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Managing relationships with power advantage buyers: The role of supplier initiated bonding tactics in long-term buyer–supplier collaborations☆

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ABSTRACT

Interorganizational long-term collaboration plays an important role in buyer and supplier relationships. However, the specific tactics a supplier firm should adopt when the buyer firm is power-advantaged and reluctant to maintain long-term collaboration remain unexplored. Drawing on resource dependence theory, this study argues that buyer power advantage makes the buyer reluctant to collaborate with the supplier in the long run. These findings further identify three types of relationship bonding tactics initiated by the supplier firm: customization, information sharing, and managerial ties to the buyer firm. Using a 131 matched buyer–supplier dyadic database, this paper's results show that buyer power advantage is negatively related to long-term collaboration. Supplier customization and managerial ties mitigate the effect of buyer power advantage on long-term collaboration. Nevertheless, the effect of information sharing on the relationship between buyer power advantage and long-term collaboration is not significant.

1. Introduction

In interorganizational relationships, collaboration utilizing a joint project approach is becoming increasingly popular (Shenhar, Dvir, Levy, & Maltz, 2001). The success of joint projects is often dependent on effectively coordinating relevant mechanisms and long-term collaboration between the collaborative partners. If the software industry is taken as an example, implementation and maintenance of software systems usually require substantial project duration as well as combined efforts in a variety of specializations. Strong interorganizational and long-term relationships can even serve as functional substitutes for hierarchy (Baker, 1990). Informal long-term exclusive ties between a firm and a single partner are very common and can persist over a very long period, instead of establishing a hierarchical organization (Baker, 1990). For example, McDonalds and Coca-Cola both target young consumers and engage in joint planning at multiple levels without a formal written contract, preferring a partnership alliance. Interorganizational long-term collaboration can ensure stable flows of critical resources between the exchange partners (Casciaro & Piskorski, 2005).

Key pivotal factors determine long-term collaboration in the business-to-business context (e.g. Cannon, Doney, Mullen, & Petersen, 2010; Ganesan, 1994; Ryu, Park, & Min, 2007; Wang, Shi, & Barnes, 2015). Among these factors, power asymmetry is a salient determinant for the reason that power is presupposed to be asymmetrically distributed between exchange partners in supply chain relationships (Nyaga, Lynch, Marshall, & Ambrose, 2013). Research on power asymmetry in the business-to-business context mainly focuses on power asymmetry's impact on relationship continuity (Kim, 2000; Nyaga et al., 2013; Ryu et al., 2007), trust (Kumar, Scheer, & Steenkamp, 1998), solidarity of a dyad (Hu & Sheu, 2005; Kim, 2000), satisfaction (Benton & Maloni, 2005), and performance (Gulati & Sytch, 2007). The extant literature, however, provides contrasting findings regarding the effect of power asymmetry on long-term collaboration. Some scholars argue that power-advantaged firms are less likely to develop long-term orientation because they always obtain their own interests through exercising their power over the weaker counterpart (Ryu et al., 2007). In contrast, other researchers contend that power asymmetry may promote collaborative behavior between exchange partners. Specifically, the power-advantaged firm with expert and referent power tends to signal its reputation, credibility and value to the weaker partner, thus facilitating

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interorganizational collaboration (Nyaga et al., 2013). In this sense, whether power asymmetry deters or promotes internorganizational long-term collaboration depends on power sources (Nyaga et al., 2013).

Such conflicting findings indicate that there is a research gap and that further investigation of the relationship between power asymmetry and long-term collaboration should be undertaken. Moreover, relatively few studies explore a situation in which a power-advantaged actor is reluctant to maintain a long-term relationship with the power-disadvantaged actor. Thus, it is crucial to examine what actions the power-disadvantaged actor should take to offset the above effect. Addressing this question is essential as it not only provides theoretical extension of resource dependence theory, but also provides practical implications for low power firms.

The aim of this study, therefore, is to explore long-term collaboration between power imbalanced exchange partners within the framework of a high-technology joint project. In high-technology joint projects, knowledge transfer is highly complex and requires extensive communication in addition to continuous interaction between the partners. Transfer of complex knowledge increases the complexity of the task which the joint project implements. In such a richly textured scenario, negotiations for identifying the buyer's needs, implementing the product, training the relevant employee in the buyer company to use the product, and maintenance of the product require the exchange partners to establish a sustainable long-term relationship.

In the context of a joint project, supplier-initiated relationship bonding tactics are particularly important to achieve a long-term reciprocal customer partnership (Ibrahim & Najjar, 2008). Indeed, this study argues that the relationship between buyer power advantage and long-term collaboration is contingent upon supplier initiated relationship bonding tactics. Based on earlier studies of buyer–supplier long-term collaboration (e.g. Ganesan, 1994; Ryu et al., 2007; Wang et al., 2015), we identify three important types of relationship bonding tactics, namely supplier customization, information sharing and managerial personal ties. Furthermore, these three types of relationship bonding tactics will tangibly mitigate the effect of buyer power advantage on long-term collaboration.

To test the proposed hypotheses, matched buyer–supplier dyadic data are utilized. The use of dyadic data perfectly matches this study's research on power advantage, long-term collaboration, and relationship bonding tactics. This method is also consistent with several researchers who suggest that the perspectives of two exchange partners should be applied to investigate power imbalance and relationship bonding tactics (McFarland, Challagalla, & Shervani, 2006).

2. Theoretical background

2.1. Resource dependence and long-term collaboration

Buyer and supplier long-term collaboration focuses on mutual benefits to achieve future goals in the long run. Long-term collaborative relationships maximize profits over many transactions through relational exchanges (Ganesan, 1994). Maintaining a long-term relationship is widely recognized as a core argument of resource dependence theory. According to resource dependence theory, interdependence in social systems and social interactions comprise two categories, specifically competitive interdependence and symbiotic interdependence. In a competitive relationship, the partner can achieve a higher outcome only when the other's performance is lower. While in symbiotic interdependence, the output of one partner is input for the other (Pfeffer, 1972). Furthermore, Pfeffer (1972) posits that interorganizational relationships may include both competitive interdependence and symbiotic interdependence simultaneously. Specifically, firms in symbiotic interdependency typically have to manage critical interdependencies that may be essentially beyond their control. Therefore, firms must seek to engage in long-term collaboration that can facilitate dealing with both types of interdependence (Pfeffer & Nowak, 1976). Interorganizational long-term collaboration is one of the strategies that can stabilize interorganizational relationships and eliminate environmental uncertainty (Pfeffer, 1972).

In the context of this research, the buyer firm and supplier firm engage in a collaborative software project entailing both implementation and maintenance. On the one hand, the buyer firm must not only interface with the incumbent supplier, but also has to cope with relationships with other suppliers outside the relationship. On the other hand, turbulence of the general environment and imperfections of inexperienced institutions exist in an emerging economy. Seeking a long-term relationship is an ideal way for the buyer firm to survive in a highly competitive environment. Therefore, this study's research context in emerging economies allows us to explore interorganizational long-term collaboration drawing on resource dependence theory.

2.2. Relationship bonding tactics

Firms possess a repertory of relationship bonding tactics that can be employed to manage interorganizational relations (Baker, 1990; Yang, Su, & Fam, 2012). Relationship bonding tactics refers to the psychological, emotional, economic, or physical attachment in a relationship through which exchange partners are connected, interact and bind together (Ibrahim & Najjar, 2008). In a joint project, if the buyer has many alternatives to cooperate outside of the joint project, and thus possesses more power, it is difficult for the supplier to build a long-term relationship with the buyer. As the less powerful side, the supplier company is motivated to implement tactics to retain the buyer company.

Wilson (1995) has conceptualized two dimensions of bonding tactics: social bonds and structural bonds. Social bonds are defined as the degree of mutual personal friendship and liking shared by the exchange partners (Wilson, 1995, p. 339). Social bonding tactics include interpersonal interactions and friendships to develop the buyer–supplier relationship. Structural bonds are a combination of forces that create impediments to the relationship termination (Wilson, 1995, p. 339). They reflect the multiplicity of economic, strategic and functional factors that can bring explicit business benefits to the exchange partners (Rodríguez & Wilson, 2002). For example, irretrievable investment dedicated to the relationship and intertwined technologies are forms of structural bonds (Wilson & Jantrania, 1994). As the level of non-retrievable investments, adaptations and shared technology between the exchange partners becomes higher, structural bonds will develop further. One actor implements structural bonding tactics in order to increase the switching costs of the other actor.

In this research context, managerial ties and information sharing constitute two social dimensions of relationship bonding tactics between the buyer and supplier. Personal managerial ties refer to ties with managers at buyer companies (Peng & Luo, 2000). The buyer company's use of managerial ties is an effective way of obtaining needed sources in interorganizational transactions (Zhong, Yang, & Wang, 2013). When the buyer company has more power, the supplier company, as the lower power party, will first appeal to informal tie-based mechanisms. Managerial ties are a trust-based instrument that the low power party easily utilizes. These ties foster reciprocal exchanges, cultivate customer loyalty, and stimulate sales and reliable payment from the buyers. The lower power party can affect the power used by the higher power party. Prior studies have shown that an interorganizational power structure is enmeshed with external networks. In other words, the power structure and managerial ties intertwine to affect the long-term collaboration between the exchange partners.

An important tactic of social bonding with the buyer firm can also consist of supplier information sharing. Information flows between partners provide a basis for action. Information sharing is critical in building the long-term relationship between buyer and supplier. Sharing refers to the extent to which each party discloses information that can facilitate the other exchange partner's activities (Heide & Miner,

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1992). Buyer and supplier require continuous information sharing to maintain strategic, operational, and technological integration (Hult, Ketchen, & Slater, 2004). In a mutually dependent relationship, both parties tend to broaden the scope of information exchange within the existing relationship. Particularly when the supplier is dependent on the buyer company, supplier information sharing with the buyer is helpful in encouraging the convergence of expectation and assumption between the exchanging partners.

Another bonding tactic, supplier customization, consists of a structural bond in the sense that it involves designing, modifying, or selecting products to meet the customers' needs (Tuli, Kohli, & Bharadwaj, 2007). The supplier invests considerable time and effort when adjusting the product through customization and this strategy can be identified as a structural relationship bonding tactic. In situations where the buyer possesses more power, supplier customization is an effective way of attracting the buyer through making structural adaptations. Obviously, customized products are more appealing to the buyer company. The buyer firm is more willing to maintain a long-term relationship with the supplier company even though it may have a lot of alternatives. This study's conceptual framework is shown in Fig. 1.

3. Hypothesis development

3.1. Buyer power advantage and long-term collaboration

According to Emerson's (1962) view, the degree of dependence of one party determines the power of that party in relation to the other. Dependence is often conceptualized as the outcome based on the comparison level for alternatives (Anderson & Narus, 1990; Emerson, 1962). In this sense, alternative resources are important factors in explaining the power–dependence relationship. The power of one actor in relation to the other actor is the inverse of the actor's dependence on the other. In the present study, buyer power, in relation to the supplier, refers to the availability to the buyer of alternative resources from other suppliers outside the incumbent relationship. In line with this definition, buyer power advantage captures the relative power of the buyer firm over the supplier firm in the relationship (Anderson & Narus, 1990; Emerson, 1962). Focusing on relative power may capture the interdependent nature of the exchange relationship (Anselmi & Marquardt, 2000). Measured as the power of the focal firm over the other firm in the relationship, power advantage can be either positive or negative (Emerson, 1962). A positive value of the difference indicates that the relative buyer power advantage is high, and a negative value of the difference means that the buyer is at a power disadvantage.

This study argues that buyer power advantage makes the buyer undermine its efforts to commit to a long-term relationship with the supplier. First, because the power-advantaged buyer company can locate many alternative resources beyond the relationship with the incumbent supplier, the buyer can obtain favorable exchange conditions and reduce uncertainty with other suppliers. Second, the buyer firm with more relative power can generate its profits and easily achieve effectiveness by controlling its supplier. It can also use its dominant position to change its suppliers and is less interested in sustaining the relationship (Anderson & Narus, 1990). Third, as Casciaro and Piskorski (2005) suggest, if establishing a long-term relationship with a low power party, the power advantaged party would fear losing discretion over critical resource allocation to the dependent party, resulting in the buyer firm's reduced commitment in any future collaboration with the supplier firm.

Compared with the buyer, the supplier with less relative power tends to dedicate its efforts to adaptation to the buyer's specific needs (Xia, Jiang, Li, & Aulakh, 2014). Nevertheless, in the context of this research setting, a high-tech technology product transaction, technological unpredictability is very high. The supplier's tying to a specific buyer may dampen its responsiveness to high technology dynamism. As such, it is unlikely that the supplier will serve the buyer firm satisfactorily. In this situation, it is appropriate for buyer firms to maintain loose coupling with the supplier so as to retain flexibility to switch from an existing sourcing partner to a more capable partner (Heide & John, 1990). All factors considered, when the buyer company possesses power advantage, it is less likely that the buyer will maintain a long-term relationship with the dependent supplier.

Hypothesis 1. Buyer power advantage is negatively related to buyer long-term collaboration.

3.2. Supplier customization as a moderator

Supplier customization is one of effective tactics to counterbalance the impact of buyer power advantage on long-term collaboration. According to Wilson (1995), supplier customization reflects the structural dimension of supplier-initiated relationship bonding tactics. Through customization, the supplier designs, develops, and manufactures

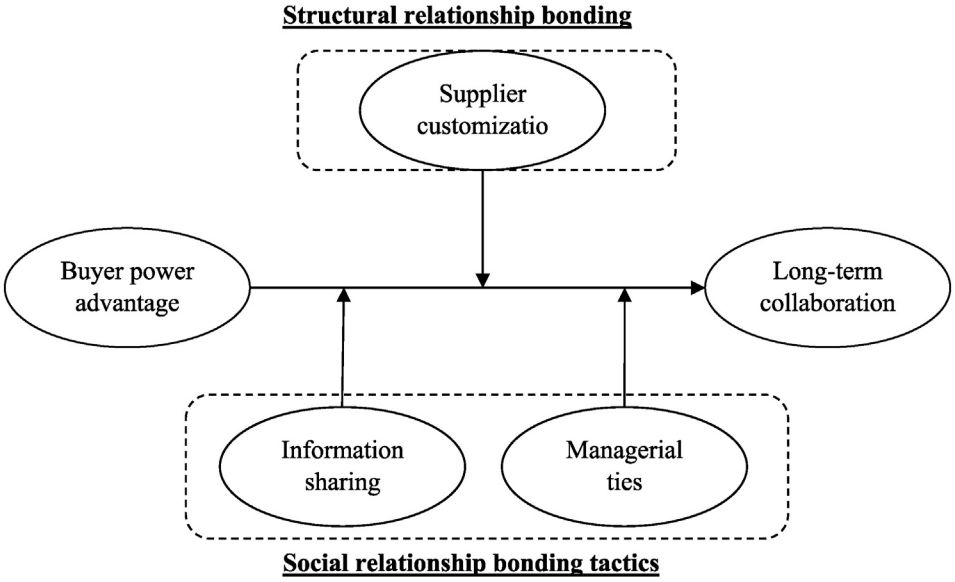

Fig. 1. The conceptual framework.

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individualized products tailored to the customer's needs. As such, the supplier changes its prior mode of operation and provides the customized products that are critical to the customer.

Customization, featuring special conditions, allows firms to gain an advantage over their competitors (Cavusgil, Zou, & Naidu, 1993). When the level of supplier customization is high, on the one hand, the products provided by the supplier are particularly unique and scarce. No other suppliers can provide products comparable to those that this specific supplier provides on a customized basis. Thus, the buyer company finds that the resources it needed cannot be easily obtained elsewhere on the market. Then, only through establishing long-term collaboration with the supplier, can the power-advantaged buyer continue to stabilize its critical resource flows and reduce uncertainty. Consequently, the more customized the products that the supplier provides, the more willing the power-advantaged buyer is to establish a long-term relationship with the supplier.

Hypothesis 2. Supplier customization reduces the negative effect of buyer power advantage during long-term collaboration.

3.3. Information sharing as a moderator

Information sharing represents the relational dimension of bonding tactics. In the context of a joint software implementation and development project, for example, supplier information sharing involves supplier firms actively transferring technological knowledge and operational knowledge into software implementation and development. Information about customer needs, as well as sharing proprietary information with customers, can improve the development of new software. Information sharing encourages the convergence of expectations and assumptions related to partners' obligations (Cai, Jun, & Yang, 2010). High level of quality and scope of information transfer can provide the partner dyads unique competitive advantage by improving their cognitive capacities and information processing capabilities (Gulati & Sytch, 2007). As such, joint projects provide more opportunities to perpetuate long-term relationships stemming from the original relationship, in which the exchange partners collaborate by exchanging information leading to a deeper understanding of each other for purposes of developing a unique competitive edge (Miller, 1996).

Supplier firms' active sharing information with buyer firms may mitigate the negative effects of buyer power advantage on long-term collaboration. First, supplier active information transfer provides opportunities for the buyer firm to access knowledge of supplier's technological applications in order to enhance their business operations and thus gain long-term benefits. Second, transferring proprietary information to the buyer, allows the supplier, in the long run, to better respond to the buyer's needs (Wang et al., 2015). Moreover, supplier information sharing can reduce information asymmetries and facilitate cooperation between the exchange partners. Therefore, even though the buyer firm is in a power-advantaged position, its decision-makers are more concerned about the quality of information flow and are likely to collaborate with the supplier which has higher quality information exposure (Casciaro & Piskorski, 2005). As the level of supplier information sharing increases, the buyer firm will trust the supplier more thoroughly and is more likely to remain fully dedicated to collaboration with the supplier in the long run, thus leading to Hypothesis 3.

Hypothesis 3. Supplier information sharing reduces the negative effect of buyer power advantage on long-term collaboration.

3.4. Managerial ties as a moderator

Managerial ties are regarded as another important social bonding tactic. Compared to information sharing, managerial ties constitute an affect-based and trust-based relationship bonding tactic. Ties between the executives of buyer and supplier firms aim to foster a reciprocal relationship between the exchanging partners. When one party is more powerful, managing interorganizational ties is an effective way to offset the effect of power advantage on the relational outcomes (Baker, 1990).

Managerial ties can develop mutual trust, commitment and solidarity between the buyer and supplier. This sense of solidarity, in turn, can reduce opportunism and provide better products through continuity and inside knowledge (Baker, 1990). Stable interorganizational managerial ties also allow both firms to pursue longer-term strategic initiatives because such an approach can minimize the manager's concerns of short-term uncertainty and fluctuation in performance (Bushee, 1998). Thus, the buyer with high power can obtain stabilized resource supply from the supplier who maintains ongoing managerial interactions with it. Furthermore, interorganizational managerial ties are strengthened and reinforced in order to access critical resources from outside of the organization. If the top managers from the supplier firm interact with those from the buyer company more frequently, the buyer firm can obtain the exclusive resources that they need from the supplier. Compared to suppliers who have fewer managerial interactions with the buyer, buyer firms with high power are more willing to build long-term collaboration with the supplier who maintains more interactions with it. This reasoning leads to the following hypothesis:

Hypothesis 4. Managerial ties reduce the negative effect of buyer power advantage on long-term collaboration.

4. Method

4.1. Research setting

To test this paper's hypotheses, a dyadic survey of project managers from a large management software supplier and its buyer firms in China was used. The supplier is a leading enterprise management software, solutions, and cloud service provider in China and the Asia Pacific region. The supplier specializes in research, development, and provision of software and solutions in the areas of Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Human Resources Management, Business Intelligence and Office Automation for companies of different scales and industries. This research context involves the software implementation stage. In this stage, the supplier installs the software system for the buyer company. Meanwhile, the supplier assists the buyer in learning the skills associated with using the software and improves some of the functions according to the buyer's needs. The transition is implemented through close collaboration of buyer and supplier based on a joint project. The supplier and buyer companies select and assign their employees respectively and comprise a project team. The project team is responsible for confirming the buyer's needs, transferring information for communication between the buyer and supplier, installing the software system for the buyer, and, together, they devise further solutions for dealing with problems in after-sales service.

The authors developed semi-structured dyadic questionnaires to guide the interviews. Two paired questionnaires were designed for the buyer and supplier company, respectively. The questionnaires include variables and corresponding measurement scales to help generate more information pertaining to the supplier and buyer collaboration process. First, to conduct a pretest, researchers selected 16 customers and their corresponding project managers from the supplier company. The variables and scales were pretested through interviews with project managers from the buyer and supplier company who are responsible for software implementation. Based on the interview results, the authors made some revisions to the scales and variables. Particularly, through the interview, it was found that buyer and supplier long-term collaboration was quite important to strengthening of the joint project model during the software implementation stage. According to resource

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dependence theory, power imbalance and mutual dependence coexist throughout the long-term collaboration. In terms of this paper's research context, the management software industry is not centralized and many suppliers compete in the market. The buyer companies have a number of alternatives when purchasing the software systems. Thus, the buyer company is usually more power-advantaged than the supplier company. Faced with the power-advantaged buyer, the supplier company must implement some strategies to mitigate the negative effect of buyer power advantage on buyer long-term collaboration.

4.2. Data collection

First, according to the customer list of the supplier company provided by the CEO of the supplier company, the top 500 buyer companies were selected. Customer survey questionnaires went out through email. Top managers who participated in the software implementation joint project were asked to answer the survey questions. They filled out the questionnaires related to the most recent experience of the projects with the supplier company. In order to match the customer data with the supplier data, the respondents from the buyer company were asked to write down their names and the corresponding buyer company's name in the final section of the questionnaire, which included a personal information confidentiality clause. Approximately two weeks later, the researchers also placed telephone calls to all the respondents and offered a 100RMB (US$15) phone bill credit to encourage them to finish the survey questions.

A total of 199 out of 500 project managers from the buyer companies returned their questionnaires. Thus, the response rate was 39.8%. Complete data from 181 buyer firms indicated an effective response rate of 36.2%. 97 of these buyer firms were in the manufacturing industry and had over 1000 employees. The average duration of the joint project with the supplier company was approximately 2 years and 5 months. The average contract value was 2 million RMB (about US $0.40 million). As is shown above, most of the buyer firms have more power than the supplier company. Intensive communications and various mechanisms are required to maintain the long-term collaboration between the buyer and supplier companies.

To check whether there was non-response bias in the data provided by the supplier company, comparisons were made of firm size, project duration and contract value between the responding and non-responding firms. T-test results of the comparison were not significant, showing no evidence of response bias. After completion of data collection from the buyer companies, the supplier questionnaires were sent out to the 181 corresponding project managers from the supplier company to match with the buyer data. Following a similar procedure, 138 project managers within the supplier company filled out the questionnaires of which 136 were deemed complete data forms. After carefully screening the dataset, we dropped 5 observations with observations from less powerful buyers (the outliers) in the data. Thus, the final sample frame consisted of 131 pairs of dyadic data, and the effective response rate attained 72.4% in this study.

In addition, the respondents assessed their familiarity with the joint project using a 7-point Likert scale. The mean of the answers from the buyer companies was 5.75 (s.d. = .69) and that of the supplier companies was 6.09 (s.d. = .39). As such, the respondents from each side properly represented the dyads and the answers were deemed reliable.

4.3. Measures

The studied constructs are operationalized by 7-point Likert scales (1 = "strongly disagree", 7 = "strongly agree."). Appendix A displays the list of all the measurement items of the constructs and their composite reliabilities.

4.3.1. Dependent variable

Interorganizational long-term collaboration has been recognized as an important factor that can create advantages for both the supplier and buyer firms (Ganesan, 1994; Nicholson, Compeau, & Sethi, 2001). In this study, buyer long-term collaboration refers to the notion that the buyer expects to benefit from the supplier in terms of both supplier outcomes and joint outcomes in the long run (Ganesan, 1994). Three items adopted from Ganesan (1994) are employed to measure buyer long-term collaboration based on the survey of buyer firms. The composite reliability for this measure is 0.92.

4.3.2. Independent variables

Buyer power advantage captures the comparative level of dependence in the exchange relationship. It is measured using the value of the difference between buyer power and supplier power. In this study, power is defined as the buyer firm having more power than the supplier because the buyer can locate more alternative exchange partners outside the relationship with the supplier (Casciaro & Piskorski, 2005). Based on Heide (1994), two items measure buyer power supplier power, respectively. This paper's measure of buyer power is derived from the customer survey and, similarly, the measure of supplier power used here is based on survey of suppliers.

4.3.3. Moderators

Supplier customization refers to developing, producing, marketing, and delivering affordable goods and services with enough variety to meet buyers' needs. The authors adapt the measure of supplier customization from Homburg, Müller, and Klarmann (2010) and make some adjustments to comply with our research context. It is measured from the supplier survey. The scales to measure supplier information sharing from the supplier describe the extent to which the supplier shares critical information about the product and organizational changes with the buyer (Fang, Palmatier, & Evans, 2008; McEvily & Marcus, 2005). This construct is measured by three items adapted from Fang et al. (2008). Managerial ties refer to the mutual trust, respect, and friendship that reside at the individual level between the top managers from the buyer and supplier firms (Li, Poppo, & Zhou, 2008), using a scale of five items adapted from Kale, Barbieri, Singh, and Perlmutter (2000) to measure this construct by asking respondents from supplier firms.

4.3.4. Control variables

This approach controlled for six important factors influencing interorganizational long-term collaboration based on the relevant literature. The two factors, collaboration experience (measured in log form of project quantities in the previous buyer–supplier collaboration) and collaboration duration (measured in log form of years), have a significant effect on buyer long-term relationship (Fang, 2008; Lee & Park, 2008). Another two control variables: controlled new product development speed and buyer system use are based on the customer survey. New product development speed to the market measures the rate of speed of introduction of a new product (Fang, 2008). A four-item scale is used to measure the construct adopted from Fang (2008). Buyer system use reflects the intensity of the product used by the buyer and feelings experienced when using the product (Lee & Park, 2008). Three items adapted from Lee and Park (2008) are used to measure the construct.

This study also controlled for market uncertainty, joint problem solving, and project complexity. Market uncertainty is measured by three items adapted from Jaworski and Kohli (1993). It captures the extent to which the preferences of the buyer firm's customers tend to change over time (Jaworski & Kohli, 1993). It is measured based on the customer survey. Joint problem solving measures the degree of dyadic cooperation in developing bilateral solutions to relational and operational problems (Cheung, Myers, & Mentzer, 2011). Four items from Cheung et al. (2011) are adapted and assessed based on the customer survey. Project complexity refers to the extent to which specific

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expertise is needed to participate in the development and implementation phases of the software (Homburg et al., 2011). It is measured based on the customer survey using a scale with three items adopted from Homburg et al. (2011).

5. Results

5.1. Confirmatory factor analysis

To analyze the convergent and discriminant validity of all the constructs, confirmatory factor analysis assessed the measurement model using SmartPLS software. The Appendix shows the measures of all the studied variables, the construct reliabilities, the average variance extracted and their respective item loadings. The standardized loadings of all items were significant at the .01 level. All of the loadings were higher than 0.5. For the variables from the customer survey, the composite reliability ranged from 0.83 to 0.92. The averaged variance extraction (AVE) of the constructs ranged from 0.59 to 0.80, higher than 0.5, in support of good convergent validity (Fornell & Larcker, 1981). For the variables measured by the supplier firms, the composite reliability ranged from 0.85 to 0.92. The AVE ranged from 0.58 to 0. 80, indicating good convergent validity.

To assess the reliability of buyer power advantage, examination of the reliabilities of the components variables (buyer power and supplier power) and their correlation followed the procedure recommended by Peter, Churchill, and Brown (1993). According to Peter et al. (1993), the reliability of the buyer power advantage, which was measured by the value of difference between buyer power and supplier power, was dependent on the reliabilities of the component variables and correlation between them. As indicated in Table 1, the correlation between buyer power and supplier power was only 0.26. In the Appendix, the construct reliability of the two component variables (buyer power and supplier power) was 0.59 and 0.76, respectively. Thus, the reliability of buyer power advantage was estimated to be around 0.65 (Peter et al., 1993). In addition, the square root of AVE for each construct was higher than the correlation between any two constructs, showing good discriminant validity for each construct.

5.2. Common method variance

Common method variance will arise from using data from the same side. To check whether common method variance is a concern in this study, the survey process utilized a pretest, and reverse-coded items were included in the questionnaires. Furthermore, design of dyadic questionnaires was tailored to the buyer and supplier respectively. Measurement of the independent variable was obtained by calculating the value of the difference between the buyer power and supplier power. The data of buyer power and supplier power were from the buyer side and supplier side, respectively. The dependent variable, buyer long-term collaboration, was obtained from the buyer data. In addition, use of a Harman's single factor test, and entering all the principal constructs into a principal components factor analysis, generated results that indicated the largest variance explained by the first factor is less than 50%. Thus, there is no evidence for common method bias existing in the present study.

5.3. Hypothesis testing

To test the effect of buyer power advantage on long-term collaboration, the approach adopted was a hierarchical regression method. Regression results are shown in Table 2. Control variables and independent variables are entered hierarchically. Model 1 and Model 2 test the effect of buyer power advantage on long-term collaboration. Model 1 only include control variables. Model 2 include control variables and independent variables to test the main effect. Model 3 include the independent variables and three moderators. Model 4 to Model 6 add the three interaction terms. Model 7 shows the full model that included all predictor variables and interaction terms. Mean-centering of the independent variables and moderating variables minimized the potential multicollinearity concerns (Aiken & West, 1991). Estimates of the variance inflation factor (VIF) were used. The highest value of VIF is 1.55, indicating that multicollinearity is not a concern in this model.

Hypothesis 1 proposes that buyer power advantage is negatively related to long-term collaboration. As shown in Table 2, in Model 2, the effect of buyer power advantage on long-term collaboration is negative and significant (Model 2: $\beta = -0.09$, $p < .05$). Therefore, Hypothesis 1 receives support.

Hypothesis 2 proposes that supplier customization reduces the negative effect of buyer power advantage on long-term collaboration. As shown in Model 7, the interaction of customization and buyer power advantage is positive and significant (Model 7: $\beta = 0.07$, $p < .05$). Thus, Hypothesis 2 is supported.

Hypothesis 3 proposes that information sharing moderates the relationship between buyer power advantage and long-term collaboration positively. In Model 7, the interaction of information sharing and buyer power advantage is not significant (Model 7: $\beta = -0.06$, $p > 0.1$).Therefore, Hypothesis 3 is not supported.

In addition, Hypothesis 4 proposes that managerial ties mitigate the negative impact of buyer power advantage on long-term collaboration. Model 7 shows that the interaction of buyer power advantage and managerial ties is positive and significant (Model 7: $\beta = 0.12$, $p < .05$). Thus, H4 receives support. The overall model explains 50% of the long-term collaboration variable.

Table 1
Descriptive statistics and correlations.

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Project quantities	0.52	0.55	1.00												
2. Collaboration duration	1.57	0.77	0.27*	1.00											
3. Buyer system use	6.15	0.91	0.03	−0.03	1.00										
4. NPD speed	4.89	0.98	0.13	−0.25*	0.32	1.00									
5. Market uncertainty	4.46	1.29	0.18	−0.14	0.05	0.34*	1.00								
6. Joint problem solving	5.77	0.84	0.01	−0.29*	0.37	0.32*	0.17	1.00							
7.Project complexity	5.48	0.86	−0.06	−0.02	0.14	0.07	0.16	0.23*	1.00						
8. Buyer power	5.49	0.88	0.02	−0.01	0.14	0.23*	0.16	−0.05	0.21*	1.00					
9. Supplier power	4.57	1.25	0.09	0.04	−0.13	0.16	0.00	−0.08	−0.07	0.26*	1.00				
10. Customization	3.65	1.46	−0.05	0.07	0.05	−0.02	−0.20*	0.05	0.02	−0.11	−0.04	1.00			
11. Information sharing	5.23	0.92	0.16	0.19*	−0.05	0.03	−0.09	0.03	−0.07	−0.05	0.06	0.21*	1.00		
12. Managerial ties	5.17	0.97	0.10	0.03	−0.04	0.05	0.04	0.06	0.07	−0.07	0.15	0.28*	0.25*	1.00	
13.Long-term collaboration	5.78	0.71	−0.14	−0.11	0.36	0.32*	0.08	0.37*	0.07	−0.04	0.02	0.08	0.14	0.21*	1.00

* Significant at the .05 level (two-tailed test).

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Table 2
Results of OLS analyses.

Variables	Model1		Model2		Model3		Model4		Mode5		Model6		Model7
Main effects													
Buyer power advantage			−.09*	(−2.04)	−.08†	(−1.78)	−.08†	(−1.74)	−.08†	(−1.70)	−.08†	(−1.72)	−.07	(−1.48)
Moderators													
Supplier customization					−.02	(−.39)	−.01	(−.17)	−.02	(−.44)	.01	(.18)	.01	(.21)
Supplier information sharing					.00	(.01)	.02	(.25)	.00	(.07)	.01	(.11)	.04	(.58)
Managerial tie					.14	(2.13)	.16	(2.41)	.14*	(2.12)	.11	(1.55)	.12†	(1.83)
Interactions													
Buyer power advantage × SUPPLIER customization							.07*	(2.06)					.07*	(2.21)
Buyer power advantage × Supplier information sharing									−.02	(−.30)			−.06	(−1.13)
Buyer power advantage × Managerial personal tie											.11*	(2.00)	.12*	(2.08)
Control variables														
Project quantities	−.31**	(−2.80)	−.33**	(−3.04)	−.35**	(−3.21)	−.33**	(−3.12)	−.35**	(−3.19)	−.36**	(−3.40)	−.34**	(−3.27)
Collaboration duration	.14†	(1.68)	.14†	(1.74)	.14†	(1.76)	.15†	(1.83)	.14†	(1.70)	.16*	(1.96)	.15†	(1.89)
Buyer system use	.29**	(4.16)	.32**	(4.61)	.33**	(4.65)	.32**	(4.72)	.33**	(4.63)	.33**	(4.86)	.35**	(5.04)
NPD speed	.14*	(2.16)	.13*	(2.03)	.13*	(2.09)	.16*	(2.45)	.13	(2.02)	.14*	(2.23)	.15*	(2.46)
Market uncertainty	.04	(.73)	.05	(1.12)	.04	(.80)	.04	(.82)	.04	(.80)	.07	(1.32)	.07	(1.36)
Joint problem solving	.24**	(3.14)	.22**	(2.89)	.21*	(2.65)	.21*	(2.73)	.20*	(2.56)	.22**	(2.88)	.21**	(2.77)
Project complexity	−.15*	(−2.15)	−.13†	(−1.95)	−.14*	(−2.05)	−.14*	(−2.08)	−.14	(−2.00)	−.15*	(−2.22)	−.14	(−2.12)
R^2		.40		.42		.45		.48		.45		.47		.50
$\triangle R^2$				.09		.03		.03		.00		.02		.03

Dependent variable: long-term collaboration. Number of observations = 131.
Significance levels shown are two-tailed for hypothesis testing and control variable.
* $p < 0.05$.
** $p < 0.01$.
† $p < 0.10$ (T-values are in parentheses).

6. Discussion

This study explores the relationship between buyer power advantage and buyer long-term collaboration in the setting of collaborative software projects and examines three types of relationship bonding tactics initiated by the supplier firm: supplier customization, supplier information sharing and managerial tie with the buyer firm. These findings provide important practical and theoretical implications for resource dependence and interorganizational relationship research.

6.1. Theoretical implications

This study deepens and enriches extant research on interorganizational long-term collaboration from the perspective of resource dependence theory using a dyadic approach. First, resource dependence theory provides a solid theoretical foundation to explain the interorganizational relationship. It focuses on how to stabilize the flow of critical resources between the exchange partners and reduce environment uncertainty (Pfeffer, 2003; Pfeffer & Nowak, 1976; Pfeffer & Salancik, 1978). As the core argument of resource dependence theory, interorganizational long-term collaboration is recognized as an effective way of stabilizing flow of resources between organizations. While most of the prior studies focus on the success factors and the performance of long-term collaboration, research on the relationship between power asymmetry and long-term collaboration has not produced consistent conclusions. Using dyadic data from the buyer and supplier firms, this study's model specifically tests the negative effect of buyer power advantage on long-term collaborative relationship in the context of high-tech product transactions, and advances the research of long-term collaboration according to resource dependence theory.

Second, this study contributes to the body of knowledge on interorganizational relationships by identifying three types of relationship bonding tactics as 'boundary conditions' of the buyer power advantage effect on long-term collaboration. From the perspective of resource dependence theory, how to maintain a long-term relationship between the exchange partners is a central tenet. When the buyer firm possesses more power, whether the buyer is willing to collaborate with the supplier in the long run is controversial. In this context, Casciaro and Piskorski (2005) argue that competing forces exist between mutually dependent organizations. On the one hand, a higher-power actor is reluctant to build a long-term relationship with the other party because this will reduce its power advantage. On the other hand, the higher-power actor is still dependent on the lower-power party to stabilize the resources it needs. These results reconcile the controversial arguments of buyer power advantage and long-term collaboration. Under conditions of buyer-initiated relationship bonding tactics, the higher power buyer's already minimal commitment within the long-term collaboration will diminish to the extent that relationship bonding tactics are initiated by the supplier. In a business-to-business joint project context, this study advances the resource dependence theory by introducing the relationship bonding tactics which affect the relationship between buyer power advantage and long-term collaboration. It is determined that when the buyer has more power than the corresponding supplier, the supplier will initiate a series of tactics to retain the buyer. Supplier customization, information sharing, and managerial ties are three important relationship bonding tactics. The empirical findings of this study demonstrate that supplier customization and managerial ties are particularly helpful in building and strengthening a long-term relationship with the buyer firm.

Finally, this study examines the role of supplier-initiated information sharing in the relationship between buyer power advantage and long-term collaboration. The findings indicate that a supplier that engages in more information sharing can enhance the capability of the supplier and attract more collaborative tasks from the buyer firm. Nevertheless, no support is forthcoming suggesting that information sharing enhances the effect of buyer power advantage on long-term collaboration. The possible explanation is that information sharing is a double-edged sword (Zhu, 2004). It is good for maintaining the relationship between exchange partners. Yet increasing information

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sharing may have no significant influence on the ongoing relationship, particularly in a power imbalanced relationship. Importantly, excessive supplier information sharing may indicate that the supplier exercises power over the buyer purposefully and creates normative pressures (Alexy, George, & Salter, 2013). Such induced pressures may impede the convergence of expectations and deter the buyer from bilateral collaboration.

6.2. Practical implications

This study provides important practical implications for managers engaging in high-tech joint projects. For supplier firms, faced with a power-advantaged buyer, it must be realized that maintaining a long-term relationship with the buyer firm is essential for its survival.

To maintain long-term collaboration with a buyer firm, a supplier can implement a bundle of relationship bonding tactics to increase its own relative power. Specifically, supplier firms should consider structural and social relationship bonding tactics simultaneously. As a critical structural bonding tactic, supplier customization increases the switching cost of exchange partners, ranking as the most important strategy among the relationship bonding tactics. By making adaptations of the products and services tailored to specific customer needs, supplier customization not only increases the criticality of the product, but also constrains the area of buyer product of selection. If the power-advantaged buyer wants to maintain stabilized flows of resources, long-term collaboration with the supplier initiating a customization strategy is the most cost-effective approach.

Managerial ties can be initiated by the supplier to complement the customization approach. As a social bonding tactic, managerial ties are trust and affect based, focusing more on future conditions and are necessary for the perception of fair divisions of value of joint outcomes in the future (Ganesan, 1994). As such, managerial ties to buyer firms can not only stabilize the resources exchanged between the buyer and supplier, but also guarantee scarce resource long-term availability from the supplier. With the managerial ties between the buyer and supplier becoming closer, the power-advantaged buyer firm is more likely to build long-term collaboration with the supplier.

When trapped in a power imbalance relationship, the supplier firm should understand that information sharing is not always a good precondition to gain bargaining power. It is better to balance information sharing and information confidentiality to reduce the risk of potential competitors' splitting the pie.

6.3. Limitations and future research

This study also has several limitations that provide directions for future research. First, the study only focuses on one factor (i.e. power asymmetry) that may have a negative effect on buyer long-term collaboration. Researchers may examine the role of bonding tactics in the relationship between such factors as trust, contract, and commitment and long-term collaboration (Ryu et al., 2007; Wang et al., 2015).

Second, during a transaction with a buyer who has more power, multiple tactics should be brought to bear in managing the power-collaboration relationship. This study only examines three types of tactics categorized as social and structural aspects of relationship bonding tactics. Berry and Parasuraman (1991) divided relationship bonding tactics into three levels: financial, social, and structural bonding tactics. Significantly, financial bonding strategies are another important dimension of relationship bonding tactics. Further investigation, focused on financial bonding tactics, will unearth different mechanisms and reveal insightful findings related to structural and social bonding tactics. Exploring more contingency conditions will surely enrich current understanding of the relationship between power imbalance and long-term collaboration.

Appendix A. Measure

	Factor loading	Cronbach's alphas	AVE	CR
Customer survey				
2. Buyer power		0.59	0.71	0.83
If we decided to stop purchasing the software from the supplier, we could easily purchase from other suppliers.	0.83			
There are many competitive suppliers for selling the software.	0.85			
3. New product development speed		0.78	0.59	0.85
Please rate the degree to which the development speed of the new product:				
Far behind our time goals/far ahead of our time goals.	0.81			
Much slower than we expected/much faster than we expected.	0.83			
Behind where we would be had we gone it alone/ahead of where we would be had we gone it alone.	0.68			
Slower than the typical software development time/faster than the typical software development time.	0.76			
4. Buyer system use		0.83	0.75	0.90
Are your company an intensive user of this software purchasing from the supplier? (1 not at all; 7 very much).	0.83			
How frequently do your company use the software (1 never; 7 frequently).	0.93			
How does your company feel on using this software? (1 not at all; 7 very much).	0.83			
5. Market uncertainty		0.87	0.71	0.90
In this product industry, customers tend to look for new products all the time.	0.90			
Customers' product preferences change frequently over time.	0.73			
Market demand is difficult to forecast in this product industry.	0.85			
The evolution of customer preference is difficult to predict.	0.87			
6. Joint problem solving		0.70	0.62	0.83
It is common to establish joint teams to solve problems in the process of software implementation and development in the relationship with this supplier.	0.65			
The atmosphere in the relationship with this supplier stimulates productive discussion that encompasses a variety of opinions.	0.85			
We have a lot of face-to-face communication in this relationship with this supplier.	0.85			
7.Project complexity		0.76	0.65	0.84
The software is requires a high amount of expertise.	0.62			
The software is requires the participation of	0.86			
further experts in the buying decision.	0.90			
Supplier Survey				
8. Supplier power		0.76	0.80	0.89
If the customer stopped buying from us, we could easily replace our volume with sales to some other buyers.	0.88			
It would be relatively easy for us to find another buyer for the software.	0.91			

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Appendix A. (*continued*)

	Factor loading	Cronbach's alphas	AVE	CR
9. Supplier customization		0.82	0.74	0.89
This software the customer purchase from our company is individually developed for them.	0.87			
This software is highly adapted to the customer needs.	0.84			
The software for this customer is different from the software for other customers.	0.86			
10. Supplier information sharing		0.78	0.58	0.85
We actively transferred information gathered from our company into the software implementation and development.	0.70			
We kept customer informed about what was happening in our company.	0.79			
The transfer of information about customer needs we know took place frequently.	0.81			
We shared proprietary information with customer if we feel that the information can improve the development of the software.	0.75			
11. Managerial ties		0.89	0.69	0.92
We are trying to work on the following aspects:				
–Personal relationship	0.78			
–Extensive interaction	0.82			
–Building trust	0.88			
–Building mutual respect	0.81			
–Building personal friendship	0.87			

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