Abstract

Shared understanding between the IS and business units has been identified as one of the key factors in successful utilization of IT, as there is considerable evidence in the literature linking IS shared business-IT understanding with increased IS use, increase IS unit success, and improved process and organizational performance. However, limited work has been done examining the factors that foster the development of business-IS shared understanding. While prior work suggest that trust is an important antecedent to shared understanding, the findings to date are based on a conceptualization of trust as a one-dimensional construct. We extend the prior work under a richer (multi-dimensional) conceptualization of trust, one that is more faithful to the conceptualization of trust in the organizational literature. More specifically, we examine the differential effects of competence-based trust, integrity-based trust and benevolence-based trust on the level of shared understanding in the IS and business relationship. Our work also considers the directionality of trust in developing shared understanding as we examine the perceptions of trust from the perspective of the business unit as well as from the IS unit. We also consider the formal management structure by investigating the effect of joint IS governance between the IS and business units on the level of shared understanding, as well as the mediating role of mutual understanding. The research model is tested using dual survey techniques and focus is on the relationship between the business and IS units. Our findings suggest that integrity-based trust is by far the most significant factor. Specifically, we find that it is the businesses perspective of the IS units integrity which is the key trust factor that is associated with higher levels of shared understanding. We also find evidence that integrity-based trust mediates the relationship between joint IS governance and shared understanding. The implications of these findings for both research and practice are discussed.

Keywords: Shared understanding, Trust, Joint IS governance
Introduction

Recent literature has focused on the concept of shared understanding in the IS and business relationship as a key factor in successful utilization of information technology (Nelson and Cooprider 1996; Ranganathan and Sethi 2002; Ray et al 2005; Reich and Benbasat 2000). These works have argued that as the business units and the information systems units reach a common understanding about the role of information technology and the business strategies, then they can better determine effective and efficient uses of information technology. However, limited work has been performed to explain how shared understanding can be fostered and developed between the business and IS units.

Two primary constructs that have been argued to affect the level of knowledge transfer are mutual trust and the IS governance approach. Mutual trust within a relationship may increase the likelihood that information will be shared by one party and the information will be accepted by the other member of the dyadic relationship. The continuation of this knowledge exchange may increase the level of shared understanding. Nelson and Cooprider (1996) investigate the relationship between a one-dimensional conceptualization of mutual trust and shared understanding; however, the trust literature has identified trust as a multi-dimensional construct including competence (ability), integrity and benevolence (Mayer et al 1995). Therefore, one research question for this study is whether one of these dimensions of trust is more salient in developing shared understanding within the IS and business relationship. Levin and Cross (2004) investigated knowledge seekers and the potential for the benevolence and competence dimensions of trustworthiness to mediate the association between the strengths of ties (a structural relationship characteristics) and the receipt of useful information (Levin and Cross 2004). This research provides information in considering the role of the trust dimensions;
however, trust is characterized only from the perspective of the receiver. Development of shared understanding in the business and IS relationship is created over time and multiple interactions and each parties perception of trust (trust directions) may impact the willingness to provide information or to absorb and assess information. Therefore, we also consider the direction of trust and the development of mutual trust and its association with shared understanding.

Joint management and governance activities have also been found to increase the level of knowledge transfer and shared understanding within relationships (Levin and Cross 2004; Nelson and Cooprider 1996; Ranganathan and Sethi 2002). The use of these structural mechanisms aids the development of shared understanding through discussions about priorities and the utilization of available resources. Levin and Cross (2004) however, argue and find, that trust mediates the relationship between a structural relationship mechanism, such as strength of ties, and knowledge receipt. Therefore, we also examine the possibility for joint IS governance to be directly associated with shared understanding, and for this relationship to be mediated by mutual trust.

The primary contribution of this work is to extend the understanding of the role of trust within the IS and business relationship by examining the relationship between the dimensions of trust and shared understanding. Data is collected through the use of a two-part survey completed by the IS and business units to describe characteristics of the units and their relationship. This approach to investigating the role of mutual trust is unique to this work, as we consider mutual trust by understanding the perceptions and beliefs of each party in the dyadic relationship. We are able to investigate the significance of trust from each direction in the dyad and the association with shared understanding.
Consistent with prior research, we find that mutual trust is a significant predictor of shared understanding; however, we are able to investigate the impact of different dimensions of trust. We find that integrity-based trust is the primary factor associated with shared understanding, and that competence-based trust and benevolence-based trust are not found to be significant. We also investigate the directionality of trust in the relationship and find that business trust of the IS unit is the key component, specifically the business units level of integrity-based trust for the IS unit. This paper also contributes to the IS management and management literature by investigating the potential relationship between trust, governance and shared understanding. We find that the association between joint governance of the IS resources and the level of shared understanding may be mediated by the presence of integrity-based trust.

The rest of this paper is organized as follows. In the next section, the theoretical framework and research model are developed. Section three describes the research methodology and data collection approach, and section four provides the data analysis and results. This paper concludes with a discussion of the results and implications for further research.

Theory and Hypotheses Development

Shared understanding

Understanding the relationship between IT and business performance has been a central theme in IS research. There is considerable evidence that suggests an organization’s ability to develop a shared understanding in the relationship between business and information systems (IS) units is a critical factor in successful utilization of information technology in the support of business objectives (Henderson 1990; Mata et al 1995; Rockart 1988; Ross et al 1996). Shared understanding has been conceived of as the knowledge that the IT organization has about the
business process, the knowledge that the business process possess about the opportunities to apply IT to improve the business activities, and the common understanding between the IT organization and the business unit regarding the role of IT in improving business performance (Ray et al 2005). Shared understanding has been investigated by many authors within the literature and has been found to be valuable to an organization and may influence the perceived performance of the IS group, assimilation of IT within and organization, alignment between business and IT, product development success, and performance of the business unit (Armstrong and Sambamurthy 1999; Hoopes and Postrel 1999; Nelson and Cooprider 1996; Ranganathan and Sethi 2002; Ray et al 2005; Reich and Benbasat 2000). Additionally, this dyadic capability is argued to be developed over time and is highly firm specific; therefore, shared understanding is rare, inimitable and valuable, and as such, consistent with resource-based expectations (Barney 1991; Wernerfelt 1984), and is likely to be a source of competitive advantage. Understanding the key factors which may aid in the development of shared understanding is the focus of this paper. Based on prior literature, we focus on the role of a relationship construct, trust, and a structural construct, joint IS governance.

**Trust**

Trust is central to social interactions and relationships between organizational groups. For the purposes of this research and consistent with Mayer et al (1995) and Rousseau et al. (1998), we define trust as the willingness to be vulnerable to the actions of another party. Extant research in the knowledge management area suggests a link between the level of knowledge exchange and the level of trust, as trust impacts the willingness to absorb new knowledge and to provide information (Levin and Cross 2004; Sivadas and Dwyer 2000; Tsai and Ghoshal 1998). In the IS area, Nelson and Cooprider (1996) argue that the development of “mutual trust” (which they
define as “the expectation that the IS and business groups will meet their commitments to each other”) leads to the sharing of ideas and a common appreciation of information; therefore, they conceive of mutual trust as an antecedent to shared understanding and find a significant and positive relationship. Nelson and Cooprider also discuss the work by Sherif (1962, 1966) and by Sherif and Sherif (1953) which investigates teams and groups and finds that interactions lead to trust which then leads to sharing of information and knowledge. While Nelson and Cooprider’s notion of trust has similarities with ours, trust is conceptualized and operationalized as a one-dimensional construct in their model. Our research is focused on extending the investigation into the role of trust within the IS and business relationship; however, we start by re-testing these findings.

*H1: Mutual trusting beliefs between the IS and Business units will be positively associated with the level of shared IS-Business understanding.*

The trust literature distinguishes between trusting behavior and antecedents such as trusting beliefs (McKnight and Chervany 2002). Trusting behavior, or trust, is a concept that is contextualized to a specific situation and each interaction. Due to the contextualization, relationship trust is a difficult construct to define and measure; therefore, similar to Nelson and Cooprider (1996) and Levin and Cross (2004) we focus on a key antecedent, trustworthiness. Mayer et al (1995) provides a review of the work on trustworthiness which has been defined as the quality of the trusted party that makes the trustor willing to be vulnerable. Trustworthiness has been identified as a multiple dimensional construct and Mayer focuses on three dimensions: ability (competence), integrity and benevolence.
<table>
<thead>
<tr>
<th>Trustworthiness Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability</td>
<td>The group of skills, competencies, and characteristics that enable a party to have influence within some specific domain.</td>
</tr>
<tr>
<td>Integrity</td>
<td>The adherence to a set of principles that the trustor finds acceptable.</td>
</tr>
<tr>
<td>Benevolence</td>
<td>The extent to which a trustee is believed to want to do good to the trustor, aside from egocentric profit motive.</td>
</tr>
</tbody>
</table>

Table 1: Dimensions of Trustworthiness from Mayer et al (1995)

The trustor’s perceptions of the ability dimension may come from information provided by other parties or from prior interactions between the trustor and trustee. Reich and Benbasat (2000) investigate the social dimensions of alignment and discuss the opportunity for prior IT implementation success to improve the expected value from future IT projects and therefore, increase the interest in seeking out the IT unit and exchanging information about how IT may help the business improve. This concept of prior success would be highly related to the perceived ability component of Mayer’s model of trustworthiness. Similarly, Levin and Cross (2004) consider the role of competence based trust (ability) and reason that the perception of competence may increase the desire of one party to obtain information from the other and increase the perception of the usefulness of the information. Levin and Cross also argue that the perception of benevolence-base trust may increase both the willingness to offer information and the desire to absorb the information. Levin and Cross find competence trust and benevolence trust to be significantly related to effective knowledge transfer. Integrity is not considered by Levin and Cross as their definition of effective knowledge transfer focuses on the receipt of useful information, and they argue that the usefulness of the information should not be impacted by the level of integrity of the provider of the information. The concept of shared understanding however is one that requires repeated interchanges of information and a willingness to consider
the perspectives and experiences of the counterparts. We believe that the ability to accept the information and share ideas over time would be based on the perception of the integrity of the other party. Whereas Levin and Cross (2004) consider only the perception of trust from the perspective of the recipient, we believe that shared understanding requires consideration of how trust may influence both the provision and acceptance of information. Therefore, each member’s perception of trustworthiness of the other member of the relationship may impact the level of shared understanding. Thus we consider that relationships with higher levels of each dimension of mutual trust may have higher levels of shared understanding.

**H1A**: The degree of competence-based trusting beliefs between the IS and Business units will be positively associated with the level of shared IS-Business understanding.

**H1B**: The degree of integrity-based trusting beliefs between the IS and Business units will be positively associated with the level of shared IS-Business understanding.

**H1C**: The degree of benevolence-based trusting beliefs between the IS and Business units will be positively associated with the level of shared IS-Business understanding.

**Joint IS Governance**

Structural influences on management relationships have been studied in many contexts and have been identified as a positive antecedent to knowledge exchange. Nelson and Cooprider (1996) consider the effect of mutual influence on shared knowledge. Nelson and Cooprider posit that organizations which are engaged in joint work and develop the ability to influence each others policies and decisions, exchange cognitive elements leading to shared knowledge. Reich and Benbasat (2000) investigate the social networks and the level of connections in the business and IT planning processes. They find that the organizational structure and networks may provide informal methods and opportunities for business and IT organizations to share ideas and concerns about how IT may better assist the business. Levin and Cross (2004) consider the
affect of tie strength – the closeness and level of interaction – between two parties and find that it is significantly associated with effective knowledge transfer. Ranganathan and Sethi (2002) consider the centralization of IS decision making. They find that greater centralization of decision making reduces the level of shared IS and business knowledge.

We focus on the concept of joint governance of the IS resources by the IS unit and the business unit. Weill and Ross (2005) recently considered the idea of governance within the IS organization and focused on the level of decision making within the organization. We believe that joint governance between the IS and business unit is a more formalize perspective of Nelson and Cooprider’s mutual influence and captures the concepts considered by Ranganathan and Sethi (2002). Joint governance of the IS resources increases the involvement of the business organization in understanding the available set of IS resources and how they may best be configured to assist with the business strategies. This formalized governance approach may lead to additional needs to exchange and interpret information from each party leading to creation of shared understanding. Therefore, we hypothesize:

**H2**: The level of joint IS governance between the IS and Business units will be positively associated with the level of shared IS-Business understanding.

Levin and Cross (2004) also consider how trust may mediate the relationship between the strength of ties and the transfer of knowledge. They argue that strong ties may assist with the transfer of knowledge because relationships with strong ties tend to be trusting, and their empirical efforts find support for their hypothesis that trust mediates the relationship and that weak ties are more informative after controlling for the level of trust. Therefore, we also consider the opportunity for trust to mediate the relationship between a structural relationship mechanism, joint IS governance, and shared understanding.
**H3:** Mutual trusting beliefs between IS and Business units mediates the relationship between the level of joint IS governance and the level of shared IS-Business understanding.

Figure 1 demonstrates the research model investigated in this paper.

![Research Model](image)

**Research Methodology**

This study focuses on investigating potential antecedents for the concept of shared understanding and we have chosen to focus on the manufacturing industry and the relationship between IS organizations and manufacturing units. The manufacturing process was chosen as it is typically the most important processes within a manufacturing organization and the business process must be perceived as critical for shared understanding to be a concern of the business organization. Manufacturing processes are also traditionally large users of information systems and have been studied within prior work on IS and business relationships (Chan et al 1997; Nelson and Cooprider 1996).

**Questionnaire Development and Variable Operationalizations**

Our research methodology is based on the use of dual surveys of the manufacturing and IS organizations, similar to the work of Ray et al (2005). This study utilizes key informants within
the IS and manufacturing organizations to provide information about the organizations, the
manufacturing and IS relationship, and the resulting level of shared understanding.

Shared understanding is operationalized based on the recent work by Ray et al (2005). Three
questions are provided in the IS survey focused on understanding manufacturing’s knowledge
about the potential application of IT for efficiency and quality improvements. The
manufacturing survey also contains three questions which are on the IS units understanding of
the manufacturing operations and business strategies. Joint IS governance is measured using a
scale adapted from Ranganathan and Sethi (2002) and Weill and Ross (2004). This scale
includes four items focused on the level of involvement of the manufacturing organization in the
IS management activities. These questions are included on both components of the survey, and
the IS and manufacturing responses are averaged. Mutual trust (trusting beliefs) is conceived of
as a higher order multi-dimensional construct, comprised of three dimensions (mutual
competence-based trusting beliefs, mutual integrity-based trusting beliefs, and mutual-
benevolence-based trusting beliefs). Each of the dimensions of mutual trust is conceptualized as
second order construct grouping two first order construct: manufacturing unit’s perceived
trustworthiness by the IS unit along one of the three dimension, and IS unit’s perceived
trustworthiness by the manufacturing unit along the same dimension. We measure trust by using
questions include two questions each for competence, integrity and benevolence and are included
in the manufacturing and IS components of the surveys; however, the IS questions ask about the
perceived trustworthiness of the manufacturing unit and the manufacturing questions ask about
the perceived trustworthiness of the IS unit. We follow Diamantopoulos and Winklhofer (2001)
and Pavlou and Geffen (2005) to score the second-order constructs based on a principal
component analysis of the first-order constructs and score mutual trust based on a principal component analysis of the second-order dimensions of mutual trust.

Survey Validation

The majority of the survey items come from existing surveys which may reduce the concern about validity. However, the items come from separate instruments and there may be some concern as they are combined. Additionally, in some cases, the items have been rewritten to match the scales used throughout this survey. The survey validation efforts consisted of three steps: sorting exercise, external review, and initial pilot. The initial validation effort was a sorting exercise where participants were asked to match the individual items with the constructs

Figure 2: Conceptualization of Mutual Trust

Survey Validation

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1 We considered alternative conceptualizations of the mutual trust construct. All yield similar results throughout. The alternative models include: mutual trust as one-dimensional construct with all 12 indicators and mutual trust as
that they represented. Items which were incorrectly matched with the appropriate construct by the majority of the participants were reviewed and lead to rewording or elimination of items. The second step of the survey validation was to send the surveys to local manufacturing and IS professionals. The professionals were asked to complete the corresponding component of the survey and note any questions which were difficult to understand or may provide for uncertainty in what was being asked. After completion of the survey, a phone interview was utilized to solicit feedback on the survey questions. This validation process resulted in additional rewriting of items and elimination of a few items to simplify the questionnaires. The third step in survey validation was an initial pilot test with local manufacturing firms which would not be included in the actual survey. This initial test was used to perform initial convergent and discriminant analysis and as a result, some items were modified to be more consistent with items from prior literature.

**Sampling Frame**

Based on review of thresholds in prior literature, we require firms to have minimum sales revenue of $100 million. We believe this threshold is significant and identifies organizations who may be concerned with the interaction between IS and business units. The manufacturing industry contains many types of manufacturing industries (sic codes 2000-3999) and we wish to identify a subset of the manufacturing industries to achieve a sample with more similar characteristics. We use the Bureau of Economic Analysis input-output tables to identify the SIC code ranges of 34 through 39 as the manufacturing sub industries which are the heaviest users of IT relative to other expenditures.

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a two-dimensional additive (or multiplicative) construct involving two second-order constructs (IS unit’s trust in Manufacturing and Manufacturing unit’s trust in IS).
We focus on identifying managerial contacts in the information systems unit, who may forward the manufacturing component of the survey to the manufacturing managers. We utilize Top Computer Executives, Hoovers, and Dunn & Bradstreet to identify contacts in the information systems unit for 1019 firms. Through a search of Hoovers and Dunn & Bradstreet we are able to identify senior business executive contacts for 484 additional firms. This creates an overall sample of 1503 firms. Table 2 provides a breakdown of the sample by industry and by revenue.

<table>
<thead>
<tr>
<th>SIC</th>
<th># of Companies</th>
<th>Revenue Range</th>
<th># of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>209</td>
<td>$100-250 million</td>
<td>788</td>
</tr>
<tr>
<td>35</td>
<td>368</td>
<td>$250-500 million</td>
<td>296</td>
</tr>
<tr>
<td>36</td>
<td>381</td>
<td>$500-750 million</td>
<td>115</td>
</tr>
<tr>
<td>37</td>
<td>252</td>
<td>$750-1000 million</td>
<td>61</td>
</tr>
<tr>
<td>38</td>
<td>219</td>
<td>$1 billion +</td>
<td>243</td>
</tr>
<tr>
<td>39</td>
<td>74</td>
<td></td>
<td>1503</td>
</tr>
<tr>
<td></td>
<td>1503</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Sampling Frame

Data Analysis and Results

Survey Administration

The survey was initially sent out in two periods during 2005. The survey package included a cover letter and the IS and Manufacturing survey components. For those surveys sent to the IS executive, the cover letter identified the survey and requested their participation by completing the IS component of the survey and forwarding the manufacturing component to the manager responsible for manufacturing of the company’s primary product line. For the surveys sent to the senior executive, the cover letter requested them to forward the surveys to the IS and
manufacturing managers responsible for the primary product line\textsuperscript{2}. The second mailing was identical to the first mailing with the exception that 189 of the senior executive contacts were replaced with senior manufacturing contacts. This change to the contact list was made based on the response to the first mailing where companies were more likely to respond if the survey had been directed to the IS manager. This could be due to the fact that the survey did not have to be handed off from the senior executive to the IS and manufacturing managers. Additionally, the survey is focused on shared understanding between the IS and manufacturing units and they may be more interested in the results; therefore, the survey may appear more relevant when sent directly to senior IS and manufacturing leaders.

As possible, email addresses for the contacts were identified and targeted emails were sent to managers who had replied to the survey however their counterpart had not replied. These reminders asked the managers to check with their counterpart and request their participation on our behalf.

\textit{Survey Response}

The survey was initially targeted to 1503 companies; however, 111 companies were dropped from the sample for the reasons shown in table 4.1, reducing the overall sample to 1392 companies.

\textsuperscript{2} The surveys also provided the IS and manufacturing managers with the opportunity to complete the surveys online.
# of Companies | Reason for exclusion
--- | ---
11 | Contact not responsible for IS or manufacturing
17 | Contact no longer there
36 | Surveys returned / wrong address or contact information
18 | Declined – against policy
19 | Declined – no mfg or IS

**Table 3. Reasons why companies were eliminated from sample**

We received responses from 171 companies, representing a response rate of 12.3%. Of the 171 companies, 75 companies provided both the IS and manufacturing responses, 54 companies provide the IS component only and 42 companies provided the manufacturing component only. This level of response is similar to other survey studies which employ a matched relationship design with senior leadership participation (Ray et al 2005).

**Data Analysis**

The research questions are focused on the relationship between IS and manufacturing; therefore, we focus our analysis on the organizations that provided paired responses. Of the seventy-five paired responses, there are six which contain missing data thus reducing the sample for our analysis to 69 firms. The characteristics of these firms are shown in table 4.

<table>
<thead>
<tr>
<th>Average Revenues</th>
<th>$ 694 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average # of Employees</td>
<td>4,000</td>
</tr>
<tr>
<td>Average IS Budget</td>
<td>$ 17.7 million</td>
</tr>
<tr>
<td>Average # of IS Employees</td>
<td>253</td>
</tr>
<tr>
<td>Public (Private)</td>
<td>31 (38)</td>
</tr>
</tbody>
</table>

**Table 4 Paired Responses Descriptive Statistics**

Since our survey is the source of data for our analysis we perform several analyses to check for potential bias. We perform a factor analysis to ensure that information does not load on a
common factor and we find separate factors for our defined constructs. We have also performed Kolmogorov-Smirinov tests to examine for differences in responses between early and late responders, between online and mail responses, and between organizations where the survey package was sent to the CIO and organizations where the survey package was sent to the senior executive. We do not find any evidence that there are differences between the timing of the response, the method, or the original target. We also tested to examine if organizations with low shared understanding did not provide responses. We performed this test by comparing responses from organizations that provided paired responses with organizations that provided only the manufacturing or IS information. Again, we do not find evidence of a response bias.

The data analysis utilizes PLS*GRAPH to estimate the latent variable and test the path significance. PLS is a form of structural equation modeling tools; however, PLS is chosen as it works well with smaller sample sizes. In evaluating each latent variable there are two primary concerns, reliability of indicators and the convergent and discriminant validity of the latent variable. Reliability in PLS is measured by the composite reliability of the indicators. Prior literature does not suggest specific minimum threshold for composite reliabilities; however, other structural equation modeling techniques focus on cronbach alpha as a reliability measure and suggest a minimum of .7 (Nunnally, 1967). Table 5 provides descriptive statistics about the latent variables including reliability scores, and both the cronbach alphas and the composite reliabilities for each latent variable are well above the .7 threshold. As mutual trust is conceived of as a third order construct, we do not calculate a unique reliability score. The composite reliability and cronbach alpha measures listed for the mutual trust – integrity, mutual trust – benevolence and mutual trust – competence represent the reliability scores for the first order
components, IS trust in manufacturing and manufacturing trust in IS. We believe that this provides evidence that the scales should be considered reliable.\(^3\)

<table>
<thead>
<tr>
<th>Research Construct</th>
<th>Composite Reliability</th>
<th>Cronbach Alpha</th>
<th>min</th>
<th>max</th>
<th>avg</th>
<th>Stdev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint IS governance</td>
<td>0.922</td>
<td>0.886</td>
<td>1.50</td>
<td>4.38</td>
<td>2.99</td>
<td>0.75</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>**</td>
<td>**</td>
<td>2.42</td>
<td>4.92</td>
<td>3.86</td>
<td>0.53</td>
</tr>
<tr>
<td>Shared understanding</td>
<td>.875</td>
<td>.828</td>
<td>1.67</td>
<td>4.5</td>
<td>3.35</td>
<td>0.72</td>
</tr>
<tr>
<td>Mutual Trust – Competence</td>
<td>.954, .954</td>
<td>.900, .897</td>
<td>2</td>
<td>5</td>
<td>3.88</td>
<td>0.55</td>
</tr>
<tr>
<td>Mutual Trust – Integrity</td>
<td>.920, .916</td>
<td>.820, .800</td>
<td>2.75</td>
<td>5</td>
<td>4.21</td>
<td>0.51</td>
</tr>
<tr>
<td>Mutual Trust – Benevolence</td>
<td>.943, .927</td>
<td>.881, .843</td>
<td>2</td>
<td>5</td>
<td>3.48</td>
<td>0.75</td>
</tr>
</tbody>
</table>

** Mutual trust is a third order factor with mutual competence, mutual integrity and mutual benevolence as second order constructs. The reliability information shown for the second order constructs relate to the first order constructs of the trust dimension for IS and for the business.

Note: Min, max, avg., and standard deviation are presented based on the original survey scale of 1 to 5.

Table 5 Descriptive Statistics for Research Constructs

PLS modeling focuses on a confirmatory method of discriminant validity by examining that the square root of the average variance explained by a latent variable is greater than the correlation between that latent variable and any of the other latent variables in the model. Convergent analysis is confirmed by verifying that the correlations between the indicators and the latent variable that they represent should be greater than the correlation between the items and any other latent variable (Geffen and Straub 2005). Table 6 provides a correlation table of the latent

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\(^3\) We also check the item loadings for each latent construct and find them to be strongly significant.
variables with the value on the diagonal being the square root of the average variance explained. We find that the square root of the average variance explained is greater than the correlation between the latent variable and any of the other latent variables which would be included in the same model\(^4\). The item loadings have also been examined and we see that the items are loading higher on their intended latent variables than on any of the other latent variables.

<table>
<thead>
<tr>
<th>Research Construct</th>
<th>Joint IS governance</th>
<th>Mutual Trust</th>
<th>Shared understanding</th>
<th>Mutual Trust - Competence</th>
<th>Mutual Trust – Integrity</th>
<th>Mutual Trust – Benevolence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint IS governance</td>
<td>.866</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>.497</td>
<td>.860</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared understanding</td>
<td>.724</td>
<td>.699</td>
<td>.734</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual Trust - Competence</td>
<td>.236</td>
<td>.843</td>
<td>.491</td>
<td>.750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual Trust – Integrity</td>
<td>.550</td>
<td>.866</td>
<td>.685</td>
<td>.583</td>
<td>.767</td>
<td></td>
</tr>
<tr>
<td>Mutual Trust – Benevolence</td>
<td>.495</td>
<td>.878</td>
<td>.644</td>
<td>.608</td>
<td>.656</td>
<td>.764</td>
</tr>
</tbody>
</table>

Note: Values on diagonals are the square root of average variance explained by the construct

Table 6. Correlation table

Tests for Direct Effects

Figure 3 presents the results of the PLS model to test hypothesis 1 and hypothesis 2. Figure 3 indicates support for hypothesis 1 and hypothesis 2, as mutual trust and Joint IS governance are each positively and significantly associated with shared understanding.

\[^4\] The correlations between the third order mutual trust and the second order dimensions of trust are greater than the square roots of the average variance explained; however, mutual trust and the dimensions of trust are not included in the same analyses.
Figure 3: PLS Results for Mutual Trust

Figure 4 provides the results from an additional PLS model where mutual trust has been replaced by mutual competence-based trust, mutual integrity-based trust and mutual benevolence-based trust. The results from the model in Figure 4 indicate that mutual integrity-based trust is the significant predictor of shared understanding; whereas, benevolence-based trust and competence-based trust are not significantly associated with shared understanding. These results support hypothesis 1B, but do not support 1A and 1C.

Figure 4: PLS Results for Dimensions of Trust

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5 We also utilize OLS to test the models shown in figures 3, 4, 5 and 6 and find similar patterns of results. We check the results for multicollinearity and outliers and find no evidence of either. Proxies for the relationship tenure, size of the organization, centralization of IS services and reporting relationship to the CEO are added as potential controls. None of the controls are found to be significant in the models, and the same pattern of results is found for the trust and joint governance constructs.
**Mediation Tests**

Hypothesis 3 describes trust as a mediator between joint IS governance and the level of shared understanding, and our approach for the testing of mediation follows Baron and Kenny (1986). The correlation table (table 6) as well as the PLS model in figure 3 demonstrate that both mutual trust and joint IS governance are significantly associated with shared understanding. Figure 5 provides the complete model of mediation.

![Mediation Model Diagram](image)

**Figure 5. Test of Mediation**

Figure 5 demonstrates that there is a relationship between joint IS governance and mutual trust, as well as significant relationships between joint IS governance and shared understanding and between mutual trust and shared understanding. Consistent with hypothesis of mediation, the coefficient of the path between joint IS governance and shared understanding in figure 5 is greatly reduced from the correlation shown in table 6; however, the path between joint IS governance and shared understanding is significant therefore the mediation is partial. We believe that the evidence supports hypotheses 3, and the role of mutual trust as a mediator between the constructs of joint governance and shared understanding.
Figure 6 provides the results for a test of mutual trust as a mediator; however, the mutual trust construct is replaced with the dimensions of mutual trust. Figure 6 provides evidence that mutual integrity-based trust acts as a mediator of the relationship between joint IS governance and shared understanding. As the path between joint IS governance and shared understanding is significant in the model in figure 6, and the coefficient is reduced from the correlation in table 6, this indicates partial mediation (Baron and Kenny 1986).

**Exploratory Analysis**

The hypotheses and analysis put forward to this point have focused on the concept of mutual trust and how this factor may cause the exchange of information associated with increases in shared understanding. However, trust may be of different levels of importance for the business unit or the IS unit. Trustworthiness perceived from either party may increase the willingness of that party to either share knowledge or process information from the other organization. Therefore, we perform an exploratory analysis where we consider the level of trust from the IS group in the manufacturing group separately from the level of trust from the manufacturing group in the IS group. Figure 7 presents the results from the exploratory analysis. We find that
when joint IS governance is included in the model, the significant trust factor is manufacturing’s perspective of the integrity of the IS unit.

![Diagram showing PLS results for Exploratory Analysis]

**Limitations**

As with all research, this study has strengths and limitations. One of the key limitations includes the response rate and sample size. The response rate is modest compared to other survey research as the collection of data from a specific set of paired executive respondents may reduce the level of response. However, the dyadic nature of the shared understanding and mutual trust constructs requires a dual survey approach to understand the perceptions from a specific relationship (the manufacturing and IS units). We also perform power analysis on the main models and find that the model power is well above the .8 recommended threshold (Cohen 1988). The models have also been rerun dropping items that were highly insignificant to account for potential power issues, and the results are generally similar. For each individual predictor in
the main models, we look at the t-value and consider it as a difference of means test. Based on Cohen’s discussion of power for difference of means, we find that with our sample size a t-value of .5 would generate a .90 power. We find that the t-values for all the predictors are greater than .5 and result in power greater than .9. The results of these tests and the power analysis would conclude that though the sample size is limited, statistical power limitations for the models do not appear to be significant.

The resulting sample size does not appear to present a power issue for the models tested as we ran the analysis multiple times by removing individual factors and find the same pattern of results.

The survey method provides additional potential limitations. The cross-sectional data does not allow us to consider how trust is developed over time. The data allows us to only show evidence of association; it does not allow us to consider causality. Additionally, the survey was focused on manufacturing industry to reduce the potential for unexplained causes of variance; however, this may also limit the generalizability of the results to other industries. Future research may wish to focus on multiple industries and consider a longitudinal study which may be able to establish causality.

**Discussion and Conclusion**

Organizations continue to spend increasing amounts on information technology, and the results of previous research indicate that the salient factor in improving return from this investment is improved management of the IS and business unit relationship. Specifically, the development of shared understanding is one construct which has been identified in the literature as being associated with higher quality IS units, greater performing business units, and firm level success.
The purpose of this paper has been to focus on how two constructs, mutual trust and joint IS governance, may be associated with higher levels of shared understanding.

The primary contribution of this study is to further investigate the relationship between trust and shared understanding. Trust may be considered a multi-dimensional construct consisting of competence, benevolence and integrity; however, we find that it is the integrity component which is most significant in the association with shared understanding. The adherence to a set of principles by one organization may impact the willingness of the other organization to share information and knowledge as there is greater awareness of how the information will be used. Our findings suggest that competence-based trust is not significant as important. The realization of how important IT is to the organization may cause the business and IS units to continue to communicate and use other mechanisms to create shared understanding regardless of the perceived competence. Contrary to prior management literature, we do not find benevolence-based trust to be significant when we control for other dimensions of trust. We interpret these results to indicate that a greater willingness to share knowledge is induced by a general adherence to principles rather than a concern for either unit’s success. This may be due to the business unit and IS unit being concerned for the overall business success rather than a concern for the perceived quality of the IS unit or the manufacturing unit.

The second contribution of this paper is the consideration of how joint IS governance may also affect the level of shared understanding. We find that the structural activity of manufacturing and IS jointly managing the IS resources may increase the communication about the role of IT and is associated with shared understanding. We also find that the relationship between joint governance and shared understanding is mediated by trust, specifically integrity-based trust. We also find that the manufacturing unit’s perception of the IS unit’s integrity is the key factor. This
may be due to a perceived senior-junior partner relationship between manufacturing and IS units. The IS unit’s primary role is to serve the manufacturing unit and they may not require trust to be willing to share or process information; whereas, the manufacturing unit may be able to fulfill their needs through other resources and require the integrity of the IS unit to convince them to share critical knowledge.

This study has further investigated the role of trust within knowledge transfer; however, there are many additional research questions. Levin and Cross (2004) consider how the type of knowledge may impact effective knowledge transfer. One research question which has not been investigated is how the association between integrity-based trust and shared understanding is affected by knowledge type. Similarly, the level of importance of the information to the firm’s success may also impact the relationship between dimensions of trust and shared understanding. The understanding of the contextual factors which influence the development of shared understanding may assist managers with improving the relationship between IS and business and the return on investments in information technology.
References


Appendix

The following questions were used to measure the level of shared understanding, joint IS governance and the dimensions of trust. Participants provided their response to the following questions based on a scale of 1 (not at all) to 5 (very greatly).

Shared understanding

The following questions were included on the manufacturing unit survey:
- The IS unit understands the improvement objectives of the manufacturing unit.
- The IS unit understands the operational procedures and practices of the manufacturing unit.
- There is a common understanding between the IS unit and the manufacturing unit regarding the role of IS in meeting new manufacturing objectives.

The following questions were included on the IS unit survey:
- The manufacturing unit recognizes IS as a tool to increase their productivity (efficiency).
- The manufacturing unit recognizes IS as a tool to increase their product and process quality.
- There is a common understanding between the IS unit and the manufacturing unit regarding the role of IS in meeting new manufacturing objectives.

Joint IS Governance

The following questions were included on the manufacturing and IS unit surveys. Responses from the two survey components were averaged to form a single indicator.
- Manufacturing personnel are actively involved in decisions about information technology infrastructure (hardware, networks and technology platforms).
- Manufacturing personnel are actively involved in establishing IS unit priorities.
- Manufacturing personnel are actively involved in choosing business application software.
- Manufacturing personnel are actively involved in IS project management decisions.

Trust

The following questions were included on the manufacturing (IS) unit surveys
- The IS (manufacturing) unit is a capable and proficient unit.
- The IS (manufacturing) unit possesses the appropriate skills to work effectively.
- The IS (manufacturing) unit works with the manufacturing unit openly and honestly.
- The IS (manufacturing) unit displays ethical behavior and integrity.
- We trust that decisions made by the IS (manufacturing) unit will be in the manufacturing (IS) unit’s best interest.
- The IS (manufacturing) unit is concerned about the well-being of the manufacturing (IS) unit, not just its own.