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Supplier motivation to share knowledge:
An experimental investigation of a social exchange perspective

Abstract

Purpose – This paper draws on social exchange theory to theorise supplier motivation to share knowledge. It examines the effects of supplier anticipated future dependence on their motivation to share knowledge with a buyer, mediated by economic, relational, and learning motives. It also examines the conditional effects imposed by the current embeddedness of the relationship.

Design/methodology/approach – The study tested the proposed moderated mediation model using a scenario-based experimental method.

Findings – The results show that supplier anticipated future dependence increases their motivation to share knowledge, mediated by relational and learning motives. The results also show that current embeddedness has negative moderation effects on economic and learning but not relational motives.

Originality/value – The study deepens our understanding of supplier motivation to share knowledge as social exchange and offers insights on buyer-supplier relationship embeddedness.

Keywords Knowledge sharing, Buyer-supplier relationships, Dependence, Motivation, Social exchange theory, Embeddedness

1. Introduction

Suppliers sharing knowledge with buyers is a key source of supply chain performance; it can foster new product development, shorten time-to-market, and reduce production costs (Revilla and Knoppen, 2015; Wilhelm and Dolfsma, 2018). However, given the risks of buyer opportunistic behaviour (Lawson and Potter, 2012; Yam and Chan, 2015), such as leaking proprietary knowledge to other suppliers, demanding price-reductions, etc. (McCarter and Northcraft, 2007; Henke Jr and Chun, 2010), how to motivate suppliers to share knowledge remains a critical factor in effective collaboration (Wagner and Bode, 2014; Chen *et al.*, 2016). Drawing on social exchange theory (SET), this study attempts to examine supplier motivation to share knowledge by addressing three limitations of existing studies.

First, most studies have focused on the effects of relational elements (e.g., trust) on knowledge sharing (e.g., Muthusamy and White, 2005; Revilla and Knoppen, 2015; Yam and Chan, 2015). However, other structural elements in social exchange are also critical (Emerson, 1962; Molm, 1994). For example, supplier dependence – the extent a supplier relies on a buyer to achieve its desired goals (Kumar *et al.*, 1995) – has been shown to play a central role in supplier attitudes and behaviour (Andaleeb, 1996; Carr *et al.*, 2008). More specifically, Chen *et al.* (2016) observed a positive relationship between supplier dependence and their motivation to share knowledge and called for future research to explicitly examine this relationship.

Second, the central motivational force of social exchange is expected returns (Blau, 1964), which are what the actors 'need and value'(Savage and Whitham, 2018, p. 29). In buyer-supplier exchange, literature suggests that suppliers seek two types of value (Gassenheimer *et al.*, 1998; Nyaga *et al.*, 2010): economic value – in a monetary form such as sales revenue, and relational value – based on satisfaction with the collaborative nature of the relationship. Specific to knowledge sharing, a supplier also intends to learn from the buyer (Easterby-Smith

et al., 2008; Lawson and Potter, 2012). We therefore expect economic, relational, and learning motives increase suppliers' overall level of motivation to share knowledge. However, since these motives are rarely studied together, we know little about their relative influences on the overall level of motivation.

Third, an essential feature of social exchange is that forward-looking actors seek future returns (Cook *et al.*, 2003). However, *future* perspectives are at best implicit in the existing literature (George and Jones, 2000). Distinguishing between present and future is important (Van Burg *et al.*, 2014) because, for example, if a supplier is currently highly dependent on a buyer, it is likely to share knowledge but if the supplier anticipates low dependence on this buyer in the future, it may reduce or even terminate knowledge sharing. Moreover, research suggests that high embeddedness can generate 'diminishing returns' (Villena *et al.*, 2011, p. 562), and the effect of the anticipated future is constrained by current status (Kaplan and Orlikowski, 2013). As such, the influence of supplier anticipated future could be weakened if the current relationship is highly embedded. To date, the temporality in the motivational process has not yet been examined.

The purpose of this study is to address these limitations and answer the following two questions: (1) What are the relative influences of supplier future dependence on supplier motivation to share knowledge with a buyer, mediated via economic, relational, and learning motives? (2) How are these effects moderated by the current embeddedness of the relationship? The proposed model is depicted in Figure 1. The study contributes to the literature on buyer-supplier knowledge sharing in two important ways. First, it proposes a multi-motive model and examines the effects together with the moderation effect of current embeddedness. The results suggest that the relational motive is most salient among the three for supplier knowledge sharing, because it persists regardless of the level of embeddedness. Second, the study

explicitly examines a temporal perspective and confirms that supplier knowledge sharing is future-oriented. It highlights the importance of suppliers' outlook on the future relationship in their motivation to share knowledge.

INSERT FIGURE 1 ABOUT HERE

2. Theoretical background and hypotheses development

2.1 Social exchange theory and supplier motivation to share knowledge

A basic tenet of SET is that actions in social exchange are motivated by returns; balancing costs and benefits (Blau, 1964). These 'returns' can be economic (e.g., goods, money) and noneconomic/socioemotional (e.g., love, friendship) (Cropanzano and Mitchell, 2005). As social exchange, suppliers sharing knowledge also involves costs and benefits. There are costs (e.g., time) to sharing knowledge, and especially, it involves the risk of knowledge being misappropriated by a buyer (Lawson and Potter, 2012; Yam and Chan, 2015). Considering such potential costs, suppliers need to perceive the expected benefits as valuable enough so that they feel it pays off to share the knowledge.

Social exchange also invokes the norm of reciprocity (Gouldner, 1960); once one party offers a service, the recipient is obligated to provide some 'unspecified' benefits in return (Blau, 1964). This means, once a supplier shares knowledge, the buyer is expected to respond by some reciprocating behaviour (e.g., sharing their knowledge). Arguably, a buyer may choose not to follow the norm and not reciprocate. However, deviating from this norm would give the impression of exploitation and erode the relationship (Gouldner, 1960). It would also have substantive network effects, as the reputation of the buyer would suffer (Ellis *et al.*, 2012). Hence, there is substantial social pressure to follow the norm and it is reasonable to assume that suppliers would have such expectations when sharing knowledge.

2.2 Types of supplier motives to share knowledge

Motives are 'a particular class of incentives' (Thrash *et al.*, 2012, p. 141). Literature highlights economic, relational, and learning motives in buyer-supplier exchange (Gassenheimer *et al.*, 1998; Nyaga *et al.*, 2010; Lawson and Potter, 2012). We address them in turn and present related hypotheses.

An economic motive represents the expectation of receiving economic rewards from the buyer. Economic rewards are a major motivational factor for knowledge sharing (Bock and Kim, 2002). Monetary incentives such as bonuses and higher salaries are used within organisations to encourage knowledge contribution (Bock *et al.*, 2005; Wang and Noe, 2010). In buyer-supplier relationships, the most direct reward a supplier receives from a buyer is sales revenue (Smals and Smits, 2012), and there are much more sophisticated performance-based incentives (Sumo *et al.*, 2016). For example, buyers often encourage suppliers to share product knowledge by committing to certain levels of spending in new product development (Smals and Smits, 2012; Picaud-Bello *et al.*, 2019). Based on the above discussion, we hypothesize:

H1a: An economic motive is positively related to a supplier's overall motivation to share knowledge with a buyer.

A relational motive represents the expectation of building a collaborative relationship with the buyer. Just as individuals who want to strengthen their relationships with others have stronger intention to share knowledge (Bock and Kim, 2002; Xu *et al.*, 2012), suppliers who seek collaborative relationships with buyers can apply knowledge sharing as a key mechanism (Vanpoucke *et al.*, 2014). Given the risk associated with unspecified obligations (Cook *et al.*, 2003) and the risks specifically associated with knowledge sharing (Lawson and Potter, 2012; Yam and Chan, 2015), suppliers who share knowledge are actually sending a strong signal of commitment and willingness to trust the buyer (van der Valk *et al.*, 2016; Ried *et al.*, 2021).

This pledge could facilitate relationship building (Anderson and Weitz, 1992). Based on the above discussion, we hypothesize:

H1b: A relational motive is positively related to a supplier's overall level of motivation to share knowledge with a buyer.

A learning motive represents the expectation of learning from the buyer. It has long been recognised that learning from each other is a key reason for alliance formation (Hamel, 1991; Doz, 1996). Similarly, supply chain partners are also motivated to learn (Lawson and Potter, 2012), and they can learn from each other through reciprocal knowledge sharing (Yang *et al.*, 2016). For example, Toyota has built a knowledge-sharing network with its suppliers, in which the suppliers can access Toyota's knowledge (e.g., inventory management, *Kaizen*) once they agree to share their knowledge in the network (Dyer and Nobeoka, 2000). 'Learning by supplying' has become an effective way for suppliers to learn from buyers (Alcacer and Oxley, 2014). Based on the above discussion, we hypothesize:

H1c: A learning motive is positively related to a supplier's overall level of motivation to share knowledge with a buyer.

2.3 Supplier dependence and the motives of knowledge sharing

Based on SET, supplier dependence indicates the benefits of the exchange relationship with a buyer and the difficulty of finding alternative buyers (Emerson, 1962). As such, it plays a central role in explaining a supplier's attitudes and behaviour (Andaleeb, 1996). For example, a dependent supplier is more likely to join a buyer's training program or engage in product development (Carr *et al.*, 2008). Dependence can influence buyer-supplier relationships in other ways (see review Kim and Fortado, 2021) such as relationship commitment (Chang *et al.*, 2012), trust (Payan and McFarland, 2005), R&D investment (Kim and Zhu, 2018), and use of power (Huo *et al.*, 2019). Moreover, most studies to date only studied dependence in its

'current' or 'presently-realized' terms (Scheer *et al.*, 2010), and future perspectives have received scant attention. In this study, we explicitly examine supplier anticipated future dependence on a buyer, and postulate its effects on suppliers' motivation to share knowledge via the three motives.

First, the economic motive. A supplier's dependence on a buyer is typically indicated by the proportion of a supplier's sales accounted for by that buyer and the cost of switching (Carr *et al.*, 2008; Ellis *et al.*, 2012). The more dependent a supplier is on a buyer (i.e., the more difficult it is for the supplier to obtain sales from an alternative buyer), the more critical it will be for the supplier to obtain sales from the buyer. We have argued that supplier sharing knowledge can enhance the possibility of the supplier obtaining sales from a buyer. As such, if a supplier anticipates high dependence on a buyer in the future (i.e., the buyer will account for a substantial portion of the supplier's turnover), its economic motive to share knowledge will be stronger than if the anticipated future dependence is low. We therefore hypothesize:

H2a: Supplier future dependence is positively related to the economic motive for knowledge sharing.

Second, the relational motive. A collaborative relationship can benefit a supplier in many ways, including having better access to buyers' resources, reducing conflicts, and enhancing joint activities, etc. (Nyaga *et al.*, 2010; Cao and Zhang, 2011), which reduces a supplier's transactional costs and improves its profitability (Kalwani and Narayandas, 1995). We have argued that sharing knowledge can facilitate relationship building with buyers. As such, if a supplier anticipates high dependence on a buyer in the future, which means this relationship being collaborative will be very important to the supplier, its relational motive to share

knowledge will be stronger than if the anticipated future dependence is low (i.e., the relationship may not be very important). We therefore hypothesize:

H2b: Supplier future dependence is positively related to the relational motive for knowledge sharing.

Third, the learning motive. Suppliers must keep learning and improving their competence. One way to achieve this is to learn from the buyer (Alcacer and Oxley, 2014). For example, a supplier can gain knowledge about its product quality from buyers who conduct engineering tests with the supplied parts (Nobeoka *et al.*, 2002). Nishiguchi (1994) found that the most important sources of technical knowledge for Japanese automotive suppliers were their buyers rather than their own R&D. We have argued that sharing knowledge can enhance the possibility to learn from a buyer. As such, if a supplier anticipates high dependence on a buyer in the future, which means that keeping competitive advantage for this buyer will be very important to the supplier, its learning motive to share knowledge will be stronger than if the anticipated future dependence is low. We therefore hypothesize:

H2c: Supplier future dependence is positively related to the learning motive for knowledge sharing.

2.4 Moderating effects of current embeddedness

The logic of embeddedness captures how the structural parameters of a relationship shapes the dispositions of the actors in the relationship (Uzzi, 1997). In a buyer-supplier dyad, embeddedness is operationalised as the total sum of buyer dependence and supplier dependence (i.e., joint dependence) (Gulati and Sytch, 2007; Huo *et al.*, 2017). Varying levels of joint

dependence demonstrate distinct behavioural and relational orientations (Gulati and Sytch, 2007). For example, if a buyer and a supplier are only weakly embedded (the level of joint dependence is low), they are likely to have a very low frequency of interactions, and keep an arm's-length relationship (Kim *et al.*, 2015). In contrast, if they are highly embedded, the parties will give heightened attention to each other, have intensive interactions, care for each other's needs and goals, and build a higher quality of relationship (Jones *et al.*, 1997; Hofer, 2015). As such, highly embedded relationships tend to be more collaborative (Kim *et al.*, 2015).

However, highly embedded relationships can also be dysfunctional (Uzzi, 1997), which can be understood in economic, relational, and learning terms.

- A highly embedded relationship increases a supplier's financial risks associated with disruptions (Yu *et al.*, 2009). A supplier may also not want a buyer to account for too much of its business because some buyers in strategic sourcing arrangements can do long-term harm to key suppliers if they only ever exploit dependence to drive cost-reductions (Rossetti and Choi, 2005).
- A highly embedded relationship increases relational overload, which could limit growth potential and reduce relationship commitment (Chang, 2011). A supplier may experience pressure to accept unnecessary obligations for the sake of the relationship (Villena *et al.*, 2011), or feel discouraged taking corrective actions (Anderson and Jap, 2005). For example, the improvement teams between Nissan and its critical suppliers focused on retaining harmony rather than pushing radical ideas to improve performance (Sting *et al.*, 2019).
- A highly embedded relationship can reduce the likelihood of learning from each other (Villena *et al.*, 2011). In this relationship, partners tend to have intensive interactions (Gulati and Sytch, 2007) and the 'thick' communication may result in 'group thinking'

(Janis, 1982). Studies have found that highly embedded relationships create fewer innovative products (Bonner and Walker, 2004) and hamper new business development (Li *et al.*, 2013).

Indeed, when a relationship becomes too close, the benefits of the relationship start to decay and the costs increase (Villena *et al.*, 2011). A supplier may perceive less returns in economic, relational, and learning terms in a strongly embedded relationship than in a weakly embedded relationship. Moreover, every buyer-supplier exchange is viewed in terms of the past, the present and the anticipated future (Dwyer *et al.*, 1987), and the effect of the anticipated future is constrained by current status (Kaplan and Orlikowski, 2013). As such, although we expect that there will be a positive relationship between a supplier's anticipated future dependence and the motives, since the supplier may perceive fewer returns in a currently highly embedded relationship, the positive effects of supplier anticipated future dependence could be weaker in a highly embedded relationship compared to their effects in a less embedded relationship. We therefore hypothesize:

H3: Current embeddedness has a negative moderating effect on the relationships between supplier anticipated future dependence and the (a) economic, (b) relational, and (c) learning motives such that the relationships are weaker when the level of current embeddedness is high than low.

3. Methodology

To test the hypotheses, we developed a scenario-based role-playing experiment, which is particularly suited to the study of attitudes and decisions (Rungtusanatham *et al.*, 2011). In the experiment, participants were recruited to play a role in a scenario carefully constructed to approximate real-life decision-making situations so that natural behaviour could be observed (Bendoly *et al.*, 2006).

3.1 Experimental design and the participants

The study had two key factors: supplier future dependence and current embeddedness of the relationship. Following extant studies (Gulati and Sytch, 2007; Huo *et al.*, 2017), the level of current embeddedness was operationalised as the total sum of supplier dependence (current) and buyer dependence (current). Therefore, the experimental design included three factors, namely buyer dependence (current), supplier dependence (current), and supplier dependence (future). Each factor was manipulated at two levels (i.e., high/low), resulted in eight scenarios. Given the recommendation to employ scenarios that have already been tested (Rungtusanatham et al., 2011), we used one developed by Chen *et al.* (2016); in the scenario, a supplier is asked by a buyer to share knowledge on a special technology to be used in one of their products. Each scenario had an introduction, manipulation materials and a concluding section. The introduction and conclusion sections are identical for each treatment condition and manipulation varies based on different levels of the three factors.

The manipulation of the variables was based on the construct descriptions in the literature and familiarity with the constructs obtained through first-hand experience via fieldwork (Rungtusanatham *et al.*, 2011). Buyer dependence (current) and supplier dependence (current) were manipulated as turnover and switching cost based on alternative market choices (Carr *et al.*, 2008; Ellis *et al.*, 2012). Supplier dependence (future) was manipulated with different experimental clues to enhance realism. First, to manipulate the supplier's expected potential turnover from the buyer, we induced different supplier perceptions of the buyer's business development (promising or declining). Second, since it is difficult to predict the switching cost based on future alternative market choices given market uncertainty (Gulati and Sytch, 2007), we used supplier expected relationship investment as the experimental clue. We based this decision on two assumptions. First, investment in a relationship (e.g., time, efforts) is a

prominent indicator of switching cost (Pick and Eisend, 2014). Second, the extent to which a supplier would like to invest in building a relationship is their own decision and can therefore be realistically assessed. Appendix A provides the description of the scenarios and experimental manipulations.

Given that participants were to be asked about their attitudes to knowledge sharing with buyers, an issue of strategic importance for any organisation (Van Burg *et al.*, 2014), senior managers were identified as ideal subjects. To this end, we invited 127 Executive MBA students at a Chinese business school to participate the experiment. All of them held executive positions in their organisations and were involved in strategic decision making. Most of them (over 82%) had more than 10 years managerial experiences (<10 years: 17. 6%; 10-14 years: 52%; 15-19 years: 21.6%; ≥ 20 years: 8.80%). 77.2 % of the participants were male (22.8% were female). 69 % of them were between age 34-45, and 19% were older than age 45 and about 12% were younger than age 34.

We applied a within-subjects design in which each participant completed two scenarios. A within-subjects design has the benefit of allowing another scenario to serve as a reference point for judgement so that the participants can reflect the true judgments of each response (Aguinis and Bradley, 2014). To control for the order effect associated with a within-subjects design, we strictly followed the method applied by Hora and klassen (2013) and Mantel *et al.* (2006) and carefully rotated the sequences of the scenarios so that each scenario was equally likely to appear in the first or second sequential position (the ordering of the scenarios was: 1-5,1-6,1-7,1-8,2-5,2-6,2-7,2-8,3-5,3-6,3-7,3-8,4-5,4-6,4-7,4-8,5-1,5-2,5-3,5-4,6-1,6-2,6-3,6-4,7-1,7-2,7-3,7-4,8-1,8-2,8-3,8-4; each sequence appeared approximately four times). In this way, the overall results of the study would not be significantly influenced by the nature of the sequence. In total, we received 254 responses.

3.2 Measurements

To measure the supplier's overall level of motivation to share knowledge with the buyer, we modified the items used by Siemsen et al. (2008) from a co-worker context to a buyer–supplier context. Participants were asked to evaluate the statements (a) 'I had no intention to share this knowledge with this customer' (R). (b) 'I was motivated to share what I know with this customer', (c) 'I really wanted to share this knowledge with this customer', (d) 'I meant to share this knowledge with this customer'. All items were assessed on Likert scales ranging from 1 ('strongly disagree') to 7 ('strongly agree'). Principal component analysis (PCA) showed that these four items were highly correlated and loaded on one factor with a Cronbach's alpha a of 0.93.

A motivation model is to explain goal-directed behaviour (Heckhausen, 1977). In this sense, motives can be explicitly measured by using the sentence 'I'm willing to…so that…' (e.g., Xue *et al.*, 2021). In our study, we measured the three motives by asking the participants to what extent they disagreed or agreed on a seven-point scale with the statements that they were *willing to* share the knowledge with this buyer *in order to* (a) obtain sales, (b) build a collaborative relationship, and (c) learn from the buyer. Although using multiple-item measures are recommended in most situations, there are several situations where using single-item measures is sufficient (e.g., Fisher *et al.*, 2016; Bammens and Huenermund, 2020); specifically, in measuring *concrete* constructs (e.g., the economic motive) (Bergkvist and Rossiter, 2007) and '*overall*' constructs (e.g., the relational and learning motives) (Nagy, 2002). Numerous studies explicitly compare single- and multiple-item measures for 'overall' and concrete constructs with results demonstrating equivalent predictive validity (e.g., Scarpello and Campbell, 1983; Wanous *et al.*, 1997; Christophersen and Konradt, 2011; Gilbert and Kelloway, 2014; Gogol *et al.*, 2014; Cheah *et al.*, 2018; Houdmont *et al.*, 2021). Single-item measures have been used to measure buyer-supplier knowledge redundancy (Noordhoff *et al.*, 2011; Villena *et al.*, 2021),

buyer's intention to switch (Wang *et al.*, 2022), perceived supplier importance (Fan *et al.*, 2020), and JIT practices (Nair *et al.*, 2016). In short, we consider single-item measures for the three motives offer the practical benefits of parsimony without undermining predictive validity.

3.3 Experimental checks

We conducted a realism check using two items developed by Dabholkar (1994). The participants were asked to what extent they consider the scenario to be believable and they could imagine themselves in the situation. On a seven-point scale, the mean score on the two realism checks was 5.58, which indicated that respondents judged the scenario used in the study to be highly realistic.

Manipulation check was conducted to ensure that the perceived factor levels were manipulated as intended (Rungtusanatham *et al.*, 2011). Two items were included to check the manipulation of dependence based on its definition in the literature (Emerson, 1962) and wordings were edited for buyer dependence (current) ('this buyer benefits a lot from our company'; 'it is very costly for this buyer to replace our company'), supplier dependence (current) ('our company benefits a lot from this buyer'; 'it is very costly for us to replace this buyer'), and supplier dependence (future) ('our company would potentially benefit a lot from this buyer in the future'; 'it would be very costly for us to replace this buyer in the future'). Participants responded on a seven-point scale to indicate to what extent they agree or disagree with the statements.

The results of the manipulation check show that all three variables were manipulated as intended. On buyer dependence(current), the response in the high group was significantly higher than that in the low group ($Mean_{high}$ = 5.47, $Mean_{low}$ = 3.23, $p<0.000$). On supplier dependence (current), the two means were significantly different ($Mean_{high}$ = 5.74, $Mean_{low}$ = 2.70, $p<0.000$). The test on supplier dependence (future) also found a significant difference between the high and low groups ($Mean_{high}$ = 5.15, $Mean_{low}$ = 3.90, $p<0.000$).

4. Data analysis and results

We conducted confirmatory factor analysis using Mplus and the results[1] supported the validity and reliability of the measure. The means and standard deviations of the level of motivation for the various treatment groups can be found in Table 1. Table 2 reports the descriptive statistics and correlations between the variables. We used PROCESS to test the proposed hypotheses. The final sample was 240 responses after excluding those responses with missing data. Given concerns with biased confidence intervals associated with indirect effects (Shrout and Bolger, 2002), bootstrapping which is a preferred method was used (Malhotra *et al.*, 2014) with 10000 random samples with replacement from the full sample.

INSERT TABLE 1 and TABLE 2 ABOUT HERE.

In this study, we explicitly distinguished between supplier current and future dependence. However, a potential issue of this temporal perspective is that supplier current dependence may influence supplier future dependence. Consequently, we included the perceived supplier current dependence (i.e., the manipulation check of supplier current dependence) as a control variable to partial out the effect in the regression. We also performed collinearity diagnostics using SPSS. The VIF value for each independent variable is well below the cut-off point of 10 (range from 1.01 to 1.53), which suggests that multicollinearity is not a concern in the regression.

4.1 Mediation analysis

We used PROCESS Model 4 to conduct the mediation analysis (Hayes, 2018) and the results are reported in Table 3. Regarding the relationships between the three motives and the overall level of motivation, the relational (B = 0.33, p = 0.000) and learning (B = 0.28, p = 0.000) motives have significant positive effects as hypothesized, but the effect of the economic motive is not significant (B = -0.07, p = 0.307); H1b and H1c are supported, but not H1a. The

relationships between supplier dependence (future) and the economic (B = 0.93, p = 0.000), relational (B = 1.37, p = 0.000), and learning (B = 0.78, p = 0.000) motives are all significant; H2a, H2b and H2c are supported.

INSERT TABLE 3 ABOUT HERE.

H1 and H2 taken together suggest mediation effects of the three motives. The results of H1 and H2 suggest that the economic motive does not have a mediation effect, but the other two motives have. This is confirmed by the indirect effects reported by PROCESS (Table 4). The mediation effect of the economic motive includes zero ([-0.210, 0.060]), but the effects of the relational ([0.212, 0.703]) and learning ([0.092, 0.382]) motives do not include zero. This means that the indirect effect via the economic motive is not significant, but the indirect effects via the relational and learning motives are significant. PROCESS also compared the indirect effects (Table 4). The results show that the difference between the indirect effects of the relational and learning motives is not significant ([-0.077, 0.528]), which suggests that the mediation effects are similar.

INSERT TABLE 4 ABOUT HERE.

4.2 Moderated mediation analysis

We used PROCESS Model 7 to conduct moderated mediation analysis (Hayes, 2018). Table 5 reports the conditional effects of supplier future dependence on the three motives at different levels of current embeddedness. The results demonstrate that for both economic and learning motives, the positive effects of supplier future dependence are only significant when current embeddedness is low (economic [0.892, 1.975]; learning [0.600, 1.735]), but not significant when current embeddedness is high (economic [-0.142, 0.928]; learning [-0.169, 0.952]). In contrast, its positive effects on the relational motive are consistently significant regardless of

the level of embeddedness (both confidence intervals do not include zero). These results may suggest that current embeddedness has negative moderation effects on the economic and learning motives but not on the relational motive. This observation is further confirmed by the index of the moderated mediation effects reported by PROCESS (Table 6). Since the economic motive does not have a significant mediation effect, this rules out a potential moderated mediation. The results indeed show non-significant effect on the economic motive ([-0.057, 0.162]). The results show that current embeddedness has a significant moderated mediation effect on the learning motive ([-0.337, -0.002]), but not on the relational motive ([-0.331, 0.012]), which further support that the moderation effect on the relational motive is not significant. H3a and H3c are supported, but not H3b. Figure 2 illustrates the negative interaction effects on the economic and learning motives, which shows positive effects of supplier future dependence on these two motives when current embeddedness is low.

INSERT TABLE 5 and TABLE 6 ABOUT HERE.

INSERT FIGURE 2 ABOUT HERE.

5. Discussion

This study examined the effects of supplier anticipated future dependence on supplier motivation to share knowledge with a buyer via economic, relational, and learning motives. We also examined these effects together with conditional effects of the current embeddedness of the relationship. The results of this study have important theoretical and practical implications for buyer-supplier relationships.

5.1 Theoretical implications

First, this study confirms that supplier knowledge sharing with a buyer is future-oriented. As knowledge is a key strategic resource (Grant, 1996), decisions on knowledge sharing are

strategic, which is typically future-orientated (Das, 2004). However, to date this had not been empirically tested. In this study, we explicitly distinguished between supplier current and future dependence, which represent short- and long-term in timeframes, respectively. Our results show the positive effects of future dependence on the motivation even after partialling out the effects of current dependence. This confirms that the decision to share knowledge with a buyer is associated with a strategic future outlook. The implication is that is even if a buyer is currently very important to a supplier, a supplier may reduce knowledge sharing if it does not anticipate such a relationship continuing for future business. But this does not mean that the anticipated future is not affected by the present. The moderating effect of current embeddedness on the motives shows that the influence of the future could be weakened when the current relationship is highly embedded.

Second, the results show that the relational and learning motives have similar mediation effects, but the economic motive does not have a significant effect on the overall level of motivation as expected. The finding is in line with some other studies that find the effect of using financial incentives to encourage knowledge sharing is limited (Bock *et al.*, 2005; Kwok and Gao, 2005; Jin Chang *et al.*, 2007; Lin, 2007). One possible reason for this insignificant effect is that suppliers may see buyers using sales incentives as an overt form of leverage control, which is de-motivating (i.e., undermining self-determination reducing motivation) (Gagné and Deci, 2005). Or from a SET perspective, different types of resources are exchanged in different time horizons (Foa and Foa, 1980); more intangible resources (e.g., knowledge, relationship) are more likely to be exchanged over a longer timeframe. Since the economic returns are tangible, its exchange is more likely to be short-term oriented, and therefore its motivational effect on knowledge sharing is limited.

Third, the results show that the current embeddedness of the relationship has negative moderation effects on economic and learning but not relational motives. This suggests that a supplier perceives less economic and learning value in a highly embedded relationship, which is in line with the discussion of the dark side of buyer-supplier relationships (Villena *et al.*, 2011). However, it seems that suppliers still see the value of building a collaborative relationship even when the relationship is highly embedded. Why? Perhaps it is because a collaborative relationship, even when it stifles some aspects of performance, can still offer value in other ways given the uncertainty and complexity in managing supply chains (Whipple *et al.*, 2015). For example, once Nissan 'de-embedded' some critical suppliers, although the performance was improved (e.g., cost reduction), supplier commitment and responsiveness severely deteriorated (Sting *et al.*, 2019). On one occasion, Nissan had to stop production because of short of supply. In light of the relational view (Dyer and Singh, 1998), a close relationship can generate 'rational rents' because the attachment to *this* relationship leads to a bank of 'goodwill' so that parties are willing to be flexible and adaptive in managing uncertainties (Cousins *et al.*, 2006). Dysfunctionalities do occur in a close relationship, but other negative consequences could emerge if without it.

5.2 Managerial implications

This study has implications for how buyers might develop strategies to facilitate knowledge sharing with suppliers. First, the study confirms that suppliers are more likely to share knowledge with buyers who they perceive to be important for their future business. Therefore, to encourage suppliers sharing knowledge, buyers can involve them in future business plans and offer them a long-term vision of the relationship, sending a clear message of 'growing together'. Second, the novel multi-motive analysis highlights the relatively limited impact of simple economic incentives on knowledge sharing, especially over a more extended timeframe,

and the greater significance of relational and learning motives. The leads us to conclude that, as suppliers perceive knowledge sharing as a key relationship-building mechanism, it increases the consequential impact of buyers' reciprocal behaviour. Suppliers recognise this reciprocity as a signal that buyers value this relationship, which will further enhance suppliers' willingness to share knowledge. Moreover, small buyers, even if unable to promise big spending, can still facilitate knowledge sharing with suppliers if they have expertise that suppliers consider valuable.

The study also sheds new light on managing embedded buyer-supplier relationships. It may not be optimal for firms to stop building collaborative relationships even if they are highly embedded. Therefore, managers have the challenging task to continue building relationships and concurrently, minimise their 'dark side'. For example, firms could try de-embedding for a short time to reinvigorate the performance, and then rebuild the relationship (Sting *et al.*, 2019). Firms can develop communication strategies (Paulraj *et al.*, 2008) so that challenging topics can be discussed in a constructive way without hurting the relationship. Firms can also design explicit contracts in which roles, responsibilities, and outcomes are clearly specified, to help firms remain objective when the relationship is very close (Villena *et al.*, 2021). Implementing these mechanisms may not be easy, but this relational competence is beneficial for firms in managing a close relationship.

5.3 Limitations and future research

This study has several limitations that in turn could influence the directions of future research. First, the results of the study must be viewed within the limitations of the experimental design. For example, we did not find a significant relationship between the economic motive and the overall level of motivation. Although this finding is in line with the results of some existent studies (e.g., Bock *et al.*, 2005; Lin, 2007), a possible reason for the non-significant effect could

be that we conducted a hypothetical scenario-based experiment. If the experiment had a consequential design and there were real economic rewards involved (Eckerd *et al.*, 2013; Mir *et al.*, 2017), the result could be different. Future studies can design such experiments to further examine the effect of economic incentives. Moreover, we used a within-subjects design and future studies can apply a between-subjects design to test our results.

Second, we developed our hypotheses under the assumption that the norm of reciprocity applies in most buyer-supplier relationships. Future studies could explicitly control or examine whether buyers reciprocate. Third, although we consider the nature of the three motives are suitable for single-item measures, future studies could use multiple-item measures to test our findings. Fourth, studies on knowledge sharing suggest other motives such as psychological ownership (Pittino *et al.*, 2018) and sense of self-worth (Bock *et al.*, 2005). Since these motives represent a social-psychological perspective on the motivation, we did not include them in this study. Future studies could examine these motives to provide a more integrative understanding of managers' decision on knowledge sharing. Fifth, this study was conducted in China. Studies have shown that managers in China exhibit different decision-making styles from those of American managers (e.g., Li *et al.*, 2019). Therefore, the results of this study might be affected by Chinese cultural traits such as long-term orientation (Hofstede, 2007). Future studies could explore cross-cultural differences in the motivational factors. Lastly, this study raises the question of how to continuously build relationships and concurrently, minimise the dark side of the relationship. We encourage future studies to explore specific mechanisms for managing close buyer-supplier relationships.

Note

1. The model indices（$\chi 2$ = 1.466, df =2, RMSEA=0.00, CFI=1.00, TLI= 1.00, SRMR= 0.01), factors loadings (all > 0.70; p-value<0.000), average variance extracted (AVE) (0.80), and composite reliability (0.94).

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Table 1. Experimental cells and means (standard deviations) of the overall level of motivation

Buyer dependence (current)	Supplier dependence (current)	Supplier dependence (future)	Mean (SD)	N
Low	Low	Low	2.87 (1.54)	32
Low	Low	High	4.93 (1.11)	34
Low	High	Low	4.20 (1.53)	29
Low	High	High	4.64 (1.35)	32
High	Low	Low	3.57 (1.60)	32
High	Low	High	5.00 (1.28)	32
High	High	Low	4.05 (1.46)	30
High	High	High	5.13 (1.34)	32

Table 2. Means, standard deviations, and correlations of variables

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.BDc	1									
2.SDc	0.01	1								
3.SDf	-0.01	0.01	1							
4.Economic	-0.09	0.20**	0.28**	1						
5.Relational	-0.03	0.17**	0.45**	0.71**	1					
6.Learning	-0.02	0.14*	0.27**	0.40**	0.55**	1				
7.Motivation	0.09	0.13*	0.40**	0.33**	0.55**	0.47**	1			
8. Gender	0.00	0.16**	0.04	0.05	0.02	0.07	0.09	1		
9. Age	-0.01	-0.03	0.10	-0.08	-0.00	0.15*	0.02	-0.07	1	
10. Managerial experience	-0.02	-0.06	0.03	-0.11	-0.08	0.03	-0.05	-0.14*	0.49**	1
Mean	0.50	0.49	0.51	5.30	5.45	5.26	4.31	1.23	2.07	3.22
SD	0.50	0.50	0.50	1.64	1.61	1.65	1.57	0.42	0.55	0.84

BDc: buyer dependence (current); SDc: supplier dependence (current); SDf: supplier dependence (future)
SD, standard deviation. *p < 0.05; **p < 0.01; 2-tailed.

Table 3. Mediation regression results

	Economic	Relational	Learning	Overall motivation
	Coeff. (S.E.)	Coeff. (S.E.)	Coeff. (S.E.)	Coeff. (S.E)
Predictor				
SDf	0.93*** (0.20)	1.37***(0.18)	0.78***(0.20)	0.51**(0.17)
Economic				-0.07(0.07)
Relational				0.33***(0.08)
Learning				0.28***(0.06)
Control variable				
Manipulation check SDc	0.21***(0.05)	0.16**(0.05)	0.19**(0.05)	0.05(0.04)
Gender	-0.01(0.23)	-0.10(0.21)	0.20(0.24)	0.12(0.19)
Age	-0.37^{+}(0.21)	-0.05(0.19)	0.34 (0.22)	0.07(0.17)
Managerial experience	-0.11(0.14)	-0.17(0.12)	-0.04(0.14)	-0.01(0.11)
Model				
R^2	0.17	0.25	0.13	0.40
F	9.74***	15.28***	7.25***	19.28***

$^{+}$p<0.1; * p<0.05; ** p< 0.01; ***p< 0.001; two tailed. N=240, listwise.

Table 4. Indirect effects

	Effect	SE	LLCI	ULCI
Economic	-0.07	0.07	-0.210	0.060
Relational	0.45	0.12	0.212	0.703
Learning	0.22	0.07	0.092	0.382
(C1)	-0.51	0.16	-0.854	-0.204
(C2)	-0.28	0.10	-0.497	-0.099
(C3)	0.23	0.15	-0.077	0.528

Note:

(C1) Economic minus Relational

(C2) Economic minus Learning

(C3) Relational minus Learning

Table 5. Conditional effects at different levels of current embeddedness

	Embeddedness	Effect	SE	LLCI	ULCI
Economic	Low	1.43	0.27	0.892	1.975
	High	0.39	0.27	-0.142	0.928
Relational	Low	1.66	0.25	1.155	2.171
	High	1.07	0.25	0.566	1.570
Learning	Low	1.17	0.28	0.600	1.735
	High	0.39	0.28	-0.169	0.952

Low: 1SD below the mean; High: 1SD above the mean

Table 6. Index of moderated mediation

	Effect	SE	LLCI	ULCI
Economic	0.05	0.05	-0.057	0.162
Relational	-0.14	0.09	-0.331	0.012
Learning	-0.15	0.08	-0.337	-0.002

Figure 1. Proposed research model

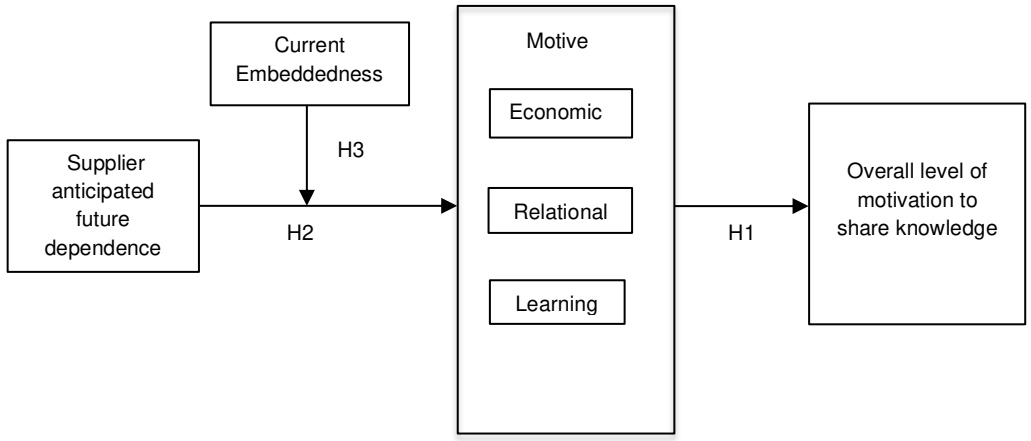
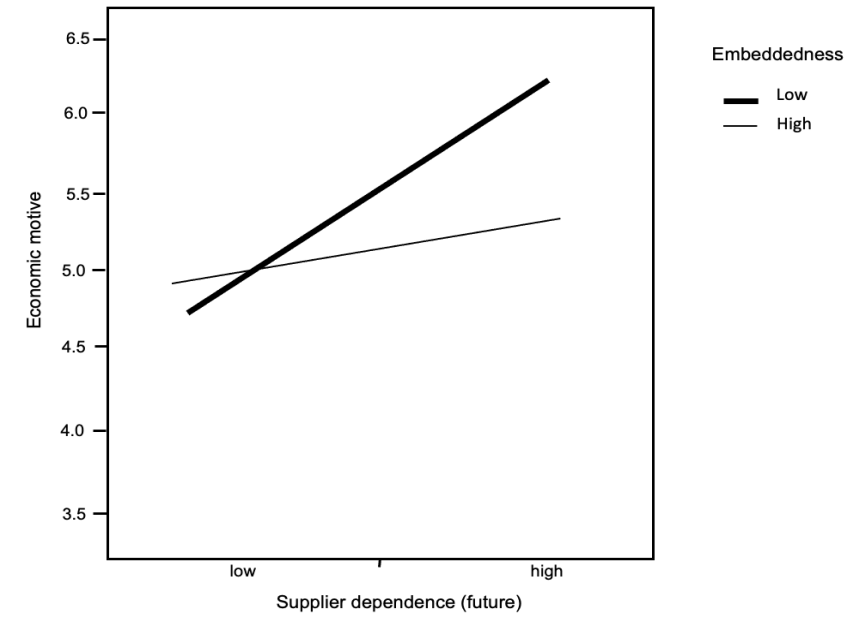
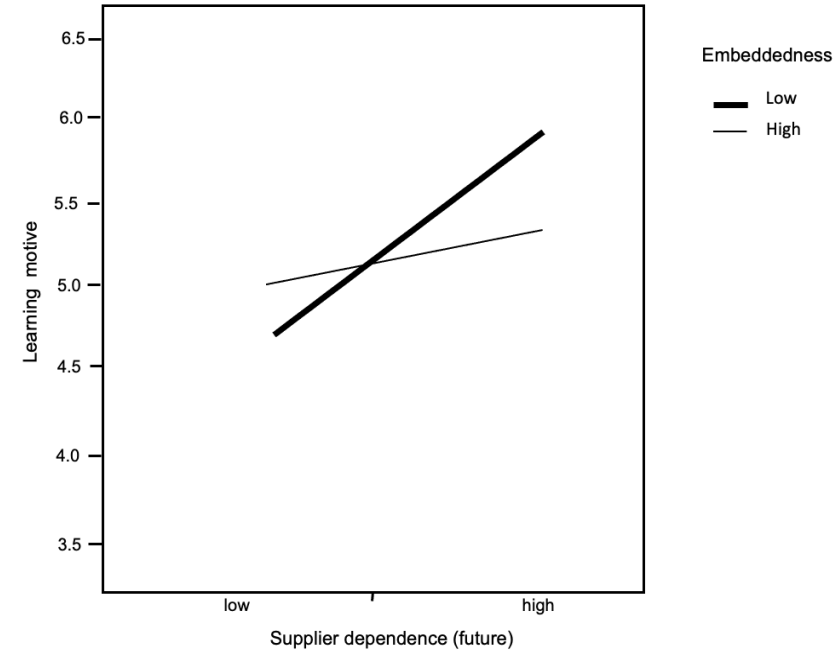


Figure 2. Moderating effects of current embeddedness





Appendix A. Description of the scenarios and experimental manipulations

Introduction You are a senior customer account manager in a mid-sized steel ball factory. The factory supplies different types of steel balls to bearing manufacturers. You have multiple customers, one of whom you have supplied for three years. The business interactions between you and this customer are described below.

High Buyer Dependence (current) At this stage, your supply is very important to this customer. You are its biggest supplier, and almost half of the customer's purchases are from your company. In the market, it is not easy for the customer to find a suitable replacement for your supply.

Low Buyer Dependence (current) At this stage, your supply is not very important to this customer. The customer has alternative suppliers for the same products, and you are not the main supplier. The customer purchases only a small amount from you, and it is easy for the customer to switch to other suppliers.

High Supplier Dependence (current) At this stage, the orders from this customer are very important to your company. The orders account for almost half of your business turnover, and there are very few, if any, competitive customers in the market to provide you with the same scale. You cannot switch to other customers without incurring significant costs.

Low Supplier Dependence (current) At this stage, the orders from this customer are not very important to your company. The orders from this customer make up less than 5% of your turnover. There are many competitive customers for your products, and you can switch to them without incurring significant costs.

High Supplier Dependence (future) Looking into the future, you perceive this customer to have a promising growth path. You know it is taking a strategic move into more environmentally

friendly products, which is favoured by industrial policies. You expect its business to grow, and therefore, there is a chance that your turnover may increase with this company's success. You would thus like to invest and develop a strong relationship with this customer. At the same time, you know that this relationship investment will make it costly to replace this customer in the future.

Low Supplier Dependence (future) Looking into the future, you have concerns about the growth path of this customer. This customer's production is characterised by high energy consumption and high pollution, which is not favoured by industrial policies. You are afraid its business will shrink, and therefore, your turnover from this customer may also decrease. You thus have no intention of investing and developing a strong relationship with this customer, which will enable you to replace this customer without incurring significant costs.

Conclusion Recently, this customer has expressed a need for a special-sized steel ball that requires a special technology. You have some knowledge of this technology. Your customer has called to enquire about it. As an immediate response, you are concerned about the risk of knowledge leakage; if you offer to share the knowledge, there is a risk that this knowledge may be leaked to other suppliers (your competitors). However, you also know that this might be an opportunity to develop deeper involvement with this customer. In such a situation, how would you react?