The Effect of Operations Strategy on Supplier-Customer Relationships and Suppliers' Financial Performance

Yoon Hee Kim, PhD Student
University of Wisconsin-Madison
(608) 770-6343; ykim@bus.wisc.edu

Urban Wemmerlöv, Professor
University of Wisconsin-Madison
(608) 262-0305; uwemmerlov@bus.wisc.edu

Abstract. Effective relationship management, as a key to a firm's success, has received much attention in the growing field of supply chain management. As a part of relationship management, leading OEMs have reduced their supplier base and reportedly developed closer relations with fewer suppliers. It has been argued that close relationships enhance the financial performance of the *buyer firms* through reduced costs and increased revenues. Yet, the benefits of close relationships (financial or non-financial) accruing to *supplier firms* have not been well documented. In this study, we empirically assess the strategic, financial, and power-based issues associated with supplier-manufacturer relationships *from the supplier's perspective.* Specifically, we investigate how the supplier's choices of operations strategy affect its relationship closeness with, and profitability from, the customer as mediated by the power-dependence relation. Using cross-sectional data collected from 158 suppliers in the manufacturing industry, we tested the direct and mediated relationships among the operations strategy, the power-dependence relation, the supplier-manufacturer closeness, and the supplier's financial performance.

Introduction: For more than a decade there has been a large and growing interest, among academics and practitioners alike, in the value of effective supply chain management (SCM) practices. The literature suggests that a move towards to close relationships between suppliers and customers is mutually beneficial for both parties. This notion has been widely accepted among original equipment manufacturers (OEMs) in the U.S (*Economist* 2006). As a result, leading OEMs have reduced their supplier base in recent years and reportedly developed closer relationships with a selected few suppliers (Johnston et al. 2004).

It has been argued that close relationships enhance the financial performance of the *buyer firms* through reduced costs and increased revenues (Noordewier et al. 1990; Cannon and Homburg 2001). Yet, the benefits of close supplier-buyer relationships accruing to *supplier firms* are seldom explicitly stated (New 2004, p.81) nor empirically demonstrated in the large body of research on SCM (one exception is Kalwani and Narayandas 1995). This gap in the literature is the starting point of this research.

Unlike a common belief on the mutual benefits of close relationships, there are many reports in the press about suppliers' complaining about their customers' opportunistic behaviors. These behaviors include forced and excessive price concessions (Bunkley 2006), punitive actions (Hingley 2005) and broken long term contracts (Velocci 1999). Anecdotal evidence suggests that unprofitable customer relationships may not be uncommon among suppliers (Helm et al. 2006), possibly due to power unbalances in the relationships (Bunkley 2006).

In this study, we investigate strategic, financial, and power-based issues associated with supplier-customer relationships *from the supplier's perspective*. Our purpose is to understand what a supplier firm can do to maintain and enhance its profitability relative to individual customers. Specifically, we investigate whether and how a supplier's strategic choices in the operations area affect its relationship with a customer and help balance risks and rewards in the exchange.

Literature Review and Hypotheses: Resource dependence theory views a business relationship to be a social exchange of critical resources with mutual dependency among the exchange partners. Thus, the survival and growth of organizations largely depend on the ability to secure critical resources from the external environment (Pfeffer and Salancik 1978; Casciaro and Piskorski 2005). Yet, transaction cost analysis (TCA) suggests that every transaction has costs. These costs are incurred for adaptation, performance evaluation and safeguarding, and are associated with uncertainty, opportunism, and transaction specific assets (TSAs)[1] invested in the relationship (Williamson 1996). Specifically, TCA identifies opportunism as the hazard of behavioral uncertainty and argues that TSAs raise the cost of safeguarding against opportunistic behaviors where one party may exploit the other for unilateral benefits (Heide and John 1990; Heide 1994; Bensaou and Anderson 1999; Ghosh and John 1999, 2005).

While resource dependence theory focuses on mutual dependence between exchange partners even before the initiation of a relationship (*ex ante)* due to critical resources, TCA assumes that two parties are initially independent but develop bilateral dependence after the initiation of a relationship (*ex post)* due to investments in TSAs over the course of the relationship (Heide 1994, p. 73; Casciaro and Piskorski 2005, p. 174). Although resource dependence theory and TCA originate from different point of view (sociology and new institutional economics, respectively), both theories recognize the existence of interdependency between exchange partners and the importance of safeguarding valued resources from environmental and behavioral uncertainty (Heide 1994).

[1] Transaction specific assets refer to specialized assets used to service the particular needs of the exchange parties (Williamson 1996). Firms invest in TSAs in order to create additional values above what standard product and service offerings can do (Ghosh and John 1999). Examples of TSAs include the development of idiosyncratic knowledge, the provision of dedicated human resources and training, and capital investment in specialized equipment and facility improvement (Williamson 1996). Being unique to a relationship, and possessing little or no value upon the relationship termination, TSAs are often viewed as "valuable but vulnerable" investments (Ghosh and John 1999, 2005; Wathne and Heide 2004).

Ghosh and John (2005) argue that a firm aligns with its exchange partners (i.e., a supplier and a customer) to jointly create values in the market, through cost reductions and/or value additions, based on firm-specific resources and investment in TSAs. From the customer's perspective, they argue that the buying firm needs to take different approaches to the supplier relationship management depending on its strategic goals (e.g., cost reduction or product enhancement) in order to safeguard valued resources (i.e., joint values created and TSAs) from behavioral uncertainty of the supplier. *From the supplier's perspective*, this suggests that the supplier contributes to the joint creation of values by providing the critical resources (products and services) and/or making investment in TSAs. Thus, the criticality of the supplier's products/services and the level of its TSAs invested in the relationship will largely influence the customer's dependence on the supplier.

To improve the values of products and services, supplier firms develop and strengthen operations capabilities by implementing various operational practices and processes (Ittner and Larcker 1997a). Given the limited resources, the operations' task within organization is to match a firm's internal resources to competitive priorities so as to achieve advantages relative to the competitors in the market (Wheelwright 1984). A firm's competitive priorities can be supported by operations capabilities developed through the adoption of practices and processes. There are five dimensions of capabilities frequently mentioned in the literature: *cost efficiency, conformance quality, delivery dependability, flexible responsiveness* and *innovative product development* (Noble 1995; Ward and Duray 2000). By implementing any of these capabilities either individually or collectively, a firm can improve the values of its products and services.

In sum, *ex ante* mutual dependence exists due to critical resources and *ex post* mutual dependence is increased by TSAs in addition to critical resources (Heide and John 1988; Heide 1994; Casciaro and Piskorski 2005). This suggests that mutual dependence would increase over time as the level of investment in TSAs increases and/or the value of critical resources exchanged increases. From the supplier's perspective, *mutual dependence* increases and *power imbalance* decreases as a customer's dependence on the supplier increases. A customer's dependence – given any level of its investment in TSAs – will increase as the value of critical resources (products and services) from the supplier increases. The value of a supplier's product and services to a customer will presumably improve through the development and strengthening of its capabilities. In this regard, a supplier's capabilities should increase its customer's dependence on the supplier and, in turn, decrease the *power imbalance* while increasing the *mutual dependence*. Thus, our first hypothesis is as follows:

> Hypothesis 1: As the degree to which a supplier implements capabilities increases, the *power imbalance* in a customer relationship decreases while the *mutual dependence* increases.

Some capabilities are believe to be complementary (Ferdows and De Meyer 1990) while some need a trade-off due to the different resource requirements (Boyer and Lewis 2002). Based on

these characteristics, capabilities can be grouped into two broad strategic focuses: *improvement* and *innovation* (Cole 2001; Peng et al. 2008). *Improvement* can be defined as a focus on refinement of existing products/processes and internal operations efficiency (Peng et al. 2008), and is associated with three capabilities: *conformance quality, delivery dependability* and *cost efficiency* (Noble 1995). *Innovation* as a strategic focus can be defined as an emphasis on assisting customers through flexible and innovative operations (Cole 2001), and associated with two capabilities: *flexible responsiveness* and *innovative product development* (Hayes et al. 2005). Due to resource limitation, firms often develop capabilities skewed to either improvement or innovation depending on resources and industry conditions, although some may pursue both types (Cole 2001).

Capabilities contribute to business performance either individually or collectively (Noble 1995; White 1996). Thus, both strategic focuses can help firms to compete on operational excellence in the market (Peng et al. 2008). Yet, each strategy creates a different path to superior business performance through different earning mechanisms, different levels of closeness in customer relationships, and different levels of investments in TSAs. The *improvement* strategy, for example, may enable firms to enhance profitability through an increase in sales volume at low margins without developing a close relationship with the customer. Customers may have intentions to expand future business volumes with suppliers that offer a cost advantage (Cannon and Homburg 2001). However, they may not necessarily be motivated to invest in TSAs, nor to develop closer relationships with those suppliers, because the products and/or services can usually be delivered through standard procedures (Bensaou and Anderson 1999). Similarly, suppliers focusing on an *improvement* strategy may not be motivated to invest in TSAs nor to develop close relationships by increasing customer involvement because they can achieve cost savings through internal operations efficiencies. Rather, such suppliers often attempt to increase sales by offering low prices to customers (Kalwani and Narayandas 1995; Cannon and Homburg 2001).

In contrast, an *innovation* strategy may enable firms to increase profitability through increased market shares and premium pricing at high margins, while promoting close relationships with customers. Customers seeking a product-enhancement advantage from suppliers, on the other hand, need to build close relationships with them in order to reduce the risks of uncertainty in downstream markets (Ghosh and John 2005). In the presence of downstream uncertainty, the ability of customers to respond to demand changes is highly contingent on their suppliers' ability and willingness to cope with change requests (Wathne and Heide 2004; Ghosh and John 2005). Thus, customers often use qualification programs to assure that suppliers' operating capabilities can accommodate such needs. They can also make investments in TSAs to increase suppliers' willingness to cooperate while urging the suppliers to do the same to reduce their opportunism (Wathne and Heide 2004). High level of TSAs is believed to increase *mutual dependence* (Heide and John 1990) and expand cooperation between exchange partners (Heide and Miner 1992). More specifically, customers tend to invest in TSAs to support non-standardized tasks such as the development of highly customized or new products (Bensaou and Anderson 1999). They are also likely to be involved in their supplier's product development process by partaking in cross-functional teams and/or various design

practices, such as quality function deployment, design of experiments, and failure mode and effects analysis (Ittner and Larcker 1997b).

Similarly, suppliers pursuing an *innovation* strategy are likely to make investments in TSAs, such as engineer training and custom design tools (Bensaou and Anderson 1999), and develop close relationships with customers by cooperating in the product development process (Ittner and Larcker 1997b). Thus, innovation-oriented suppliers not only have a higher dependence on customers than those focusing on improvement, but they also increase the customers' dependence on them to a greater extent. As a result, suppliers focusing on an *innovation* strategy are likely to show a lower *power imbalance* and a higher *mutual dependence* than those focusing on an *improvement* strategy. As such, the criticality of the supplier's resources and the level of the customer's investments in TSAs may vary depending on the supplier's operations strategy. Thus, our second hypothesis is as follow:

> Hypothesis 2: Capabilities associated with an *innovation* strategy have a more favorable impact on a supplier's power imbalance and mutual dependence than do capabilities associated with an *improvement* strategy.

Mutual dependence and *power imbalance* may have different effects on the closeness of a supplier-customer relationship and the supplier's ability to claim its share of jointly created value. As *power imbalance* increases in a relationship, for example, the parties may have more conflicts (Gundlach and Cadotte 1994; Kumar et al. 1995) and less commitment due to a high potential for opportunism and a lack of trust between the firms (Kumar et al. 1995). As a result, a high *power imbalance* may reduce cooperation between the exchange partners (Heide 1994) and impede the weak party's ability to achieve its desired outcomes (Buchanan 1992). High *mutual dependence*, on the other hand, may reduce conflicts while increasing commitment and trust between the exchange partners (Gundlach and Cadotte 1994; Kumar et al. 1995). As *mutual dependence* increases, the parties will be engaged in more frequent exchanges with each other (Piskorski and Casciaro 2006) and adjust to the needs of the other party under a low risk of opportunism (Heide 1994). Thus, *mutual dependence* improves cooperation between parties and can result in greater joint value (Jap 1999).

From the supplier's perspective, this suggests that as its *power imbalance* decreases the supplier can develop a closer relationship with the customer through increased cooperative activities such as information sharing and joint decisions, and can jointly create higher values in the market. Furthermore, a supplier's increased relative power can improve its financial gains from the relationship because the supplier will have greater bargaining power with the customer when it comes to dividing the value created in the relationship. Similarly, in the presence of high *mutual dependence,* suppliers can develop closer relationships with customers and create greater joint value. In return, suppliers can financially benefit from the relationships due to frequent exchanges and low opportunism in sharing created values with the customers. So, our third and fourth hypotheses are as follow:

Hypothesis 3a: As a supplier's *power imbalance* reduces, the supplier-customer relationship becomes closer through expanded information sharing and more joint decisions.

Hypothesis 3b: As *mutual dependence* increases, the supplier-customer relationship becomes closer through expanded information sharing and more joint decisions.

Hypothesis 4a: As a supplier's *power imbalance* reduces, the supplier's profitability from the relationship with the customer increases.

Hypothesis 4b: As *mutual dependence* increases, the supplier's profitability from the relationship with customer increases.

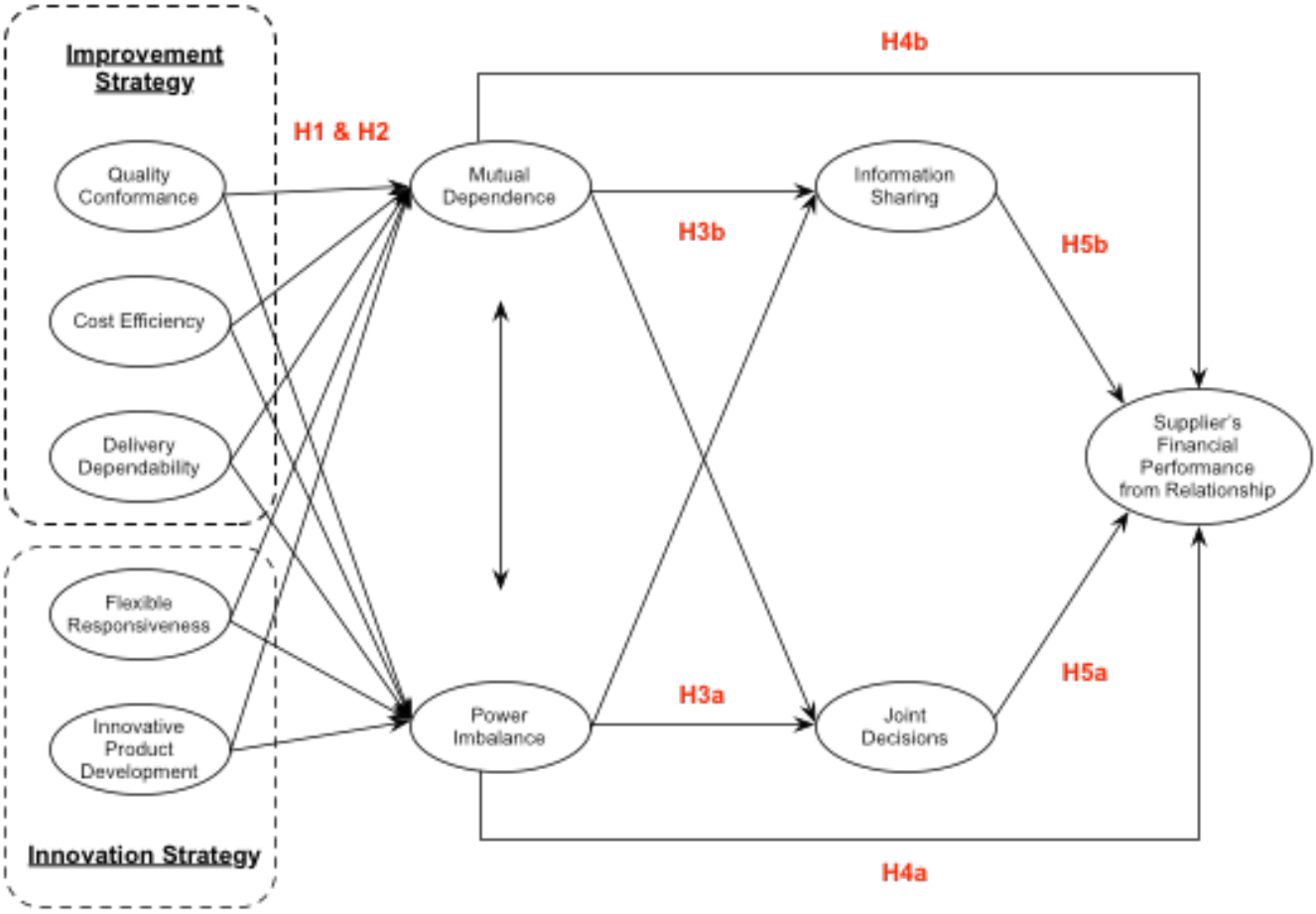
The literature views the ideal relationships between supplier and customer firms as cooperative for mutual benefits. Cooperative activities can bring the parties closer to each other and generate benefits for suppliers. For example, suppliers can increase revenues by selling more of existing products and/or by offering new products and services to the incumbent customers through information sharing and/or joint decisions (Lyons et al. 1990; Kalwani and Narayandas 1995). Suppliers can also save money on the selling, administrative and general expenses by servicing return customers (Kalwani and Narayandas 1995) and reduce inventory and manufacturing costs by improving demand forecasts and manufacturability through information sharing and/or joint decisions (Lyons et al. 1990; Kalwani and Narayandas 1995; Hayes et al. 2005). Yet, the parties may incur higher costs of information sharing, activity coordination, and investments in TSAs as they develop closer relationships (Lyons et al. 1990). Thus, there are both costs and benefits associated with close relationships between suppliers and customers (Lyons et al. 1990). We believe, however, that supplier firms will receive net gains from close relationships with customers because, without sufficient returns, suppliers eventually have to disassociate themselves from cooperation (Kalwani and Narayandas 1995; Helm et al. 2006). Thus, our last hypothesis is as follow:

Hypothesis 5a: As the degree to which joint decisions increase in a supplier-customer relationship, the supplier's profitability from the relationship improves.

Hypothesis 5b: As the degree to which information sharing increases in a supplier-customer relationship, the supplier's profitability from the relationship improves.

The relationships referred to in the five hypotheses are illustrated in Figure 1.

Figure 1: Conceptual Framework of the Effects of Operations Strategy on the Supplier-Customer Relationship and Suppliers' Profitability from the Relationship



Data Collection: Cross-sectional data were collected by survey from 158 suppliers in the U.S. manufacturing industry through an extensive data collection process. Firstly, we conducted interviews with regional supplier firms in manufacturing industry to confirm whether the research topic is relevant to practice and interesting to managers. Based on the literature review and interviews, we developed a self-administered questionnaire available both online and by mail, and refined it through a Q-sort exercise, an expert review and a pre-test with professionals. Before distributing the questionnaire, we randomly drew a sampling frame of 3,107 manufacturing firms operating in SIC 34–38 with an employee base between 100 and 1000 from a commercial database (www.OneSource.com). We then contacted all of them by phone (1) to identify a manufacture supplying to other manufacturing companies and (2) to recruit a key informant who is knowledgeable about the topics of our research interests. We made the questionnaire available (via mail and online) to 1,334 firms and received 158 usable responses with the effective response rate of 14.6%.

Data Analysis: We assessed non-response bias (Groves et al. 2004) by comparing responding firms (n = 158) with non-responding firms (n = 150) on key demographic characteristics such as SIC code, number of employees, and annual sales revenues. There was no sign of non-response bias. We also assessed two types of response bias by the response method (i.e., online vs. mail) and the response time (i.e., early vs. late) (Dillman 2007). Following Johnston et al. (2004), we considered early responses to be those who responded to the survey prior to the first reminder (n = 63). The *t*-test was performed to investigate the mean differences in responses to 50 scale items between online and mail responses and between early and late responses, respectively. The results suggested no significant differences at alpha of 0.05 for 92% and 94% of the items, respectively.

Operations strategy is defined as a pattern of decisions regarding the selection and development of capabilities – with the latter accomplished through a variety of strategic choices of operational practices and processes. To measure the capabilities-based concept of operations strategy in this relatively new perspective (Ketokivi and Schroeder 2004; Peng et al. 2008), we created a number of new items in addition to existing items adapted or adopted from the literature. For content validity, the 28 items measuring operating practices/processes were reviewed by four academic experts who associated each item with a specific capability. Through the Q-sort exercise, it was suggested that certain practices and processes are related to more than one capability. Therefore, we performed exploratory analysis to identify the dimensional structure of capabilities – the number of distinctive capabilities and the unique practices associated with each capability – prior to confirmatory analysis.

We randomly split the total sample (n = 158) into equal halves (n = 79) to be used for calibration and validation, respectively. In the first stage, we used the calibration sample to define a measurement model through exploratory and confirmatory analysis. For exploratory analysis, we first evaluated a Corrected Item to Total Correlation (CITC) for item reliability (Netemeyer et al. 2003) and then performed exploratory factor analysis (EFA) to identify the structure underlying the capabilities. EFA was conducted with CF-Varimax oblique rotation and the maximum likelihood (ML) estimation method using M-plus 5.0 (Muthén and Muthén 2007). From this iterative analysis with two to seven factors in multiple steps, a 6-factor solution was chosen based on interpretability and goodness of fit.

Although five dimensions of capability were adopted for our analysis based on the literature (see Figure 1), two distinctive dimensions of *innovative product development* were suggested by the EFA. One dimension is manifested by practices such as the use of design of experiment (DOE), quality function deployment (QFD) and failure mode of effects analysis (FMEA). The other dimension is manifested by practices such as the involvement of engineers, the use of cross-functional teams and design for ease of manufacturing. According to Flynn et al. (1999), the former group of practices focuses on product design to shorten lead time by developing right product specifications for both the customer and the producer while the latter group of practices focuses on minimizing ramp-up time into full production by avoiding over-specifications of products. To separate the two, we labeled the former dimension as *innovative product design* and the latter dimension as *innovative product development*.

After EFA, we performed a confirmatory factor analysis (CFA) to evaluate the adequacy of the dimensional structure extracted during EFA and to assess the construct validity of the measurement model. CFA was conducted with LISREL 8.80 using ML estimation with a covariance matrix extracted from the raw data. The result suggested convergent validity, item-level reliability and unidimensionality of the measurement model. Although we assessed the validity and reliability of all measures separately with calibration, validation and whole samples, we present the results only for the whole sample in Table 1 to avoid redundancy. Overall, 50 scale items were reduced to 34 during calibration.

Table 1: Validity and Reliability of the Measurement Model for the Whole Sample (n = 158)

Item		Latent Variable	λ_i (*t*-value) [a]	R^2	Cronbach's α	Composite Reliability	AVE
QUAL1	←	Conformance Quality [QUAL]	0.72 (8.05)	0.51	0.68	0.69	0.52
QUAL2	←	Conformance Quality [QUAL]	0.73 (8.18)	0.53			
EFF1	←	Cost Efficiency [EFF]	0.68 (8.14)	0.46	0.69	0.70	0.42
EFF2	←	Cost Efficiency [EFF]	0.61 (7.22)	0.37			
EFF3	←	Cost Efficiency [EFF]	0.65 (7.78)	0.43			
EFF4	←	Cost Efficiency [EFF]	0.49 (5.62)	0.24			
DEL1	←	Delivery Dependability [DEL]	0.54 (5.10)	0.30	0.46	0.49	0.33
DEL2	←	Delivery Dependability [DEL]	0.59 (5.33)	0.35			
FLEX1	←	Flexible Responsiveness [FLEX]	0.63 (5.72)	0.40	0.62	0.63	0.46
FLEX2	←	Flexible Responsiveness [FLEX]	0.72 (6.13)	0.52			
IPD1	←	Innovative Product Development [IPD]	0.79 (9.64)	0.62	0.72	0.74	0.50
IPD2	←	Innovative Product Development [IPD]	0.83 (10.18)	0.69			
IPD3	←	Innovative Product Development [IPD]	0.45 (5.39)	0.20			
IPDS1	←	Innovative Product Design [IPDS]	0.77 (10.01)	0.59	0.80	0.80	0.57
IPDS2	←	Innovative Product Design [IPDS]	0.75 (9.74)	0.57			
IPDS3	←	Innovative Product Design [IPDS]	0.74 (9.59)	0.55			
SDP1	←	Supplier's Dependence [SDP]	0.66 (7.44)	0.43	0.68	0.72	0.46
SDP2	←	Supplier's Dependence [SDP]	0.62 (7.05)	0.38			
SDP3	←	Supplier's Dependence [SDP]	0.76 (8.35)	0.58			
CDP1	←	Customer's Dependence [CDP]	0.65 (7.74)	0.42	0.75	0.76	0.52
CDP2	←	Customer's Dependence [CDP]	0.63 (7.57)	0.40			
CDP3	←	Customer's Dependence [CDP]	0.89 (10.05)	0.75			
INF1	←	Information Sharing [INF]	0.76 (10.54)	0.58	0.84	0.84	0.58
INF2	←	Information Sharing [INF]	0.81 (11.40)	0.65			
INF3	←	Information Sharing [INF]	0.67 (8.86)	0.45			
INF4	←	Information Sharing [INF]	0.79 (11.16)	0.63			
JD1	←	Joint Decisions [JD]	0.52 (6.41)	0.27	0.79	0.80	0.45
JD2	←	Joint Decisions [JD]	0.68 (8.80)	0.46			
JD3	←	Joint Decisions [JD]	0.67 (8.68)	0.45			
JD4	←	Joint Decisions [JD]	0.80 (10.88)	0.63			
JD5	←	Joint Decisions [JD]	0.65 (8.36)	0.42			
PERF1	←	Supplier's Performance [PERF]	0.54 (7.06)	0.29	0.82	0.84	0.65
PERF2	←	Supplier's Performance [PERF]	0.98 (14.73)	0.96			
PERF3	←	Supplier's Performance [PERF]	0.84 (12.01)	0.71			

[a]Standardized factor loading (*t*-value).

In the second stage, we cross-validated the measurement model – specified *a priori* – with the validation sample to evaluate the generalizability of the measures (Anderson and Gerbing 1988; Netemeyer et al. 2003). The results showed the similar pattern and size of factor

loadings in the calibration and validation samples, suggesting invariance of form across samples (Netemeyer et al. 2003).

In the last stage, we tested validity, reliability and unidimensionality of all measures for the whole sample and presented the results in Table 1 and 2. The overall fit indices suggested that the *a priori* specification of the measurement model is a good fit to the data (chi-square = 588.55, d.f. = 472, RMSEA = 0.04, Standardized RMR = 0.065, CFI = 0.92, NNFI = 0.91). Reliability was assessed by Cronbach's Alpha, composite reliability, and average variance extracted (AVE) (Fornell and Larcker 1981; Bollen 1989; Netemeyer et al. 2003; Hair et al. 2006). Cronbach's Alpha exceeded the threshold value of 0.60 for 5 of 6 newly constructed or adapted latent variables (LV) and exceeded the threshold value of 0.70 for 4 of 5 existing latent variables (Robinson et al. 1991; Hair et al. 2006). Composite reliability exceeded the recommended value of 0.70 for 8 out of 11 latent variables (Hair et al. 2006). AVE exceeded the recommended value of 0.50 for 6 out of 11 latent variables (Fornell and Larcker 1981). Since the reliability measures are largely influenced by the number of items (Bollen 1989; Netemeyer et al. 2003; Hair et al. 2006), the latent variables with two indicators (i.e., QUAL, DEL, and FLEX) showed lower reliability than those latent variables with three or more indicators. However, only DEL failed to exceed the reliability threshold values for all three tests. Therefore, DEL was removed from further analysis. Discriminant validity was assessed by the chi-square difference between the constrained and unconstrained models for all possible pairs of latent variables. As reported in Table 2, the chi-square difference tests suggest discriminant validity for all latent constructs.

Table 2: Correlations and Discriminant Validity for Whole Sample (n = 158)

	LV	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1	QUAL	5.96	1.18		27.50	27.86	36.19	44.50	41.75	42.31	47.99	38.27	42.82
2	EFF	4.81	1.37	0.54**		26.70	97.49	109.34	128.03	116.88	126.12	119.40	179.25
3	FLEX	5.20	1.46	0.34**	0.27*		26.61	35.80	32.98	31.33	28.24	24.82	30.91
4	IPD	5.38	1.23	0.39**	0.38**	0.35**		103.82	100.30	108.41	98.27	97.66	99.48
5	IPDS	4.13	1.77	0.10	0.31**	-0.14	0.20*		96.53	121.09	148.33	153.67	172.18
6	SDP	5.05	1.02	-0.08	0.02	-0.27*	0.06	0.14		95.08	88.40	98.31	94.04
7	CDP	4.47	1.20	0.04	-0.03	0.15	-0.005	0.16	0.16		125.31	127.69	119.93
8	INF	5.26	1.00	0.27**	0.04	0.33**	0.09	-0.001	0.20*	0.03		130.52	156.27
9	JD	4.67	1.08	0.33**	0.14	0.33**	0.29**	0.16	0.19	0.10	0.63**		177.24
10	PERF	3.87	1.09	-0.05	0.008	0.29**	0.01	-0.07	-0.30**	-0.03	0.30**	0.16	

The lower triangle shows correlations with * $p < 0.05$ and ** $p < 0.01$ (two-tailed *t*-test). The upper triangle shows the difference in χ^2-test statistic between the constrained and unconstrained CFA models; all χ^2 differences are significant at $p < 0.01$

Lastly, we assessed common method bias by Harmon's single-factor test and the marker-variable technique (Lindell and Whitney 2001; Malhotra et al. 2006). Firstly, we used CFA to test Harmon's single-factor model as Malhotra et al. (2006) did. The result showed a poor fit to the data, suggesting no evidence for substantial common method bias (chi-square = 1922.70, d.f. = 527, RMSEA = 0.130, SRMR = 0.347, CFI = 0.53, NNFI = 0.50). Secondly, we used a marker-variable to estimate common method variance (CMV) as suggested by Lindell and Whitney (2001). The results suggested that CMV is unaccountable for the statistical significance of the correlations observed in Table 2. Hence, common method bias should not be a problem in this study.

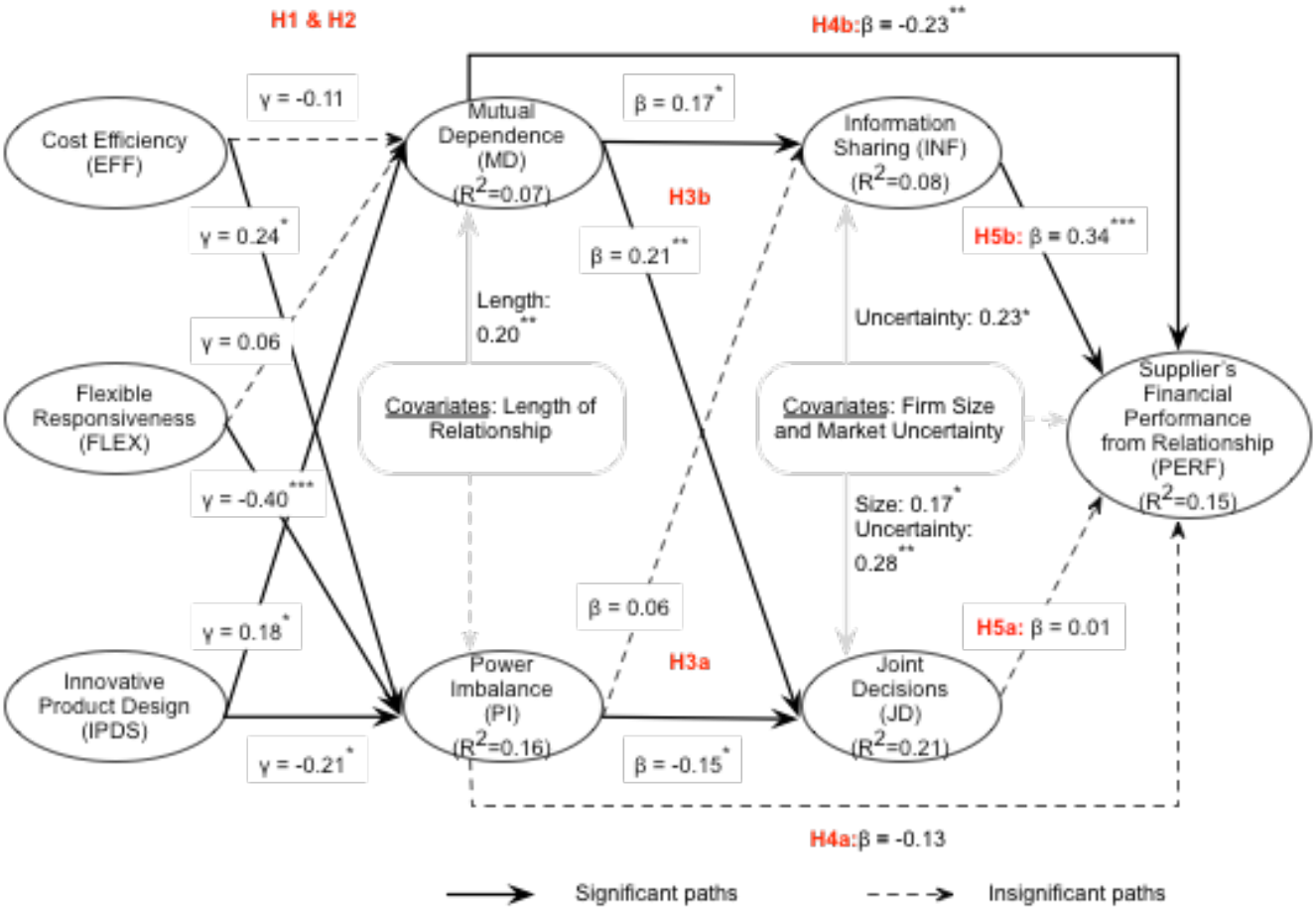
Results: Overall, our analysis indicates that our conceptual framework is supported by the data (Figure 2). As for the hypotheses testing, the results are mixed. In H1, we expected that strategic capabilities – regardless of whether associated with an improvement or an innovation strategy – would be positively associated with MD and negatively associated with PI. The results show that two capabilities (FLEX and IPDS) are negatively associated with PI (γ = -0.40, p = 0.000 and γ = -0.21, p = 0.019, respectively), one capability (EFF) is positively associated with PI (γ = 0.24, p = 0.016), and two capabilities (QUAL and IPD) have no associations with PI. On the other hand, only one capability (IPDS) shows a positive association with MD (γ = 0.18, p = 0.038) while other capabilities have no statistically significant associations with MD. Thus, H1 is supported only in part.

In H2, we hypothesized differential effects on MD and PI depending on the strategy. Specifically, we expected capabilities associated with an innovation strategy to decrease PI and increase MD to a greater degree than capabilities associated with an improvement strategy. The results show that the capabilities associated with an innovation strategy (FLEX and IPDS) decrease PI while the capability associated with an improvement strategy (EFF) increases it. IPDS also increases MD while EFF does not. This suggests that certain capabilities associated with an innovation strategy have a more favorable impact on a supplier's PI and MD than capabilities associated with an improvement strategy. Thus, H2 is also partly supported.

In H3a, we expected PI to be negatively associated with INF and JD. The results show that PI has a significant negative association with JD (β = -0.15, p = 0.038) while having no significant association with INF (β = 0.06, p = 0.226). This suggests that as a supplier's PI reduces, the supplier-customer relationship becomes closer through more joint decisions. Thus, H3a is partly supported. In H3b, MD was expected to be positively associated with INF and JD. The results show that MD is positively associated with both variables (β = 0.17, p = 0.022 and β = 0.21, p = 0.008, respectively). This suggests that as MD increases the supplier-customer relationship becomes closer through expanded information sharing and more joint decisions. Thus, H3b is supported.

In H4a, we expected a negative relationship between PI and PERF. The results show that PI has a negative but insignificant association with PERF (β = -0.13, p = 0.063). This suggests that a reduction in a supplier's PI does not lead to an improvement of the supplier's performance from the customer relationship in terms of gross margin, sales revenue, and sales growth. Thus, H4a is not supported. In H4b, we expected a positive relationship between MD and PERF. The results show that MD is negatively associated with PERF (β = -0.23, p = 0.005). This suggests that as MD increases the supplier's performance in terms of gross margin, sales revenues, and sales growth decreases rather than increases. Thus, H4b is not supported.

Figure 2: Structural Model



Chi-square = 481.201/ d.f. = 345, CFI = 0.93, NNFI = 0.92, RMSEA = 0.042, Standardized RMR = 0.093
Standardized estimates are reported with * p < 0.05, ** p < 0.01, *** p < 0.001 (one-tailed)

In H5a and H5b, we expected INF and JD to be positively associated with PERF. The results show that INF has a strong positive significant association with PERF ($\beta = 0.34$, $p = 0.000$) while JD has no significant association with PERF ($\beta = 0.01$, $p = 0.45$). Thus, H5a is supported while H5b is not.

In addition, we included six control variables in the model (i.e., industry membership, firm size, holding status, market uncertainty, the length of a relationship, and the percentage of sales accounted by a customer). The results suggest a positive association between MD and the length of a relationship. This indicates that the longer a relationship lasts, the more the parties become dependent on each other. The results also show that INF is positively associated with market uncertainty while JD is positively associated with market uncertainty and the size of the supplier firm. The positive association of INF and JD with market uncertainty suggests that as

markets become more unpredictable, the parties tend to develop closer relationships through expanded information and more joint decisions. The positive association between JD and the size of a firm suggests that the larger the supplier firm, the more it is involved with customers in joint decision-making. Other control variables were not statistically significant.

Discussion: The main purpose of this study is to understand what a supplier firm can do to maintain or enhance the financial gains derived from exchanges with its customers. Firstly, we investigated whether and how a supplier's choices and implementation of capabilities associated with operations strategy affect its power-dependence relation with a customer. It is often believed that excellence in any capability area will enhance the value of the supplier's products or services to a customer and, in turn, increase the customer's dependence on the supplier due to high switching costs. Unlike the conventional belief in the virtue of operational capabilities of any kind, our findings suggest that not all supplier capabilities have a favorable impact on the power-dependence relation with a customer. Instead, we found that there exist differential effects among the capabilities.

Contrary to expectations, for instance, *cost efficiency* tends to increase rather than reduce a supplier's power imbalance. This is probably because *cost efficiency* is mainly achieved through internal practices, such as lean manufacturing and value stream mapping, without requiring a customer's involvement or investment in TSAs. The customer can benefit from the supplier's improved *cost efficiency* without increasing its dependence on the supplier. Given any level of the supplier's dependence on the customer, the customer's lower dependence on the supplier would increase the supplier's power imbalance. On the other hand, *flexible responsiveness* and *innovative product design* are likely to reduce a supplier's power imbalance by increasing a customer's dependence either because there are fewer suppliers who can deliver in these regards and/or because these capabilities require the customer's investment in TSAs to some extent. Although both capabilities increase a customer's dependence, our findings show that *innovative product design* alone promotes mutual dependence while *flexible responsiveness* has no impact. This might be because a supplier achieves *flexible responsiveness* mainly through the internal training of engineers and production workers, a skill investment whose impact can readily transfer outside a specific relationship while making a customer more dependent on the enhanced capabilities. On the other hand, a supplier achieves *innovative product design* through the practices such as DOE, QFD and FMEA. These practices require the involvement of a supplier and a customer, and cannot easily transfer outside a specific relationship. Thus, *innovative product design* increases mutual dependence while *flexible responsiveness* does not.

Secondly, we investigated whether and how power-dependence is related to the suppliers' profitability from the relationship. Surprisingly, our findings indicate that *mutual dependence* hurts a supplier's profitability while *power imbalance* has no impact. Thirdly, we investigated whether and how power-dependence is related to the supplier-customer relationships. Our findings suggest that mutual dependence leads to a close relationship through information sharing and joint decisions while a supplier's power imbalance impedes joint decision-making.

Lastly, we investigated whether getting closer to the customers is beneficial for suppliers. Our findings show that expanded information sharing improves a supplier's financial outcomes from a customer relationship in terms of meeting its goals for gross margin, sales revenues and sales growth, while joint decision-making has no impact. Thus, our findings suggest that a supplier can benefit from a customer relationship through expanded information sharing that can help a supplier create value for both its customer and itself.

Contributions: The theoretical contributions of our study are three-fold. First, we proposed a conceptual framework that integrates a supplier's operations strategy, the supplier-customer power-dependency, the supplier-customer relationship closeness, and the supplier's financial performance from the relationship. In this framework, we introduced operations strategy – viewed as a group of capabilities developed by the supplier – as a mean to improve the supplier's stance in the power-dependence relation with a customer. To the best of our knowledge, our study is the first inter-disciplinary attempt to investigate the interrelations between operations strategy and power-dependence between suppliers and customers. Second, our study fills a gap in the supply chain literature by studying supplier-manufacturer relationships *from the suppliers' perspective*. This begins by mapping out the critical elements of a relationship with a customer as seen by the supplier: the power-dependence structure (i.e., mutual dependence and power imbalance), cooperation as a measure of the relationship closeness (as evidenced by joint decision-making and information sharing), and the supplier's financial performance from the relationship (the supplier's goal achievement with respect to sales revenues, sales growth, and gross margin). Our findings *from the suppliers' perspective* show the importance of power-dependence in the supplier-manufacturer relationships and the different behaviors of customers and suppliers depending on their role. Third, the study assessed whether there are economic benefits accruing to suppliers from "close" supplier-manufacturer relationships. There is documented evidence that *customer firms* benefit from close relationships with suppliers through reduced costs and increased revenues (Noordewier et al. 1990; Cannon and Homburg 2001), but the benefits of close relationships accruing to *supplier firms* are not adequately documented in the literature. Our study contributes to this void.

Acknowledgement: This study is supported in part by *Institute of the Study of Business Markets (ISBM) Research Grant* from the Pennsylvania State University, and the *Graduate School Research Grant* from the University of Wisconsin-Madison.

REFERENCES

Anonymous, Survey: Partners in Wealth, *The Economist,* 2006, pp. 18.
Anderson, James C. and David W. Gerbing, "Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach", *Psychological Bulletin*, 103:3, 1988, pp. 411-423.
Bensaou, M. and Erin Anderson, "Buyer-Supplier Relations in Industrial Markets: When Do Buyers Risk Making Idiosyncratic Investments?", *Organization Science*, 10:4, 1999, pp. 460-481.
Bollen, Kenneth A., *Structural Equations with Latent Variables*, John Wiley & Sons, Inc., Hoboken, NJ, 1989.
Boyer, Kenneth K. and Marianne W. Lewis, "Competitive Priorities: Investigating the Need for Trade-Offs in Operations Strategy", *Production and Operations Management*, 11:1, 2002, pp. 9-20.
Buchanan, Lauranne, "Vertical Trade Relationships: The Role of Dependence and Symmetry in Attaining Organizational Goals", *Journal of Marketing Research*, 29:1, 1992, pp. 65-75.
Bunkley, Nick, "When Ford Pushed, A Supplier Pushed Back", in *New York Times*, 2006, C.4.
Cannon, Joseph P. and Christian Homburg, "Buyers-Supplier Relationships and Customer Firm Costs", *Journal of Marketing*, 65:1, 2001, pp. 29-43.
Casciaro, Tiziana and Mikolaj Jan Piskorski, "Power Imbalance, Mutual Dependence, and Constraint Absorption: A Closer Look at Resource Dependence Theory", *Administrative Science Quarterly*, 50:2, 2005, pp. 167-199.
Cole, Robert E., "From Continuous Improvement to Continuous Innovation", *Quality Management Journal*, 8:4, 2001, pp. 7-21.
Dillman, Don A., *Mail and Internet Surveys: The Tailored Design Method*, 2nd Ed., John Wiley & Sons, Inc., Hoboken, NJ, 2007.
Ferdows, Kasra and Arnoud De Meyer, "Lasting Improvements in Manufacturing Performance: In Search of a New theory", *Journal of Operations Management*, 9:2, 1990, pp. 168-184.
Flynn, Barbara B, E. James Flynn, Susan K. Amundson and Roger G. Schroeder, "Product Development Speed and Quality: A New Set of Synergies?", in *Perspectives In Total Quality*,Michael J. Stahl (ed.), Blackwell Publishers Inc. , Oxford, England, 1999, pp. 245-271.
Fornell, Claes and David F. Larcker, "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error", *Journal of Marketing Research*, 18:1, 1981, pp. 39-50.
Ghosh, Mrinal and George John, "Governance Value Analysis and Marketing Strategy", *Journal of Marketing*, 63:4, 1999, pp. 131-145.
Ghosh, Mrinal and George John, "Strategic Fit in Industrial Alliances: An Empirical Test of Governance Value Analysis", *Journal of Marketing Research*, 42:3, 2005, pp. 346-357.
Groves, Robert M., Jr. Fowler, Floyd J. , Mick P. Couper, James M. Lepkowski, Eleanor Singer and Roger Tourangeau, *Survey Methodology*, John Wiley & Sons., Inc., Hoboken, NJ, 2004.
Gundlach, Gregory T. and Ernest R. Cadotte, "Exchange Interdependence and Interfirm Interaction: Research in a Simulated Channel Setting", *Journal of Marketing Research*, 31:4, 1994, pp. 516-532.
Hair, Jr., Joseph F., William C. Black, Barry J. Babin, Rolph E. Anderson and Ronald L. Tatham, *Multivariate Data Analysis*, 6th Ed., Prentice Hall, Upper Saddle River, NJ, 2006.
Hayes, Robert H., Gary P. Pisano, David M. Upton and Steven C. Wheelwright, *Operations, Strategy, and Technology: Pursuing the Competitive Edge*, Wiley & Sons: Hoboken, NJ, 2005.

Heide, Jan B., "Interorganizational Governance in Marketing Channels", *Journal of Marketing*, 58:1, 1994, pp. 71-85.
Heide, Jan B. and George John, "The Role of Dependence Balancing in Safeguarding Transactions", *Journal of Marketing*, 52:1, 1988, pp. 20-35.
Heide, Jan B. and George John, "Alliances in Industrial Purchasing: The Determinants of Joint Action in Buyer-Supplier Relationships", *Journal of Marketing Research*, 27:1, 1990, pp. 24-36.
Heide, Jan B. and Anne S. Miner, "The Shadow of the Future: Effects of Anticipated Interaction and Frequency of Contact on Buyer-Seller Cooperation", *Academy of Management Journal*, 35:2, 1992, pp. 265-291.
Helm, Sabrina, Ludger Rolfes and Bernd Günter, "Suppliers' Willingness to End Unprofitable Customer Relationships: An Exploratory Investigation in the German Mechanical Engineering Sector", *European Journal of Marketing*, 40:3/4, 2006, pp. 366-383.
Hingley, Martin K., "Power Imbalanced Relationships: Cases from UK Fresh Food Supply", *International Journal of Retail & Distribution Management*, 33:8/9, 2005, pp. 551-569.
Ittner, Christopher D. and David F. Larcker, "The Performance Effects of Process Management Techniques", *Management Science*, 43:4, 1997a, pp. 522-534.
Ittner, Christopher D. and David F. Larcker, "Product Development Cycle Time and Organizational Performance", *Journal of Marketing Research*, 34:1, 1997b, pp. 13-23.
Jap, Sandy D., "Pie-Expansion Efforts: Collaboration Processes in Buyer-Supplier Relationships", *Journal of Marketing Research*, 36:4, 1999, pp. 461-475.
Johnston, David A., David M. McCutcheon, F. Ian Stuart and Hazel Kerwood, "Effects of Supplier Trust on Performance of Cooperative Supplier Relationships", *Journal of Operations Management*, 22:1, 2004, pp. 23-38.
Kalwani, Manohar U. and Narakesari Narayandas, "Long-Term Manufacturer-Supplier Relationships: Do They Pay Off for Supplier Firms?", *Journal of Marketing*, 59:1, 1995, pp. 1-16.
Ketokivi, Mikko and Roger Schroeder, "Manufacturing Practices, Strategic Fit and Performance: A Routine-Based View", *International Journal of Operations & Production Management*, 24:1/2, 2004, pp. 171-191.
Kumar, Nirmalya, Lisa K. Scheer and Jan-Benedict E. M. Steenkamp, "The Effects of Perceived Interdependence on Dealer Attitudes", *Journal of Marketing Research*, 32:3, 1995, pp. 348-356.
Lindell, Michael K. and David J. Whitney, "Accounting for Common Method Variance in Cross-Sectional Research Designs", *Journal of Applied Psychology*, 86:1, 2001, pp. 114-121.
Lyons, Thomas F., A. Richard Krachenberg and Jr. Henke, John W., "Mixed Motive Marriages: What's Next for Buyer-Supplier Relations?", *Sloan Management Review*, 31:3, 1990, pp. 29-36.
Malhotra, Naresh K., Sung S. Kim and Ashutosh Patil, "Common Method Variance in IS Research: A Comparison of Alternative Approaches and a Reanalysis of Past Research", *Management Science*, 52:12, 2006, pp. 1865-1883.
Muthén, Linda K. and Bengt O. Muthén, *Mplus User's Guide*, 5th Edition, Muthén and Muthén, Los Angeles, CA, 2007.
Netemeyer, Richard G., William O. Bearden and Subhash Sharma, *Scaling Procedures: Issues and Applications*, Sage Publications, Inc., Thousand Oaks, CA, 2003.
New, Steve, "Supply Chains: Construction and Legitimation", in *Understanding Supply Chains: Concepts, Critiques & Futures*,Steve New and Roys Westbrook (ed.), Oxford University Press, New York, 2004, pp. 69-108.

Noble, Margaret A., "Manufacturing Strategy: Testing the Cumulative Model in a Multiple Country Context", *Decision Sciences*, 26:5, 1995, pp. 693-721.
Noordewier, Thomas G., George John and John R. Nevin, "Performance Outcomes of Purchasing Arrangements in Industrial Buyer-Vendor Relationships", *Journal of Marketing*, 54:4, 1990, pp. 80-94.
Peng, David Xiaosong, Roger G. Schroeder and Rachna Shah, "Linking Routines to Operations Capabilities: A New Perspective", *Journal of Operations Management*, 26:6, 2008, pp. 730-748.
Pfeffer, Jeffrey and Gerald R. Salancik, *The External Control of Organizations: A Resource Dependence Perspective*, Harper & Row Publishing, NY, 1978.
Piskorski, Mikolaj Jan and Tiziana Casciaro, "When More Power Makes You Worse Off: Turning A Profit In The American Economy", *Social Force*, 85:2, 2006, pp. 1011-1036.
Robinson, John P., Phillip R. Shaver and Lawrence S. Wrightsman, "Criteria for Scale Selection and Evaluation", in *Measures of Personality and Social Psychological Attitudes*,John P. Robinson, Phillip R. Shaver and Lawrence S. Wrightsman (ed.), Academic Press, San Diego, 1991, pp. 1-16.
Velocci, Jr., Anthony L., "Pattern of Broken LTAs Raising Supplier Angst", *Aviation Week & Space Technology*, 1999, pp. 73.
Ward, Peter T. and Rebecca Duray, "Manufacturing Strategy in Context: Environment, Competitive Strategy and Manufacturing Strategy", *Journal of Operations Management*, 18:2, 2000, pp. 123-138.
Wathne, Kenneth H. and Jan B. Heide, "Relationship Governance in a Supply Chain Network", *Journal of Marketing*, 68:1, 2004, pp. 73-89.
Wheelwright, Steven C., "Manufacturing Strategy: Defining the Missing Link", *Strategic Management Journal*, 5:1, 1984, pp. 77-91.
White, Gregory P., "A Meta-Analysis Model of Manufacturing Capabilities", *Journal of Operations Management*, 14:4, 1996, pp. 315-331.
Williamson, Oliver E., *The Mechanisms of Governance*, Oxford University Press, NY, 1996.