A NEW BREED OF SUPPLIERS FOR PRODUCT INNOVATIONS:
A MULTI-METHOD INVESTIGATION

Chanchai Tangpong, College of Business, North Dakota State University, Fargo, ND 58108, Chanchai.Tangpong@ndsu.edu, (701) 231-9445
Kuo-Ting Hung, Sawyer School of Management, Suffolk University, Boston, MA 02108, khung@suffolk.edu, (617) 573-8395
Michael D. Michalisin, School of Business, Penn State Worthington Scranton, Dunmore, PA 18512, (570) 963-2665
Arlyn J. Melcher, College of Business, Southern Illinois University Carbondale, Carbondale, IL 62901, (618) 453-3328

ABSTRACT

This study extended the buyer-supplier relationship (BSR) literature by examining how supplier dependence influences buyer firms’ product innovation under the high and low relationalism conditions of BSRs. Using content-analytic case study and survey methodologies in tandem, this study highlighted the innovation-inhibiting effect of supplier dependence under the high relationalism condition.

Keywords: supplier dependence, relationalism, product innovation, buyer-supplier relationships, content analysis, case study, survey

INTRODUCTION AND BACKGROUND OF THE STUDY

In today’s business landscape, firms in various industries have been challenged by rapid technological change and shortened product life cycles, and have increasingly relied on supplier networks to sustain their product innovation capabilities (e.g., Lawson, Petersen, Cousins, & Handfield, 2009; Leonard-Barton, 1995). While the link between relational behaviors in buyer-supplier relationships (BSRs) (i.e., relationalism – the degree to which buyers and suppliers promote behaviors that maintain or improve their relationship (Noordewier, John, & Nevin, 1990) and buyer firms’ product innovation (BFPI) has recently gained attention from scholars, the empirical research in this area has unfortunately been inconclusive (e.g., Tangpong, Michalisin, & Melcher, 2008; Wynstra, Von Corswant, & Wetzels, 2010), and the underlining mechanisms of BSRs that improve product innovation is less understood.

In this study, we contend that a possible theoretical explanation for the inconclusive results is that relationalism-based studies are conventionally process oriented, focusing on process properties of the BSRs (e.g., buyer-supplier cooperation, supplier involvement, etc.), and often overlook the innovation-influencing impacts of structural properties of the BSRs (e.g., corporate interlocking, power-dependence position, etc.) in their theoretical development. This study contributes to the BSR literature by incorporating both structural and process perspectives in the investigation of the BSR-BFPI relationship. Specifically, this study focused on a key structural property, namely supplier dependence (i.e., suppliers’ dependence on the buyer firm), and investigated the interplay among supplier dependence, relationalism, and BFPI in addressing the
To achieve our research objective, we first performed a longitudinal qualitative study of eight U.S. computer companies, using a content-analytic case study, to explore the innovation-influencing effect of supplier dependence in the low and high relationalism conditions and then derive theoretical propositions based on the case data. We then tested the case-driven theoretical propositions with the use of survey research.

**CONTENT-ANALYTIC CASE STUDY**

Content-analytic case study research is a qualitative research approach employing a combination of case study research and content analysis. Case study research is a powerful research method in dealing with complex phenomena (such as BSRs) while content analysis is an effective methodological technique that enables researchers to analyze qualitative contents of recorded communication materials through the use of systematic procedures in classifying, coding, and converting the textual data into an analyzable form (e.g., Krippendorff, 1980), thus providing synergistic methodological opportunities.

**Case Selection, Design, and Data Collection**

The computer hardware industry during the period of 1993-1998 was selected for the current research since it was an industry where suppliers were responsible for a large portion of firms’ operating costs and had gone through major technological changes and vertical disintegrations during that period of time. The cases included in our study were Apple Computer, Compaq, Dell, Gateway, Hewlett-Packard (HP), Micron Electronics (Micron), Silicon Graphics, and Sun Microsystems (Sun). We used a longitudinal case design to explore how the selected firms’ product innovation varied with supplier dependence under the low and high conditions of relationalism over time. The overall time frame of the study was 1993-1998, which was then divided into three observation periods: 1993-94, 1995-96 and 1997-98. The data sources included 10K reports and the Industry and Market News Database provided by Lexis-Nexis. In addition to the 10K reports, we analyzed Lexis-Nexis industry and market news reports relevant to BSRs, focusing on manufacturing/sourcing, product development, supplier agreements, and original equipment manufacturer contracts in the content analysis. In total, over 1,000 news reports from Lexis-Nexis were collected and used in the content analysis.

**Measurement and Content Analysis**

We used the number of registered trademarks per billion dollars of assets (median-adjusted) as a proxy for the *buyer firms’ emphasis on product innovation* and the number of registered trademarks per hundred million dollars of R&D expenditures (median-adjusted) as a proxy for the *efficiency of the buyer firms’ product innovation activities*. Principal Component Analysis (PCA) revealed that the two product innovation measures were highly correlated and loaded onto a single principal component; thus, the PCA score was then used as a single composite measure of BFPI.
Supplier dependence was measured using the sales contribution approach (e.g., El-Ansary & Stern, 1972; Nobeoka, Dyer, & Madhok, 2002), which focuses on the percentage of the supplier’s sales to the buyer firm using financial data from objective sources, such as audited annual reports. According to the U.S. Securities and Exchange Commission (SEC) Regulation §229.101(c)(1)(vii), 10% or more of a publicly-traded company’s total sales coming from one customer signal a significant degree of company (i.e., supplier) dependence on the buyer. Congruent with the SEC’s view of significant dependence, we used the percentage of (a) suppliers whose sales to a sample firm accounted for 10% or more of their total sales in (b) the sample firm’s total supplier pool (i.e., the number of the sample firm’s total suppliers), as a proxy of supplier dependence. In essence, the higher the percentage reflects the larger the proportion of dependent suppliers in the buyer firm’s supplier pool, thus indicating the higher the degree of overall suppliers’ dependence on the buyer firm.

Finally, relationalism in BSR was measured via content analysis of industry news reports about supplier relationships with each sample firm in the study. Recent literature has indicated the reliability and validity of content analytic approach in BSR and supply chain research (e.g., Lumineau & Henderson, 2012; Tangpong, 2011). To assess the degree of relationalism in the BSR, each industry news report was content analyzed and then categorized as (a) a positive theme if the BSR was enhanced, (b) a negative theme if the BSR had deteriorated and (c) a neutral theme if the BSR had neither been enhanced nor had deteriorated. The inter-coder reliability check (Krippendorff, 1980) was successfully performed by two independent coders, attaining an 86.08% agreement rate with the kappa inter-coder reliability of 0.71 (p<0.001). We then computed a relationalism ratio for each firm by subtracting the number of negative themes from the number of positive themes, and then divided the difference by the total number of themes (positive, neutral, and negative). The logic of this relationalism ratio is that the larger the number of business events enhancing BSRs (positive theme) and the fewer the number of business events undermining BSRs (negative theme), the higher the degree of relationalism in BSRs. For theory-building purposes, we then categorized relationalism into low and high, using both hierarchical cluster analysis and the arbitrary relationalism ratio cutoff point of 0.5. We successfully validated the results of the cluster analysis and the cutoff-point grouping, using ANOVA and Discriminant Analysis, which suggest that the results of our grouping methods were largely consistent and valid.

Data Analysis and Results

Consistent with the case study research prescription (Eisenhardt, 1989; Yin, 1994), we focused our analysis on theoretically meaningful cases where the influence of supplier dependence on BFPI under conditions of low and high relationalism is transparently observable. From the eight selected firms examined across three observation periods (i.e., 1993-94, 1995-96, and 1997-98), we identified 10 observations that are meaningful to our exploratory efforts. Seven of the observations were specific to the influence of supplier dependence on BFPI when relationalism was high, including (1) Dell from 1993-94 to 1995-96, (2) Dell from 1995-96 to 1997-98, (3) Sun from 1993-94 to 1995-96, (4) Sun from 1995-96 to 1997-98, (5) Gateway from 1993-94 to 1995-96, (6) HP from 1993-94 to 1995-96, and (7) HP from 1995-96 to 1997-98. The other three observations corresponded to the influence of supplier dependence on BFPI when relationalism was low, including (1) Apple from 1995-96 to 1997-98, (2) Compaq from 1993-94
to 1995-96, and (3) Micron from 1995-96 to 1997-98. Silicon Graphics was excluded from our analysis as its relationalism in BSRs fluctuated over the three observation periods, making it a less theoretically meaningful case for this type of exploratory research (e.g., Eisenhardt, 1989).

In the first seven case observations of the sample firms operating in a high relationalism condition, a clear pattern emerged: When the firms had high relationalism with their suppliers, the increase in supplier dependence was associated with a decrease in BFPI, and vice versa. For example, two within-case observations of Dell indicated that the decrease in Dell’s product innovation over the period of 1993-94 and 1995-96 coincided with the increase in its supplier dependence whereas the increase in its product innovation over the period of 1995-96 and 1997-98 corresponded with the decrease in its supplier dependence. The same pattern also applied to Gateway, HP and Sun’s case observations. In short, the seven within-case and cross-case observations collectively yielded a consistent pattern of the relationship between supplier dependence and BFPI, as suggested in the following theoretical proposition.

**Proposition 1:** Under the high relationalism condition, supplier dependence is negatively related to buyer firms’ product innovation.

In the last three observations for the sample firms operating in a low relationalism condition, the pattern of the supplier dependence-BFPI relationship. Specifically, Apple’s product innovation increased during the periods 1995-96 and 1997-98 when supplier dependence decreased; however, such pattern did not apply in Compaq and Micron’s case observations. In short, these findings indicate no systematic pattern of how supplier dependence influences BFPI under the low relationalism condition. This may also suggest that supplier dependence becomes an irrelevant factor to BFPI when buyer firms operate in a BSR characterized by a low degree of relationalism, as summarized in the proposition below.

**Proposition 2:** Under the low relationalism condition, supplier dependence is not associated with buyer firms’ product innovation.

To cross-validate the case-driven theoretical propositions above, we conducted a survey study, which is detailed in the next section.

**SURVEY STUDY**

**Sample and Respondents**

Surveys were sent to 1000 business professionals in high-level management positions (e.g., CEO, Vice President, Senior Manager, etc.) from industries including technology, service, and manufacturing. The unit of analysis for the survey is the business unit for which the respondents are directly responsible (i.e., business units in diversified firms), which also includes single-business firms if their firms are largely single-business focused. Among those contacted, 178 responded, and 175 provided us with usable responses, representing the response rate of 17.5%. The characteristics of the sampled 175 business units included (a) the average business unit size of $36.3 million in sales. (b) 17.7 product lines on average, and (c) 48.7% in manufacturing sector, 39.5% in technology sector, and 11.8% in service sector. In the subsequent analyses, we
considered these business units as buyer firms (i.e., we use buyer firms in place of business units hereafter) in their exchange relationships with their suppliers.

Measurement

We developed a survey instrument to measure (a) buyer firm’s product/service innovation (hereafter BFPI), (b) supplier dependence, and (c) buyer firm’s relationalism with suppliers. Through the survey instrument, we also collected data regarding (d) buyer dependence (i.e., buyer firm’s dependence on suppliers), (e) buyer firm’s size in terms of annual sales (actual sales with subsequent log transformation for skewness/non-linearity correction), (f) the number of buyer firm’s product lines (log-transformed), (g) the synergies among buyer firm’s product lines (a single-item 1-7 scale; 1 = very limited and 7 = very extensive), and (h) industry sectors (coded as 1, 2, 3 for manufacturing, technology, and service, respectively). These additional variables were used as control variables in the statistical analyses.

To reduce the potential biases from perceptual survey-based measures, we used the objective indicators: the number of new products/services launched in the past five years per product line and the percentage of sales from the new products/services launched in the past five years as the proxies for BFPI. The results of PCA, summarized in Table 2, revealed that these two proxies for BFPI significantly loaded onto a single factor; thus, the PCA score was then used as a composite measure of BFPI in the subsequent analyses. In addition, we used Lusch and Brown’s (1996) three-item instruments to measure supplier dependence and buyer dependence (Cronbach’s alphas of 0.97 and 0.92, respectively), and used Boyle et al.’s (1992) three-item instrument to measure the buyer firm’s relationalism with suppliers (Cronbach’s alpha of 0.90). We then used PCA scores as the composite measures for these constructs in the later analyses.

Data Analyses and Results

In the full sample analysis, we identified two outliers based on the standardized residual approach, and then excluded from the analyses. The results of the multiple regression analyses indicated that after controlling for the control variables, the main effects of Supplier Dependence and Relationalism on BFPI were not significant whereas their interaction effect on BFPI was negative and significant at p<0.05. The overall model was significant at p<0.001. These results provided strong support for the thesis embedded in the case-driven propositions, suggesting that the effects of supplier dependence vary under different conditions of relationalism. The negative Supplier Dependence – Relationalism interaction effect also suggests that supplier dependence is negatively related to BFPI under the high condition of relationalism, thus supporting Proposition 1 from the content-analytic case study.

To further elaborate the results of the full sample analysis, we conducted the sub-sample analyses of the high and low conditions of Relationalism. In the high Relationalism sub-sample analysis, the results indicated that after controlling for the control variables, Supplier Dependence was negatively related to BFPI (p<0.01), thus consistent with Proposition 1 from the content-analytic case study. In the low Relationalism sub-sample analysis, the results indicated that Supplier Dependence was not significantly related to BFPI (p>0.25) while the post-hoc power analysis indicated the sample size adequacy to reject the null hypothesis at the p< 0.1 and
p< 0.05 levels with the 0.94 and 0.90 probability, respectively. These results thus yield support for Proposition 2 from the content-analytic case study.

**CONCLUSION**

The results obtained from both content-analytic case study and survey research methodologies in this study were largely consistent with each other. Overall, the findings in this study are consistent with the extant BSR-BFPI literature (e.g., Clark, 1989; Hua & Wemmerlöv, 2006) in showing that relationalism in BSRs (exhibited by cooperative processes, joint activities, and strong relational ties between buyer firms and their suppliers) is an important process consideration for buyer firms to reap product innovation improvements from their exchange relationships with suppliers. Lacking relationalism in BSRs can result in unstable working relationships and disruptive operational processes that hinder BFPI. However, this study went beyond the process-oriented BSR-BFPI literature to show that high degrees of supplier dependence (a structural property of BSRs) seem to hinder BFPI despite the presence of high relationalism in the BSRs.

In summary, the results of this study, encapsulated in Propositions 1 and 2, suggest that to fully leverage the exchange relationships with suppliers toward product innovation, buyer firms need to promote high relationalism in BSRs while limiting the degree to which their suppliers are dependent on them. Based on this insight, we identified a new breed of suppliers for product innovation. Counter to conventional thinking that independent suppliers are associated with arm’s-length transactions and that dependent suppliers are associated with close cooperative arrangements (with buyer firms), this new breed of suppliers are those that develop strong cooperative and relational ties with the buyer firms, while maintaining the requisite levels of independence needed to strengthen BFPI. This new breed of suppliers possess BFPI-enhancing capabilities that are invaluable to the buyer firms, as innovation becomes increasingly more critical to the buyer firms’ strategic competitiveness in today’s ever-changing business environment.

**REFERENCES**


