tie strength, in both of its components,

has an indirect consequence on innovation through the acquisition of knowledge from customers.

This effect has been operationalized as a mediating effect (Baron & Kenny, 1986). Accordingly, we formulate the following hypotheses for innovative performance and for the two dimensions of tie strength.

Hypothesis 4: *The knowledge that a firm acquires from its customers positively mediates the relationship between the level of the behavioural component of tie strength with the customer and its innovative performance.*

Hypothesis 5: *The knowledge that a firm acquires from its customers positively mediates the relationship between the level of the affective component of tie strength with the customer and its innovative performance.*

Figure 1 shows the hypothesized model.

FIGURE 1 ABOUT HERE

4. Method

4.1 Sample and data

We investigated the vertical supplier–customer relationship of small- and medium-sized high-tech companies located in a geographical cluster near Rome (Majocchi et al., 2016; Ferras-Hernandez & Nylund, 2019; Capaldo & Petruzzelli, 2014) by capturing the point of view of the suppliers. Thus, the unit of analysis is constituted by vertical business relationships, and the unit of observation is the SME. These firms belong to the electronics sector, which includes the computer, electronics and telecommunications industries.

The database of the Chamber of Commerce of Rome is used for business descriptions, and to identify our sample, we excluded electronics firms without R&D activity or based only on non-technical services, identifying a total of 275 firms. A total of 130 of these firms agreed to complete the questionnaire (47% response rate). We compare the mean values of the responding and non-responding firms and did not find a significant response bias. Following Yli-Renko et al. (2001), companies were free to list their main customers, with a maximum of 10 partners. Therefore, we collected data on 511 main customers (3.9 key customers, on average).

Based on the Pavitt classification, the investigated firms can be considered "specialized suppliers" because they primarily produce and offer technology and services to their industrial customers. These supplier companies provide devices and systems based on integrating computing into electromechanical components. In recent years, companies have started to move more towards being providers of entire production lines, and customers access technology by acquiring products from suppliers. Consequently, the processes of knowledge acquisition and innovation depend on the interactive learning activity between customers and suppliers (Dyer & Sing,1998).

To collect data, we used a specially designed questionnaire by interviewing the entrepreneur, who is representative of small firms (McEvily & Zaheer, 1999). Only seven companies in our sample were managed by a team of entrepreneurs (5%), that is, by more than one entrepreneur. In this case, we considered the average of the values expressed by all entrepreneurs.

The questionnaire was pretested with the entrepreneurs of five randomly selected sample firms. We collected the data over 5 months, starting at the end of 2016.

The average age of the companies corresponds to 8 years, and they developed 8 new products per year, on average (range 1–23). The average sales of the companies amounted to €810,000. The percentage of R&D in total sales was 3.5%, on average (range 0.01–15%). The customers were similar in age to their suppliers but were smaller. Table 2 reports the descriptive statistics for the untransformed variables.

TABLE 2 ABOUT HERE

4.2 Measures

We measure all item values using a scale from 1 to 7.

4.2.1 Dependent variable: Innovative performance

We measured innovative performance following Rindfleisch & Moorman (2001). Specifically, we used four items illustrated in Table 5 to capture the impression of entrepreneurs about the innovativeness of their products developed in collaboration with their key customers over the past three years. We asked about the degree of novelty and creativity of the products and the ability to generate new ideas for other products or for the industry more in general.

To consider the level of innovative performance, which previous studies have analysed as a possible contingent factor (Bonner & Walker, 2004), we distinguish between high and low levels of innovative performance according to the different results obtained from the item responses; we used the median value (3.7), which is very similar to the average value (3. 5) to reach this result.

4.2.2 Mediating variable: Knowledge acquisition in the relationship

To measure knowledge acquisition, we used two statements, illustrated in Table 5, to capture the technological and market knowledge acquired by a firm from its key customers. We based this measurement on the works of Nooteboom et al. (1997) and Von Hippel (1988) as well as many other previous authors (i.e., Zahra et al., 2000; Yli-Renko & Autio, 1998).

4.3 Independent variables

4.3.1 Tie strength – the behavioural component

Following Han's work (1991, p.56), we consider the behavioural component of tie strength according to the extent to which the relationships between customers and suppliers are enriched by an economic, strategic and organizational components, regardless of personal (emotional) matters. We used two items to measure this variable (Koenig & Van Wijk, 1991; Table 5).

4.3.2 Tie strength – the affective component

In this study, we defined the affective component of tie strength as the closeness of the relationship between a customer and supplier at the interpersonal level, according to Han (1991, p. 57). We used two items based on the works of Han (1991) and Sullivan & Peterson (1982; Table 5).

4.4 Control variables

Several control variables are included in the model. First, we include the total sales of both the firms (Size) and their customers (CustSize) to check for the effects of the size of the partners. Moreover, we computed (log) the age of the firms (Firm Age) and of the customers (CustAge) as the number of years since their foundation to check for the age effects. Finally,

in the analysis, we used R&D expenditure – the log value of the average ratio between R&D expenditures and total sales for the previous 3 years – as a control variable for a firm's interest in investing in absorptive capacities that are useful to its knowledge acquisition from its key customer (e.g., Cohen & Levinthal, 1990). Table 3 reports the correlations among the studied variables.

TABLE 3 ABOUT HERE

4.5 Reliability, validity and endogeneity

First, we reviewed the survey by pretesting the questionnaire with five entrepreneurs. Second, we used previously validated multi-item measures whenever possible to ensure the validity of selected variables. We used previously validated measures and Harman's one-factor test to manage the problem of common method variance. We obtain three factors with eigenvalues greater than one, with the first factor representing only 29% of the total variance and the dependent and independent variables loading on different factors. Moreover, in our study, we used many objective data observations from secondary sources; thus, common method variance is not a problem.

Moreover, we used the Durbin–Wu–Hausman test (Wooldridge, 2012) to discuss the potential endogeneity of the explanatory variables. The results, shown in Table 4, reveal that the endogeneity problem does not affect the data when both knowledge acquisition and product innovativeness are used as the dependent variables.

Finally, we run a robustness check in which the 5% of sample companies run by a team of entrepreneurs are omitted to ensure that team effects do not influence our results (7

companies out of a total of 130 companies). We obtain very similar or almost equal results. Table 4 reports the results of the Durbin–Wu–Hausman test.

TABLE 4 ABOUT HERE

4.6 Data Analysis

To test the hypotheses, we applied the partial least squares (PLS) analysis technique, a method of structural equation modelling that can estimate complex cause–effect relationship models with latent variables (Haenlein & Kaplan, 2004; James et al., 2006). This method is a component-based estimation approach that differs from the covariance-based structural equation modelling. Unlike covariance-based approaches to structural equation modelling, PLS–PM does not fit a common factor model to the data; rather, it fits a composite model. In doing so, it maximizes the amount of variance explained, which fits our dataset. The PLS results in our study indicate that this method is the most effective one to estimate the selected complex cause–effect relationship models with our latent variables. Thus, we can summarize that by using this method, we can analyse, explore and test our conceptual models and theory in the most effective way.

To ensure the validity of our model, we followed the two-stage procedure recommended by Anderson & Gerbing (1998): first, to test the reliability and validity of the data, we used confirmatory factor analysis; in the second stage, we identified the best structural model that fit the data, testing the supposed effects among the variables.

4.7 Results

4.7.1 Measurement model

Both factor and confirmatory factor analysis (Churchill, 1979) confirm the effectiveness of the selected model because the constructs have good internal consistency and reliability and indicate strong internal consistency because all our multiple-item constructs achieved Cronbach's alphas of 0.71 or higher (Table 5).

Moreover, the data show discriminant validity, as the average variance values of the factors are shown to be higher than the squared correlations between the constructs (Fornell & Larcker, 1981).

Table 5 shows the good overall fit of the model; the values are close to or above 0.90 with respect to the goodness-of-fit index, Bollen's incremental fit index (IFI) is ideal (Schumacker & Lomax, 1996), and the recommended range for the normed chi-square statistic is between 1.0 and 2.0 (Hair, et al., 1995). Thus, we can confirm that all of the variables are acceptable and can move to the second stage.

TABLE 5 ABOUT HERE

4.7.2 Nested model tests

In our model, which supposes mediation effects, we compared different nested models to select the best model by analysing the different chi-squares obtained. The results are presented in Table 6.

TABLE 6 ABOUT HERE

The four nested models are as follows: (1) a null model, where no relationships are assumed; (2) a saturated model, which consists of both direct relationships among the variables and indirect effects; (3) the hypothesized mediation model, which considers the indirect effects of both behavioural and affective components on innovation through knowledge acquisition and (4) a direct model, which considers only the direct effects of tie strength on product innovativeness.

First, in the comparison between the saturated and null models, we verify that the saturated model fits better than the null model. In the second step, as the difference in the chi-squares between the hypothesized model and the saturated model is not significant, we conclude that the hypothesized model provides a better fit with the data. Finally, the comparison between the direct and saturated models produces a significant difference in the chi-squares, indicating that the saturated model is preferable. Thus, we verify that the hypothesized mediation model fits the data better than the saturated and direct models (Table 7)

TABLE 7 ABOUT HERE

Table 8 shows the results of the hypothesized model. We consider both the aggregated results for innovative performance (first column) and the different results obtained for high and low levels of innovative performance, respectively, as specified in the measurement model.

TABLE 8 ABOUT HERE

The results support hypotheses 1 and 2, with significant and positive coefficients corresponding to 0.58 and 0.54, respectively. Thus, we verify that both the behavioural and the affective components are very effective in supporting knowledge acquisition between suppliers and customers.

Hypothesis 3 concerns the relationship between knowledge acquisition and product innovativeness. Additionally, in this case, we obtained a significant and positive coefficient of 0.49 between knowledge acquisition and product innovativeness. Thus, hypothesis 3 is supported. We also distinguish between high and low levels of innovative performance by verifying that knowledge acquisition positively and significantly impacts both low and high levels of innovative performance (0.52*** vs. 0.49**).

Hypothesis 4 suggests significant indirect effects of the behavioural component of tie strength on product innovativeness. As predicted, the indirect path through knowledge acquisition to product innovativeness (β=0.399) was significant. While a direct effect was not found, we obtained a full mediation of knowledge acquisition in the relationships, supporting hypothesis 4. The results are equal for the affective component of tie strength on product innovativeness, which shows no significant direct effect but only significant indirect effects on product innovativeness through knowledge acquisition (β=0.31). Thus, hypothesis 5 is supported.

Considering the difference between high and low levels of innovative performance, we can verify that both the behavioural and affective components positively and very significantly

impact high levels of innovative performance (0.33*** and 0.35***, respectively), while for low levels of innovative performance, they continue to be positive, but are less significant (0.08* and 0.11*, respectively).

Finally, for the control variable, we obtained only a positive correlation between firm size, R&D expenditure and knowledge acquisition (Table 7). Figure 2 shows the results of the model, including the distinction between low and high levels of innovative performance.

FIGURE 2 ABOUT HERE

5 Discussion and Conclusion

5.1 Discussion

Over the last few decades, the tie strength in supplier–customer relationships, particularly its role in the focal firm's knowledge acquisition and innovation, has attracted much attention. With tie strength considered as both an asset and a liability for the firms, a paradox was identified and investigated following different research paths: from the exploration of an inverted U-shaped relationship between tie strength and knowledge acquisition to the more recent identification of different contingent factors influencing the relation. Unfortunately, the empirical results are contrasting and/or still at a preliminary stage. We propose a further approach that might eventually be combined with the previous approach to address the paradox. Our approach is based on how tie strength is evaluated. We adopt the seminal definition by Granovetter, which recognizes the behavioural (task-related) and affective components of strong ties. While in innovation studies, the majority of the research is based

on the behavioural component and, if the two components are considered, they tend to be evaluated in a bundled way, in industrial marketing research, the diversity of the two components and their dynamics are appreciated, even if with reference to performance indicators not related to innovation. Accordingly, we disentangle and measure their impact, hypothesize on their direct impact on knowledge acquisition and test the mediating effect of knowledge between both components and innovation. Empirically, we analyse the vertical partnerships between SMEs and their key customers.

Our results indicate that both components positively impact knowledge acquisition. We do not find any difference in the way the two components impact knowledge acquisition. The positive relation between the behavioural dimension and knowledge acquisition substantiates the role of interdependence between the focal firm and its key customers in motivating the supplier to fulfil customers' needs and develop useful routines for learning (Nieto & Santamaria, 2007). The positive association between the affective component and knowledge acquisition is compatible with the assumption that the learning that takes place between different business partners is aided by personal and affective relationships built through interpersonal exchange. Strong interpersonal ties allow the creation and maintenance of the proper conditions for knowledge exchange. Our study suggests that this positive impact on the transmission of tacit knowledge and on joint problem-solving arrangements might overcome any possible detrimental effects. Moreover, because of our effort to disentangle the two components, we could show that not only the behavioural component at the organizational level (or a bundled combination of the two components), but also the less investigated affective component at the interpersonal level contributes to knowledge acquisition in supplier–customer relations.

By showing that the affective component also supports the knowledge acquisition of firms involved in relationships with their customers, we show that a combination of behavioural and affective components at the dyad level might contribute to increasing a firm's innovative performance, besides the already observed long-term stability of the relationship with customers (Wilson & Mummalaneni, 1986), the trust and commitment among partners (Rodriguez & Wilson 2002) and customer loyalty (Zeithaml, et al., 1996).

We also provide new evidence of the positive effect of the affective component of strong ties on knowledge search and acquisition at the inter-organizational level. We find that what was proven true at the intra-organizational level (Tsai & Ghoshal 1998) might be extended at the inter-organizational level, at least with regard to the relationship with key customers.

We also show the mediating role of knowledge acquisition between tie strength and knowledge exploitation in terms of innovation, confirming the essential role of knowledge acquisition in transforming the potential benefits of strong ties into concrete innovation outcomes. Accordingly, these results justify the interest in how organizations can acquire knowledge from their partners (Burgelman & Hitt, 2007). Moreover, we find support for the idea that strong ties with customers represent an enabling environment for innovation, but routines and other mechanisms have to be created to enable knowledge acquisition and to sustain the co-creation of innovation (Fredberg & Piller, 2011).

We find that knowledge acquisition mediates between the components of tie strength and innovation, but both components have a more significant impact at higher levels of innovative performance. This result somehow contradicts previous studies that expected (even if they could not confirm) the negative moderation of the level of product newness on the positive relation between tie strength and innovation (Bonner & Walker, 2004). Strong

ties, in their organizational and personal components, have a positive impact on innovation through knowledge acquisition, at both lower and higher levels of innovativeness, but this seems more significant for more innovative products. We believe that this is very coherent with the challenges of innovation processes characterized by high innovation content. Under these conditions, high levels of the behavioural component of tie strength lead the supplier to address the customer's needs and stimulate the supplier to identify and access all the information and knowledge needed, while high levels of the affective component enable the transmission of tacit knowledge and the establishment of joint problem-solving arrangements.

5.2 Conclusion

In recent years, research on supplier–customer relationships has developed significantly, as such relationships can positively impact firms' knowledge acquisition and innovation. Within this stream of research, strong ties with customers have been explored with attention to their beneficial and detrimental effects, presenting a paradox to be addressed. Our most important contribution is providing and empirically testing a research approach that might eventually complement previous approaches, which recognize that different factors might interact with tie strength and produce different results in terms of knowledge acquisition and innovation. We propose that the impact of tie strength can also depend on how we define and measure it. In fact, we unbundle its two components (behavioural and affective ones), recognize their different characteristics and dynamics and show their individual impacts on knowledge acquisition and innovation. The informed use of the tie strength construct, based on Granovetter's seminal definition, starts with the recognition of the different characteristics and dynamics of the behavioural and affective components of tie strength and supports a

separated evaluation of their impact on knowledge acquisition. We show that both components of strong ties in supplier–customer relations have a positive impact on knowledge acquisition and innovation, and we therefore contribute to addressing the call for more studies on how different levels of embeddedness in business-to-business relations impact knowledge and innovation (Lipparini et al., 2014). While we did not find significant differences in the role of the two components in our research, this could be contingent on our empirical setting, and future researchers could benefit from considering this distinction.

A second contribution is related to the explicit consideration of the role of the affective component of tie strength in knowledge acquisition and innovation that has not been previously investigated in empirical studies of supplier–customer relations. Our approach enables us to show the important role of the affective component of tie strength in knowledge acquisition and innovation in supplier–customer relations. As others have claimed at the organizational level (among others, Casciaro and Lobo, 2015, Gomez-Solorzano et al, 2019, Tasselli, 2019), it is imperative to appreciate the human element and its emotional and affective aspects in business-to-business relations, as it might greatly impact on their task-related performance.

In addition, this study also has managerial implications. First, as relationships with key customers provide access to resources and knowledge not otherwise available for innovation, this implies the need to competently coordinate and utilize a set of interrelated profitable relationships. The ability of managers to leverage strong external networks can be considered a strategic competency. Our study also suggests that firms need to invest in management systems to facilitate the exchange and acquisition of knowledge with key customers to

transform the strong ties with them into a source of opportunities and resources for innovation.

Our study suggests that to foster innovation, suppliers should invest in strong ties with key customers, developing both task interdependence with them and affective bonds at the interpersonal level. Organizations, in addition to regulating the relationship with contracts, should establish and sustain ongoing interpersonal relationships with key customers, eventually involving different organizational units. Managers need to understand and properly manage the unique role of interpersonal relationships with key customers, not only to sustain customers' commitment, loyalty and trust and to maintain long-term relations with them but also to favour product and process innovation.

In particular, the role of the interpersonal affective relationship between the supplier and the customer in knowledge acquisition sheds light on the strategic task that the supplier's human resource managers have to fulfil. Personal interfaces with key customers should be selected, trained and motivated to fit with the technological and relational capabilities needed. Finally, the government and institutions involved in managerial education should favour educational paths where soft skills are regarded as key and are appropriately enhanced.

We recognize some limitations of our study and highlight opportunities for further research. What we have found may not be generalizable to other industries, to less specialized firms and to relationships involving less strategic partners or different partners (e.g., complement providers or competitors). Future research can go beyond these conditions of our study and, by appreciating the separate impacts of the components of strong ties, might develop a better understanding of the contribution of tie strength to the innovative performance of firms.

Additionally, in our analysis, we considered the role of strong ties in innovative performance, depending on the level of innovativeness, but the characteristics of our firms' innovation did not allow us to consider a wide spectrum of innovations. Following this path, future researchers can benefit from combining our research approach based on unbundled measures of tie strength components and other approaches based on the possible interaction of contingency conditions to fully address the strong tie paradox.

Finally, once we recognize that the components of tie strength have different characteristics and dynamics, a new research path emerges, calling for longitudinal studies following the evolution of the two components and their impact on firms' capability to access and exploit knowledge to innovate in suppler–customer relations.

References

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411-423

Baron, R., & Kenny, D. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology,* 51 (6), 1173-1182.

Berry, L.L. (1995). Relationship marketing of services—growing interest, emerging perspectives. *Journal of the Academy of marketing science*, *23*(4), 236-245.

Berry, L.L. & Parasuraman, A. (1991), Marketing Services: Competing Through Quality, Free Press, New York, NY.

Bonner, M., & Walker, O.C. (2004). Selecting influential business-to-business customers in new product development: relational embeddedness and knowledge heterogeneity considerations. *Journal of Product Innovation Management*, 21 (3), 155-169.

Burgelman, R.A., & Hitt, M.A. (2007). Entrepreneurial Action, Innovation and Approbiability, *Strategic Entrepreneurship Journal*, (1), 349–352.

Burt, R.S., (1992). *Structural Holes: The Social Structure of Competition*. Harvard Business

Capaldo, A. (2007). Network structure and innovation: the leveraging of a dual network as a distinctive relational capability, *Strategic Management Journal*, 28 (6), 585-608.

Capaldo, A., & Petruzzelli, A. M. (2014). Partner geographic and organizational proximity and the innovative performance of knowledge-creating alliances. *European Management Review*, *11*(1), 63-84.

Casciaro, T., & Lobo, M. S. (2015). Affective primacy in intraorganizational task networks. *Organization Science*, *26*(2), 373-389.

Churchill G.A., Jr., (1979). A paradigm for developing better measures of marketing constructs. *Journal Marketing Research*, 16, 64–73.

Cohen, W.M., & Levinthal, D.C. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative science quarterly*, 128-152.

Danneels, E. (2003). Tight–loose coupling with customers: the enactment of customer orientation. *Strategic Management Journal*, 24 (6), 559-576.

Dyer, J. H., & Nobeoka, D. (2000). Creating and managing a high-performance knowledge-sharing network: the Toyota case. *Strategic Management Journal*, 345-367.

Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23 (4), 660-679.

Ebers, M., & Maurer, I. (2014). Connections count: How relational embeddedness and relational empowerment foster absorptive capacity. *Research Policy*, *43*(2), 318-332.

Ferras-Hernandez, X., & Nylund, P. A. (2019). Clusters as Innovation Engines: The Accelerating Strengths of Proximity. *European Management Review*, *16*(1), 37-53.

Flor, M.L., Cooper, S.Y. & Oltra, M.J. (2019). External knowledge search, absorptive capacity and radical innovation in high-technology firms, *European Management Journal*, *36*(2), 183-194.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.

Fredberg, T, & Piller, F.T. (2011). The paradox of tie strength in customer relationships for innovation: a longitudinal case study in the sports industry. *R&D Management*, 41 (5), 470-484.

Galunic, D. C., & Rodan, S. (1998). Research notes and communications: resource recombinations in the firm: knowledge structures and the potential for Schumpeterian innovation. *Strategic Management Journal*, 19 (12), 1193-1201.

Gómez-Solórzano, M., Tortoriello, M., & Soda, G. (2019). Instrumental and affective ties within the laboratory: The impact of informal cliques on innovative productivity. *Strategic Management Journal*, *40*(10), 1593-1609.

Granovetter, M. (1973). The strength of weak ties. *American Journal of sociology*, 78(6), 1360-1380

Haenlein M. & Kaplan A.M. (2004). A beginner's guide to partial least squares analysis, *Understanding Statistics* 3, 283-297.

Hair, J., Anderson, R., Tatham, R., & Black, W. (1995). *Multivariate data analysis* (4' ed.). Upper Saddle River, NJ: Prentice Hall.

Han, S. (1991). Antecedents of Buyer-Seller Long-Term Relationships: An Exploratory Model of Structural Bonding and Social Bonding, Unpublished Doctoral Dissertation. Department of Marketing. The Pennsylvania State University.

Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative science quarterly*, 44 (1), 82-111.

Inkpen, A. C., & Tsang, E. W. K. (2007). Learning and strategic alliances. *Academy of Management Annuals*, 1: 479-511

James L.R., Mulaik S.A., & Brett J.M. (2006). A tale of two methods, *Organizational Research Methods* 9, 233-244.

Kachra, A. & White, R.E. (2008). Know- how transfer: The role of social, economic/competitive, and firm boundary factors, *Strategic Management Journal*, 29, 425–445.

Kale, P., Singh, H., & Perlmutter, H. (2000). Learning and protection of proprietary assets in strategic alliances: Building relational capital. *Strategic Management Journal*, 21(3), 217-237.

Kautonen, T., Zolin, R., Kuckertz, A., & Viljamaa, A. (2010). Ties that blind? How strong ties affect small business owner-managers' perceived trustworthiness of their advisors. *Entrepreneurship and Regional Development*, 22(2), 189-209

Kim, T. Y., Oh, H., & Swaminathan, A. (2006). Framing interorganizational network change: A network inertia perspective. *Academy of Management Review*, 31(3), 704-720.

Koenig, C., & Van Wijk, G. (1991). *Inter-firm Alliances: The Role of Trust. In Microeconomic Contributions to Strategic Management*, eds. J. Thepot and R. -A. Thietart. 169-83. Amsterdam: North Holland Publishing.

Krackhardt, D. (2003). The strength of strong ties. The importance of philos. In N. Nohria, and B. Eccles. *Networks and Organizations: Structure, form, and action* (pp. 216-239) Boston: Harvard Business School Press.

Lane, P.J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, 19 (5), 461-477.

Lin, N. P., Weng, J. C., & Hsieh, Y. C. (2003). Relational bonds and customer's trust and commitment-a study on the moderating effects of web site usage. *Service Industries Journal*, *23*(3), 103-124.

Lipparini, A., Lorenzoni, G., & Ferriani, S. (2014). From core to periphery and back: A study on the deliberate shaping of knowledge flows in interfirm dyads and networks. *Strategic Management Journal*, 35(4), 578-595.

Lowik, S., van Rossum, D., Kraaijenbrink, J., & Groen, A. (2012). Strong ties as sources of new knowledge: How small firms innovate through bridging capabilities. *Journal of Small Business Management, 50*(2), 239.

Majocchi, A., Odorici, V. & Presutti, M. (2016) Firms' ownership and internationalisation: is it context that really matters? *European Journal of International Management*, 10, 2, 202-220.

Martínez-Cañas, R., Sáez-Martínez, F. J., & Ruiz-Palomino, P. (2012). Knowledge acquisition's mediation of social capital-firm innovation. *Journal of Knowledge Management,* 16(1), 61-76.

McEvily, B.& Zaheer, A. (1999).Bridging ties: a source of firm heterogeneity in competitive capabilities, *Strategic Management Journal*, 20 (12), 1133-1156.

McAllister, D. J. (1995). Affect-and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of management journal*, *38*(1), 24-59.

Nadvi, K. & Halder, G. (2005). Local clusters in global value chains: exploring dynamic linkages between Germany and Pakistan. *Entrepreneurship & Regional Development*, 17(5), 339-363.

Nielson, C. C. (1998). An Empirical Examination of the role of. *European Journal of Marketing*, *32*(5-6), 441-463.

Nieto, M.J. & Santamaría, L. (2007). The importance of diverse collaborative networks for the novelty of product innovation, *Technovation*, 27, 6–7, 367-377,

Nooteboom, B., Berger, H. & Noorderhaven, N.G (1997). Effects of trust and governance on relational risk. *Academy of management Journal*, 40, 2, 308-338.

Pallotti, F., Tubaro, P., & Lomi, A. (2015). How far do network effects spill over? Evidence from an empirical study of performance differentials in interorganizational networks. *European Management Review*, *12*(3), 189-208.

Portes, A. & Sesenbrenner, J. (1993) Embeddedness and immigration: notes on the social determinants of economic action, *American Journal of Sociology* 98, 1320-1350.

Presutti, M., Boari, C., & Majocchi, A. (2013) Inter-organizational geographical proximity and local start-ups' knowledge acquisition: a contingency approach, *Entrepreneurship & Regional Development: An International Journal*, 25, 5-6, 446-467.

Rindfleisch, A., & Moorman, R. (2001). "The acquisition and utilization of information in new product alliances: A strength-of-ties perspective". *Journal of Marketing*, 65 (2), 1-18.

Ritala, P., Olander, H., Michailova, S., & Husted, K. (2015). Knowledge sharing, knowledge leaking and relative innovation performance: An empirical study, *Technovation* (35), 22-31.

Ryais, L., & Knox, S. (2001) Cross-functional issues in the implementation of relationship marketing through customer relationship management, *European Management Journal,* 19 (5), 534-542

Rodriguez, C.M., & Wilson, F.C. (2002) Relationships bonding and trust as a foundation for commitment in US-Mexican strategic alliances: a structural equation model approach. *Journal of International Marketing*, 4, 53-76.

Rost, K. (2011). The strength of strong ties in the creation of innovation. *Research policy*, *40*(4), 588-604.

Rowley, T., Behrens, B., & Krackhardt, D. (2000). Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strategic management Journal*, 369-386.

Schumacker, R. E., & Lomax, R. G. A (1996). Beginner's Guide to Structural Equation Modeling, *Lawrence Erlbaum Associates*, Inc., Mahwah, NJ.

Seggie, S. H., Griffith, D. A., and & Jap, S. D. (2013). Passive and Active Opportunism in Interorganizational Exchange, *Journal of Marketing*, 77, 73–90.

Sullivan, J. & Peterson, R.B. (1982). Factors associated with trust in Japanese-American joint ventures, *Management International Review*, 22, 2, 30-40.

Svare, H., & Gausdal, A. H. (2015). Strengthening regional innovation through network-based innovation brokering. *Entrepreneurship & Regional Development*, 27(9-10), 619-643

Tasselli, S. (2019). Love and Organization Studies: Moving beyond the perspective of Avoidance. *Organization Studies*, *40*(7), 1073-1088.

Tomlinson, P. R. & Fai, F. M. (2016). The impact of deep vertical supply chain relationships upon focal-firm innovation performance. *R&D Management*, 46, (1), 277-290.

Tsai, W. P., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks, *Academy of Management Journal*, 41, 4, 464–476.

Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American sociological review*, 674-698.

Von Hippel, E. (1988). *Sources of Innovation*. New York: Oxford University Press

Wang, Z., McNally, R., & Lenihan, H. (2019) The role of social capital and culture on social decision-making constraints: A multilevel investigation, *European Management Journal,* 37 (2), 222-232

Williams, J. D., Han, S. L., & Qualls, W. J. (1998). A conceptual model and study of cross-cultural business relationships. *Journal of Business Research*, *42*(2), 135-143.

Wilson D.T., (1995). An integrated model of buyer-seller relationships. *Journal of the Academy of Marketing Science*, 23 (4), 335–345.

Wilson, D. T., & Mummalaneni, V. (1986). Bonding and commitment in buyer-seller relationships: a preliminary conceptualisation. *Industrial Marketing and Purchasing*, 1(3), 44-58.

Wooldridge, J.M., (2012). *Introductory Econometrics: A Modern Approach*. Cengage Learning, Mason, OH.

Yli-Renko, H., & Autio, E. (1998). The network embeddedness of new, technology-based firms: developing a systemic evolution model. *Small Business Economics*, 11, 3, 253-267.

Yli-Renko, H., Autio, E., & Sapienza, H.J. (2001). Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms, *Strategic Management Journal*, 22, 6–7, 587–613.

Zahra, S.A., Ireland, D.R., & Hitt, M.A. (2000). International expansion by new venture firms: international diversity, mode of market entry, technological learning and performance. *Academy of Management Journal*, 43, 925–950.

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of marketing*, *60*(2), 31-46.

Table 1. The advantages and disadvantages of strong ties

ADVANTAGES OF STRONG TIES	DISADVANTAGES OF STRONG TIES
• Enabling trust between the buyer and the supplier and benefiting firms. Easy transmission of the knowledge between actors (Uzzi, 1996).	• Trust can cover or hide the supplier's misconduct. In combination with other factors and under certain circumstances, insufficient monitoring could lead to lower performance, in spite of trust (Langfred, 2004).
• Lowering transaction costs, increasing commitment and collaboration, and improving efficiency in the relationship (Nadvi and Halder, 2005; Kautonen et al., 2010, Pallotti et al. 2015).	• The buyer may fear disruption due to reputational consequences (Gulati, 1995).
• Favouring the exchange of complex and tacit knowledge, high-quality information transfer and shared problem-solving procedures (Uzzi, 1996; Yli-Renko et al., 2001; Martinez-Cañas et al, 2012).	• Individuals' efficiency may decline as they become complacent with their roles in the network (Berman et al., 2002).
• Encouraging companies to continue their existing relationships (Kim et al., 2006) by diminishing the risk that one of the parties acts opportunistically (Dakhli and De Clercq, 2004).	• The buyer/seller may tolerate the opportunism of suppliers/buyers if doing so is less costly than the negative consequences of the breakdown of relations (Seggie et al., 2013).
• Strong ties are related to the knowledge acquisition and innovative performance of organizations. Such ties have been found to be important for innovation since they lessen the need for rigid control systems (Quinn, 1979).	• Lack of exploring activities and limited acquisition of new and exclusive knowledge (Granovetter, 1973; Burt, 1992; McEvily & Zaheer 1999).

Table 2. Descriptive statistics for the untransformed variables

	Average	S.D.	Min	Max
Innovative performance	8	7.2	1	23
Firm Size	810.10	1108.95	100	10,000
CustSize	510.15	542.34	121	3,000
CustAge	18.01	12.86	2	90
FirmAge	18	14.44	6	70
R&D expenditure	3.5	3.04	0.08	0.15
Behavioural component	5.5	4.9	1	7
Affective component	5	4.5	1	7

Table 3. Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10
1. Firm size	1									
2. Customer size	0.21	1								
3. Firm age	0.40*	0.18	1							
4. Customer age	0.15	0.15*	0.07	1						
5. R&D spending	0.31*	0.04	0.14	–0.11	1					
6 Tie strength– behavioural component	0.24	0.22	0.18	0.17	0.23	1				
7. Tie strength– affective component	0.16	0.13	0.30	0.24	0.20	0.33*	1			
8.Knowledge acquisition	0.15	0.08	0.12	0.03	0.28*	0.40**	0.27*	1		
9. Number of new products developed	0.11	0.13	0.01	0.03	0.03	0.28*	0.31*	0.45**	1	
10. Innovative performance	0.01	0.03	0.01	0.22	0.13	0.31**	0.29*	0.40**	0.35**	1

*p-value at the 10% level. **p-value at the 5% level. ***p-value at the 1% level.

Table 4. Results of the Durbin–Wu–Hausman test

	Knowledge acquisition	Innovative performance
Tie strength–behavioural component	183.5	125.6
Tie strength–affective component	160.1	164.2

Chi-square values are presented in this table.

Table 5. Measurement model

Factor name	Measurement Item	Standardized loading	Cronbach's alpha	Average variance extracted
Tie strength– behavioural component	1 – How long has your company had a close relationship with this customer, regardless of your personal relationships?	0.65**	0.85	0.59
	2 – In an economic sense, to what extent does your company need to have a close relationship with this customer?	0.70**		
Tie strength– affective component	1 – In a personal sense, how close are your relationships with this customer?	0.78***	0.81	0.63
	2 – I have excellent social relationships with this customer	0.71**		
Knowledge acquisition	1 – Since we supply to this customer, we are able to obtain a tremendous amount of technical knowledge	0.76**	0.85	0.69
	2 – We obtain most of our valuable market information on customer needs and trends from this customer	0.59*		
Innovative performance	1 – The new product is very novel in our industry	0.81***	0.78	0.55
	2 – The new product offers new ideas to our industry	0.61*		
	3 – This new product is creative	0.55*		
	4 – This new product is capable of generating ideas for other products	0.70**		

*** p>0.001

Table 6. Model statistics

Models	Chi^2	p*	d.f.	GFI	IFI	NFI	Normed Chi^2
1. Null model	1640.11	0.00	280	0.45	0.00	0.00	2.34
2. Saturated model	280.22	0.00	160	0.86	0.90	0.81	1.62
3. Hypothesized model	287.45	0.00	168	0.89	0.93	0.83	1.73
4. Direct model	289.89	0.00	165	0.87	0.91	0.83	1.70

Table 7. Model test sequence and difference test

Models	Chi^2 Diff.	d.f. diffi.	P	Model preference
Saturated vs. null	1359.89	120	<0.005	saturated
Hypothesized vs. saturated	7.23	8	>0.10	hypothesized
Direct vs. saturated	2.44	3	<0.05	saturated

Table 8. Structural equation modelling results

	Standardized estimate	Hypothesis	High levels of innovative performance	Low levels of innovative performance
Direct effects				
Tie strength−behavioural component on innovative performance	0.19		0.23	0.28
Tie strength−affective component. on innovative performance	0.29		0.11	0.08
Tie strength−behavioural component on knowledge acquisition	0.58***	H1		
Tie strength−affective component on knowledge acquisition	0.54***	H2		
Knowledge acquisition on innovative performance	0.49***	H3	0.52***	0.49**
Indirect effects				
Tie strength−behavioural component on innovative performance via knowledge acquisition	0.39***	H4	0.33***	0.08*
Tie strength−affective component on innovative performance via knowledge acquisition	0.31***	H5	0.35***	0.11*
Control variables				
Firm size on knowledge acquisition	0.19			
Firm size on innovative performance	0.28**		0.20***	0.08*
Customer size on knowledge acquisition	0.33			
Customer size on innovative performance	0.19		0.22	0.05
Firm age on knowledge acquisition	0.19			
Firm age on innovative performance	0.28		0.29	0.11
Customer age on knowledge acquisition	0.21			
Customer age on product innovativeness	0.01		0.12	0.03
R&D expenditure on knowledge acquisition	0.39			
R&D expenditure on innovative performance	0.50**		0.52***	0.08*

Figure 1: Hypothesized model (circles represent latent constructs)

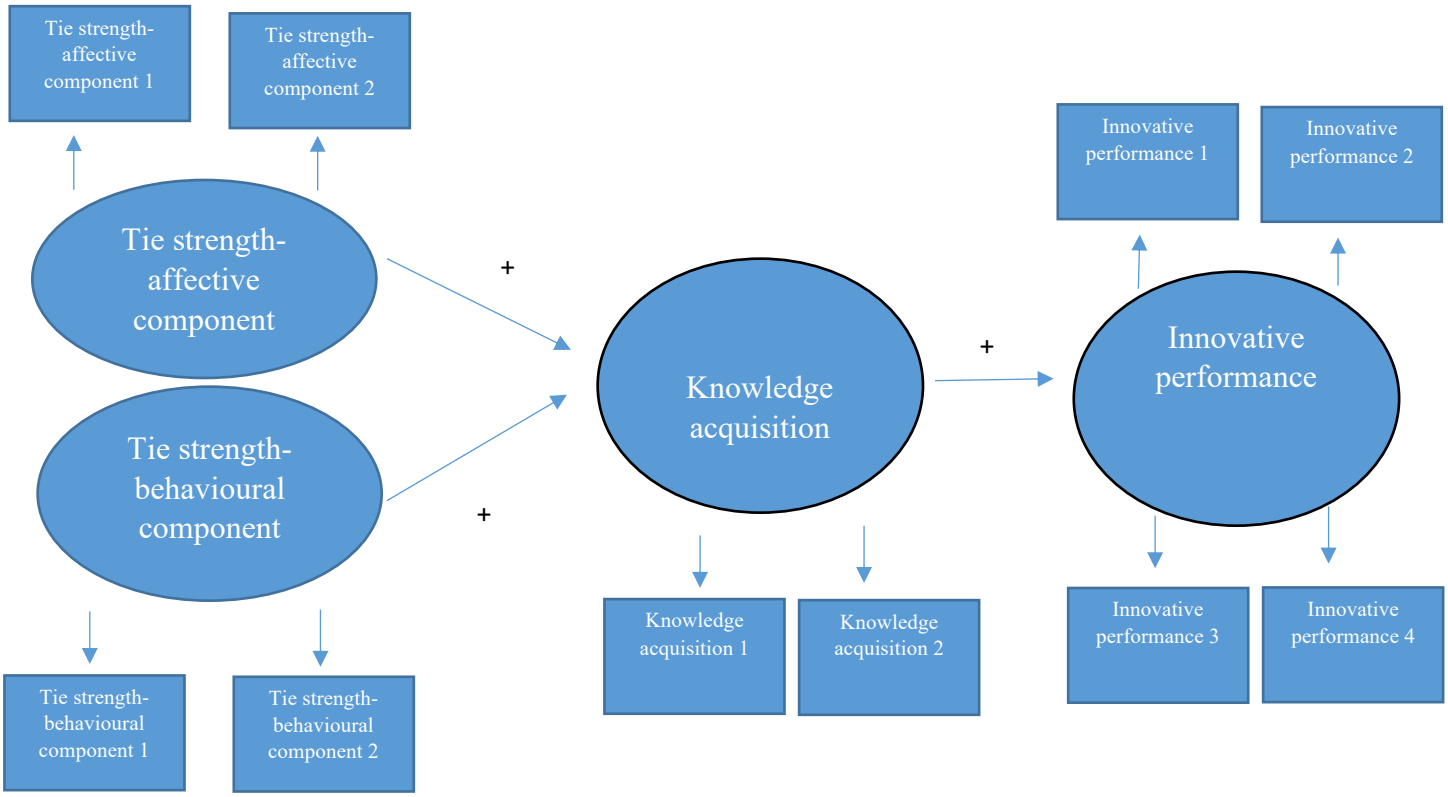
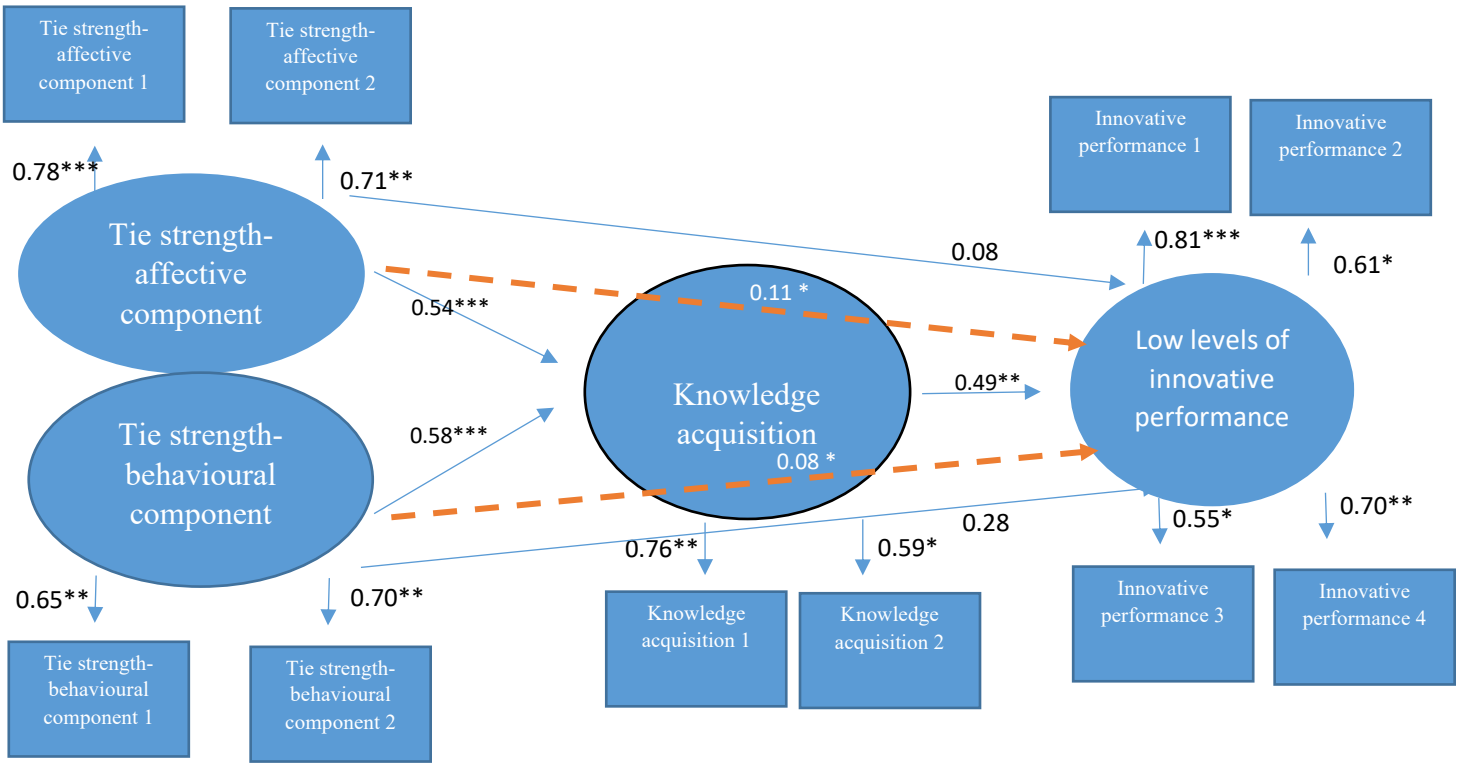
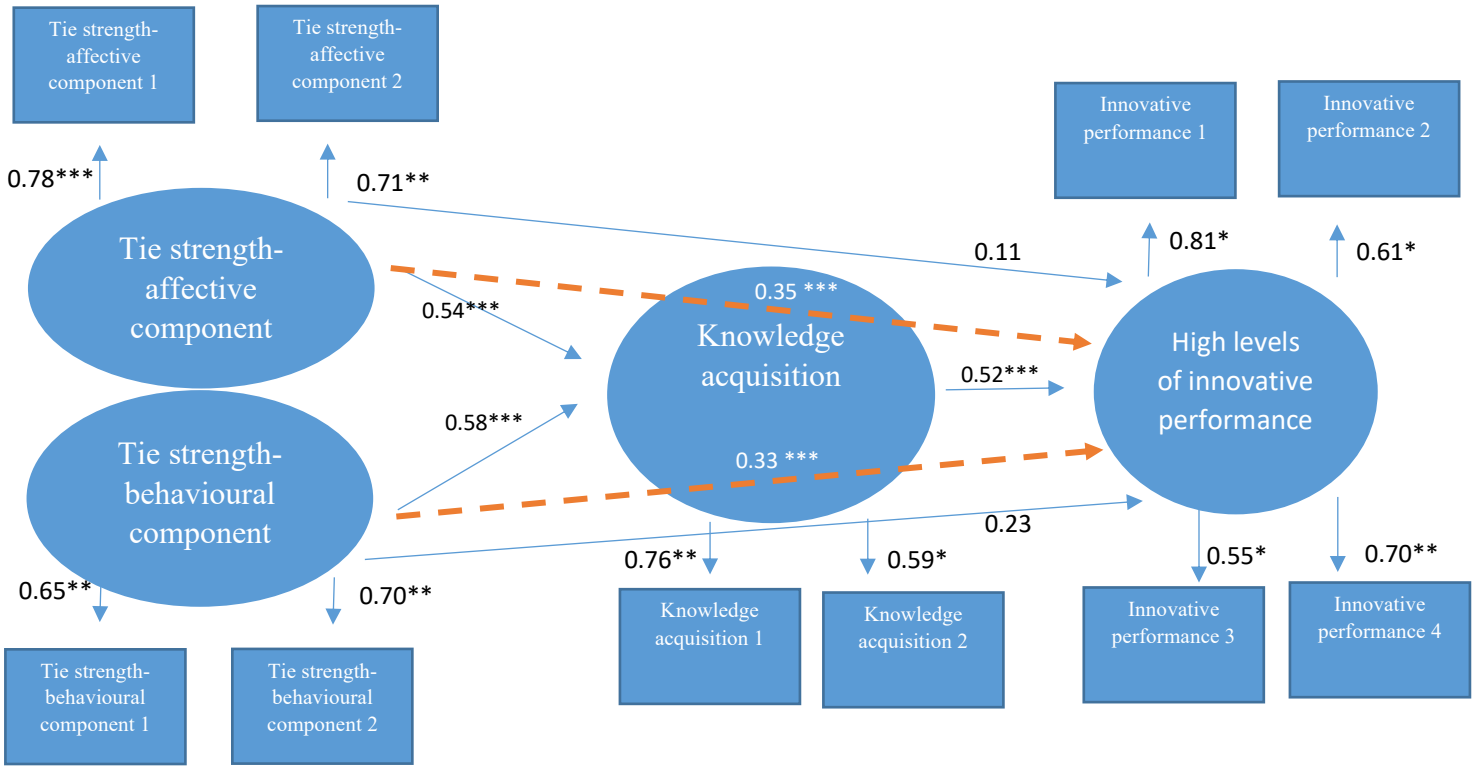


Figure 2: Results of the model for low and high levels of innovative performance (circles represent latent constructs)




Tie strength-affective component 1
Tie strength-affective component 2
Innovative performance 1
Innovative performance 2
0.78***
0.71**
0.11
0.81*
0.61*
Tie strength-affective component
0.35 ***
0.54***
Knowledge acquisition
High levels of innovative performance
0.52***
0.58***
0.33 ***
Tie strength-behavioural component
0.23
0.76**
0.59*
0.55*
0.70**
0.65**
0.70**
Knowledge acquisition 1
Knowledge acquisition 2
Innovative performance 3
Innovative performance 4
Tie strength-behavioural component 1
Tie strength-behavioural component 2