Factors Affecting the Level of Trust and Commitment in Supply Chain Relationships

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SUMMARY

Trust is a critical factor fostering commitment among supply chain partners. The presence of trust improves measurably the chance of successful supply chain performance. A lack of trust among supply chain partners often results in inefficient and ineffective performance as the transaction costs (verification, inspections and certifications of their trading partners) mount. Although the literature often mentions a relationship between trust and commitment, there is a lack of empirical testing of such relationship in the supply context. This study attempts to fill the gap between the theoretical argument and empirical testing. Results using a comprehensive survey of supply chain practitioners indicate that a firm's trust in its supply chain partner is highly associated with both sides' specific asset investments (positively) and behavioral uncertainty (negatively). It is also found that information sharing reduces the level of behavioral uncertainty, which, in turn, improves the level of trust. A partner's reputation in the market has a strong positive impact on the trust-building process, whereas a partner's perceived conflict creates a strong negative impact on trust. Finally, the level of commitment is strongly related to the level of trust. Policy implications are discussed.
INTRODUCTION

Successful supply chain performance is based on a high level of trust and a strong commitment among supply chain partners. Effective supply chain planning based on shared information and trust among partners is an essential requirement for successful supply chain management. One study reported that one-third of strategic alliances failed due to a lack of trust among trading partners (Sherman 1992). Information sharing sometimes requires a release of guarded financial, strategic and other operating information to partners who might have been and/or will be competitors, since "effective information sharing is heavily dependent on trust beginning within the firm and ultimately extending to supply chain partners" (Bowersox et al. 2000). It has been argued that "issues of trust and risk can be significantly more important in supply chain relationships, because supply chain relationships often involve a higher degree of interdependency between competitors" (La Londe 2002). If information is available but cannot be shared by the partners, its value degrades exponentially. Morgan and Hunt (1994) argued that "when both commitment and trust - not just one or the other - are present, they produce outcomes that promote efficiency, productivity and effectiveness." It is reported that the biggest stumbling block to success of strategic alliance formation is the lack of trust (Sherman 1992), and subsequently trust is perceived as a cornerstone of the strategic partnership (Spekman 1988). Several studies assert that if supply chain partners share information openly and come to have a long-term perspective on the relationship, they may even attempt to reduce opportunistic behaviors (Ellram and Cooper 1990; Gardner and Cooper 1988).

A lack of trust among trading partners often creates a condition where every transaction has to be scrutinized and verified, thereby increasing the transaction costs to an unacceptably high level. Productivity is lost and efficiency and effectiveness, cornerstones of supply chain goals, will be compromised. Creating value-added activities with such partners becomes almost impossible and the supply chain tools used to improve efficiency, effectiveness and productivity (such as vendor-managed inventory (VMI), cross-docking (CD), and collaborative forecasting, planning and replenishment (CFPR)) eventually become ineffective. Under the less than open-trust conditions, decision makers often spend their time mostly on analyzing their trading partner's credibility, reliability and trustworthiness, rather than optimizing their operations. Although there are studies focusing on the relationship between related variables and the level of trust, there is a lack of empirical studies that examine the relationship between trust and the ultimate facilitator of supply chain success, commitment. This study attempts to bridge the gap in supply chain management.

The objective of this research, therefore, is to study factors affecting the level of trust in supply chain management. Several constructs known to be related to trust in the literature will be explored and tested, such as asset specificity, behavioral uncertainty, information sharing and other constructs in social exchange theory. Finally, this study attempts to explore a relationship between trust and commitment based on Morgan and Hunt's framework. This study proposes that commitment is a key success factor in achieving supply chain integration and trust is a root in fostering such commitment. Although the literature mentions a relationship between trust and commitment (Morgan and Hunt 1994), there is a lack of empirical testing of such relationship in the supply chain management area. This study attempts to test the connection between the theoretical argument and empirical realities.
More specifically, this study attempts to fill the void in the following research areas. First, this study uses a comprehensive set of explanatory variables based on both transaction cost analysis (TCA) and social exchange theory, which have been separately researched (e.g., Joshi and Stump 1999; Morgan and Hunt 1994). Second, this study tests the role of information sharing by modeling its association with behavioral uncertainty, which turns out to be the strongest TCA influencer in supply chain partnerships (Suh and Kwon 2002), and its direct and indirect effect on trust. The final contribution of this study is its managerial implications. Instead of emphasizing mutual faith, moral integrity or only discussing abstract variables, this study focuses on information sharing at the center of the relationships addressing trust and commitment.

RESEARCH FRAMEWORK

Trust

In their attempt to bring trust into the TCA framework, scholars have argued that trust has the important effect of lowering transaction costs. Trust is frequently defined as a willingness to take risk (Johnston-George and Swap 1982; Kee and Knox 1970; Mayer et al. 1995). Trust exists when one party has confidence in an exchange partner's reliability and integrity (Morgan and Hunt 1994).

The outcome of trust, therefore, is the "firm's belief that another company will perform actions that will result in positive outcomes for the firm as well as not take unexpected actions that result in negative outcomes" (Anderson and Narus 1990). Analyzing their field data, Beccerra and Gupta (1999) categorized both key negative consequences of lack of trust and key positive results from high-trust relationships. Pertaining to negative aspects resulting from a lack of trust, they observed the emergence of higher transaction costs and agency costs in low-trust relationships. For instance, a manager's time and energy spent on dealing with low-trust relationships are higher than those spent in dealing with high-trust relationships. In contrast, a partnership with high trust would enjoy open communication and willingness to take risks. People in high-trust relationships are not afraid to share all information and believe in the content of the information received. Furthermore, partners with high-trust relationships are more inclined to take risks than low-trust partners. They also indicated that the overall performance would be enhanced if the problems of distrust were reduced (Beccerra and Gupta 1999).

Commitment

This study borrows the concept of commitment from Morgan and Hunt (1994) who defined commitment as "an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it; that is, the committed party believes the relationship endures indefinitely," and commitment is central to all of the relational exchanges between the firm and its various partners. The above definition has its root in social exchange (Cook and Emerson 1978), marriage (Thompson and Spanier 1983), and organizations (Meyer and Allen 1984). Various works using a similar definition have been explored (Aranya and Ferris 1983; Aven et al. 1993; Baack and Rogers 1993; Bhuian et al. 1996; Colbert and Kwon 2000; Curry et al. 1986; Steers 1977; Zeffane 1994).
The essence of the research framework for this study is that a successful supply chain relationship requires commitment among the supply chain partners, and trust is a critical element to sustain such commitment. Conceptually, this study proposes that the partners' asset specificity will increase the level of trust and information sharing among supply chain partners and by its nature will reduce the level of behavioral uncertainty for the partners. This study postulates that the lower the behavioral uncertainty, the higher the level of trust among supply chain partners. Finally, this study proposes that the level of trust so determined by several constructs discussed above directly influences the level of commitment. Figure 1 summarizes the relationship between various constructs and trust, and trust and commitment.

Factors Affecting the Level of Trust and Commitment in Supply Chain Relationships

**Figure 1**

CONCEPTUAL MODEL

TESTABLE HYPOTHESES

**Asset Specificity**

Asset specificity refers to investments in physical or human assets that are dedicated to a particular business partner and whose redeployment entails considerable switching costs (Erramilli and Rao 1993; Heide 1994). Williamson (1985) defined asset specificity as "durable investments that are undertaken in support of particular transactions, and the opportunity cost of (such) investment is much lower in best alternative uses." This definition depicts a variety of relationship-specific investments, including both specialized physical and human capital, along with intangibles such as R&D and firm-specific knowledge (Shelanski and Klein 1995).

The fact that transaction-specific investments cannot be easily redeployed gives rise to a safeguarding problem, which poses potential costs. Thus, since a firm always tries to minimize transaction costs, the firm's investments in specific assets provide a rationale for distrusting partners in the relationship. In other words, non-redeployable specific asset investments make the
firm behave in a skeptical manner toward the partner, due to the perceived need to safeguard information. This state (the firm's aroused distrust or skepticism) may logically lower the level of trust. Based on this argument, the following hypothesis will be tested:

H1: The respondent firm's specific asset investments (RAS) will be negatively associated with the level of trust in the supply chain partner.

The influence of reciprocal specific asset investments of the supply chain partner on trust is more straightforward.

Although no previous studies were found that directly explain this relationship, one can infer a positive impact of a partner's asset specificity on trust. For example, Weiss and Anderson (1992) argued that a partner's asset specificity reduces dissatisfaction with its trading partners. It is also positively related to commitment for both sides of the partnership (Anderson and Weitz 1992; Heide and John 1990). Finally, it is said that a partner's specific asset investments are positively related to expectations of continuity (Heide and John 1990). Accordingly, the following hypothesis will be tested:

H2: The supply chain partners' specific asset investments (PAS) will increase the level of trust in the partners.

Behavioral Uncertainty (BU)

Behavioral uncertainty is defined as "the inability to predict a partner's behavior or changes in the external environment" (Joshi and Stump 1999). Behavioral uncertainty arises from the difficulties associated with monitoring the performance of transaction partners (Williamson 1985). Thus, behavioral uncertainty creates an evaluation problem as to whether contractual compliance has taken place (Alchian and Demsetz 1972), and subsequently leads to an adaptation problem.

Recent research findings suggest that uncertainty has a large effect on governance (Heide and John 1990; Joshi and Stump 1999; Klien et al. 1990; Masten et al. 1991; Stump 1995; Sutcliffe and Zaheer 1998; Zaheer and Venkatraman 1995). It is expected that behavioral uncertainty created by a supply chain partner will decrease trust of its trading partner since it creates a performance evaluation problem. Therefore, although none of the studies explicitly assesses the relationship between behavioral uncertainty and trust in the trading partner, it seems a reasonable assumption that increasing costs of evaluating the performance of the partner created by behavioral uncertainty may lower the level of trust in the partner.

H3: Behavioral uncertainty perceived in relationships with supply chain partners will decrease the level of trust in other partners.

Information Sharing (IS)

Information sharing has been singled out as the most important factor for successful supply chain management (Bowersox 2000; Handfield et al. 2000; Handfield 2002; La Londe 2002). Uncertainty surrounding the supply chain process has been blamed for many supply chain glitches, ranging from unusually high levels of inventory throughout the supply chain to a shortage of some...
products in other areas, thereby creating supply chain sub-optimizing results. Such supply-and-demand mismatch in the supply chain is often caused by uncertainty and usually brings about a bullwhip effect, which further paralyzes the supply chain process (Lee 1996; 1997). Although there are many factors associated with such a mismatch and subsequent bullwhip effects, uncertainty inherited by the multi-layer decision-making process in the supply chain often unavoidably increases the level of behavioral uncertainty by the partners in the supply chain (Simchi-Levi et al. 2003). Many solutions have been suggested to reduce the degree of uncertainty, including formation of strategic alliances among partners and collaborative planning, forecasting and replenishment (CPFR) to control and manage the flow of information, thereby reducing the variability of information (reducing information distortion). These suggestions, although different to some degree in their core emphasis, have one thing in common: lack of critical information needed to be shared by all supply chain partners to make optimum decisions. A recent study, for example, argued that financial stress experienced by semiconductor industries could have been mitigated if information was shared among the supply chain partners (KPMG Consulting 2002). Linking to Hypothesis 3, where it was stipulated that an increase in behavioral uncertainty (BU) would lower the level of trust, the following hypothesis is tenable.

H4: Information sharing will lower the degree of behavioral uncertainty and indirectly will improve the level of trust among supply chain partners.

Other Social Exchange Variables

Based on social exchange theory in the relationship-building process (Morgan and Hunt 1994), this study stipulates that the following three additional constructs are assumed to have influence in assessing the level of trust among supply chain partners.

1. Perceived Satisfaction (SAT): It is assumed that the level of trust will be enhanced if there is an understanding that partnerships produce mutually satisfactory outcomes that they can share (Batt 2003).

2. Partner's Reputation (PR): If a supply chain partner enjoys a high and credible reputation in a market, it would be construed that the partner is trustworthy in relationships.

3. Perceived Personal Conflict (PPC): If a partner is perceived as having conflict in dealing with the business, it is possible that the trust-building process may suffer from such perceived appearance.

Accordingly, the following three additional sets of hypotheses will be tested:

H5-A: The level of perceived satisfaction with his/her counterpart in the supply chain will directly improve the level of trust with his/her trading partners.

H5-B: There is a positive relationship between a partner's reputation in the market and the level of trust in partners.

H5-C: Perceived conflict with his/her trading partners attenuates the level of trust among trading partners.
Trust and Commitment

Spekman (1988) considered trust so important as to call it "the cornerstone of strategic partnership," because "mistrust breeds mistrust. And as such, would also serve to reduce commitment in the relationship" (McDonald 1981). Morgan and Hunt (1994) called trust a major determinant in relationship commitment. Dyer (1996), for example, even argued that trust is a prerequisite to the successful involvement (commitment) of customers and mutual levels of suppliers in value analysis. However, it should be pointed out that unless trust is translated into actionable commitment, no measurable economic gains would be attained from supply chain management. Accordingly, a framework needs to be developed to link the level of trust and the degree of commitment, commitment that certain actions benefiting both parties will be consummated to improve the overall supply chain performance. Accordingly, this study proposes:

H5-D: There is a positive relationship between the level of trust and the degree of commitment.

RESEARCH METHODS

Sample

Four supply chain practicing organizations were initially identified for their sponsorship of this research: American Production and Inventory Control Society (APICS), American Society of Quality (ASQ), the Council of Logistics Management (CLM) and the Institute for Supply Management (ISM. APICS and ISM have been active in optimizing their operations in supply chain management, building alliances among suppliers (ISM) or instituting optimum inventory management (APICS). CLM has been engaged for many years in encouraging efficient and lean logistics systems within supply chains. Finally, ASQ has been increasingly active in making supply chains more responsive and lean through quality control tools such as the Six Sigma approach.

After several meetings with the leadership of each organization, it was agreed that the president of each organization would write an introductory cover letter of this research to their membership. The cover letter has a logo of the organization to make their membership more familiar with their organization's participation in this research project. Several reminder notes were sent through the Internet mode.

In the survey region, a preliminary review of the membership rosters revealed an average of over 10 percent overlapping memberships. In other words, many members of one organization were also members of other organizations. For example, it is not uncommon to see members of the APICS organization also members of ISM. Accordingly, it is estimated that the total net recipients of this survey would be about 1,800.

Any survey in supply chain management faces a difficult task of routing the instrument to the appropriate person in an organization, since a supply chain encompasses many units within an
organization. Although the cover letter specifically requested to forward the questionnaire to other person(s) within the organization if the recipient was not the appropriate person, it was reported (via personal contact) that many questionnaires were lost/misplaced during the transmittal process. As a result, 177 returns were received out of approximately 1,800 questionnaires (9.8 percent). Of the 177 returns, six returns were deleted due to incomplete information, leaving 171 usable returns for analysis (9.5 percent). Such a seemingly low rate of return is not unusual. For example, Rutner and Gibson (2001) reported in their study on a logistics information systems survey that different survey techniques yielded different rates of return ranging from 3.7 percent with a Mail-Fax survey to 12.6 percent pre-called mail surveys with an average yield rate of 6 percent.

Nevertheless, due to a seemingly low return rate, eight valid returns from a third reminder were used to examine whether the contents of these late returns were significantly (statistically) different from those returns from the first two reminders. The later responses are considered as representative of non-respondents (Amstrong and Overton 1997; Lambert and Harrington 1990; Kannan and Tan 2002). The t-test results of means of descriptive variables and frequency of nominal and/or categorical variables for two groups of returns do not show any statistically significant differences.

**Instrument**

Many researchers have defined trust as concerning the partners' two characteristics: honesty and benevolence (Deutsch 1958; Kumar et al. 1995; Larzelere and Huston 1980; Rempel et al. 1985). In the definition, "trust exists when a firm believes its partner is being honest and benevolent" (Kumar et al. 1995). Therefore, this study used a measure of trust developed by Kumar et al. (1995) consisting of a total of 10 items. Five items assessed the extent to which the partner is honest, truthful and reliable; another five items encapsulated the respondent firm's belief that the partner considers the firm's interests or welfare. The reliability of the measure was high (coefficient alpha = 0.94). Commitment, defined as the desire to continue a relationship because of a positive effect toward the partner (Morgan and Hunt 1994), was measured based on a three-item construct on a reseller performance scale by Kumar et al. (1995). The reliability coefficient is 0.83.

The measure for a partner's asset specificity (PAS) and the respondent firm's asset specificity (RAS) was adapted from Joshi and Stump (1999) and Heide (1994). This measure describes the specific asset investments in resources, procedures and people made by the partner in its partnership with the respondent firm and vice versa. The reliability coefficients for PAS and RAS are 0.67 and 0.70, respectively. Behavioral uncertainty (BU) was adequately indicated by decision-making uncertainty. Adapted from Noordewier et al. (1990), Zaheer and Venkatraman (1995), and Joshi and Stump (1999), the measure for decision-making uncertainty captures the degree of predictability of a partner's behavior for the respondent firm. It measures the predictability of a partner's performance over the next business cycle. The two items were reverse-coded to reflect decision-making uncertainty. The reliability coefficient is 0.67. Information sharing (IS) was measured based on two-item constructs designed especially for this research. The reliability coefficient is 0.88. Commitment (COMM) was measured based on a reseller performance scale by
Kumar et al. (1995). The reliability coefficient is 0.83. On the other hand, perceived personal conflict (PPC) was measured by Kumar et al.'s (1995). It is two-item constructs. The reliability coefficient is 0.75. Perceived satisfaction (SAT) was measured by three-item constructs from Kumar et al. (1992). One item was reversed to make the measurement consistent with the rest. The reliability coefficient is 0.87. Finally, the partner's reputation (PR) was measured based on a three-item measure by Ganesan (1994). One item was reverted to a positive scale to make the measurement consistent with the rest. The reliability coefficient is 0.81.

All questions in the instrument were measured by a seven-point Likert scale from 1 = strongly disagree to 7 = strongly agree. In addition, the questions in the survey were randomly arranged to minimize any response bias. The values in each construct were averaged to yield consistent information (1 through 7) with the measuring scale in the survey instrument.

The descriptive statistics of, and inter-correlation matrix among, independent variables are shown in Table I. Mean values range from 2.92 for perceived personal conflict (PPC) to 5.68 for personal reputation (PR). Frequency distribution of the returns (not shown here but provided upon request) by the responding organizations shows ISM with 32.8 percent, CLM with 31 percent, ASQ with 20.1 percent and APICS with 16.1 percent. When the returns are classified by job titles, nearly 34 percent came from manager levels, followed by directors (20.1 percent), CEO/President/COO (19 percent), supply chain specialists (8 percent), buyers and agents (5.2 percent each) and others (3.4 percent).

Pertinent statistics on various demographic variables are listed in Table II. The length of business with a particular partner ranges from one year to 50 years with a mean of 8.2 years (median = six years). The average "man-days" each partner spends face-to-face is about 97 "man-days" per year (median = 25 days) with a wide variation ranging from one day to 1,800 days. Over 74 percent of their business has been renewed ranging from zero to 100 percent. It appears that not many supply chain partners own stock of their partners; only 1.07 percent of respondents owned the partner's stock.

RESULTS

The OLS regression model was used to test Hypothesis 1 through Hypothesis 6. The model appears to be fairly satisfactory with adjusted R-square (0.756) and F-value (56.5, p < 0.01) and seems to support that the research model fits well into the data. The results from OLS regression are summarized in Table III.

Footnote: F-test on each construct by the demographic variables (due to wide variations of some of the variables such as annual "man-days," sales and length of time that organizations practice supply chain, these three variables were converted into log values in the model) yielded no statistically significant relationship at p < 0.1. Accordingly, no demographic variables were included in an estimating model. It is, however, interesting to note that when a simple independent t-test is performed on all constructs by stock ownership (1 = own stock, 0 = others),
there are no statistically significant differences of mean values except RAS (respondent's asset specificity), where the mean score for both constructs is higher for those who own the partner's stock. It appears that respondents who own the partner's stock pay more attention to the partner's business and become more concerned with the partner's business processes.

Relationship between Economics and Social Exchange Constructs with Trust

Consistent with H1, a respondent firm's asset specificity (RAS) is negatively related to trust in the partner, but the relationship is marginally significant (p < 0.1). It is assumed that the firm's concern about a partner's investment in specific assets is the main route that lowered its trust in partners, given that opportunistic behavior is always possible.

The second hypothesis was also supported. The partner's asset specificity (PAS) has a significantly positive impact on trust (t = 3.475; p < 0.01). The firm might consider transaction-specific assets invested by its partner as a favorable devotion to their relationship, and it may be a rational response to the commitment to raise its trust with the partner.

Behavioral uncertainty (BU), measured by decision-making uncertainty, is negatively associated with trust in a partner as hypothesized (t = -5.202; p < 0.01). Therefore, H3 is supported. The impact of behavioral uncertainty on trust and other subsequent business decisions is becoming more important due to the increasing uncertainty in the ever-changing business environment in the post-modern

Table I
DESCRIPTIVE STATISTICS OF AND INTER-CORRELATION MATRIX AMONG INDEPENDENT VARIABLES PPC 1.0

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>STD</th>
<th>PAS</th>
<th>SAT</th>
<th>IS</th>
<th>PR</th>
<th>RAS</th>
<th>BU</th>
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</thead>
<tbody>
<tr>
<td>PAS</td>
<td>4.62</td>
<td>1.33</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SAT</td>
<td>5.51</td>
<td>1.15</td>
<td>0.426</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>IS</td>
<td>5.00</td>
<td>1.12</td>
<td>0.226</td>
<td>0.222</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR</td>
<td>5.68</td>
<td>0.98</td>
<td>0.435</td>
<td>0.781</td>
<td>0.248</td>
<td>1.0</td>
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</tr>
<tr>
<td>RAS</td>
<td>4.95</td>
<td>1.28</td>
<td>0.452</td>
<td>-0.048</td>
<td>0.340</td>
<td>0.009</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>BU</td>
<td>3.12</td>
<td>1.22</td>
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<td>-0.301</td>
<td>-0.671</td>
<td>- 1.0</td>
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<td>PPC</td>
<td>2.92</td>
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<td>-0.237</td>
<td>-0.735</td>
<td>-0.226</td>
<td>-0.630</td>
<td>0.114</td>
<td>0.53</td>
</tr>
</tbody>
</table>

1 = strongly disagree, 7 = strongly agree

Legend: PAS = Partner's asset specificity; SAT = Satisfaction; IS = Information sharing; PR = Partner's reputation; RAS = Respondent's asset specification; BU = Behavioral uncertainty; PPC = Perceived conflict

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Table II

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Unit</th>
<th>Sample Size</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>STD</th>
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</thead>
<tbody>
<tr>
<td>Years of Business With</td>
<td>year</td>
<td>168</td>
<td>1</td>
<td>50</td>
<td>8.2</td>
<td>6.92</td>
</tr>
<tr>
<td>Annual &quot;Man-Days&quot;</td>
<td>day</td>
<td>156</td>
<td>1</td>
<td>1,800</td>
<td>97.05</td>
<td>223.92</td>
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<tr>
<td>Contract Renewal percent</td>
<td>percent</td>
<td>163</td>
<td>0</td>
<td>100</td>
<td>74.17</td>
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</tr>
<tr>
<td>Stock Ownership percent</td>
<td>percent</td>
<td>168</td>
<td>0</td>
<td>50</td>
<td>1.07</td>
<td>6.32</td>
</tr>
<tr>
<td>Sales $millions</td>
<td>$millions</td>
<td>156</td>
<td>1</td>
<td>53,000</td>
<td>2,290</td>
<td>7,236</td>
</tr>
<tr>
<td>Years of SCM Practice years</td>
<td>years</td>
<td>138</td>
<td>1</td>
<td>20</td>
<td>6.73</td>
<td>4.57</td>
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</table>

* "Man-days" denotes number of days that a firm and its partner firm spent in face-to-face contact during the past year.

world. Continuous, two-way communication should be implemented so as to lower the level of uncertainty in supply chain partnerships.

Information sharing has been cited by many studies (e.g., Bowersox et al. 2000) as the most critical agent in the trust-building process of supply chain implementation. A positive relationship, therefore, is expected. This study seems to confirm such a relationship ($t = 2.438; p < 0.05$). Also, a path analysis was conducted in order to confirm the mediating role of information sharing on behavioral uncertainty, and the degree of relationship between behavioral uncertainty and trust. The result is shown in Figure 2. The path model seems to be acceptable based on several benchmarking statistics. The model appears to indicate that information sharing reduces the degree of uncertainty ($t = -4.146; p < 0.01$), which in turn enhances the level of trust ($t = -14.301; p < 0.01$). Accordingly, H4 is supported.

As expected in HS-A, the level of perceived satisfaction (SAT) has a positive and significant impact on the level of trust ($t = 2.482; p < 0.05$). Any business relationship that results in a sustained degree of satisfaction usually creates an environment where the trust-building process becomes much more conducive. This study seems to support such an argument.

Consistent with HS-A to some degree, this study also shows that the partner's reputation (PR) in business transactions has a significant and positive impact on the level of trust ($t = 3.850; p < 0.05$). This construct (partner's reputation) is an especially critical trust-building agent for those who have had no previous track record with this firm, but base their willingness to do business solely on a partner's recognized reputation in the market. Accordingly, HS-B is supported. Finally, as argued earlier, if the partner perceives a potential conflict with its trading partners, there will be considerable reluctance by the other trading partner to engage in the trust-building process and ultimate relationship. Accordingly, a negative relationship is hypothesized between the degree of perceived conflict (PPC) and the level of trust. This study reveals a statistically significant negative relationship between these two constructs ($t = -2.869; p < 0.01$). Accordingly, HS-C is also supported.
As discussed in the modeling section, this study proposed a linkage of relationship between social and economic constructs with the level of trust, and between the level of trust and the degree of commitment to business partners (Morgan and Hunt 1994). Results from a simple linear regression model are shown in Table IV. There appears to be a positive and significant relationship between the level of trust (independent variable) and the degree of commitment (dependent variable) (t = 7.621; p < 0.01). Accordingly, H-6 is supported.

DISCUSSION

This study appears to confirm a positive and significant relationship between the degree of commitment and the level of trust as hypothesized. Among several constructs impacting the level of trust, the partner firm's specific asset investments directly and significantly affect trust in the partner, while the respondent firm's specific asset investments and their decision-making uncertainty seem to negatively influence trust in the partner in a calculative way. That is, the firm may find some indirect (in the case of BU) or extraneous (in the case of RAS) reason to distrust its partner by the increasing level of the two TCA-related variables, and at the same time, manipulate its trust in the partner in a negative direction.

This study, however, reveals that it is the respondent's unpredictable behavior (negative impact) and the partner's reputation in the market (positive impact) that
Footnote: When the various constructs were regressed directly against commitment, no statistically significant results were revealed for any construct, suggesting the level of commitment to be a function of trust and not directly related to other constructs.

* RMSEA (Root Mean Squared of Estimation Approximation) = 0.041,

CFI (Comparative Fit Index) = 0.998, NFI (Normalized Fit Index) = 0.997, TLI (Tucker br Louis Index) = 0.985

seem to heavily influence the level of trust. These two constructs may provide an avenue where supply chain implementation becomes a challenge rather than a barrier. Continuous and open (honest) communication between and among supply chain partners will minimize, if not eliminate, any degree of uncertainty and/or misunderstandings (Moorman et al. 1993). Frequent communications on important strategic issues pertinent to supply chain performance are not a privilege in the supply chain, rather they are essential requirements in the competitive market (Kannan and Tan 2002). Hartley (2001) argued in a study on collaborative value analysis in the automotive industry that good communication helps to build a trusted partnership.

On the other hand, building a reputation is not a short-run task. It takes time to build a reputation in the market; however, it is not an impossible task. Reputation is based on the perception of partners that other trading partners are honest, they deliver quality products/services, and they keep their word and never second-guess the other's intentions (Maister et al. 2000). Once such agents present these qualities, the supply chain partners will gain a reputation in the market.

It must be pointed out, however, that there is a counterargument for a collaborative approach. For example, Cox (2001) argued that development of mutual trust and collaborative information sharing between supply chain partners (for example, buyers and suppliers) in order to overcome inherited conflicts between these two trading partners may prove problematic. Delaney (2003) even went so far as to say that "collaboration is being overtaught, over-sold and over-published." Nevertheless, well-designed collaborative initiatives such as collaborative planning, forecasting and replenishment (CPFR) are respected approaches to ensuring effective supply chain systems. Processes of supply chain management are inherently uncertain and risky. Risks may often be originated in the interface between the supply chain partners and the respondent firm, in areas such as inter-organizational trust, alignment of organizational cultures, and ineffective communication of potential benefits. In particular, while the facets that reinforce the difficulty of implementing successful supply chain management may be multifaceted, one of the biggest challenges is cultivating mutual trust (Bowersox et al. 2000). For instance, supply chain members may be reluctant to share information on costs and processes, and the need to release sensitive and confidential information may compound this hesitation. Ambiguous or intimidating legal issues and ineffective lines of communication also may inhibit the trust-building process necessary for a successful supplier development effort and ultimate commitment. Initiating and implementing supply chain trust is not an easy job. There are many pitfalls on the way. Thus, success will take time and is only achieved by transparent relationships.

<table>
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<th>Hypothesis Statement</th>
<th>Legend Coefficient</th>
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<td>Table IV</td>
<td>REGRESSION RESULTS BETWEEN TRUST AND COMMITMENT</td>
</tr>
<tr>
<td>Regression</td>
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</tbody>
</table>

Hypothesis Statement Legend Coefficient
H6 Positive relationship between Trust and Commitment

\[
\text{Constant value} = 2.456
\]

*** \( p < 0.01 \)

based on trust and commitment between the participants (Handfield et al. 2000). For implementing trust in supply chain management, many conditions affecting the level of trust using various perspectives have yet to be found and tested.

**IMPLICATIONS FOR SUPPLY PRACTICE**

Several implications for implementing trust-building blocks result from this study. It has been actively argued among supply chain strategists that collaborative efforts among trading partners may be the best way to minimize uncertainty and enhance the degree of trust. Simple information sharing may not be enough to overcome barriers and suspicion inherent in the information-sharing process. It is posited that enjoyment of the full benefits of supply chain collaboration (efficiency, effectiveness and profit sharing) requires each partner to willingly provide, within the collaborative framework, critical information needed for effective management of the supply chain. This information may include, but not be limited to, operational data (utilization rate, productivity goals, production and distribution systems), financial data (activity costs, cost of goods sold per unit, return on capital, carrier cost-and-profit structure), forecasting data (volume, product and market strategy), and supply chain data (cost and value-added propositions) (Henderson 2002).

From a practical perspective, research has shown that regardless of the many positive theoretical research outcomes from supply chain integration, only 2 percent of those who claim practicing supply chain integration reported any appreciable supply chain success (Moberg et al. 2003). To foster the level of trust among supply chain partners, it is important to develop a new breed of decision makers whose visions are more toward enterprise optimization than functional outcomes. Senior decision makers in an organization must take ownership of the concepts of supply chain management in order for other managers/decision makers to follow their lead. One recent research study revealed that those leading companies whose senior executives view the supply chain as a critical driver of shareholder value and competitive differentiation have superior supply chain performance and financial success (D'Avanzo et al. 2003). Curricula in business schools need to be changed from traditional functional disciplines toward an integrated and strategic-oriented curriculum to satisfy the needs of a new breed of decision makers.

```
t-value 7.621 *** Dependent variable = Commitment Adjusted R-square = 0.254
```

Supply chain management requires knowledge of relationship-building skills. Supply chain integration is often regarded as a long-term strategic process and relationship management is one critical skill needed for the new breed of decision makers. Research is abundant indicating relationship management skill as a critical element for increasing the likelihood that supply chain management initiatives will be successfully implemented. For example, a recent study of companies in the United Kingdom found that 55 percent of all strategic partnerships fail within three years (Moberg et al. 2003). One way to build relationship management skills is through
intensive training and education of existing decision makers. Top management must recognize that this skill is an essential requirement for successful supply chain implementation.

Finally, the academic community should pay more attention to practical and empirical research connecting supply chain management theory to the results of supply chain implementation. Although recently, several groundbreaking research works addressed the value of supply chain implementation (e.g., D'Avanzo et al. 2003), more are needed to convince decision makers that supply chain implementation improves their operational performance. Failure in connecting these two areas may perpetuate skepticism that many practitioners may have in questioning the value and validity of supply chain management concepts.

STUDY LIMITATIONS

An initial limitation that should be noted is that information sharing and asset specificity could be used as tools in enhancing the level of trust. In other words, those factors have a circular relationship with trust. In future studies, a complete research model that adequately explains the circular relationship between trust and asset specificity should be presented and tested. Trust can be both the antecedent to and the consequence of asset specificity. The current data, however, only deals with the opposite case when trust is affected by specific asset investment from each side, which is an additional limitation of this study. Trust is an ever-changing phenomenon, constantly affecting and being affected by most activities in economic transactions. Therefore, a research model with panel data that can span a series of interactions regarding trust is indeed required for a more complete understanding of trust in supply chain partnerships.

REFERENCES


Appendix

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure Items</th>
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</thead>
<tbody>
<tr>
<td>Trust</td>
<td>Though circumstances change, we believe that the partner will be ready and us assistance and support. When making important decisions, the partner is concerned about our welfare. When we share our problems with the partner, we know that it will respond understanding. In the future, we can count on the partner to consider how its decisions and</td>
</tr>
</tbody>
</table>
When it comes to things that are important to us, we can depend on the partner's
Even when the partner gives us a rather unlikely explanation, we are confident
telling the truth.
The partner has often provided us information that has later proven to be
The partner usually keeps the promises that it makes to our firm.
Whenever the partner gives us advice on our business operations, we know
best judgment.
Our organization can count on the partner to be sincere.

<table>
<thead>
<tr>
<th>Commitment</th>
<th>PAS</th>
<th>RAS</th>
<th>BU</th>
<th>SAT</th>
<th>IS</th>
<th>PR</th>
<th>PPC</th>
</tr>
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<tbody>
<tr>
<td>Even if we could, we would not drop the partner because we like being</td>
<td>This partner firm has made significant investments in resources dedicated to its</td>
<td>We have made significant investments in resources dedicated to our</td>
<td>We know that this partner will adapt quickly, should we have to change our</td>
<td>We are very pleased with our working relationship with the partner.</td>
<td>We share a common information technology (software) to facilitate</td>
<td>This partner firm has a good reputation in the market.</td>
<td>A high degree of conflict exists between the partner and our firm.</td>
</tr>
<tr>
<td>Our positive feelings towards the partner are a major reason we continue</td>
<td>with us.</td>
<td>Our operating process has been tailored to meet the</td>
<td>short notice. We can accurately predict the performance of this partner for our next</td>
<td>Generally, we are very satisfied with our overall relationship with this partner.</td>
<td>Information sharing on important issues has become a critical element to</td>
<td>This partner firm has a reputation for being honest.</td>
<td>The partner and our firm have major disagreements on certain key issues.</td>
</tr>
<tr>
<td></td>
<td>This partner firm's operating process has been tailored to meet the organization.</td>
<td>Training our people has involved substantial commitments of time and money partner.</td>
<td></td>
<td>The relationship of our firm with the partner firm has been an unhappy one</td>
<td></td>
<td>This partner firm has a bad reputation in the market (reversed).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training and qualifying this partner has involved substantial commitments of money.</td>
<td></td>
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</tbody>
</table>

Legend: PAS = Partner's asset specificity; SAT = Satisfaction; IS = Information sharing; PR = Partner's reputation; RAS = Respondent's asset specification; BU = Behavioral uncertainty; PPC = Perceived conflict