



# Establishing Trust in a Business-to-Business Collaboration: Results from an International Simulation

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## ABSTRACT

*Businesses in the 21<sup>st</sup> century have extended to a process oriented, e-business world that is increasing in business-to-business, web-centric interactions. The geographical dispersion of participants in this new process oriented e-business world introduces challenges of building a degree of trust needed for effective collaboration. Yet, examining the correlation of various trust manifestations to the success of business-to-business collaboration remains a challenge. This paper examines trust as a factor in successful business-to-business process implementations. Based on an international collaboration between two universities that address issues of new e-centric business practices, results in the form of students' perceptions of trust manifestations are presented.*

## INTRODUCTION

In recent years, we have seen tremendous worldwide growth of process-oriented e-Business relationships between organizations. In 1999 Forrester Research analyzed inter-organizational trade (e-business) of goods and services and predicted that business-to-business (B2B) spending would surpass consumer spending worldwide (Intelligent Enterprise, 2001; Beximco, 2001). Recently the Gartner Group predicted worldwide B2B spending to reach 7.9 trillion by 2004, and several other research organizations have also revised their forecasts to be higher than predicted in 1999 (Intelligent Enterprise, 2001). As a result, corporations are leveraging their investment in their Enterprise Resource Planning (ERP) solution by extending the existing ERP system to support inter-organizational transactions and e-commerce applications. Despite the fact that increased collaboration is being conducted in a B2B setting, little is known about the factors that affect the effectiveness of such collaboration.

Effective B2B process implementations are constrained by inter-organizational collaboration methods. In fact, the ability to collaborate between organizations may be as important as the ability to deploy appropriate technology in maintaining a competitive advantage (The Economist, 1999). Yet, establishing effective collaboration methods for this new process oriented e-business world remains a challenge. The geographical dispersion of participants in a B2B endeavor can introduce challenges of building trust without a face-to-face interaction (Jarvenpaa, Knoll and Leidner, 1998). Trust has been defined by Mayer et al. (1995) as "the willingness of a party [trustor] to be vulnerable to the actions of another party [trustee] based on the expectation that other [trustee] will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party." It has been revealed that a degree of trust is needed in order to engage in cooperative behavior (Cassell and Bickmore, 2000). Recent research has begun exploring the impact of trust on both B2B (e.g., Welty and Becerra-Fernandez, 2001) and B2C (e.g., Torkzadeh and Dhillon, 2002) relationships. Bhattacharjee (2002)

points out that the importance of trust as a key facilitator of electronic commerce is increasingly being recognized in academic and practitioner communities. Three dimensions of trust identified are ability (expertise, information, competence, expertness, dynamism), integrity (fairness in transaction, fairness in data usage, fairness in service, morality, credibility, reliability, dependability), and benevolence (empathy, resolving concerns, goodwill, responsiveness) (Bhattacharjee 2002, McKnight, Choudhury and Kacmar 2002). However there is still a lack of research that examines the correlation of various trust manifestations to the success of B2B collaboration.

The research reported in this paper examines trust as a factor in successful B2B process implementations. Data was collected from an international collaboration between two universities that addressed these issues of B2B process implementation. Similar classes of the two universities, one located in the US and one located in Germany, participated in joint projects involving the negotiation, analysis, design and implementation of B2B processes. Specifically, each project group was composed of 8-10 students, 4-5 from each university. Thus, the groups from each University simulated the geographical dispersion of participants in a B2B collaboration. An online forum was created by the course instructors and used by the project groups throughout the semester as a collaboration medium. A post-course survey was utilized to measure the trust manifestations.

## HYPOTHESES AND METHODOLOGY

This research builds upon other studies that explored the impact of trust in collaborative activities between geographically dispersed participants. Jarvenpaa, Knoll, and Leidner (1998) argue that collaboration between remote participants introduces the challenge of building and maintaining trust without face-to-face interaction. Because trust is essential to a relationship, creating trust during the implementation process is critical to successful collaboration endeavors. Several manifestations of trust during interactions such as good rapport, politeness, technical knowledge, comfort, use of pictures, and confidence in the other party to meet deadlines, have been identified by Cassell and Bickmore (2000), and Tractinsky and Rao (2001).

In order to examine the role of trust, data collected from a B2B collaboration between two university classes, one in Germany and one in the U.S., were analyzed. Faculty from these universities collaborated in the development and deployment of five case scenarios that were used to simulate a business-to-business integration project. Kalakota and Robinson (1999) discuss two implementation methods of inter-organizational process integration. The first method involves a shared process where both organizations are interdependent upon each other within the process, requiring extensive collaboration among the organizations to ensure success. In the second method each organi-

zation maintains their own independent process, designed to invoke each other's process when needed (Hayami et al., 2000). The second method was used to design the case scenarios. The case scenario method of collaboration allowed the simulation of business-to-business process development between university class teams, which formed a two-stage supply chain. Student teams from the American university assumed the role of the customer/client enterprise and teams from the German university assumed the role of the service provider (see Figure 1).

The collaboration between these two Universities began with a pilot of one scenario in 1999. Based on the results of that pilot, improvements were made for the collaborations conducted in 2000 and 2001. The collaboration methods included a web forum created by the course instructors that allowed the students to communicate non-verbally and discuss project details. The classes were divided into 5 project groups, each assigned to a different B2B scenario. The forum included student pictures in order to provide some level of personal communication. Students were required to utilize this forum to establish contact with their virtual partners and meet several required milestones evolving around the negotiation of process details. The students were also encouraged to negotiate with their counterparts from the other university and create a project web page.

Analysis of the students' perception of the collaboration effectiveness from the 2000 class revealed there was a significant difference between the five scenarios (Antonucci and zur Muehlen, 2001). This supported the assumption that other possible factors, such as trust, contribute to collaboration effectiveness. This paper thus hypothesizes that trust is a determinant of collaboration effectiveness.

**H1:** Geographically dispersed participants in a B2B collaboration who establish a high level of trust will have greater collaboration effectiveness.

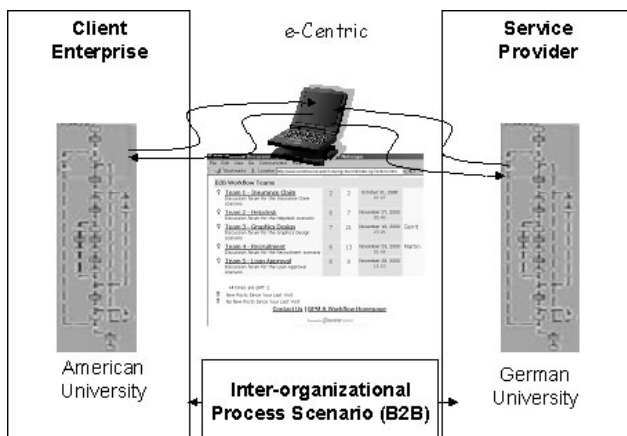
This preliminary hypothesis is designed to identify correlation in perceived trust and collaboration success. Perceived trust was measured using student perception data from a post-course survey, which was designed using the trust manifestations identified by Cassell and Bickmore (2000), and Tractinsky and Rao (2001). Collaboration success was based on the ability of the scenario teams in accomplishing the required milestones. Regression analysis and Analysis of Variance was used to initially examine this hypothesis.

Based on the same rationale as H1, the following was hypothesized:

**H2:** The level of trust during the collaboration among the German students will be significantly different to the level of trust during the collaboration among the US students.

This hypothesis was designed to examine possible differences in trust as a factor of collaboration success between the German and US Cultures. The following manifestations of trust were included in the post-course survey and were compared between the German and US student responses:

Figure 1: Basic Construct of Business-to-Business Case Scenarios



Good rapport, politeness, technical knowledge, comfort, use of pictures, and confidence in the other party to meet deadlines.

These hypotheses were designed to examine the ability of the various trust items identified by Cassell and Bickmore (2000), and Tractinsky and Rao (2001) to predict the effectiveness of a simulated B2B collaboration.

**DATA ANALYSIS AND DISCUSSION**

A 5-point Likert-type scale was used to assess the students' perceptions of the trust manifestations with their virtual team counterparts. A Likert value of 1 represents a very low trust level, a value of 2 represents a moderately low trust level, a value of 3 represents a neutral trust level, a value of 4 represents a moderately high trust level, and a value of 5 represents a very high trust level.

The raw data, gathered from the 26 students, were analyzed using SAS™. The analysis of student demographics (age, major, gender) showed no significance. H1 hypothesized that a high level of trust led to greater collaborative effort. Analyzing H1 is not possible since in each of the four scenarios, the teams were all successful in the collaboration. They were all able to meet the milestone requirements. Although there was no significance in the correlation of collaboration success and trust manifestations, there are some interesting observations. The recruitment and insurance teams were outstanding in completing the required milestones where the loan approval team was very good and the graphics team was good. Overall perceived trust was slightly higher for the recruitment and loan approval teams.

H2 hypothesized that there were no overall differences between the German students' perceptions and US students' perceptions of trust during the collaboration. Table 1 shows the results of t-tests between all the US and all of the German students' collaboration perceptions for the trust manifestations. For most of the trust manifestations, there was no significant difference found between the German students' perceptions of trust and the US students' perceptions of trust, however there was an indication of difference in the trust manifestation, technical knowledge. The means suggest that the German students felt they had a higher level of technical knowledge than the US students and the US students agreed. There was also a marginal difference in the trust manifestation, comfort of collaboration. US students tended to be more comfortable collaborating with German student. The overall results present some similarities between the US and German teams such as both felt the presence of pictures did not enhance the collaboration experience, suggesting that the use of pictures does not affect their level of trust in the collaboration. Also the German team seemed to have an overall lower perceived level of trust than the US students.

Table 1: Analysis of Variance between US and German students for trust factors

Item	N	Sig.	Mean of Response	
			US	GERMAN
(A) I feel our collaboration group was able to establish a <b>good rapport</b> with our counterparts.	26	.82	4.19	3.56
(B) I feel our counterpart team was very <b>polite</b> .	26	.92	4.50	4.20
(C) The presence of our <b>pictures</b> on the web site enhanced the collaboration experience.	26	.77	3.25	3.00
(D) I feel the level of <b>technical knowledge</b> of our counterpart team is higher than ours.	26	.00	4.25	1.20
(E) I feel very <b>comfortable</b> collaborating with our counterpart team.	26	.10	4.13	3.67
(F) I felt as though I had <b>confidence</b> in our counterpart team to meet the milestone due dates.	26	.92	2.44	2.78
(G) I feel video connections would increase the effectiveness of the collaboration.	26	.84	3.67	3.88
(H) Overall I have a high level of trust for our counterpart team.	26	.47	3.88	3.44

Table 2: Analysis of Trust Measures by Scenario

Trust Items		Scenarios			
		Insurance Claim	Graphics Design	Recruitment	Loan Approval
(A) I feel our collaboration group was able to establish a <b>good rapport</b> with our counterparts.	Germany	5.00(0.0)	3.00(0.0)	2.50(0.71)	3.67(1.15)
	US	4.75(0.5)	4.25(0.5)	4.00(0.82)	4.25(0.96)
	P	.39	.32	.12	.52
(B) I feel our counterpart team was very <b>polite</b> .	Germany	5.00(0.0)	4.33(1.15)	4.00(0.0)	3.67(0.58)
	US	5.00(0.0)	4.50(0.58)	4.25(0.58)	4.25(0.96)
	P	—	.83	.39	.36
(C) The presence of our <b>pictures</b> on the web site enhanced the collaboration experience.	Germany	3.50(0.71)	3.00(0.0)	Does not matter*	2.50(2.12)
	US	3.00(0.82)	3.75(0.96)	3.00(1.83)	3.25(1.26)
	P	.51	.36	.00	.33
(D) I feel the level of <b>technical knowledge</b> of our counterpart team is higher than ours.	Germany	1.00(0.0)	1.00(0.0)	1.00(0.0)	1.67(1.15)
	US	4.75(0.5)	4.00(0.0)	4.25(0.96)	4.00(1.15)
	P	.00	-	.01	.05
(E) I feel very <b>comfortable</b> collaborating with our counterpart team.	Germany	4.00(0.0)	4.00(0.0)	3.50(0.71)	3.30(0.58)
	US	4.00(0.82)	4.00(0.0)	4.50(0.58)	4.00(1.15)
	P	1.0	-	.25	.37
(F) I felt as though I had <b>confidence</b> in our counterpart team to meet the milestone due dates.	Germany	2.00(0.0)	2.50(0.71)	3.50(0.71)	3.00(0.0)
	US	1.75(1.5)	2.25(1.26)	2.75(1.26)	3.00(1.41)
	P	.76	.77	.41	1.0
(G) I feel video connections would increase the effectiveness of the collaboration.	Germany	4.00(0.0)	3.00(0.0)	4.00(0.0)	3.00(0.0)
	US	4.00(1.15)	3.25(2.06)	3.33(1.53)	3.00(1.41)
	P	1.0	.82	.85	.55
(H) Overall I have a high level of trust for our counterpart team.	Germany	3.00(0.0)	3.50(0.71)	3.00(0.0)	4.00(0.0)
	US	4.00(0.82)	3.75(0.96)	3.75(0.5)	4.00(0.82)
	P	.09	.74	.06	1.0

\* Notation is MEAN(STANDARD DEVIATION)  
 \*\* All of the subjects in this cell felt that pictures had no effect on trust.

Out of the five different scenarios, only four were usable for this study. One scenario team did not have participation at all from the German group, therefore this scenario was not used. Since combining the scenarios may obscure some interesting insights, Table 2 presents the results for each trust manifestation for each of the scenarios. A general observation is that the levels of the trust manifestations usually differed for each of the scenarios. Both German and US students felt a high level of rapport was established in the Insurance claim scenario, German students felt a lower level of rapport than US students.

## SIGNIFICANCE OF RESEARCH AND FUTURE DIRECTIONS

Understanding the role of trust in collaboration during inter-organizational process implementation can potentially increase the probability of achieving a successful B2B implementation that leads to a productive longer-term relationship. Identifying specific trust manifestations early in the collaboration may introduce the ability to intervene during an unsuccessful collaboration and ensure success. These results could impact both industry relationships and University class collaboration teams that are designed to simulate real world project environments. This study extended the current research (Cassell and Bickmore (2000); Tractinsky and Rao (2001)) by identifying possible relationships between trust items and their ability to contribute to successful B2B collaborations.

Future studies are needed to incorporate measures of collaboration success. Our follow-up study uses the student's perceptions of success and the instructors' evaluation of success. This study only analyzed the students' perceptions of various trust manifestations. Additional factors that can contribute to trust include small talk, self-disclosure, and the use of technical jargon (Cassell and Bickmore 2000). This study only used single items on the post-

course survey to measure the manifestations of trust, which limits the reliability of the measurements. Our follow-up study uses multiple items and also includes other items under the dimensions of ability, integrity, and benevolence. Future studies should analyze these factors by analyzing the content and frequency of the teams' communications that were captured through sanctioned channels, such as the web forum. In addition, small talk, self-disclosure, and the use of technical jargon should be compared between the US and German students as disclosed through the analysis of the web forum discussions.

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