

**ANTECEDENTS AND PERFORMANCE OUTCOME OF
INTER-ORGANIZATIONAL TRUST: EVIDENCE FROM GERMAN SMEs**

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Abstract

We investigate the effect of exchange partner top management team (TMT) competence, knowledge intensity, and environmental uncertainty on interorganizational trust and subsequent performance of SMEs, using an integration of the upper echelons literature with the transaction cost literature. We propose that partner TMT competence and production process knowledge intensity will have a positive relationship while environmental uncertainty will have a negative relationship with interorganizational trust, in an exchange relationship. Further, we propose a negative relationship between environmental uncertainty and SME performance, and a positive relationship between interorganizational trust and SME performance. Empirical evidence, based on the survey data of 854 firms supports our arguments.

Key Words

Trust, Top Management Teams, Environmental uncertainty, SMEs, Performance, Germany

INTRODUCTION

Firms depend on other firms for intangible resources and unique technological capabilities in niche areas (Stuart, 2000; Takeishi, 2001). Such inter-organizational collaborations often involve high relation specific investments and are prone to hazards such as uncertainty about future exigencies (Bensaou and Anderson, 1999; Carson et al., 2003; Dyer, 1997). The uncertainties associated with inter-organizational collaborations require that firms rely on formal dispute settlement mechanism (Birnbirg, 1998; Poppo and Zenger, 2002). However, formal enforcement mechanisms have several limitations and may even signal distrust and encourage (rather than discourage) opportunistic behavior (Dyer and Chu, 2003). Because of the limitations of formal enforcement, organizational scholars have suggested that informal mechanisms such as trust are necessary for smooth functioning of organizations (Arrow, 1974).

Inter-organizational trust is the degree to which the trustor holds a positive attitude toward the trustee's goodwill and reliability in a risky exchange relationship (Ring and Van de Ven, 1992). Trust has been found to affect the performance of the interorganizational relationships, by fostering cooperative behavior (Robson, Katsikeas and Bello, 2008), reducing transactions costs through superior information sharing (Zaheer, McEvily and Perrone, 1998), and thereby enhancing alliance performance (Mohr and Spekman, 1994). In addition, mutual trust between partner organizations has been found to have a positive impact on the ability of partners to adjust to changing environmental demands or unintended problems that might arise (Young-Ybarra and Wiersema, 1999).

The literature exploring the antecedents of interorganizational trust focuses only on the dyadic characteristics such as frequency and length of past relationships (Dyer and Chu, 2000, Gulati and Singh 1998), familiarity and relationship history (Gulati, 1995), expectation of

reciprocity (Gulati, Khanna, and Nohria, 1994), and information sharing (Aulakh, Kotabe and Sahay, 1996). The dyadic view on the antecedents of interorganizational trust precludes factors that are extraneous to the dyad, but may have an impact on trust. This is an important limitation of the extant literature, given that organizations do not survive in dyadic relationships, but in a broader institutional and technological environment. Consequently, scholars need to examine the role played by institutional and transactional characteristics in the development of interorganizational trust. Although trust has been repeatedly proved to be as a positive influence on alliance performance (Krishnan et al., 2006), the relationship between interorganizational trust and firm performance is not well established in literature. While some other studies did find a positive link between trust and organizational level outcomes such as reduction in transaction costs (Dyer and Chu, 2003) and sales (Mohr and Spekman, 1994), there are very few studies testing the direct link between interorganizational trust and firm performance. In other words, while the extant literature tells us that trust in dyadic relationships enhances the outcomes at the dyadic level, the literature is silent on how the overall level of trust an organization has in its partners, affects its performance.

We attend to these two issues in this paper. We go beyond existing works by integrating the upper echelons theory with the transaction cost economics to suggest that the development of inter-partner trust as well as its performance consequences is dependent on the institutional characteristics, transaction characteristics and the top management team (TMT). In doing so, we move away from a purely dyadic view on trust, to incorporate the role of external influences on trust. Specifically, we argue that the level of trust an organization has on its partners depends on the TMT competence of the partner, knowledge intensity of the transaction, and level of environmental uncertainty. Further we expect a positive linkage between interorganizational

trust and organizational performance. Such an approach builds on the existing literature and offers a new perspective to previous findings.

We test our arguments using a sample of 854 German small and medium sized enterprises (SMEs). We collected this information through two extensive surveys of SMEs operating in Germany, conducted in 2003 and 2007. We utilize a structural equation modeling framework to test our theoretical model. Our analysis shows that exchange partner TMT competence and production process knowledge intensity have a positive relationship while environmental uncertainty has a negative relationship with interorganizational trust. Further, we find a negative relationship between environmental uncertainty and SME performance, and a positive relationship between interorganizational trust and SME performance.

THEORY AND HYPOTHESES

Business Partner TMT Competence and Trust

The upper echelons research suggests that the experience, knowledge, insight, and the extensiveness of perspective provided by a TMT is positively related to firm performance (e.g., Hambrick and Mason, 1984; Kilduff et al., 2000). Based on Kor (2003), a business partner's TMT competence refers to the degree to which business partner TMT's reputation, technical skills, and experience is perceived favorably by the focal firm. Hambrick and Mason (1984) contended that TMTs may serve as reflections of their organizations; firms with high quality TMT should enjoy higher reputation and performance than firms with lower quality TMT. A favorable perception of a firm's TMT may help that firm to attract business and alliance partners. For instance, Zimmerman, (2008) found that firms can raise more capital through initial public offerings when their TMTs are perceived favorably by the market. Relatedly, Heide and John (1990) observed that firms often assess their suppliers and other business partners to *ex ante*

selection and verification in the form of accreditation programs to evaluate their competence. A positive assessment creates a sense of confidence in the focal firm which is an important precursor of inter-firm trust (Zucker, 1986).

Studies based on signaling theory contend that favorable signals made by a firm may actually reduce information asymmetry and subjective uncertainty of outside actors regarding the productivity and viability of the organization (Spence, 1974). A firm may present its management team's characteristics as signals that the firm is structured for high performance, and investors use those signals in making their investment decisions (Certo, 2003; Lester et al., 2006). Such signals can include evidence of the TMT's ability to manage the firm and also the ability of its top executives in converting firms' resources into rent generating capabilities.

Based on the work of Certo (2003) and Lester et al. (2006) we suggest that a specific aspect of the firm that may provide a valuable signal to business partners about its future prospects and value, is the competence of its TMT, defined in terms of its reputation, experience, technical understanding and skills. At the organizational level, scholars agree that more reputable firms generally attract superior quality applicants (Rynes and Barber, 1990). In other words, in the context of an interorganizational relationship, a business partner's TMTs reputation, skills, and experience may help alleviate uncertainties regarding the future cooperative behavior of the firm as the focal firm perceives the other firm competent enough to add value to the relationship. In addition, a competent TMT of a business partner signals that unfair exploitation will not occur, which, in turn may inspire the focal firm to engage in collaborative relationship as a way to reciprocate in a positive manner.

In the face of an uncertain environment the partner organizations have to count heavily on the information they accumulate from third party sources. A positive perception of business

partner's reputation, experience and ability with regard to technical understandings and skills may be viewed positively by the focal organization while reviewing the 'trustworthiness' of its business partner (Mayer et al., 1995). Previous research has shown that there is tremendous uncertainty surrounding strategic alliances (Zaheer et al., 1998). As such, partner competence is a desirable feature of any alliance relationship and is expected to reduce the level of potential and actual opportunism within an alliance. Thus, focal firm's faith in the competence of an exchange partner is likely to form a trust based partnership. When partner top management reputation, skills, and experience are perceived favorably, the focal firm will likely respond by increasing cooperation, making the contract less complex, and by feeling less threatened (e.g., Masterson et al., 2000). Indeed, prior research shows that a positive attribute such as TMT prestige is positively related to firm performance (e.g., Cohen-Charash and Spector 2001). However, when top management is perceived less favorably, conflicts may arise that can affect future actions by making the partner firm more apprehensive, cautious, and less cooperative. Accordingly we hypothesize:

***Hypothesis 1:** Partner TMT competence is positively related to inter-organizational trust.*

Knowledge Intensity and Trust

Knowledge refers to a fluid mix of framed experience, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information (Davenport and Prusak, 1998). It is widely accepted in the management literature that knowledge is the most strategically-significant resource that firms can possess (Grant, 1996). Knowledge helps in the creation of new value, is the source of firm heterogeneity, and competitive advantage (Barney, 1991; Grant, 1996; Kogut and Zander, 1992). Since SMEs are often resource constrained, their acquisition of appropriate knowledge from external sources is fundamental to

their survival and success. *Knowledge intensity* for the purpose of this paper refers to the extent to which the production process of the focal firm involves specialized and unique knowledge or technology that may render competitive advantage to the firm (Autio, Sapienza and Almeida, 2000; Subramani and Venkatraman, 2003; Subramani 2004).

Knowledge intensity arises from the development of production process specific routines and operating procedures that are pertinent to efficient and effective production of outputs. In the automotive and other technology oriented manufacturing industries, firms rely on suppliers, competitors and other business partners for valuable external knowledge (Langfield-Smith and Greenwood, 1998). Organizational scholars have suggested that the extent to which a firm is dependent on another firm influences the nature of interorganizational relationships (Pfeffer and Salancik, 1978; Williamson, 1975). Thus, a focal firm which depends on highly specialized and unique knowledge for its production process may be dependent on other supplier or other partner firms. When both partners are highly dependent on each other, it may become difficult for firms to replace one another, which may create a 'lock-in' effect (Nooteboom et al., 1997). Such interdependence "exists whenever one actor does not entirely control all of the conditions necessary for the achievement of an action or for obtaining the outcome desired from the action"(Pfeffer and Salancik, 1978: 40). In the context of automotive industries, Bensaou and Anderson (1999, p 460) describe it succinctly:

"An automobile manufacturer is contemplating deepening its relationship with a supplier of electronic dashboard subassemblies. The automaker wants to capitalize on the supplier's know-how, which is the fruit of years of making electronic dashboard subassemblies, and nothing else, on a huge scale for a variety of cars. Acknowledging its inability to duplicate the supplier's deep specialization, the automaker aims to harness that know-how by inducing the supplier to develop differentiated dashboards which will work with and enhance the automaker's models. Doing so will involve a great deal of cooperative effort, including sharing information, trade secrets, and designs. Ultimately, it will involve accepting the supplier's designs and building them into the cars. Along

the way, useful human relationships will form between buyer and supplier personnel”.

Research has found that interdependence between organizations may encourage trust and cooperative behavior because of the mutuality of interests (Langfield-Smith and Greenwood, 1998). In an exchange, when the parties are highly dependent on each other, they have a motivation to make the relationship work (Ring and Van de Ven, 1994). The parties concerned are likely to interact more and build a shared understanding with regard to obligations and outcomes and of the utility of a mutually beneficial behavior (Gulati and Sytch, 2007; Lawler et al., 2000) that can create value for both parties in the long term. Indeed, transaction cost economics and game theory suggest that specificity of an asset (knowledge in this case) may well create a lock-in effect for alliance partners (Anderson and Weitz, 1992) which in turn, changes the pay-off structure thereby discouraging opportunistic behavior (Lui and Ngo, 2005; Parkhe, 1993).

Social exchange theory also posits that parties make relationship specific investments in each other to prove that they are trustworthy and to initiate a reciprocal exchange process (Blau, 1964). Thus, the importance of interorganizational trust stems from the interdependence of cooperating partners. Such cooperative actions are driven by mutual value creation motive - generally based on a belief that a certain outcome will result from the action (Vroom, 1964). Empirically, Kumar et al. (1998) observed that with increasing interdependence the punitive actions of automobile dealers on their suppliers are inhibited. In the same vein, Nesheim (2001) explored interorganizational relationships in a sample of 150 Norwegian manufacturing firms and suggested that focal firms' often use external suppliers for their knowledge intensive core services. The level of specific assets associated with their core services is significantly correlated with the level of inter-firm trust. Similarly, Lui, Wong, and Liu (2009), in their analysis of Hong

Kong trading firms and their Chinese suppliers, found that greater asset specificity and increased interdependence enhance the trust between partners, which in turn leads to more cooperative behavior and higher partnership performance. This leads to the following hypothesis:

***Hypothesis 2:** Knowledge intensity is positively related to inter-organizational trust.*

Environmental Uncertainty and Trust

Uncertainty refers to “the difference between the amount of information required to perform the task and the amount of information already possessed by the organization” (Galbraith, 1973: 5). *Environmental uncertainty* may result from changes in the external environmental conditions faced by an organization that are beyond its control and difficult to anticipate (Dess and Beard, 1984), such as volatility or unpredictability in markets (Aldrich, 1979). It is widely argued that perceived environmental uncertainty exerts significant influence on organizational processes (Walker and Weber, 1987; Sutcliffe and Zaheer, 1998). Duncan (1972) suggested that external environmental influences can be divided into environmental dynamism and environmental complexity. Environmental complexity refers to the variety of external forces with which the organization should interact, whereas environmental dynamism refers to the rate of change in the environment and the unpredictability of environmental changes.

Past empirical research on the effects of environmental uncertainty on firm governance structure has found that uncertainty has a positive effect on vertical integration (e.g., Walker and Weber, 1987), and thus, in turn a negative effect on market-based transactions. Williamson (1975, 1985), following Herbert Simon’s concept, pointed out that uncertainty is created from “bounded rationality”. In simple words, a rational actor cannot foresee all the possible contingencies at a given point of time which gives rise to uncertainty. Williamson argues that when these contingencies become numerous, they exceed the data processing capabilities of the

concerned party. Under these circumstances, “the complete decision tree simply cannot be generated” (Williamson, 1975). Pilling, Crosby and Jackson (1994) indicated that environmental uncertainty increases the *ex ante* costs of developing an exchange relationship. Consequently, market governance is not preferred by the focal firm thereby decreasing the likelihood of outsourcing. These findings imply that under uncertain circumstances a focal firm often opts for internalization as opposed to externalization in order to avoid potential opportunistic behavior from its external suppliers. In other words, the existing theoretical and empirical research suggests that environmental uncertainty increases perceived potential of opportunistic behavior among the exchange parties, which, in turn, may become an important impediment to interorganizational trust.

On the empirical front, we find evidence supporting the argument that increased external uncertainty may hinder trust building mechanisms. For instance, it has been found that when uncertainty is high firms prepare detailed and more complex contracts for the sake of easy monitoring and future adjustments (Barthelemy and Quelin, 2006), which can potentially threaten interpartner trust. Relatedly, Joshi and Stump (1999) empirically showed that manufacturers facing an uncertain environment are less likely to have a long term trust-based orientation toward its supplier. Such environmental uncertainty is particularly salient in the technology-oriented manufacturing sector (such as automotive industry) considering the high rate of technology change and time pressure involved (Atuahene-Gima and Li, 2004). In highly uncertain environments, firms may encounter increased difficulty in collecting information about their business partners’ attributes such as trustworthiness. These theoretical and empirical findings suggest that the focal firm, in the face of an uncertain environment may be apprehensive about the eventuality to develop interorganizational trust with its business partners and suppliers

as trust involves willingness to take additional risks and increased vulnerability (Krishnan et al., 2006; Mayer et al., 1995) which may not be possible under uncertain market conditions. Based on this discourse, we predict the following:

***Hypothesis 3:** Environmental uncertainty is negatively related to inter-organizational trust.*

Environmental Uncertainty and Performance

Environmental uncertainty is often conceptualized as a multidimensional construct which refers to the unpredictability of environment or the inability to anticipate changes in the external environment (David and Han, 2004). Scholars have shown that uncertainty for a firm increases with the increase in competition (Poppo and Zenger, 2002), changing consumer preferences, changing technology (David and Han, 2004), and with the fluctuation in market demands (Voss and Voss, 2000). Such changes often force firms to alter their strategic postures (Aldrich, 1979) and result in a high information processing demand for effective decision making (Dess and Beard, 1984; Pfeffer and Salancik, 1978).

A highly uncertain environment may pose additional challenges for SMEs as these firms do not just face external pressures, but are also confronted with a shortage of resources to counter external pressures (Jarillo, 1989). In the presence of high environmental uncertainty, managers suffer from greater information processing burdens, and find it difficult to assess future market trends and requirements to remain competitive in the market place (Milliken, 1987). For instance, Ghauri et al. (2003) suggest that in periods of increased environmental uncertainty SMEs find it more difficult to access market information, which affects their performance negatively. In addition, in an intensely competitive market, customers have a range of alternatives to satisfy their needs (Jaworski and Kohli, 1993) which exerts additional pressures on the SMEs to supply uniquely differentiated products. In such markets it is also difficult to

predict competitors' action which, in turn, adds to greater uncertainty.

Similarly, technological uncertainty arises from high rates of technical change, increases in product complexity, and risks of obsolescence (Quinn and Hilmer, 1994) all of which apply similar pressure on the SMEs to stay afloat. Even though some firms develop organizational structures and routines to cope up with environmental uncertainty stable environments are easier for firms of any type of structure and strategy to navigate (Keats and Hitt, 1988). When firms are uncertain due to changing market demands, industry-level technology trajectories and standards, and the general competitive climate, they may find it increasingly difficult to make efficient and effective strategic choices and may face strategic inertia. In an unpredictable environment, the subsequent effect of such inertia may be detrimental for firms. Thus we expect SMEs that experience a higher level of environmental uncertainty will perform worse. When stated formally, we hypothesize:

***Hypothesis 4:** Environmental uncertainty will be negatively related to firm performance.*

Trust and Firm Performance

The general arguments in favor of trust assert that it allows for greater flexibility in responding to changing environmental conditions, facilitates investments in transaction or relation-specific assets that enhance productivity, and reduces transaction costs associated with costly monitoring and other formal safeguarding mechanisms (Dyer and Chu, 2003; Nooteboom et al., 1997). In terms of enhanced exchange value, trust mobilizes parties to be more productive by sharing knowledge and committing to collective efforts (McEvily et al. 2003). More broadly, McEvily et al. (2003) suggest that trust mobilizes exchange partners to pursue relational governance mechanisms that in turn improve business performance. By enabling relational governance, trust motivates actors to collaborate fully, integrating activities in a way that effectively coordinates

the task and resource interdependencies associated with an economic exchange relationship.

The above arguments suggest that interorganizational trust may enhance focal firm performance in two ways. First, trust provides the assurance against potential opportunistic and hazardous behavior from the partner. Such assurance greatly reduces the need for costly and formal safeguarding mechanisms such as complex contracts and close monitoring (Dyer and Singh, 1998; Larson, 1992). Second, in a trust-based relationship, exchange partners are likely to engage in extensive communication and novel information sharing on an informal basis which helps in co-value creation via greater cooperation (Kedia and Mukherjee, 2009; Wu, 2008). In the case of SMEs, focal firm's trust on its business partners may have even more prominent effect on its subsequent performance. SMEs are often embedded in a network of interdependent firms in a given sector. Participation in such inter-firm networks can offer small firms with access to a larger pool of resources and knowledge, helping them to surmount disadvantages associated with their relatively smaller size (Maillat, 1995). Trust makes it easier for such firms to interact effectively and exchange crucial information and resources.

A partnership based on mutual trust and commitment may also increase organizational learning while making the optimal or most efficient use of associated resources (Perez-Nordtvedt et al., 2008), which is particularly crucial for SME survival. For instance, Hite (2003) observed "relationally-embedded network ties generally provide greater access to resources for emerging firms, and since access to resources may be tempered by the effectiveness of governance mechanisms" a focal firm with high level of trust-based partnership will have greater access to the network resource pool. In sum, our argument is predicated on the rationale that trust based partnerships contributes positively to alliance success in the form of greater commitment, coordination, enhanced communication quality and better conflict resolution through joint

problem solving (e.g., Mohr and Spekman, 1994; Stuart, 2000). All these attributes have major implications for firm-level performance. When stated formally:

Hypothesis 5: Inter-organizational trust is positively related to focal firm performance.

METHODS

Sample

Our sample comprises small and medium-sized unlisted German manufacturing enterprises. Our context provides a useful alternative to the extant research, which is mostly done on large firms from the US and UK. The manufacturing sector in Germany is dominated by engineering related, knowledge intensive industries. Dominance of engineering related industries makes the TMT quite important for these firms. This is evident from the fact that half of the firms in our sample had a CEO with a Ph D degree. Germany is also different from other EU countries as well as the US, in that many firms in Germany with a small number of employees have high market shares in their niche-market and are sometimes even industry and/or technology leaders. This makes it important to identify the right population for a study on SMEs.

To identify what is an SME in the German context, we first worked with the definition provide by the Commission of the European Union, which identifies all firms with less than 250 employees as SMEs. This contrasts with the US government's definition, which considers firms with a number of employees of 500 or less as an SME. Faced with this difference in definitions, we interviewed senior executives from banks and consulting firms such as Deutsche Bank Corporate Finance, Roland Berger Strategy Consultants, Bain and Company, Sannwald Jaenecke and Cie., HVB Consult GmbH to develop a better understanding of SMEs in the German context. In our interviews, a general consensus emerged which identified two conditions that could be used to identify a firm as an SME: (1) the turnover of the firm should not be more than

one billion Euros, and, (2) the firm should not be listed on any stock exchange.

Based on the above criteria, we compiled a list of 3,978 SMEs from information from various industry associations such as Verband Deutscher Automobil Industrie (an association of German automobile manufacturers and supporting companies), www.marktplatz-mittelstand.de, and organizations such as Sannwald Jaenecke and Cie and Hypovereinsbank Munich. In making this compilation, we obtained the contact information of CEOs and and or board members through the directories of these associations as well as through an extensive search on the internet. It is worthwhile to mention here that there are a total of 106,398 manufacturing enterprises in Germany, according to the Institut für Mittelstandsforschung Bonn. Of these, 8,088 are listed firms which we do not include in our study. Ninety percent of the remaining firms are micro and very small enterprises with less than 10 full time employees. These are also not included in our research. This leaves us with a population of about 9800 industrial enterprises which we could target for our surveys. Of the possible 9800 firms, we could obtain addresses for 40 percent or 3,978 firms.

Data Collection

Management research in general has stressed on the importance of key-respondents while collecting firm level data. The underlying assumption is that the perceptions of top managers in a company reflect the collective perspective of that company and as a result, in the absence of hard data, the views of the top managers (i.e., subjective measures) are held as reliable sources of firm-level data (Simonin, 1997). Therefore, the informants were selected by using two important criteria: (1) they should be the most able to recognize and assess the strategy and performance-related issues within the organizational boundaries, and (2) they should also be the most qualified to report specialized information on firm strategy, inter-firm relationships and their

impact on firm's performance. Consequently, we collected our data using a questionnaire targeted at the CEOs and TMT members.

We conducted the survey in two rounds, in September 2004 and June 2007. The first round of survey took us three months to complete. We sent our questionnaire following a request to participate in the survey to all the 3,978 firms. In the three weeks following the first mailing, we received completed responses from 213 firms. We followed the initial mailings with second and third round of reminders along with questionnaires to the non-respondents. The second round of mailings yielded 258 responses, while the third round of mailings yielded 234 responses. Thus we had a total of 705 completed questionnaires with five years of information. Several of these questionnaires had missing information on key variables. We removed these from the final analysis, resulting in a final sample of 565 questionnaires. This represents a response rate of 14.2 percent, which is well within the range of 10-15 percent suggested for mail-in surveys.

We followed up with the firms that responded in the first round (total 705) three years later in June 2007. Within the first four weeks, we received responses from 160 firms. We followed this up with a reminder and another copy of the questionnaire, which resulted in another 148 responses in next five weeks. Thus we had a total of 208 questionnaires, 10 of which we had to discard due to missing data on key variables. This resulted in a final sample of 289 firms in the second round, with information for the 2004-2006 time period. The response rate of 41 percent in the second round was exceptionally good, perhaps because we reminded the firms that they had already participated in our survey three years back. Combining the surveys from the two rounds, we had a total sample of 854 firms.

While, the response rate was in the acceptable range for survey based research, we

formally tested for response bias following the procedure suggested by Oppenheim (1966). The test includes comparing responses received in the early and late rounds. The t-tests revealed no significant difference between the early and late respondents in both rounds of surveys. Further, we compared the industry composition of the respondents in the 2007 survey with the non-respondents, for whom we could get information from the 2003 survey. Here again we found not difference in the industrial makeup of the respondents. This provides a reasonable assurance against non-response bias.

Survey Instrument

Our survey instrument had four subjective measures for knowledge intensity, environmental uncertainty, TMT's competence and interorganizational trust, and one objective measure for firm performance. We administered the survey instrument in German language as English is not a very common business language in Germany. We measured firm performance using return on assets (ROA), which is an accounting based measure of firm performance. ROA is a widely used measure of firm performance, giving us an opportunity to compare as well as accumulate empirical findings based on a standard criterion.

Knowledge intensity refers to a firm's use of technical skills during the production process. Extant literature measures knowledge intensity using indicators such as research and development expenditure and number of patents a firm holds. However, scholars have criticized the use of these measures, particularly for SMEs (Eisenhardt and Schoonhoven, 1990; Spender and Grant, 1996). SMEs often do not have a distinct research and development department, making it difficult to estimate the cash flows into this area. Likewise, the number of patents held by SMEs is more likely to reflect the strategic positioning of the SME rather than its knowledge intensity (Eisenhardt and Schoonhoven, 1990). Faced with these challenges, Eisenhardt and

Schoonhoven (1990) recommended the use of managerial assessment to measure knowledge intensity. Accordingly, we developed a scale comprising four items on a seven-point Likert scale to measure the knowledge intensity of a firm. The items in our scale include the direct indicators of knowledge intensity such as the availability of specialized knowledge in the organization and the economic value added, as well as indirect indicators such as the efforts a firm puts in to understand the technical requirements of its customers.

We developed our construct of environmental uncertainty following the definitions proposed by Duncan (1972), Milliken (1987) and Galbraith (1973). As discussed before, environmental uncertainty comprises environmental dynamism as well as environmental complexity. The objective indicators used in the extant literature are based on measuring the fluctuations in demand or profitability, which only partly capture environmental uncertainty. Consequently, we used three items which asked the respondents about the ease of a new entry into an industry, uncertainty of technical standards and uncertainty of market demand. We measured TMT's competence using two indicators on a seven-point scale. The two indicators assess how important the reputation and skills of the TMT are for a firm to decide on business relationships.

Finally, we develop our scale of interorganizational trust based on the scale developed by Rempel and Holmes (1986), after modifying it to include the recent advances in the trust literature. In trust scale, we utilize four indicators measured on a seven-point Likert scale. Two of the indicators directly assess the level of interorganizational trust through questions about the competence of the partners and the feeling of being cheated in business relationships. The other two indicators measure trust indirectly by assessing the use of contracts and time horizon of business relationships. Appendix A lists all the items that we used to measure the constructs of

trust, TMT competence, knowledge intensity, and environmental uncertainty. We discuss the reliability and validity of our survey based scales in the next section.

RESULTS

Measurement Properties

Since four of the five variables in our model comprise multiple items, it is important to assess the reliability and validity of the scales used to measure the corresponding constructs. We conducted a confirmatory factor analysis (CFA) using AMOS 16.0. We developed the measurement model comprising four latent variables – trust, uncertainty, knowledge intensity and TMT competence. We expected each of the latent variables to correlate with each. We tested for overall model fit using maximum likelihood estimation. Given the sensitivity of chi-square to large sample and its unreliability in the case of assessing the model fit in SEM, we relied on a variety of other fit indices and standards to assess model fit: goodness-of-fit index (GFI) and normed fit index (NFI) greater than 0.90, adjusted goodness-of-fit index (AGFI) greater than 0.80 (Gefen et al., 2000), comparative fit index (CFI) greater than 0.90, and root mean square of approximation (RMSEA) lower than 0.08 for a good fit and lower than 0.05 for an excellent fit (Hu and Bentler, 1992). Table 1 presents these values for the hypothesized CFA model as well as several combinations of constrained models. As shown in Table 1, all the fit indices suggest that the hypothesized model has an excellent fit with the data.

Insert Table 1 about here

We next assessed the convergent and discriminant validities of our constructs. Convergent validity is established if each loading is greater than twice its standard error (Anderson and Gerbing, 1988), which also suggests that each loading is significant at $t = 0.01$

level (Gefen et al., 2000). Table 2 shows that the lowest ratio of loading to standard error was 4.62, with the next lowest being 8.71. All loadings were significant at $t = 0.001$ level. We also calculated composite factor reliability (CFR) for each of the constructs. Analogous to coefficient alpha, CFR assesses the internal consistency of a measure. We calculated CFR using the following equation (Fornell and Larcker, 1981, p. 45):

$$CFR = \frac{\left(\sum_{i=1} \lambda_{yi} \right)^2}{\left(\sum_{i=1} \lambda_{yi} \right)^2 + \sum_{i=1} Var(\varepsilon_i)}$$

The numerator in the above equation is the square of the sum of standardized factor loadings, whereas the denominator is numerator plus the sum of the variance due to random measurement error for each loading. Variance due to random measurement error is computed as 1 minus the square of each loading. As shown in Table 2, the CFR values vary from 0.56 to 0.74. These findings give a robust support for convergent validity of the items in each scale.

 Insert Table 2 about here

We assessed the discriminant validity in three ways. First we looked at the correlations between different latent variables. Inter-correlation values less than 0.60 suggest discriminant validity (Carlson et al. 2000). Correlation between trust and knowledge intensity was 0.68, all other correlations were less than the recommended value of 0.60 (Table 3). Next, we calculated average variance extracted (AVE), which measures the amount of variance captured by a construct in relation to the variance due to random measurement error, using the following equation (Fornell and Larcker, 1981, p. 46):

$$AVE = \frac{\sum_{i=1} \lambda^2_{yi}}{\sum_{i=1} \lambda^2_{yi} + \sum_{i=1} Var(\epsilon_i)}$$

The numerator in the above equation is the sum of the square of the standardized factor loadings, whereas the denominator is numerator plus the sum of the variance due to random measurement error for each loading. Table 2 presents the AVE values for different constructs. Since the AVE values were less than the 0.50 limit suggested by Fornell and Larcker (1981), we conducted more detailed test of discriminant validity, using a constrained analysis method.

 Insert Table 3 about here

Constrained analysis involves setting the correlation between one pair of variables (e.g., trust and knowledge intensity) to unity (1.0) and running the model again. Discriminant validity is established if a chi-square difference test supports the original model (Anderson and Gerbing, 1988). Table 1 presents the Chi-square values along with other fit indices for the constrained models. As can be seen in Table 1, the constrained models are significantly worse than the original four factor model, giving support for discriminant validity and thus indicating unidimensionality of our scales.

Model and Hypotheses Testing

We tested our four hypotheses by conducting structural equation modeling using AMOS 16.0. Table 4 presents the results of hypotheses testing.

 Insert Table 4 about here

Before we can analyze the hypothesized relationships in a structural model, we must assess if the model fits the data. The model fit indices suggest that there was an excellent fit

between our hypothesized model and the data ($\chi^2_{70} = 331.00$, $p < 0.01$; RMR = .068; RMSEA = .066; GFI = .948; AGFI = .922; NFI = .878; TLI=.871; CFI = .901).

Hypothesis 1 predicted that competence of the partner TMT is positively related to inter-organizational trust. The beta coefficient for the linkage between partner TMT's competence and inter-organizational trust was positive and significant ($\beta = 0.249$, $t < 0.001$). Hypothesis 1 is supported. Hypothesis 2 predicted that knowledge intensity is positively related to inter-organizational trust. The beta coefficient for the linkage between knowledge intensity and inter-organizational trust was positive and significant ($\beta = 0.695$, $t < 0.001$). Hypothesis 2 is supported. Hypothesis 3 predicted that environmental uncertainty is negatively related to inter-organizational trust. As hypothesized, the beta coefficient for the linkage between environmental uncertainty and inter-organizational trust was negative and significant ($\beta = -0.078$, $p < 0.05$). Hypothesis 3 is supported. Together, the three variables – TMT competence, knowledge intensity and environmental uncertainty – accounted for 60% variation in trust ($R^2 = 0.60$).

Next, we look at the impact of environmental uncertainty and trust on firm performance. Hypothesis 4 predicted that environmental uncertainty has a negative relationship with firm performance. The beta coefficient for the linkage between environmental uncertainty and firm performance was negative and significant ($\beta = -0.003$, $p < 0.001$). Hypothesis 4 is supported. Hypothesis 5 predicted that inter-organizational trust has a positive relationship with firm performance. The beta coefficient for the linkage between inter-organizational trust and firm performance was positive and significant ($\beta = 0.004$, $p < 0.001$). Hypothesis 5 is supported. Inter-organizational trust and environmental uncertainty accounted for 25% variation in firm performance ($R^2 = 0.25$).

In addition to assessing the overall fit and path estimates of the proposed theoretical model, we compared this model with another alternative model, in which we removed the direct linkage between environmental uncertainty and firm performance. We compared the model fit of the two models using χ^2 difference test (Anderson and Gerbing, 1988). The deletion of the path between environmental uncertainty and firm performance resulted in significantly higher χ^2 value, rejecting the alternate model.

DISCUSSION AND CONCLUSION

We attempted to enhance our understanding of interorganizational trust by focusing on its firm level (knowledge intensity), environmental (environment uncertainty), and business partner level (business partner TMT competence) antecedents and subsequent performance outcome (firm performance). In addition, we examined the relationship between focal firms' environmental context and focal firm performance. In doing so, we addressed two research questions that helped us explicate (a) in what measure do these antecedents (partner TMT competence, production knowledge intensity, and environmental uncertainty) affect interorganizational trust, and (2) how does interorganizational trust influence the resulting firm performance. Our empirical analysis indicated that knowledge intensity, and partner TMT competence impacted interorganizational trust positively and significantly. In addition, increased environmental uncertainty was associated with decreased amount of interorganizational trust and firm performance. Furthermore, interorganizational trust was found to be positively associated with focal firm performance.

Although this study expands our knowledge of the relationships among partner TMT characteristic, knowledge intensity, environmental uncertainty, trust, and firm performance, the findings should be interpreted with caution and practical prospects for additional research

remain. First, the scope of this study was restricted to German SMEs and the firms surveyed represented the manufacturing industry. Consequently, extension of the research to other countries, larger companies and non-manufacturing sectors are needed for cross-validation. Second, the data was collected using a survey methodology. This raises concerns about the reliability of the financial data. However, a survey was necessary to collect data as published sources of financial information on SMEs were not available. However, Brush and Vanderwerf (1992) found that self-reported performance data is correlated with objective firm performance. Finally, while we looked at important macro level antecedents of inter-organizational trust, we missed out on some other equally important factors such as psychological characteristics of the top management team. A meaningful extension of our research can be made by investigating the interplay between the micro level and macro level determinants of inter-organizational trust.

The unique context of this study and its findings offer several theoretical and practical implications. First, we add to the existing literature by demonstrating that partner-specific unique characteristics (partner TMT competence in this case) may actually help develop a trust-based relationship between exchange partners. Proponents of upper echelon theory have typically viewed organizations as reflections of their TMTs. Our findings confirm that competent TMTs are perceived favorably by partner firms as ‘competence’ or ‘ability’ is considered a significant predictor of trust (Schoorman et al., 2007). In fact, our focus on TMT competence as an antecedent of trust is critical to understanding since this level is responsible for steering the strategic actions of the organization (Cyert and March, 1963). This is also in line with the call for applying the factors of Mayer and his colleague’s model of trust at the organizational level (Schoorman et al., 2007). Second, we contribute to the burgeoning literature on relational exchange. We found that firms with knowledge intensive production processes often have more

trust on their business partners. According to the TCE, such knowledge intensive production process may create a future ‘hold-up’ problem if the focal firm depends on its partner firms for external knowledge (David and Han, 2004.). However, we believe that such interdependencies may create a lock-in effect and compel firms to develop calculative mutual trust on one another. Our findings corroborate with the line of research that views organizations as ‘creator of positive’ as opposed to ‘avoider of negative’ (Conner, 1991).

We also add to the literature by showing the positive effect of trust on firm performance. Research has generally focused on more proximal measures of performance by highlighting effects of trust on alliance success, alliance performance etc (Krishnan et al., 2006). We have used a more objective measure of firm performance (ROA) to establish the direct effect of trust on an organization’s performance. Finally, this study provides us with an opportunity to test arguments from multiple perspectives on small and medium sized enterprises. This study responds to the call by organizational scholars to internationalize strategy and SME research by testing the extant theories and perspectives in a non-US-context (Zahra, 2007), which is in a strong contrast to the US context due to the differences in the social, political, legal and business environment of Germany as compared to the US (Fiss and Zajac, 2004). In sum, this research contributes in a meaningful way in the broad realm of strategy literature by drawing renewed attention to trust in general and focusing on its antecedents and performance outcome in particular.

Our research findings also have important managerial implications for both the focal firms and their business partners. Top managers of both types of organizations need to develop and maintain a strong trust-based partnership that was shown to have positive effect on firm performance. Ideally, organizations need to assist each other in moving from a formal

contractual relationship to a more relational form of governance in the interest of mutual value creation and competitive advantage (Kedia and Mukherjee, 2009). Top executives should also understand that uncertainty arising from its immediate environment may actually have a detrimental effect on organizational trust and performance. Thus, top managers of the SMEs need to continuously examine environmental uncertainty and to devise strategies to mitigate the potentially negative impact of these factors on relational and firm financial performance. Appropriate measures, such as, proactive environmental scanning, planning, or proactive networking endeavors may prevent such negative performance effects. Given that a business partner's TMT competence was strongly related with trust development, top executives should also focus on actively communicating such positive signals to their business partners.

To conclude, we found that inter-organizational trust is dependent on factors related to the external environment, the transaction characteristics and partner characteristics. We also found that inter-organizational trust, along with the environmental uncertainty have an impact on the performance of an SME. In doing so, we integrate the literature on upper echelons perspective and transaction cost economics, and apply it to the context of trust in inter-organizational relationships. Together, our theory and findings help advance the literature on inter-organizational relationships and firm performance.

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**Table 1:
Fit Indices for the CFA Model**

Model	χ^2 (d.f.)	RMR	RMSEA	GFI	AGFI	NFI	TLI	CFI
Hypothesized Model	206.13 (59)	.072	.054	.965	.946	.906	.908	.931
Constrained Model 1 (Trust and TMT Comp.)	381.88 (60)	.261	.079	.940	.909	.826	.802	.848
Constrained Model 2 (Trust and Know. Int.)	312.61 (60)	.249	.070	.950	.924	.858	.845	.881
Constrained Model 3 (Trust and Env. Uncertainty)	726.83 (60)	.429	.114	.904	.854	.669	.591	.685
Constrained Model 4 (Know. Int. and Env. Uncertainty)	791.12 (60)	.450	.119	.907	.859	.640	.551	.655
Constrained Model 5 (Know. Int. and TMT Rep.)	447.72 (60)	.331	.087	.936	.904	.796	.762	.817
Constrained Model 6 (Env. Uncertainty and TMT Rep.)	495.35 (60)	.283	.092	.934	.901	.774	.733	.794

**Table 2:
Measurement Properties**

Construct	Items	Unstandardized Loading	S.E.	Standardized Loading	Item Reliability	Composite Factor Reliability	Cronbach Alpha	Average Variance Extracted
Trust	Trust 1	1.060	0.122	0.424	0.180	0.647	0.642	0.322
	Trust 2	1.111	0.114	0.486	0.236			
	Trust 3	1.278	0.129	0.643	0.413			
	Trust 4	--		0.678	0.460			
Knowledge Intensity	KI1	0.906	0.079	0.548	0.300	0.666	0.667	0.333
	KI2	0.904	0.077	0.594	0.353			
	KI3	0.975	0.081	0.566	0.320			
	KI4	--		0.599	0.359			
Environmental Uncertainty	EU1	0.879	0.053	0.739	0.546	0.740	0.723	0.493
	EU2	0.664	0.049	0.540	0.292			
	EU3	--		0.800	0.640			
TMT Competence	TMTComp1	0.678	0.147	0.589	0.347	0.558	0.548	0.388
	TMTComp2	--		0.655	0.429			

Table 3:
Inter-factor Correlation Coefficients

Items			Estimate
Trust	<-->	Knowledge Intensity	.683
Trust	<-->	Environmental Uncertainty	-.499
Trust	<-->	TMT Competence	.405
Knowledge Intensity	<-->	Environmental Uncertainty	-.577
Knowledge Intensity	<-->	TMT Competence	.191
Environmental Uncertainty	<-->	TMT Competence	-.182

Table 4:
Results of the Hypotheses Testing

Paths		Beta	S. E.	t-value
TMT Competence (H1)	→ Trust	0.249***	0.073	3.403
Knowledge Intensity (H2)	→ Trust	0.695***	0.085	8.139
Environmental Uncertainty (H3)	→ Trust	-0.078*	0.041	-1.896
Environmental Uncertainty (H4)	→ Firm Performance	-0.003***	0	-9.195
Trust (H5)	→ Firm Performance	0.004***	0	8.207

Goodness-of-Fit Statistics: $\chi^2_{70} = 331.00$, $p < 0.01$; RMR = .068; RMSEA = .066; GFI = .948; AGFI = .922; NFI = .878; TLI = .871; CFI = .901).

N= 856

Appendix A: Survey Scales

Interorganizational Trust ($\alpha = .64$)

1. In contact with business partners you never had the feeling of being misled.
2. The longer the business relationship with a partner last, the better and faster the understanding is.
3. You remain cautious to new business partners until they prove that they are trustworthy.
(Reverse coded)
4. You cover everything in watertight contracts while dealing with your business partners.
(Reverse coded)

Business partner TMT Competence ($\alpha = .55$)

1. The reputation of the top management team of your business partner plays a crucial role for your business relationships.
2. The technical understanding/skills of your business partner's TMT is essential for your decision to do business with them.

Knowledge Intensity of the Production Process ($\alpha = .72$)

1. Specialized knowledge and technology required for your production process is easily available in the market.
2. The Economic Value Added during the production process is high.
3. Special knowledge required for the production process is equally divided among different members in the organization.
4. Much time has been spent acquiring the procedures necessary for the demands of your customers.

Environmental Uncertainty ($\alpha = .67$)

1. The industry the firm is operating in is characterized by low entry barriers.
2. Your firm is operating in a market characterized by fast changing and hard to predict market demands.
3. The technological standards in your industry are changing at a high pace.