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# Leveraging IT Resources, Embeddedness, and Dependence: A Supplier's Perspective on Appropriating Benefits with Powerful Buyers

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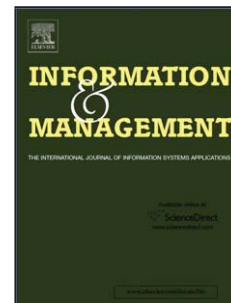


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## Highlights

- Supplier –buyer relationships often exhibit power differentials and dependence.
- Relation-specific IT, embeddedness and dependence lead to supplier benefits.
- Embeddedness does not result in a supplier appropriating benefits.
- A supplier must use a buyer's dependence on a supplier to appropriate benefits.

# Leveraging IT resources, embeddedness, and dependence: A supplier's perspective on appropriating benefits with powerful buyers

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## Abstract

The relationships between suppliers and buyers are often characterised by power differentials and dependence at the same time. This leads to the ability of a powerful buyer to benefit more from the relationship than the supplier. We examine how a supplier can strengthen its use of relation-specific IT with embeddedness to appropriate its share of relational benefits. We developed and tested a model of supplier relation-specific IT use, embeddedness, and buyer dependence on supplier. The results showed that embeddedness did not lead directly to the sharing of relational benefits; rather the appropriation of relational benefits is derived from buyer dependence.

## Keywords

Relation-specific IT  
Supplier-buyer relationships  
Embeddedness  
Power  
Dependence

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## **Abstract**

The relationships between suppliers and buyers are often characterised by power differentials and dependence at the same time. This leads to the ability of a powerful buyer to benefit more from the relationship than the supplier. We examine how a supplier can strengthen its use of relation-specific IT with embeddedness to appropriate its share of relational benefits. We developed and tested a model of supplier relation-specific IT use, embeddedness, and buyer dependence on supplier. The results showed that embeddedness did not lead directly to the sharing of relational benefits; rather the appropriation of relational benefits is derived from buyer dependence.

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## 1. Introduction

Proponents of the resource-based view of the firm have shown that firms with resources and capabilities that are rare, valuable, nonsubstitutable, and difficult to imitate will achieve superior and sustainable firm performance over competing firms [4]. However, trading partnerships have become more prevalent in business today and this important unit of analysis deserves more study [27]. For example, suppliers and buyers often form partnerships to combine resources, develop unique and valuable interorganisational assets, and create relational benefits [26]. The relational view of competitive advantage explains this phenomenon since a firm's resources and capabilities may extend beyond firm boundaries to be embedded in interfirm routines and processes [27].

The literature on business-to business (B2B) ecommerce demonstrates how relation-specific information technology (IT) is used to create relational benefits through knowledge and information sharing [77,84,67,13,91]. However, much of this research focuses on how the relational benefits that are created by relation-specific IT use are appropriated by buyers at the expense of their suppliers [1,64,67,66,91,61]. These results occur since partnerships often exist in a power regime where either the supplier or the buyer dominates [19]. However, even when a supplier has a power advantage over a buyer that advantage does not enhance supplier benefits [37].

Therefore, we pose the question of what can a supplier do to appropriate its share of relational benefits? To address our research question, we take a supplier's perspective and utilise the relational view to develop a research model that contains the elements for a supplier to appropriate its share of the partnership benefits. The relational view states that relation-specific assets (in our context, a relation-specific IT system) can create relational benefits if there are

complementary resources and capabilities, knowledge-sharing routines and effective governance [27]. Given that relational benefits are already earned by a supplier-buyer partnership, we advocate that the inability for a supplier to appropriate relational benefits is most likely attributed to ineffective relational governance.

Embeddedness between a supplier and a buyer is often cited as a key capability for creating and sharing relational benefits because it allows for enhanced knowledge-sharing and is an informal self-enforcing mechanism for relational governance [37,88,27,87]. Embeddedness involves information sharing, joint problem solving, socialisation and communication [87]. In the context of the management information systems (MIS) literature, embeddedness is a managerial and relational capability that complements relation-specific IT in pursuit of relational benefit sharing [64,84,63,27,18,61,4]. We test whether relation-specific IT use and embeddedness is associated with both supplier and buyer benefits.

From a buyer's perspective, the relational view approach suggests that, by increasing their dependence on a smaller set of suppliers, buyers can increase their benefits from the partnership through knowledge sharing and investments in relation-specific assets [84,67,27,18]. Furthermore, the joint ownership of relation-specific resources and capabilities fosters partner dependence [63,70]. According to resource dependency theory (RDT), this dependence is also an informal self-enforcing governance mechanism for the distribution of the relational value in a partnership [27]. Therefore, we utilise RDT as a complement to the relational view and measure a buyer's dependence on a supplier, and test the association between embeddedness, buyer dependence on supplier and supplier benefits in our research model to determine whether a supplier can foster this dependence to appropriate their share of the relational benefits.

In sum, we address a gap in current research on a supplier's perspective regarding the use of relation-specific IT and relational benefit sharing by examining how a supplier can appropriate its share of relational benefits in the presence of powerful buyers using embeddedness and buyer dependence on supplier.

## **2. Theory and hypothesis development**

The relational view of competitive advantage predicts that relational benefits are developed from four sources: (1) relation-specific assets, (2) knowledge sharing routines, (3) complementary resources and capabilities, and (4) effective governance [27]. We propose that within a partnership, the relation-specific IT system or system that partner firms use as a relation-specific asset, develops embeddedness between the partners that fosters deeper knowledge sharing, and serves as an informal self-enforcing form of relational governance that ultimately allows a supplier to leverage buyer dependence on supplier to appropriate its share of relational benefits.

### *2.1. Embeddedness capability*

The logic of embeddedness was first referred to by Emerson [28] in his research into power dependence relationships. In partnerships with differential power and resource dependence, Emerson states that the partners in a relationship are being controlled by the relationship itself. The relationship's controlling nature reflects the logic of embeddedness, which results in each partner giving heightened attention to the responses and attitudes of the other, such that the quality of the relationship becomes one of the main determinants of a satisfactory business partnership [60]. In fact, partnerships with power differentials and resource dependence can interpret ambiguities in their partners' behaviours in a positive rather than negative light [37,68]. For example, a supplier-buyer relationship in the automotive



manufacturing industry is characterised by power differentials and high dependence at the same time. It was demonstrated that this high level of commitment to the relationship led toward an orientation for long-term, effective conflict resolution, and the willingness of partners to forego immediate self-interest for the benefit of the relationship [52,53].

Dacin et al. [20], Uzzi [87] and Granovetter [36] define embeddedness as a process by which the quality and structure of relations among actors shape economic actions in ways that differ from standard economic organisational-centric explanations. A supplier and buyer form a business friendship which helps to ensure that relationship benefits are shared because partners can respond and adapt to each other in areas not specifically covered by a formal written contract [22,73,27,87]. That is, embeddedness provides informal and social controls to govern what a formal written contract cannot completely cover. Embeddedness yields the utility of shared understanding of reciprocally beneficial behaviour as a result of trust, exchange of sensitive and sometimes confidential information, rational knowledge sharing routines, and joint problem solving arrangements [47,13].

In summary, embeddedness is a relation-specific capability that manages the implicit yet congruent expectations and assumptions about information sharing, joint planning, joint problem solving, socialisation and communications [27,87,36]. The expectations and assumptions should come from past commercial interactions, values and experiences, and capture the give and take required to govern the commercial and social needs of each party [87].

## 2.2. *Relation-specific IT use*

Relation-specific IT is used to create relational benefits through knowledge and information sharing [77,84,67,13,91]. When a supplier and a buyer use an interorganisational IT system, the relation-specific activities transpire in specialised and unique ways that is consistent

with the relational view to allow the partners to learn how to leverage their relationship and create value that cannot be replicated outside of the partnership [80,84,22,13,12,48].

In practice, IT systems are used for automating and informing [21], and efficiency and effectiveness [64]. These two uses of IT have implications for partnerships since performance is often dependent on operating efficiencies derived from automation, and operating effectiveness derived from interpreting and acting on information. In the strategic management literature, IT use for automating and efficiency is similar to the concept of exploitation; and informing and effectiveness is similar to the concept of exploration [29,44,59].

Known as exploitation, a supplier can use the knowledge and information in the IT system to improve operating efficiencies with their buyer through increased standardisation, tighter process controls and automation in order to achieve quantifiable benefits in the form of cost reductions, process consistency and process efficiency [84,6,59]. In contrast, a supplier can engage in exploration by using the knowledge and information in the IT system to solve old problems, discover ways to innovate, invent and build new capabilities, enter new lines of business or improve absorptive capacity [84,6,59]. Since the IT use for exploitation is required for short-term partnership viability and IT use for exploration is required to sustain long-term partnership viability, they must coexist and be undertaken in parallel [51,29,76]. Therefore, we define relation-specific IT use as the use of relation-specific IT systems for both exploitation and exploration.

The issue that arises from relation-specific IT use is that the relational benefits are often appropriated by a powerful buyer at the expense a supplier [84,19,67,66,91]. Even a powerful supplier is unable to appropriate its fair share of relational benefits [37]. Therefore, we propose that when relation-specific IT use is associated with embeddedness, a supplier will likely be able

to appropriate its share of relational benefits. Relation-specific IT use creates relational benefits from unique and valuable knowledge and information, and embeddedness is a capability that informally self-governs relational benefit sharing through information sharing, joint planning, and joint problem solving using a social context involving business friendships.

### 2.3. *Relation-specific IT and embeddedness*

Relation-specific IT “use” starts with a physical interorganisational IT system [65,41] and evolves into information sharing, joint planning, joint problem solving, socialisation and communications to maximise relational benefits. Initially, relation-specific IT use by a supplier provides the opportunity to open communications between the partners about the insights gained. These initial discussions create interaction and familiarisation that establishes a low level of embeddedness. As discussions, interactions and familiarisation continue, reciprocity builds, leading to more collaborative relations between the supplier and buyer. These relations open a supplier and buyer to knowledge sharing, and the partners partake in deeper provision of solution, support, and service [47]. The closer relations establish a medium level of embeddedness. When a high level of embeddedness is reached, proprietary information and knowledge about relationship strategies, problems, needs, and service levels are likely to be shared and debated. Therefore, with a business friendship formed, a supplier and buyer can respond and adapt to each other in areas that cannot be completely written into a formal contract. Therefore, we hypothesise the following:

**H1:** Relation-specific IT use by a supplier is positively associated with embeddedness.

### 2.4. *Embeddedness and relational benefit sharing*

Since embeddedness elevates a supplier and buyers understanding of each other, their values, attributes, and goals will tend to converge [37]. The partners tend to develop mutual

empathy and a focus on joint success, embracing a long-term horizon for the relationship. Partners become more structurally similar [25] and this convergence improves communications and negotiations, reduces operational frictions and avoids unnecessary transaction costs [37]. Consequently, this facilitates the development of a stable business relationship that promotes continuity, and provides the ingredients for superior value creation and distribution [85]. For example, in a partnership that exhibits some embeddedness, a supplier and buyer may use the relation-specific IT system to analyse the relationship's purchasing data with the objective of understanding purchasing patterns, and whether they meet requirements to optimise relational benefits. This type of analysis provides benefits for the partnership by providing benefits to each partner unique to their role as a supplier and as a buyer. The analysis may show that if the buyer switches to a recommended product substitute and increases its order size by aggregating purchase orders, the buyer would be able to reduce its purchasing costs as well as provide additional margins for the supplier. Taken together, embeddedness reduces transaction costs, provides greater resilience in the face of conflict, and increases opportunities for value creation and distribution for each partner. Therefore, we hypothesise that:

**H2a:** Embeddedness is positively associated with supplier benefits.

**H2b:** Embeddedness is positively associated with buyer benefits.

## 2.5. *Resource dependence*

In a partnership, resource dependency theory (RDT) [70] states that such relationships exist because of: (1) the importance of a shared resource; (2) lack of other partners that possess that resource; and (3) the discretion of the partnership to deploy the resource [63]. However, suppliers and buyers will often have differing levels of resource dependence and the imbalance in dependence allows for a power differential that causes relational benefits to be appropriated by

the more powerful partner [37,63,18]. Embeddedness can bring such dependence into balance. A supplier can increase the dependence of a more powerful buyer with embeddedness by reminding the buyer of their valuable and unique resources and capabilities, and reinforce a buyer's recognition and appreciation of the resources and capabilities that are provided [37]. The common empathy, values, attitudes, collaboration and goals consequently become an important set of resources for a buyer to rely on to motivate and support the relationship's value creating and sharing potential [38]. Studies in the banking industry and apparel industry have demonstrated how embeddedness has balanced power differentials while maintaining heavy joint dependence [88,87]. Despite the increased frequency of operational tensions that can generally be associated with dependent ties and power differentials, embeddedness reduced the residual feelings of conflict in joint dependence [49]. Therefore, we hypothesise the following:

**H3:** Embeddedness is positively associated with buyer dependence on supplier in powerful buyers.

## 2.6. *Dependence and relational benefit sharing*

Embeddedness is a key capability that facilitates the structural and attitudinal convergence of a supplier and a buyer [25]. They become business allies, and develop greater overlap in their goals because there are fewer structural and attitudinal impediments [49]. RDT predicts that the emergence of this behavioural solidarity increases buyer dependence on supplier and reduces the initial relative dependence and power differential favouring a buyer. The increase in buyer dependence on supplier, in turn, allows a supplier to appropriate benefits from the partnership. Therefore, the effect of embeddedness on supplier benefits is mediated by buyer dependence on supplier. A high level of buyer dependence on supplier also imposes a high cost for a buyer to switch [63]. Consequently, a supplier is able to capture incremental sales from a

buyer; appropriate additional margins for itself through discretionary changes in prices and charges; and/or reduces its management costs because a supplier does not have to spend as much time in maintaining the relationship with its buyers. Therefore, we hypothesise that:

**H4:** Buyer dependence on supplier mediates the association between embeddedness and supplier benefits.

Buyer dependence on supplier also intervenes on the association between buyer benefits and supplier benefits. Since a buyer derives benefits from embeddedness in a partnership, such benefits are deemed to be fostered from interactions that involve trust, exchange of sensitive information, knowledge distribution, joint problem solving, and shared goals [47,13]. A supplier and a buyer would bring together a much “larger” set of capabilities than any one firm can muster, heightening the level of buyer dependence on supplier [27,42]. The increase in buyer dependence on supplier, in turn, would allow a supplier to appropriate benefits from the partnership, mediating the effect of buyer benefits. Buyer dependence on supplier is created because these benefits are valuable and unique to the relationship. Therefore, we hypothesise the following:

**H5:** Buyer dependence on supplier mediates the association between buyer benefits and supplier benefits.

Fig. 1 shows the research model that is developed and tested in our study.

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Insert Fig. 1 about here

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### 3. Research method

#### 3.1. Supplier selection

The supplier chosen was an independent Australian office products company with sales revenue of approximately A\$1.16 billion (profit A\$57.15 million) in 2010. It was subsequently bought out in 2011 by a U.S. office products company after showing above industry average growth in sales revenue and profits since the early/mid 2000s. There were many case studies testifying its success in supplier-buyer relationships. The office products company sold office supplies, IT solutions, business furniture, facility supplies, print management, and promotional marketing.

A survey was administered to gather the data for testing the research model in Fig. 1. This is because relation-specific IT use, embeddedness and buyer dependence on supplier are not amenable to archival recording. We chose a single supplier with many powerful buyers to perform an undiluted analysis of a supplier-buyer relationship with only buyer-side controls. This eliminated statistical bias that may be created by selecting a proxy variable to control for the varying levels of differential power that will exist in a sample of suppliers and their relationships with buyers.

The variables of interest in our study were best understood from the dyadic nature of the relationships between a supplier and its buyers. Therefore, we randomly selected a sample of the office product company's dominant buyers and controlled for the influence that the level of technology use, duration of the partnership, and size of the buyer might have on embeddedness, buyer benefits, buyer dependence on supplier and supplier benefits in each supplier-buyer relationship. To control for the level of technology use, we introduced a variable to measure the extent to which the buyer purchases electronically versus other purchasing methods. Buyer

benefits, buyer dependence on supplier, and supplier benefits are likely to be higher on average for buyers that extensively used electronic purchasing than for those that use it less extensively. We captured the duration of each supplier-buyer relationship to control for the influence that short-term versus long-term supplier-buyer relationship may have on buyer benefits, buyer dependence on supplier, and supplier benefits. To control for the effect of the varying levels of power or dominance that buyers may have on embeddedness, buyer benefits, buyer dependence on supplier, and supplier benefits, we included a measure for the size of each account as a proportion of all of the supplier's accounts.

Choosing an office products supplier also allowed us to control for the effects of physical resource dependence. These suppliers provide commoditised products and services, and this allowed us to isolate and test the effects of relation-specific IT use, embeddedness and buyer dependence on supplier without the confounding effects of unique and valuable physical products in a partnership.

### *3.2. Survey development*

A supplier-buyer relationship was defined by a formal written contract between a supplier and a buyer organisation or their autonomous divisions. The measures for relation-specific IT use and embeddedness were derived from a supplier and its buyers using a developmental method that involved focus groups with the structured approach of nominal group techniques [89,90]. A supplier focus group and a buyer focus group were carried out separately to develop factors from each point of view of the relationship. The aim was to derive an exhaustive list of factors around relation-specific IT use for exploitation and exploration, and dimensions of a supplier-buyer relationship that yielded relationship benefits. Account managers were chosen to represent the supplier as they were the point of contact for buyers. Purchasing managers were chosen in buyer



organisations because they were responsible for the trading agreement with account managers.

This development procedure also minimised common method bias. Each group was taken through a half day four step procedure. The four steps were: (1) presentation and discussion of the focus group objectives; (2) individual generation of items that would be used to form the factors; (3) group generation of factors; and (4) categorising (essential versus nonessential) and ranking (by number) the factors based on the impact on relationship benefits.

Supplier relation-specific IT use for exploitation measured the extent to which the relation-specific IT system provided an easy, convenient, and flexible system for computer use; assisted with business process reengineering initiatives; a desktop delivery programme that dispensed with a centralised stationery department and warehouse; and the ability to have a single source supplier that leverages large volumes of consolidated office products and services. Supplier relation-specific IT use for exploration measured the extent to which the IT system was used as a basis for strategic procurement analysis conducted by the supplier; expenditure control and management reporting assistance; account manager-assisted purchasing decision making; and a comprehensive management reporting package that incorporated benchmarking and trend analysis. Since we used a developmental method to produce the underlying factors that gave rise to observed scores for supplier relation-specific IT use for exploitation and exploration, we recognised these indicators as being reflective and accounted for variance among the observed indicators [2,23,14,31]. As relation-specific IT use for exploitation and exploration are conceptualised as distinct uses of relation-specific IT, we operationalise these constructs as reflective second-order constructs [50,84].

Consistent with Uzzi [87], our structured approach of nominal group techniques used in the focus groups recommended that we measure embeddedness as the extent to which there was

sharing of proprietary information and joint problem solving in the supplier-buyer relationship. The focus group also recommended that we measure the extent of value-adding discussions and frequency of performance reviews between the supplier and buyer. Since embeddedness is a socio-psychological concept that is observed, reflective indicators were applied [2,23,14,31].

We sourced and modified reflective measures of buyer dependence on supplier from Cool and Henderson [18] and Subramani [84]. On each side of the relationship, benefits are often measured by metrics defined by sales, sales growth, profit margin on sales, return on investment (ROI), and growth in ROI [9]. These organisational-level measures are the primary benchmarks by which most stakeholders in an organisation are rewarded [30,54,11,7]. We modified these measures and defined relationship-level constructs from a supplier and a buyer perspective respectively. Therefore, supplier benefit measures included: (1) incremental sales from the buyer; (2) additional margins through product prices and service charges; and (3) reduced buyer management costs. Buyer benefits were measured on the reduction in purchasing costs from the supplier.

Appendix A shows the supplier survey, Appendix B shows the buyer survey, and Appendix C shows the control measures and demographic questions. We collected our survey responses and assembled our case data using the tailored design method outlined in Dillman [24]. For analysis and modelling, we defined each case as a set of supplier responses for the relation-specific IT use, and supplier benefits; and buyer responses for embeddedness, buyer dependence on supplier, and buyer benefits. Assembling our case data in this way also allowed us to examine all the supplier-buyer dyads with the aim of eliminating common method bias [71].

### 3.3. *Survey sample*

The office supplies company provided a database of buyer organisations that was classified by account manager and their corresponding buyer's purchasing manager contact details. In total, there were more than 24,000 buyer contracts or agreements that were looked after by 226 account managers. To maximise sample size, we randomly emailed surveys to as many 12 purchasing managers for each account manager (we expected a response rate of about 20% or a little more than two responses for each account manager). We then aimed for each account manager to complete no more than two surveys corresponding to two buyer responses. We took this approach to minimise survey fatigue and response bias on the part of account managers from having to respond to more than two surveys.

After adjusting for account managers that had resigned and buyers that did not have an assigned account manager at the time, 2,324 buyers were cleared for surveying by account managers. Dissemination of the buyer survey yielded 223 (9.59%) responses that were complete enough to provide data for the constructs in the research model. The 223 surveys were sent out to the supplier account managers, and 77 (34.53% of the 223 surveys) provided fully completed responses that could be paired to the buyers' responses.

Prior to analysing our measurement and structural model, supplier-buyer dyads were screened for accuracy, outliers, normality, early and late response bias, nonresponse bias and missing data. A test using Little's MCAR test [56] indicated that the data was missing at random, and data was imputed using maximum likelihood estimation (MLE) as recommended by Hair et al. [39].

#### 4. Model analysis and results

The descriptive statistics for the buyer responses to control variables and demographic questions are shown in Table 1. On average, the responding buyers have been with the office products supplier for 4.21 years. During that time, buyers have had about 2.18 account managers. Buyers estimated that their spends were over A\$382,000 per year on average. About 82.11% of the buyers expected that their spending would increase by an average of 2.64% in the next year. Some 74.92% of buyer purchases were conducted electronically.

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 Insert Table 1 about here  
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Account managers also provided their responses to control variables and demographic questions about their buyers, and this is shown in Table 2. Based on two tailed  $t$  tests of the pairs in Tables 1 and 2, there were no significant differences between the buyer and supplier estimates of the partnership characteristics at  $p < 0.05$ , except for the account managers' estimates on buyer spend. Despite explicit instructions that the definition of the supplier-buyer relationship is the formal contract or agreement with a purchasing manager, the discrepancy occurred because some account managers responded to the survey by viewing the buyer account as the whole parent organisation (organisational-level) rather than the formal contract or agreement with the purchasing manager in a division of the buyer's parent organisation (relationship-level).

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 Insert Table 2 about here  
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We analysed our data using the partial least squares technique (PLS) [79]. We chose PLS for several reasons. First, it is capable of analysing data models with small sample sizes that are potentially non-normal [34,35]. That said, there is still considerable debate over the efficacy and choice of statistical techniques (i.e., covariance-based structural equation modelling, PLS, and/or regression) to use when analysing hypothesised causal relationships between constructs (see [34,35,58,57,78]). Regardless of the choice of statistical technique, the purpose of analysis is to ensure that the measurement model has adequate reliability and validity, and to determine the statistical significance of path estimates so that the findings can be used to enhance the existing knowledge of the MIS research community.

Second, with our complex research model, PLS may have an advantage over regression since it can analyse the whole model as a unit, rather than dividing it into pieces [35].<sup>1</sup> This contrast with regression, where equal weights are normally given to all indicators, and each dependent composite construct and all its predictors are analysed separately using ordinary least squares [34,35].<sup>2</sup> We performed a multiple regression analysis using both equal weights and factor weights given to all indicators and found results that were consistent with PLS.<sup>3</sup>

Third, PLS lends itself to the somewhat exploratory nature of this research [40,35]. We were concerned with identifying potential relationships and their predictive power more than the magnitude of those relationships (see our Stone's [83] and Geisser's [33]  $Q^2$  tests results in

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<sup>1</sup> PLS simultaneously analyses the measures and interactions among latent constructs to evaluate the quality of the measurement and structural properties of the research model. PLS allows the correct parameterisation of the latent constructs for our research model [34]. PLS iterates through a process to find the optimal indicator weights for each construct, such that the overall  $R^2$  for all dependent constructs is maximised [35]. The approach then uses the indicator weights to calculate construct scores which are used to determine the final path estimates. The standard deviation of those path estimates is determined with bootstrapping.

<sup>2</sup> There is no iteration involved. Standard deviations of each path estimates are determined using normal distribution theory.

<sup>3</sup> In a comparison of PLS with regression and covariance-based structural equation modelling using well-behaved data, Goodhue et al. [35] found no advantage of PLS over other techniques for non-normal data or for small sample size. However, they stated that "actual" field data may exhibit more challenging characteristics.

section 4.2.2) [40,35]. Fourth, we did not have any distributional assumptions about our data, and PLS is robust against moderate departures from normality [40].

Fifth, PLS can handle a relatively small but complex model with a relatively large number of independent latent constructs and measures for a given sample size [40]. The minimum sample rule for PLS that is commonly cited states that the sample size should be at least 10 times the number of incoming paths to the construct with the most incoming paths [3,15]. Since there are three paths at most, our sample size should be a minimum of 30. Our sample of 77 cases meets this criterion.<sup>4</sup> However, recent research has suggested that researchers should not rely on the “rule of 10” for PLS. Rather, for a more accurate assessment, researchers need to specify the effect size for each regression analysis and compare them against the power tables provided by Cohen [17] [35]. In our analysis and results in section 4.2.2, we calculated the effect sizes associated with our structural model using Chin’s [14]  $f^2$  tests. Finally, PLS overcomes the multicollinearity problem since its factors are orthogonal [40].

Fig. 2 shows a fully saturated: (1) measurement model – the results of the relationship between the observed survey measures and corresponding latent constructs relation-specific IT use, embeddedness, buyer dependence on supplier, two types of buyer benefits, and two types of supplier benefits; and (2) structural model – the results from testing the hypothesised and emergent paths between the latent constructs.

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Insert Fig. 2 about here  
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<sup>4</sup> Goodhue et al. [35] examined three top MIS journals between 2006 and 2010 inclusive, and identified 49% of the 188 path analysis papers used PLS. Of the 90 papers, some 14% had sample sizes smaller than 80.

#### 4.1. Measurement model

The properties of the measurement model in Fig. 2 were assessed for reliability and validity between the observed survey measures and their corresponding latent constructs. The purpose of evaluating the measurement model first was to ensure that each measure is reliable and valid before analysing the structural model [3]. We assessed the two types of reliability (individual and composite), and two types of validity (convergent and discriminant). We also tested for common method bias to determine the extent to which our survey method and the responses may create measurement error and bias our results.

##### 4.1.1. Reliability and validity

Table 3 shows the factor loadings and cross-loadings for each measure to their respective construct using a confirmatory factor analysis performed using PLS.<sup>5</sup> The measures in Table 3 exclude five measures from the original survey after conducting an exploratory factor analysis. Based on the recommendations from Carmines and Zeller [10] and Hulland [46], we excluded two measures of buyer dependence on supplier (BDS1, BDS2) because they cross-loaded onto more than one factor with similar loadings that exceed the 0.5 threshold; and three measures of buyer benefits because one measure (BB5) did not load onto any factor with a value greater than or equal to the 0.5 threshold, and the other two measures (BB9, BB10) because once again, we could not distinguish which factors they belonged to even though they exceeded the 0.5 threshold.

Table 3 shows that the measurement model demonstrates adequate *individual reliability*. We focused on the highest loadings or primary loadings for measures underlying each latent

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<sup>5</sup> PLS factors are orthogonal and allow for correlated factors [40]. To validate the cross-loadings in PLS, we also ran the confirmatory factor analysis through SPSS using oblique rotations (OBLIMIN and PROMAX) that allow correlated factors among orthogonal approaches. We find our cross-loadings robust across our multiple analyses.

construct [62]. The factor loadings of the measures to their respective construct are shown in bold and are comfortably above 0.6. The  $t$  statistics of these loadings are all significant at  $p < 0.01$ . The  $t$  value for each measure to their respective construct is shown in brackets in Fig. 2 below each coefficient. We noted that the secondary factor loadings for embeddedness and buyer dependence on supplier are greater than the 0.5 threshold, and in some cases greater than 0.6. Since the primary to secondary discrepancy was sufficiently large (at least 0.2 and usually between 0.3 to 0.4), we utilised the primary loadings to specify the measures that reflected the embeddedness and buyer dependence on supplier constructs in our research model in Fig. 1 [62,45]. We also find that the supplier benefit measures loaded onto two factors with primary and secondary loadings. Similarly, we allowed the supplier benefit measures to represent two supplier benefit constructs since the loading discrepancies between the two factors were sufficiently large [62].

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Insert Table 3 about here  
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Given our analysis in Table 3, we highlighted three items that impact the resultant research model in Fig. 2. First, the factor analysis showed that the measures for relation-specific IT use for exploitation and for exploration loaded on one factor. This result is consistent with the research on organisational learning [51,76,59]. Relation-specific IT use is a combination of making operational improvements that provide certainty and immediacy in efficiency benefits (exploitation), together with the need to take risks and make discoveries that can provide future benefits (exploration). Although it is possible to model all the exploitation and exploration measures of relation-specific IT use as reflective measures on relation-specific IT use as a single



construct, we operationalise the exploitation and exploration measures as reflective second-order constructs - IT use for exploitation and IT use for exploration - representing relation-specific IT use to be consistent with the conceptualisation in the research literature [50,84].

Second, the buyer benefit measures loaded onto two factors. The factor analysis showed that buyers received benefits from two sources: (1) efficiencies in transactions processing through the ease of using, and the reliability of the IT system, and (2) savings through a reduction in the time and cost spent on the overall purchasing process. Since this result was important to understanding the sequential nature of relationship benefits [8], we separated buyer benefits into efficiency benefits and saving benefits before testing the structural properties of the research model. Hypothesis 2b (H2b) was tested based on all emergent paths between embeddedness and buyer efficiency benefits, and buyer saving benefits. Subsequently, H5 was tested based on all emergent paths between buyer efficiency benefits, buyer saving benefits, and buyer dependence on supplier. We also specified and tested a path between buyer efficiency and saving benefits since the association between efficiency benefits and saving benefits is axiomatic.

Third, as previously discussed, the factor analysis showed that the supplier benefit measures load on two factors. Since managers in a supplier business would want to understand the sequence of how their benefits are derived [8], we specified supplier benefits as internal benefits and external benefits. Hypothesis 2a (H2a) was tested based on all emergent paths between embeddedness and internal supplier benefits, and external supplier benefits. Subsequently, H4 was tested based on all emergent paths between buyer dependence on supplier and internal supplier benefits and external supplier benefits. We also specified and tested a path

between internal supplier benefits and external supplier benefits since the association between internal and external benefits is axiomatic.

Table 4 shows that the measurement model demonstrates adequate *composite reliability* and *convergent validity*. The measures were robust with their internal consistency reliability meeting the recommended threshold value of 0.7 and above [69]. Consistent with the guidelines of Fornell and Larcker [32], the average variance extracted (AVE) for each measure exceeds 0.5.

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Insert Table 4 about here  
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Table 5 shows the results of testing *discriminant validity* of the measure scale. The elements in the matrix diagonals (in bold) represent the square root of the AVEs, and are greater than the off diagonal elements in their corresponding row and column. Therefore, the table shows that the seven sets of measures each seem to relate to different latent constructs, and that each set is discriminated from each other.<sup>6</sup>

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Insert Table 5 about here  
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#### 4.1.2. *Common method bias*

In prior discussions on survey development, we explained the process that we took to minimise common method bias. To confirm the absence of common method bias, we first

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<sup>6</sup> We note that the inter-construct correlation between embeddedness and buyer dependence on supplier, and internal and external supplier benefits are greater than the 0.6 threshold. This is consistent with our prior discussions on primary and secondary loadings between constructs where the secondary loadings are greater than the 0.5 threshold. There is no cause for concern since differences in the primary to secondary loadings are sufficiently large [62,45]. Furthermore, the square roots of the AVEs are greater than the inter-construct correlation, which show that the constructs are conceptually distinct and demonstrate discriminant validity [39,14].

performed a test on our self-reported survey responses using the Harman's single factor test [72,43]. Our result showed that the single factor explained 0.277 of the variance, less than the 0.5 or above threshold often used as the benchmark for the existence of common method bias. We also performed the unmeasured latent marker construct (ULMC) approach by including a common method factor in our research model [55]. We evaluated each indicator's variance substantively explained by the principal construct and the method factor [55].<sup>7</sup> Table 6 shows that the average variance of the constructs' indicator is 0.830, whereas the average method-based variance is 0.000. The small magnitude and insignificance of the method variance confirmed once again that common method bias was not a concern in our results.

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 Insert Table 6 about here  
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#### 4.2. *Structural model*

The structural properties of the research model are shown by the PLS path coefficients with *t* statistics in brackets in Fig. 2. The results showed that relation-specific IT use is positively associated with embeddedness (path = 0.231, *t* = 2.204, *p* < 0.01). Therefore, H1 is supported. Our results showed that relation-specific IT use provided a basis for the supplier to learn about its relationship with its buyer. Our measures indicated that the combined insights from exploitation and exploration encouraged a supplier to commence communications with its buyers. As relation-specific IT use became the primary source of information for a supplier-buyer relationship, deeper levels of embeddedness developed as a supplier has more insights to

<sup>7</sup> We note that the efficacy of the ULMC approach for identifying common method bias [55] is still being evaluated in the current literature [16].

share, and buyers found unique relation-specific value in socialisation and information sharing [28]. Our measures (in Appendix B) also indicated that communication, socialisation and information sharing from relation-specific IT use was accompanied by joint planning and problem solving in facilitating an embedded relationship, and is consistent with theoretical predictions developed by Uzzi [87].

Unexpectedly, the results showed that there is no significant association between embeddedness and internal supplier benefits (path = 0.089,  $t = 0.634$ , ns), and between embeddedness and external supplier benefits (path = -0.060,  $t = 0.610$ , ns). Therefore, H2a is not supported. However, the results do show that embeddedness is positively associated with buyer efficiency benefits (path = 0.310,  $t = 3.610$ ,  $p < 0.01$ ), and buyer saving benefits (path = 0.307,  $t = 3.795$ ,  $p < 0.01$ ). Therefore, there is support for H2b. Taken together, these results showed the outcome of benefit sharing between a supplier and powerful buyers evident in the research literature [84,22,19,73,67,91]; a one-sided flow of benefits that goes to the buyer. These results were somewhat surprising since embeddedness is supposed to have elevated a supplier and buyer's concern for each other's values, attributes, goals and benefits [37,27,87,28]. Therefore, the view that embeddedness is a capability that provides an informal self-enforcing mechanism for relational governance of power buyers did not bear out in our results. Uzzi [87] may have an explanation for our results. He speculates that when there are high levels of embeddedness, there may be an inability to govern through trust, information sharing and joint problem solving because feelings of obligations, friendship or betrayal become so intense that either or both parties sacrifice benefits for each other.

The model results showed that embeddedness is positively associated with buyer dependence on supplier (path = 0.564,  $t = 6.948$ ,  $p < 0.01$ ), and this supported H3. Despite a

power differential favouring a buyer, embeddedness can remind a buyer about recognising and appreciating the unique and valuable resources and capabilities that are provided by a supplier [Medcof 2001]. These resources and capabilities encompass the empathy, values, attitudes, collaboration and goals that support the partnership's value creation and sharing [38]. In the end, the business friendship is a unique and valuable one that is worthy of balancing the power in the relationship through a buyer's dependence on a supplier [49].

#### 4.2.1. *Mediating effects*

To test for evidence of buyer dependence on supplier as a mediating variable, the tests using the causal steps approach as suggested by Baron and Kenny [5] were performed. The mediating effect of buyer dependence on supplier on the association between embeddedness and internal supplier benefits was examined by performing tests for statistical significance with the whole model as a unit rather than isolating the mediation piece of the model and conducting tests without the presence of the other constructs and indicators [35]. The direct effect of embeddedness on internal supplier benefits yielded a test statistic of 0.174 ( $p < 0.1$ ), but this decreased to 0.085 (ns) when buyer dependence on supplier was included as the mediator. This indicated that buyer dependence on supplier fully mediated the relationship between embeddedness and internal supplier benefits. The results also showed that buyer dependence on supplier is positively associated with internal supplier benefits (path = 0.189,  $t = 1.736$ ,  $p < 0.05$ ), but the association is not significant in relation to external supplier benefits (path = 0.002,  $t = 0.022$ , ns). External supplier benefits were created following internal supplier benefits (path = 0.623,  $t = 7.665$ ,  $p < 0.01$ ). Therefore, H4 was only partially supported. Consistent with the prior research literature [63,18,27,70], we found that buyer dependence on supplier allowed a supplier to reduce its internally generated operating costs (e.g., a reduction in management costs) because

a supplier did not have to spend as much time and effort in maintaining its embedded relationship with buyers. Reduced operating costs provided for increased margins, which in turn, led to externally generated benefits. Our results provided evidence that a supplier generated its benefits sequentially, first through internal benefits, followed by external benefits. This process of affecting intermediate and final output variables was consistent with the process of tracing and measuring IT business value [8]. The supplier may also obtain an increase in margin by taking advantage of discretionary changes in prices and charges, made possible by buyer dependence on supplier [63,18].

Finally, the results showed that buyer efficiency benefits were not significantly associated with buyer dependence on supplier (path = 0.006,  $t = 0.065$ , ns). Efficiency benefits led to buyer saving benefits (path = 0.304,  $t = 2.378$ ,  $p < 0.01$ ), which in turn, was associated with buyer dependence on supplier (path = 0.224,  $t = 2.237$ ,  $p < 0.01$ ). Again, our results supported existing research on the process of tracing and measuring IT benefits by demonstrating that as buyers received efficiency benefits, saving benefits followed sequentially [8]. Following these results, the mediating effect of buyer dependence on supplier on the association between buyer saving benefits and internal supplier benefits was examined with the whole model as a unit rather than isolating the mediation piece of the model and conducting tests without the presence of the other constructs and indicators [35]. The direct effect of buyer saving benefits on internal supplier benefits yielded a test statistic of -0.037 (ns), but this decreased to -0.069 (ns) when buyer dependence on supplier was included as the mediator. This showed that buyer dependence on supplier fully mediates the relationship between buyer saving benefits and internal supplier benefits [5]. Therefore, H5 was only partially supported. Tangible savings from efficiency

benefits created buyer dependence on supplier from the point of view of the buyer, and this allowed the supplier to appropriate its share of the relational benefits [63,18].

We also conducted mediation tests with bootstrapping over the Sobel test [81,82] as recommended by Preacher and Hayes [74,75]. These tests required the specification of single mediator models (isolating the mediation piece of the model), and applying a nonparametric resampling procedure (repeated thousands of times) in an additional method for testing mediation that does not impose the assumption of normality of the sampling distribution [75]. In our bootstrap results, we found significant effects between embeddedness and buyer saving benefits and our mediator, buyer dependence on supplier respectively; however, the effects between buyer dependence on supplier and internal supplier benefits were not significant. Furthermore, the direct effects between embeddedness and internal supplier benefits, and buyer saving benefits and internal supplier benefits were also not significant. We attributed these results to the lack of holistic consideration of our research model since we isolated the mediation model from the whole model when we performed the bootstrapping [35]. We also attributed these results to the lack of correct parameterisation surrounding the constructs since we had to use equal weights rather than optimal weights for the indicators (as performed by PLS) for each construct [35]. We also note that the existing literature on mediation analysis is inconclusive, and the current thinking is that mediation exists whether tests show either partial or full mediation [92]. In the end, we found support for mediation, and for completeness, report both the Baron and Kenny [5] and Preacher and Hayes [74] procedures.

#### 4.2.2. *Effect size*

Since PLS makes no distributional assumption other than predictor specification in its procedure for estimating parameters, traditional parametric-based techniques for significance

testing/evaluation would not be appropriate [14]. Therefore, evaluation of PLS models should apply prediction-based measures that are also nonparametric. We used the  $R^2$  for each dependent construct provided by PLS and performed Chin's [14] effect size  $f^2$  test to see whether the impact of a particular independent construct on a dependent construct has substantive impact. Using Cohen's [17] operational definition for effect sizes, levels of high ( $> 0.35$ ), medium ( $> 0.15$ ) and small ( $> 0.02$ ) effect sizes are presented for each of the independent constructs on their corresponding dependent constructs in Fig. 3. The effect sizes show the dominant paths which explain the most variance in the model. The effect sizes were consistent with our structural model results.

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 Insert Fig. 3 about here  
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We also performed the  $Q^2$  test, a predictive sample reuse technique developed by Stone [83] and Geisser [33] to test for predictive power. This technique represents a synthesis of cross-validation and function-fitting with the view that "the prediction of observables or potential observables is of much greater relevance than the estimation of what are often artificial construct-parameters" [33, pp. 320]. We applied a blindfolding procedure that omits a part of the data for a particular block of indicators during parameter estimations and then estimate the omitted part using the estimated parameters. This procedure is repeated until every data point has been omitted and estimated. The resulting  $Q^2$  value is a generalised cross-validation measure and jackknife standard deviations of parameter estimates [14]. If the  $Q^2$  value for a construct is greater than zero, this indicates that its explanatory latent construct exhibits predictive relevance [39]. All of our dependent variables, embeddedness (0.050), buyer dependence on supplier



(0.343), buyer efficiency benefits (0.068), buyer saving benefits (0.175), internal supplier benefits (0.015) and external supplier benefits (0.006) were greater than zero.

#### 4.2.3. *Post hoc analysis*

Following the analysis of the measurement and structural model, we examined three issues post hoc: (1) the high correlation between embeddedness and buyer dependence on supplier, and whether this raises concern with the causal direction hypothesised between constructs; (2) explore whether there were additional relationships present in the model that were not hypothesised; and (3) pursued explanations for the association between buyer dependence on supplier and internal supplier benefits (path = 0.189,  $t = 1.736$ ,  $p < 0.05$ ), since  $p < 0.05$  rather than  $p < 0.01$  and  $R^2 = 0.04$ .

Contrary to the relational view and RDT arguments presented in our theory and hypotheses development section, we tested a model that directly associated relation-specific IT use with buyer dependence on supplier, and buyer dependence on supplier with embeddedness. The result showed that relation-specific IT use was not associated with buyer dependence on supplier nor was there a significant relationship between buyer dependence on supplier and embeddedness or any relational benefits. Therefore, there was no requirement for an association analysis involving Cohen's path analysis [86]. Consistent with the theoretical complementarities of relational view and RDT, our results suggested that embeddedness, which is unique and valuable, must be accompanied by buyer dependence on supplier to appropriate benefits.<sup>8</sup>

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<sup>8</sup> A similar phenomenon involves insurance advertising. Insurers can use customer-specific information to help save their customers money only if they first establish a connection or relationship (embeddedness). Once the insurer saves the customer money through the relationship, this saving makes a customer dependent on its insurer (buyer dependence on supplier).

To explore whether there were additional relationships present in the model, we tested a fully saturated model which we presented in Fig. 2. Therefore, we were able to show that the links between constructs that were not hypothesised were not significant.

We note that the association between buyer dependence on supplier and internal supplier benefits was not as strong as we would have liked (Fig. 2 showed  $p < 0.05$  rather than  $p < 0.01$ ). Furthermore, the 4%  $R^2$  between buyer dependence on supplier and internal supplier benefits is low, and this may suggest that our model could benefit from a moderating variable that would allow a supplier the choice to exercise its power from buyer dependence that would lead to supplier benefits. We conducted some anecdotal discussions with the supplier's account managers after the survey was completed. These discussions indicated that the association between buyer dependence on supplier, internal supplier benefits and external supplier benefits may be explained by a time lag between the times a supplier exercises its dependency power, and the time it takes to receive internal and external benefits. It would seem that these discussions were consistent with the intermediate and final effects of IT business value as expressed by Barua et al. [8]. Ultimately, we are not able to determine whether there is a need for a moderating variable or whether it is a time lag effect using our cross-sectional study. A longitudinal study is one approach to answering this question.

## 5. Conclusion

Extant literature on B2B ecommerce has demonstrated relational benefits from relation-specific IT systems in a hub and spoke representation of partnerships [1,91]. Taking a relational view, these relational benefits are possible since the supplier and buyer have invested in an IT system and shared knowledge that are unique and valuable to the partnership [27]. However, the large buyers such as retailers and automobile manufacturers often act as dominant leaders, and

despite partner dependence, the relational benefits created by a relation-specific IT system are appropriated by buyers because of a buyer's power advantage over a supplier [77,84,13,91]. Therefore, using the relational view as a theoretical lens [27], we examined the question of whether a supplier can raise buyer dependence on supplier to appropriate its share of relational benefits. Our study is focused on a supplier's perspective, and we hypothesised and found that the relative power between a supplier and its more powerful buyers is reduced through the process of creating embeddedness and making buyers aware of their dependence on a supplier.

We developed and tested a research model that showed how a supplier could associate its relation-specific IT use with embeddedness to appropriate relational benefits since embeddedness is a capability that involves more nuanced knowledge-sharing routines and effective self-enforcing governance [64,84,13,27,87]. We found that relation-specific IT use was associated with embeddedness which created operating efficiencies and savings for buyers (supported by H1 and H2b). However, embeddedness was not directly associated with supplier benefits (H2a is not supported). Our results did not seem to be consistent with the existing prediction of the relational view [27]. Uzzi [87] speculates that perhaps high levels of embeddedness had reduced its self-enforcing governance properties. Such speculation provides an opportunity for future research.

In our theory and model development, we utilised RDT to create a more complete and rigorous research model using buyer dependence on supplier as an important construct for explaining the process and dynamics of what a supplier can do to appropriate its share of relational benefits in the presence of powerful buyers. Consequently, we tested the association between embeddedness, buyer dependence on supplier and relational benefits. We found that embeddedness reduced a buyer's power advantage by association with buyer dependence on

supplier (supported by H3). Our results showed that embeddedness was associated with buyer dependence on supplier and this mediating association was relied on for supplier benefits (partially supported by H4). In addition, we found that buyer dependence on supplier mediated buyer benefits and supplier benefits (partially supported by H5). In conclusion, our research showed that embeddedness and supplier benefits are not always associated as theory and empirical studies predict [13,87,28]. Rather, we found that the association between embeddedness and buyer dependence on supplier facilitated the appropriation of supplier benefits that would otherwise go to the buyer.

### *5.1. Implications for theory*

The relational view of interorganisational competitive advantage goes beyond the search for competitive advantage that focuses on resources and capabilities within the firm (resource-based view), and explains that such advantage can also be gained when trading partners are willing to make relation-specific investments and work together in unique ways [27]. The other side of relation-specific resources and capabilities in trading partners is the implicit dependence that emerges from unique and valuable interorganisational resources and capabilities [63,70]. Although they are distinct, we advocate that the relational view and RDT are complementary theories because of similarity in their fundamental concepts for generating relational value. The relational view holds that relational benefits come from unique and valuable interorganisational resources and capabilities, and this concept of a unique and valuable interorganisational resource is very close in meaning to the importance and scarcity of the shared resource from an RDT perspective. Our findings show that a supplier is required to engage in embeddedness to provide the knowledge sharing and relational problem solving routines, but buyer dependence on supplier is required to effectively govern the relational benefit sharing in the presence of

differential power between a supplier and buyer. Our results provide support for the complementary theoretical connections between the relational view and RDT.

Our findings also provided empirical evidence for measuring IT business value as process of tracing and measuring intermediate and final output variables [8]. Internal and external buyer and supplier benefits were identified by our factor analysis, and our analyses showed that internal benefits were earned before external benefits were earned. This is consistent with the view in Barua et al. [8] that the sequential nature of IT business value also applies to the creation of relational benefits using relation-specific IT and complementary interorganisational capabilities.

Finally, we supplement MIS research by operationalising relation-specific IT use through the strategic management research on organisational learning [59] rather than referring to use in terms of the outcome of use [64,21]. Our definition of relation-specific IT use was comprehensive, and captured a supplier's ability to learn through exploitation and exploration. Both types of learning simultaneously allow a firm to be ambidextrous by achieving short-term performance through operational improvement and long-term performance by discovery and innovation [51,76,59].

## 5.2. *Implications for practice*

Our research has practical implications for suppliers who deal with powerful buyers. We developed and tested a package of complementary capabilities that can be used with relation-specific IT to reduce the power differential that cause relational benefits to be appropriated by the powerful buyer at the expense of the supplier. A supplier could develop an embedded relationship with its buyers and create buyer dependence on supplier; and both of these capabilities could be used to find an equitable working relationship that share in relational

benefits. We also suggest that suppliers use relation-specific IT comprehensively. A supplier must improve its operational efficiencies and reduce costs (exploitation) to ensure short-term performance, while simultaneously take risk to innovate, build new capabilities and consider new lines of business that would ensure sustainable long-term performance (exploration).

### 5.3. *Limitations*

Like all research, there were a number of limitations in our study. First, our sample was limited to a single supplier to ensure that we could test a pure supplier model without having to control for varying levels of power that would exist in a sample of suppliers. Our research model only required buyer-side controls. Therefore, our results may not be consistent across competitors in the same market sector or suppliers in other sectors. Second, our study is limited to a supplier's perspective on appropriating relational benefits using a causal research model and cross-sectional data, and does not allow for the proper determination of whether there are any time-lagged, sequential, or feedback effects among the constructs that were studied in the research model. For example, we were unable to measure or test any sequential or feedback effects of embeddedness or buyer dependence on supplier that may have subsequent or feedback impacts on supplier dependence on buyer and supplier benefits. Lagged, sequential or feedback effects would be questions for future research that utilise longitudinal research techniques. However, we can speculate that these effects may be limited since suppliers are able to garner buyer dependence on supplier and appropriate relational benefits in our research model. Finally, by measuring the perceptions of the respondents at a single point in time, we note that it is not entirely possible to make causal statements with respect to any of the relationships considered in the research model. Rather, the direction of associations can only be inferred from our chosen theoretical base.

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**Table 1**

Buyer responses – control variables and demographic questions.

Average time as a <Supplier Name> buyer	4.21 years	(n=77)*
Average time with current account manager	1.93 years	(n=77)
Average size of account	A\$382,686 per year	(n=59)
Expectation that account will grow in the next year	82.11%	(n=67)
Average account growth in the next year	2.64%	(n=58)
Average percentage of purchases electronically	74.92%	(n=77)*

\* control variable

**Table 2**

Supplier responses – control variables and demographic questions.

Average time of buyer association with <Supplier Name>	3.94 years	(n=77)
Average time as account manager for a buyer	1.82 years	(n=77)
Average size of buyer account	\$777,759 per year	(n=77)*
Expectation that buyer account will grow in the next year	91.80%	(n=73)
Average buyer account growth in the next year	4.11%	(n=75)
Average percentage of buyer sales electronically	69.53%	(n=77)
Average buyer account percent of total account portfolio	11.04%	(n=74)
Probability of keeping the buyer account	68.92%	(n=74)

\* control variable, 5 observations imputed using MLE.

**Table 3**

Factor loadings (bold) and cross-loadings.\*

	BB Eff	BB Sav	EM	R-S IT Use	SB Ext	SB Int	BDS
BB11_ont_del	0.387	<b>0.878</b>					
BB12_high_fulfil	0.401	<b>0.886</b>	0.356				
BB1_red_time	<b>0.786</b>						
BB2_red_cost	<b>0.796</b>		0.426				0.493
BB3_imp_serv	<b>0.915</b>	0.401	0.309				0.348
BB4_imp_satis	<b>0.914</b>	0.422	0.359				0.393
BB6_reliab_ord	0.315	<b>0.887</b>	0.349				
BB7_easy_use	0.353	<b>0.856</b>					
BB8_acc_ord		<b>0.861</b>					
EM1_disc_val	0.403		<b>0.897</b>				0.544
EM2_cduct_rev	0.500	0.307	<b>0.911</b>				0.593
EM3_share_info			<b>0.825</b>				0.564
EM4_mful_disc	0.350		<b>0.936</b>				0.556
EM5_prob_solv		0.324	<b>0.834</b>				0.538
EM6_iss_ctract			<b>0.860</b>				0.647
SB1_inc_sale				0.432	<b>0.891</b>	0.514	
SB2_inc_salegrw				0.367	<b>0.928</b>	0.557	
SB3_red_mgtcost					0.496	<b>0.852</b>	
SB4_inc_pcsharespd				0.376	<b>0.878</b>	0.513	
SB5_inc_gpm					<b>0.859</b>	0.615	
SB6_inc_ROI				0.322	0.584	<b>0.888</b>	
BDS3_neg_price	0.439		0.608				<b>0.877</b>
BDS4_neg_serv	0.427		0.644				<b>0.905</b>
BDS5_find_alt	0.472		0.503				<b>0.823</b>
BDS6_influ_proddec	0.302	0.314	0.484				<b>0.820</b>
BDS7_influ_servdec			0.555				<b>0.874</b>
UI1_prov_webord				<b>0.785</b>	0.303		
UI2_prov_selfserv		0.309		<b>0.711</b>			
UI3_inform_org				<b>0.756</b>	0.326		
UI4_auto_restk				<b>0.647</b>			
UI5_min_ord				<b>0.707</b>			
UI6_auto_rep				<b>0.798</b>	0.412	0.351	
UI7_info_cap	0.352			<b>0.755</b>	0.375		
UI8_restruct_purch				<b>0.696</b>			
UI9_integ_is				<b>0.720</b>			
UX1_ana_spend				<b>0.801</b>	0.433	0.343	
UX2_ana_ctract				<b>0.746</b>			
UX3_know_pref				<b>0.804</b>	0.400	0.316	

UX4_targ_techapp	<b>0.774</b>		
UX5_ana_subst	<b>0.810</b>	0.450	0.355

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\*Factor loading < 0.3 are excluded.

BB - Buyer Benefits, BB Eff - Buyer Efficiency Benefits, BB Sav - Buyer Savings Benefits, EM - Embeddedness, R-S IT Use – Relation-specific IT Use, SB – Supplier Benefits, SB Ext - External Supplier Benefits, SB Int - Internal Supplier Benefits, BDS – Buyer Dependence on Supplier, UI – IT Use for Exploitation, UX – IT Use for Exploration.

**Table 4**

Composite reliability and convergent validity.

	Composite Reliability: Dillion-Goldstein's Rho	Composite Reliability: Cronbachs Alpha	Average Variance Extracted (AVE)
BB Eff - Buyer Efficiency Benefits	0.915	0.876	0.731
BB Sav - Buyer Saving Benefits	0.942	0.924	0.763
EM - Embeddedness	0.953	0.941	0.771
R-S IT Use - Relation-Specific IT Use	0.948	0.941	0.566
SB Ext - External Supplier Benefits	0.938	0.912	0.791
SB Int - Internal Supplier Benefits	0.862	0.680	0.757
BDS - Buyer Dependence on Supplier	0.934	0.912	0.741



**Table 5**

Discriminant validity (inter-correlations) of variable constructs.

	CB Eff	CB Sav	EM	R-S IT Use	SB Ext	SB Int	BDS
BB Eff	<b>0.855</b>	0	0	0	0	0	0
BB Sav	0.399	<b>0.874</b>	0	0	0	0	0
EM	0.402	0.311	<b>0.878</b>	0	0	0	0
R-S IT Use	0.219	0.200	0.258	<b>0.752</b>	0	0	0
SB Ext	0.087	0.127	0.050	0.395	<b>0.889</b>	0	0
SB Int	0.041	0.087	0.173	0.335	0.623	<b>0.870</b>	0
BDS	0.449	0.267	0.655	0.140	0.083	0.189	<b>0.861</b>

BB Eff - Buyer Efficiency Benefits, BB Sav - Buyer Savings Benefits, EM - Embeddedness, R-S IT Use – Relation-specific IT Use, SB Ext - External Supplier Benefits, SB Int - Internal Supplier Benefits, BDS – Buyer Dependence on Supplier.

**Table 6**

Common method bias analysis.

Construct	Measure	Substantive Factor		Method Factor	
		Loading (R1)	R1 <sup>2</sup>	Loading (R2)	R2 <sup>2</sup>
R-S	UI1	0.809***	0.654	-0.025	0.001
IT Use	UI2	0.613***	0.375	0.074	0.006
	UI3	0.889***	0.791	-0.130	0.017
	UI4	0.685***	0.469	-0.053	0.003
	UI5	0.894***	0.799	-0.227**	0.052
	UI6	0.617***	0.380	0.208**	0.043
	UI7	0.624***	0.389	0.152	0.023
	UI8	0.744***	0.553	-0.041	0.002
	UI9	0.677***	0.458	0.065	0.004
	UX1	0.812***	0.660	-0.002	0.000
	UX2	0.917***	0.841	-0.175*	0.031
	UX3	0.753***	0.567	0.083	0.007
	UX4	0.599***	0.359	0.168	0.028
EM	UX5	0.914***	0.834	-0.101	0.010
	EM1	0.954***	0.910	-0.083	0.007
	EM2	0.810***	0.656	0.146	0.021
	EM3	0.945***	0.893	-0.172	0.029
	EM4	0.950***	0.903	-0.015	0.000
	EM5	0.788***	0.622	0.065	0.004
BDS	EM6	0.823***	0.677	0.049	0.002
	BDS3	0.829***	0.687	0.073	0.005
	BDS4	0.893***	0.798	0.008	0.000
	BDS5	0.773***	0.597	0.086	0.007
	BDS6	0.873***	0.761	-0.070	0.005
BBEff	BDS7	0.935***	0.874	-0.098	0.010
	BB6	0.857***	0.735	0.080	0.006
	BB7	0.872***	0.761	0.003	0.000
	BB8	0.935***	0.875	-0.106	0.011
	BB11	0.867***	0.751	-0.014	0.000
	BB12	0.845***	0.715	0.036	0.001
BBSav	BB1	0.808***	0.653	0.003	0.000
	BB2	0.705***	0.497	0.111	0.012
	BB3	0.943***	0.888	-0.037	0.001
	BB4	0.950***	0.903	-0.061	0.004
SBInt	SB3	0.868***	0.753	0.005	0.000
	SB6	0.873***	0.762	-0.005	0.000
SBExt	SB1	0.866***	0.750	0.079	0.006
	SB2	0.925***	0.856	0.016	0.000
	SB4	0.882***	0.777	0.000	0.000
	SB5	0.887***	0.786	-0.103	0.011

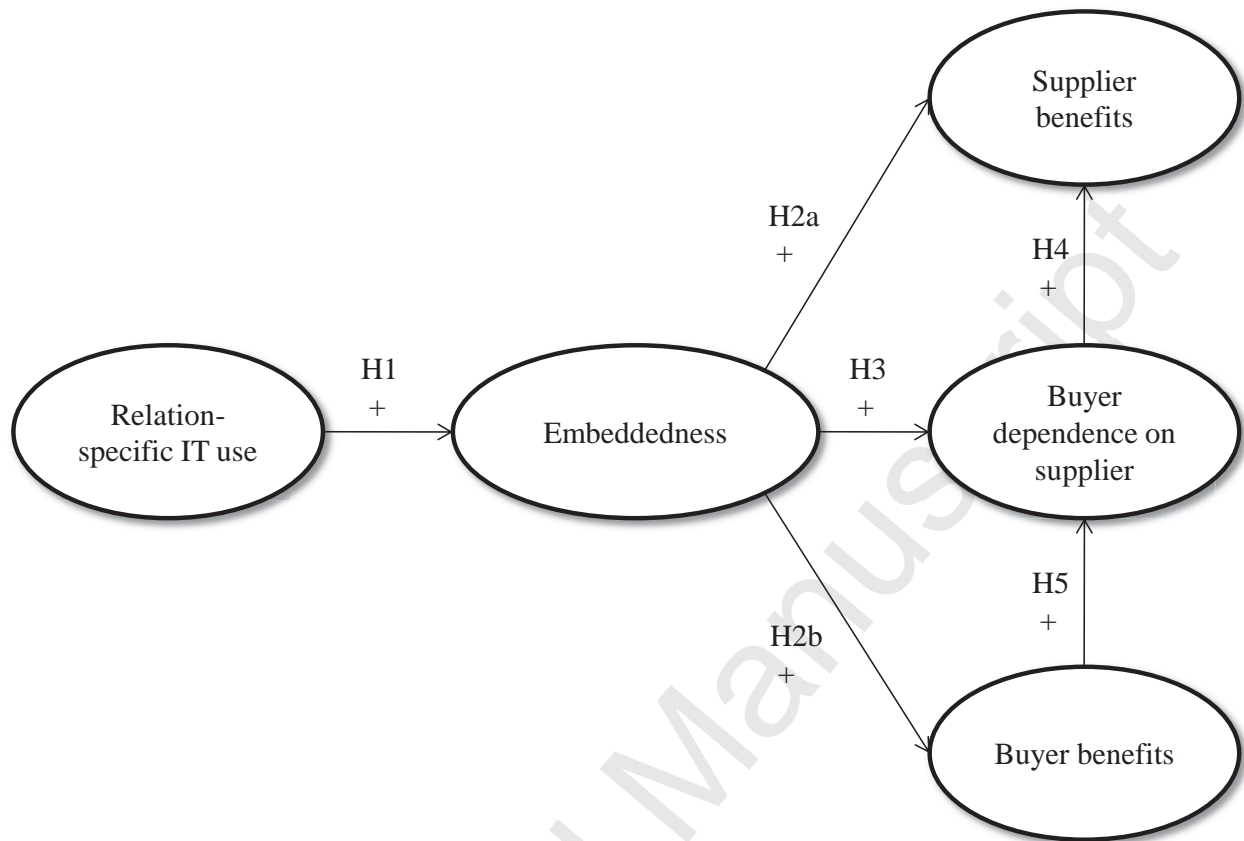
Average	0.830	0.699	0.000	0.009
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\*p < 0.1.

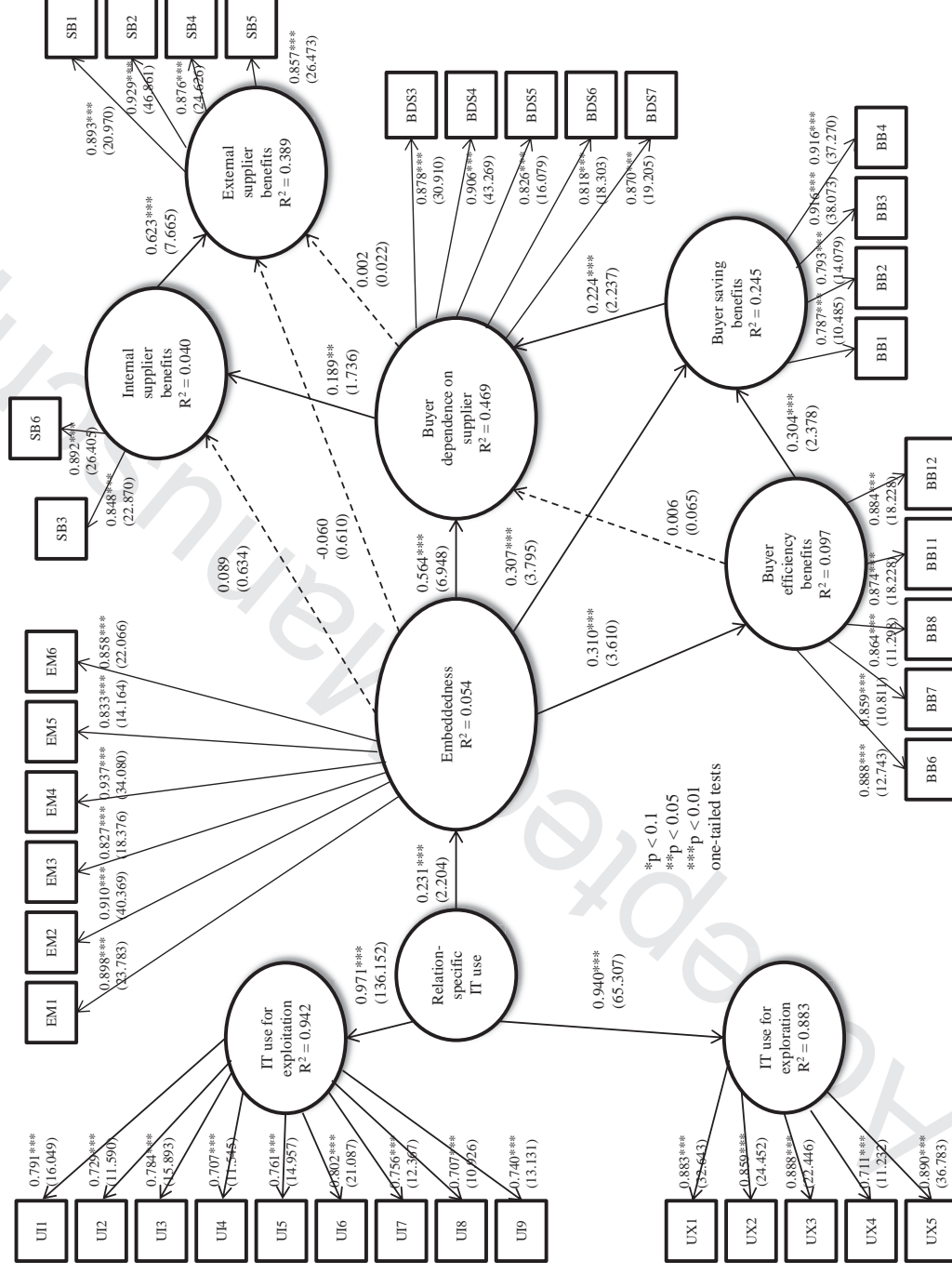
\*\*p < 0.05.

\*\*\*p < 0.01.

R-S IT Use – Relation-specific IT Use, EM - Embeddedness, BDS – Buyer Dependence on Supplier, BB Eff - Buyer Efficiency Benefits, BB Sav - Buyer Savings Benefits, SB Ext - External Supplier Benefits, SB Int - Internal Supplier Benefits.

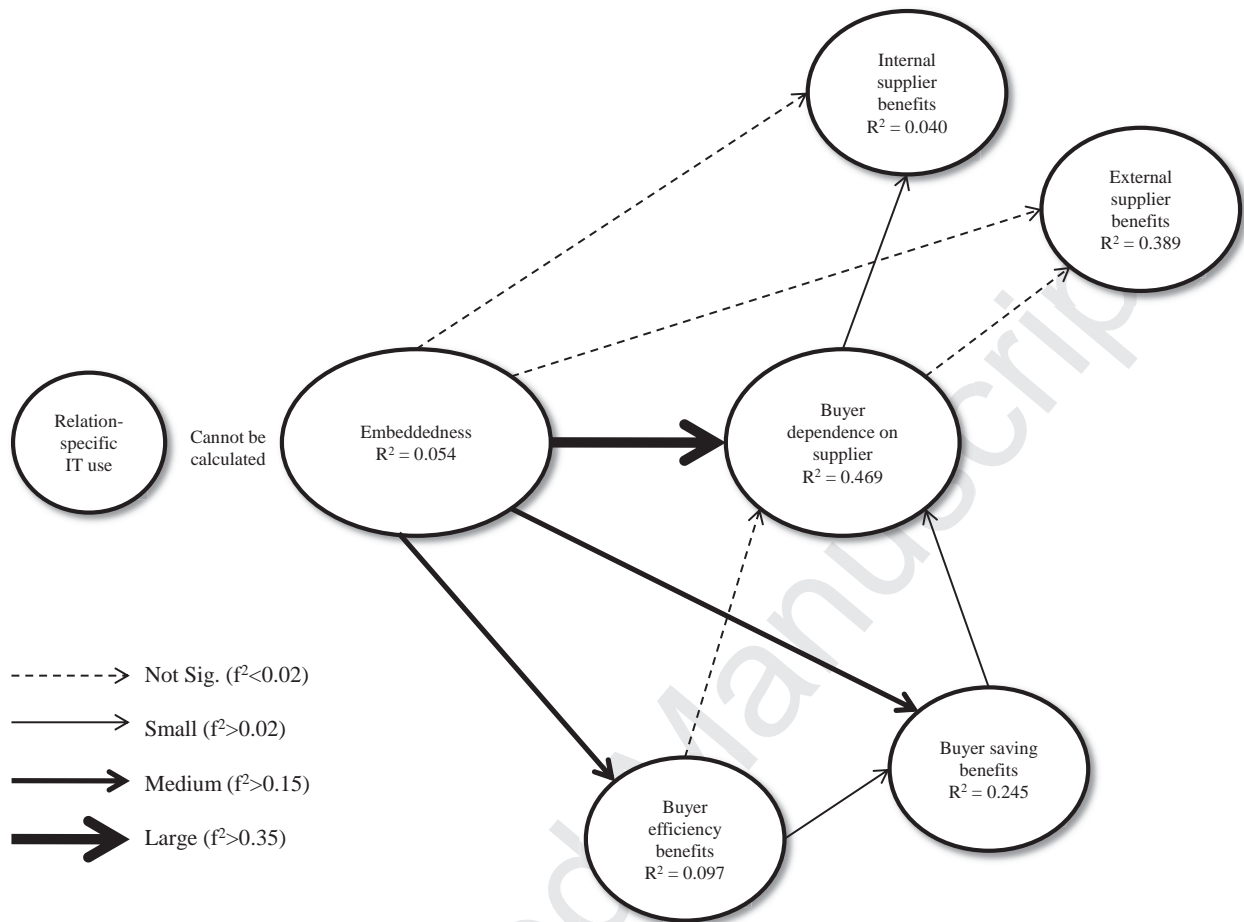


**Fig. 1.** Research model.



UI – IT use for exploitation, UX – IT use for exploration, EM – Embeddedness, BDS – Buyer dependence on supplier, BB – Buyer benefits, SB – Supplier benefits.

**Fig. 2.** Measurement and structural properties of the research model.



**Fig. 3.** Effect sizes.

## Appendix A. Supplier survey constructs and measures

### IT Use for Exploitation – UI

In your relationship with this buyer, please indicate the extent to which you use information systems and processes for the following (0 = no basis to answer, 1 = not at all, 5 = extensive use):

- UI1\_prov\_webord: To provide this buyer with web-based ordering capabilities. E.g., ordering, approval, tracking, budgeting, stock control.
- UI2\_prov\_selfserv: To provide this buyer with specialised/customised self-service capabilities. E.g., print online custom stationery, promotional marketing.
- UI3\_inform\_org: To keep this buyer informed of <Supplier Name> initiatives. E.g., email advice about new products, changes in services, events.
- UI4\_auto\_restk: To automate the reporting function for this buyer. E.g., office supplies cabinets, custom stationery replenishment.
- UI5\_min\_ord: To monitor when this buyer does NOT meet the minimum purchase order sizes.
- UI6\_auto\_rep: To automate the reporting function for this buyer. E.g., purchasing reports, contract compliance reports.
- UI7\_info\_cap: To provide this buyer with web-based information capabilities. E.g., view catalogue of products and availability, conduct searches.
- UI8\_restruct\_purch: To allow this buyer to restructure their purchasing function. E.g., decentralised purchasing, delivery to desktop, eliminate office supplies warehouse.
- UI9\_integ\_is: To integrate this buyer's own information systems and processes with <Supplier Name>. E.g., electronic invoicing.

### IT Use for Exploration – UX

In your relationship with this buyer, please indicate the extent to which you use information systems and processes for the following (0 = no basis to answer, 1 = not at all, 5 = extensive use):

- UX1\_ana\_spend: To analyse this buyer's spending patterns for new sales opportunities. E.g., cross-selling, up-selling opportunities.
- UX2\_ana\_cotract: To analyse contact history with this buyer for the purpose of optimising sales calls and visits.
- UX3\_know\_pref: To know the product/service preferences of this buyer better.
- UX4\_targ\_techapp: To effectively target innovative applications of technology to this buyer for new sales opportunities. E.g., print online custom stationery, promotional marketing.
- UX5\_ana\_subst: To analyse this buyer's spending patterns in order to recommend product substitutes that are in line with their objectives and specifications. E.g., <Supplier Name> branded photocopy paper, environmentally friendly products.

### Supplier Benefits - SB

Please indicate the extent to which the following benefits have been received from this buyer over the course of the relationship (0 = no basis to answer, 1 = not at all, 5 = great extent):

- SB1\_inc\_sale: Increase in sales.
- SB2\_inc\_salegrw: Increase in sales growth.
- SB3\_red\_mgtcost: Reduction in <Supplier Name>'s account management costs.
- SB4\_inc\_pcsharespd: Increase in the percentage share of the buyer's total spending on all lines of business provided by <Supplier Name>.
- SB5\_inc\_gpm: Increase in the gross profit margin received.
- SB6\_inc\_ROI: Increase in the ROI (Return On Investment) from this buyer.

## Appendix B. Buyer survey constructs and measures

### Embeddedness – EM

Please indicate the extent to which the following OTHER activities occur in your relationship with the buyer (0 = no basis to answer, 1 = not at all, 5 = great extent):

- EM1\_disc\_val: Your account manager discusses how information systems and processes provided by <Supplier Name> adds value to your organisation. E.g., ability to comply with your organisational policies, requirements for social responsibilities.
- EM2\_cduct\_rev: Your account manager conducts regular performance reviews with you. E.g., assistance in managing expenditure, controlling order sizes, diverting deliveries to different locations.
- EM3\_share\_info: You share proprietary information with <Supplier Name>. E.g., purchasing budgets, purchasing plans, strategic plans.
- EM4\_mful\_disc: Your account manager has meaningful discussions with you about how to interpret information about your account. E.g., discussions about <Supplier Name> reports.
- EM5\_prob\_solv: Your account manager engages in joint problem solving with you. E.g., solving problems as they occur, developing innovative solutions.
- EM6\_iss\_ctract: When issues come up, your account manager manages the relationship by reference to the terms of the contract.

### Buyer Dependence on Supplier - BDS

Please select ONE response to each of the following statements (0 = no basis to answer, 1 = not at all, 5 = very high):

- BDS1\_prod\_impt: The extent to which <Supplier Name> provides your organisation with PRODUCTS that are important is:
- BDS2\_serv\_impt: The extent to which <Supplier Name> provides your organisation with SERVICES that are important is:
- BDS3\_neg\_price: Overall, the extent to which your organisation can negotiate hard on PRICE with <Supplier Name> is:
- BDS4\_neg\_serv: Overall, the extent to which your organisation can negotiate hard on SERVICES with <Supplier Name> is:
- BDS5\_fin\_alt: At contract renewal, the effort involved in finding ALTERNATIVE suppliers for the products and services offered by <Supplier Name> is:
- BDS6\_influ\_proddec: The extent to which <Supplier Name> influences your organisation's decisions with respect to their new and/or existing PRODUCTS is:
- BDS7\_influ\_servdec: The extent to which <Supplier Name> influences your organisation's decisions with respect to their new and/or existing SERVICES is:

### Buyer Benefits - BB

Please indicate the extent to which the following benefits have been received from <Supplier Name> over the course of the relationship (0 = no basis to answer, 1 = not at all, 5 = great extent):

- BB1\_red\_time: Reduction in the time spent on purchasing your organisation's requirements.
- BB2\_red\_cost: Reduction in the cost of purchasing your organisation's requirements.
- BB3\_imp\_serv: Improved buyer service on average.
- BB4\_imp\_satis: Improved buyer satisfaction on average.
- BB5\_prov\_custmserv: Customised services that are offered by <Supplier Name> to meet your organisation specifically. E.g., merchandising, uniforms.
- BB6\_reliab\_ord: A reliable ordering system
- BB7\_easy\_use: An ordering process that is easy to use.
- BB8\_acc-ord: An accurate ordering process.
- BB9\_red\_tc: A reduced cost of transacting. E.g., automating the administration of office supply spending, visibility of product availability.
- BB10\_ease\_custm: Ease of customisation to suit your requirements. E.g., ordering, reporting.
- BB11\_ont\_del: On-time delivery across all business lines from <Supplier Name>.
- BB12\_high\_fulfil: High fulfillment rates across all business lines from <Supplier Name>.



## Appendix C. Control measures and demographic questions

### Supplier Survey

spend\_cus: What is the current approximate size (revenue) of this account? (Respond in \$ amount)

Approximately, how long has this buyer been associated with <Supplier Name>? (Respond in years and months)

Approximately, how long have you been an account manager for this buyer? (Respond in years and months)

Do you expect this account to grow or decline in size (revenue) over the next year? (Respond Grow or Decline)

What is the expected growth/decline in size (revenue) of this account over the next year? (Respond in %)

The following describes methods in which a buyer can use to purchase from <Supplier Name>. Please indicate the current PERCENTAGE of purchase orders received from this buyer using each method. (Respond in percentage for each method)

- % purchases that are conducted by phoning in orders through the call centre.
- % purchases that are conducted by faxing and/or emailing in orders.
- % purchases that are conducted through information systems.
- % purchases that are conducted by exchanging purchase orders, invoices and payments through integrated systems (e.g., EDI and/or XML).

What is the approximate size of this account as a proportion of your accounts? Please enter a number between 0 and 100.

What is the likelihood or probability of keeping the account at the time of renewal? Please enter a number between 0 and 100.

### Buyer Survey

long\_cus: Approximately, how long has your organisation been a buyer of <Supplier Name>? (Respond in years and months)

purch\_pce: The following describes methods in which your organisation can use to purchase from <Supplier Name>. Please indicate the current PERCENTAGE of purchase orders made using each method. (Respond in percentage for each method)

- % purchases that are conducted by phoning in orders through the call centre.
- % purchases that are conducted by faxing and/or emailing in orders.
- % purchases that are conducted through information systems.
- % purchases that are conducted by exchanging purchase orders, invoices and payments through integrated systems (e.g., EDI and/or XML).

Approximately, how long has the current Account Manager been assigned to your account? (Respond in years and months)

What is the current approximate size (spend) of your account? (Respond in \$ amount)

Do you expect your account to grow or decline in size (spend) over the next year? (Respond Grow or Decline)

What is the expected growth/decline in size (spend) of this account over the next year? (Respond in %)