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Distinguishing the effects of B2B information quality, system quality, and service outcome quality on trust and distrust

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ABSTRACT

Successful business-to-business (B2B) data exchanges can help firms improve inter-organizational cooperation and operational practices, thereby increasing competitive advantage. However, data exchange quality and trust are not assured. Further, although researchers have examined how trust in the exchange partner relates to data exchange system success, both trust and distrust may be important to consider. Using two-factor theory and trust theory, we examine the differential impacts of information quality, system quality, and service outcome quality on trusting and distrusting beliefs. We also study whether trusting and distrusting beliefs have differential influences on relationship commitment and perceived risk. Results from a laboratory experiment show that information quality, a process (i.e., motivating) factor, more strongly influences trusting beliefs than distrusting beliefs, whereas service outcome quality, an outcome (i.e., hygiene) factor, more strongly influences distrusting beliefs. Also, while trusting beliefs has a significantly stronger influence on relationship commitment, trusting and distrusting beliefs have equivalent effects on perceived risk. Implications and ways to expand this research are discussed.

Introduction

Internet and electronic commerce applications are allowing businesses to use information technology (IT) to manage B2B activities and create competitive advantage (Ho et al., 2011). These technologies range from standard web-based ordering systems to elaborate proprietary systems (Hart and Saunders, 1998; Lippert, 2007; Nicolaou and McKnight, 2006; Nicolaou et al., 2013; Ratnasingam, 2001). Forrester Research recently reported that the B2B e-commerce market alone is more than twice the size of online retail, and is expected to top $1.1 trillion by 2020.[1] Online B2B data exchanges are beneficial to organizations because they can enhance buyer and seller cooperation, and potentially improve their operational performance (Madlberger, 2006). According to a real-life B2B data exchange participant, these systems can help exchange partners: (1) establish visibility; (2) change manufacturing schedules; (3) improve inventory control; (4) reduce carrying costs; and (5) increase customer order fulfillment satisfaction (Lippert, 2007). These make B2B data exchanges critical strategic information systems.

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[1] https://www.internetretailer.com/2015/20/23/groundbreaking-survey-b2b-e-commerce.

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0963-8687/

However, some researchers find that B2B data exchange systems do not achieve these benefits, and can even damage inter-organizational coordination efficiency (Clemons and Row, 1993) and customer service performance (Closs and Savitskie, 2003; Wong et al., 2011–12). Two factors emerge in the literature as being among the most important for ensuring the benefits of online B2B data exchange relationships. The first is quality. Purchasing is often the main point of contact in inter-organizational relationships, and to remain competitive businesses must focus their strategy on improving quality, responsiveness, and delivery performance (Kannan and Tan, 2003; Prakash, 2011). Enhancing process and delivery quality can improve partner relationships and operational efficiency, and can positively impact the competitiveness of the entire supply chain (Prakash, 2011). However, quality is sometimes inadequate in B2B data exchange system relationships (Lippert, 2007; Nicolaou and McKnight, 2006). Low quality can have drastic consequences like lost orders, increased claims, lower prices, delayed payments, and generally lower supplier ratings (Guonaris, 2005; Mehta and Durvasula, 1998). Thus it is crucial to investigate how quality influences data exchange partner perceptions and intentions.

The second vital factor for ensuring the benefits of B2B data exchange systems is trust.[2] Trust is necessary in data exchange relationships because such relationships involve uncertainty and risk. Uncertainty and risk exist because business partners experience less personal contact, increased technical changes and competitive pressures, and unknown future events (Ratnasingam, 2005). Research shows trust in the exchange partner can help alleviate uncertainty and increase favorable perceptions about the data exchange system and the relationship as a whole (Ibrahim and Ribbers, 2009; Morgan and Hunt, 1994; Lippert, 2007; Nicolaou and McKnight, 2006; Nicolaou et al., 2013; Ratnasingam, 2001).

However, distrust may also be important to data exchanges. Trusting beliefs are perceptions of the exchange partner's positive trust-related attributes, whereas distrusting beliefs are perceptions of the exchange partner's negative trust-related attributes. Trusting beliefs and distrusting beliefs are distinct constructs that can exist simultaneously (Dimoka, 2010; Lewicki et al., 1998), and both may be important to understand in this context. For example, researchers find through interviews that while trust is important in well-functioning buyer-seller relationships, distrust is also vital for questioning things and not taking them for granted (Seppänen and Blomqvist, 2006). Others suggest that sustained high trust and high distrust is not uncommon in complex organizational relationships, and may require partners to use controlling actions because of distrust's effects (Lewicki et al., 1998). This makes it critical to know what factors influence both trusting and distrusting beliefs in B2B data exchange relationships.

Based on this, our main research objective is to understand the complex relationships among quality, trust, and distrust. We extend the Nicolaou and McKnight (2006) theoretical model that depicts the roles of information quality and trusting beliefs in inter-organizational data exchange relationships (Fig. 1). While their model includes only trusting beliefs, we add distrusting beliefs to account for buyers' beliefs about both the vendor's positive and negative attributes (Fig. 2). Also, while Nicolaou and McKnight (2006) focus solely on information quality, we extend their work to also include system quality and service outcome quality. While previous studies investigate the impacts of system, information, and service quality on trusting beliefs (Kim et al., 2004; Nicolaou and McKnight, 2006; Zhou, 2011b, 2012), no work to our knowledge has examined the impact of all three quality factors on trusting and distrusting beliefs in a B2B data exchange context. But all three types of quality are important because of intensive pressures to remain competitive (Kannan and Tan, 2003; Prakash, 2011), and because they may differentially impact trusting and distrusting beliefs. Based on Herzberg et al.'s (1959) two-factor theory that distinguishes between service process and service outcome quality (Chen and Kao, 2010; Collier and Bienstock, 2006; Mentzer et al., 2001), we predict differential effects of these three quality-related factors on trusting and distrusting beliefs. We also propose and test differential influences of trusting and distrusting beliefs on two exchange outcomes: relationship commitment and perceived risk.

We investigate our research model using a laboratory experiment that is intended to help create variance in quality. The experimental design places subjects in the role of a purchasing manager for a large manufacturing company who is using a system modeled after real-life B2B data exchange systems. The experimental materials include a number of B2B contextual attributes not only to help the subjects role-play, but also to ensure the context is distinguishable from a B2C context (Table 1). This is important because B2B and B2C contexts differ widely in terms of purchase objectives, decision complexity, payment, products, and supplier relationships. B2B purchasing for example, is often for raw materials to be used in manufacturing rather than for finished goods to be used personally as in B2C purchasing (Kaplan and Sawhney, 2000).[3] Also, B2B purchasing decisions are often more complex because they can involve more people (functional areas) than B2C purchasing decisions (Oliveira and Roth, 2012). Further, researchers suggest that trust can be perceived differently based on these differences (Sirdeshmukh et al., 2002). Hence, it is important to ensure our experimental design simulates a B2B context. Table 1 shows that our procedures usually do so, either partly or fully.

This study potentially contributes to strategic information systems theory and practice by examining the differential effects of quality, trust and distrust on data exchange system user perceptions and intention to use. Little work has investigated the influence of all three quality factors on trust and distrust in any context, yet all are important for understanding

[2] The general term "trust" includes both trusting beliefs and trusting intention (Rousseau et al., 1998). The term "trust" is used often in the information systems literature (e.g., Gefen et al., 2003a) to refer to the more specific construct "trusting beliefs" (perceptions about the positive attributes of the trustee), usually comprised of benevolence, integrity, and competence. Hence when talking from or about the literature, we use the terms "trust" and "distrust." We also use "trust" and "distrust" in conveying our practical implications. But we use "trusting beliefs" when hypothesizing, measuring, or reporting on the specific operationalization of trust in this paper.

[3] http://smallbusiness.chron.com/differences-between-b2c-b2b-business-systems-39922.html.

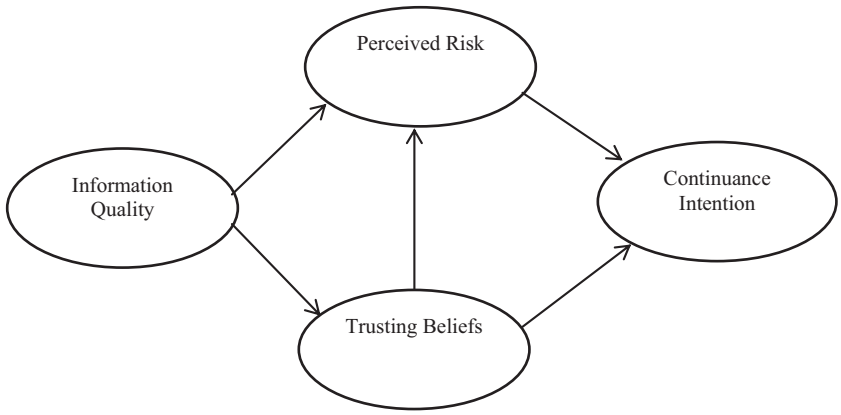

Fig. 1. Trust in Inter-Organizational Data Exchanges (Nicolaou and McKnight, 2006).

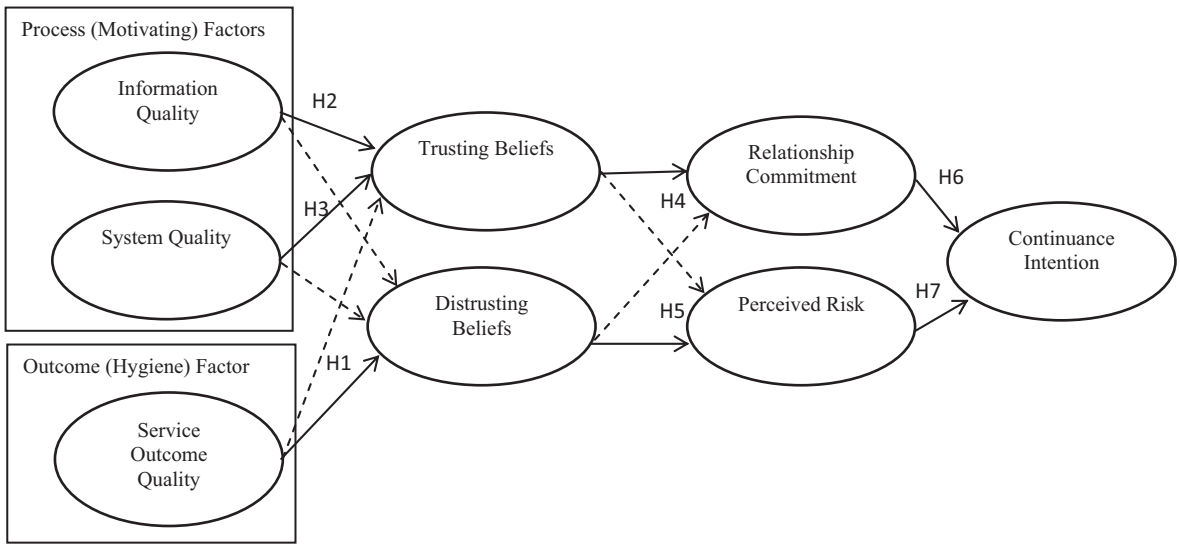

Fig. 2. Research model.

continued use of these strategic systems. We demonstrate that in a B2B context there are strong differential effects of information quality and service outcome quality on trusting and distrusting beliefs. We also show how trusting and distrusting beliefs in the exchange partner differentially influence continuance intentions. This study is an initial attempt to unravel some online B2B data exchange system relationship complexities.

Theoretical background

Trust and distrust

Trusting beliefs are perceptions of the other party's positive trusting attributes, which usually include benevolence, integrity, and competence (McKnight et al., 2002a). As defined by Mayer et al. (1995), benevolence is the belief that a trustee wants to do good to the trustor aside from an egocentric profit motive. Integrity is the belief that the trustee adheres to a set of principles that the trustor finds acceptable. Finally, competence is the belief that the trustee has the skills, competencies, and abilities to have influence within some specific domain.

Table 1
B2B contextual attributes examined in our study.

B2B contextual attributes	Examined in our study
Purchase objective	
Products are purchased for company use versus personal use.[a]	Yes. The experimental materials tell subjects they are a purchasing manager at a metal stamping manufacturing plant making a purchase of materials required in the production process.
Considers a broader view of the entire supply chain to better understand the full ownership experience, from suppliers to intermediaries to end users.[b]	Partly. The experimental materials mention that subjects are buying materials to be used in production to make products for large industrial customers. They state that the plant operates in a just-in-time format and that they need to have the raw materials in stock in five business days. The goal is to receive the materials on time.
Decision complexity	
Involves a larger decision-making group including members from technical, business, financial, and operational areas.[b]	Partly. The experimental materials do not discuss others being involved in the decision. They do mention that the product must be bought "according to specifications," which implies others are involved in deciding what to buy.
Purchasing agent may not be the end user or the person authorizing the purchase.[a,b]	Partly. The experimental materials say that the plant produces products for large industrial customers, implying the subject acting as the purchasing agent is not the end user. However, the materials do not address authorization.
Payment	
Price may vary by customer depending on size of the order or other negotiated special discounts.[a]	No. The experimental materials do not address any variations in price.
Purchasing agents do not pay at the time of the order, but receive an invoice which they settle with agreed payment terms.[a]	Yes. During the experiment the subject is not required to pay (or process payment) at the time of the order.
Product	
Includes either manufacturing inputs (raw materials) or operating inputs (finished goods and supplies).[c]	Yes. The subject is purchasing manufacturing inputs (aluminum sheets) and is told and reminded multiple times that they are purchasing raw materials.
Products are of high value (volume and price).[b]	Yes. The volume of materials is 5000 5′ X 8′ sheets of aluminum at a price appropriate for valuable industrial raw materials.
Relationship with supplier[b]	
Can be either systematic sourcing that involves negotiated long term contracts with qualified suppliers, or spot sourcing that rarely involves long term contracts where the buyer's goal is to fulfill an immediate need at the lowest possible cost and the supplier may be unknown (often used for purchasing commodities).[c]	Partly. The experimental materials do not mention systematic or spot sourcing. They do refer to the supplier relationship by saying that in the past they have placed telephone and fax orders from this supplier. Using the new exchange system will allow the subject to participate in the supplier's network and achieve future cooperation that will be beneficial to them and the supplier.

[a] http://smallbusiness.chron.com/differences-between-b2c-b2b-business-systems-39922.html
[b] Oliveira and Roth (2012).
[c] Kaplan and Sawhney (2000).

In this study, we examine both trusting and distrusting beliefs. Traditional trust research conceptualizes trust and distrust as bipolar opposites of a single dimension (Rotter, 1967), such that low trust is considered the same as high distrust. However, many researchers now treat trust and distrust as two separate constructs (Lewicki et al., 1998, 2006). Distrust is not just low trust or the absence of trust, but instead is the active belief that the other party will behave in a way that violates one's welfare and security (Cho, 2006). As such, distrusting beliefs are defined as one's beliefs about the other party's undesirable or negative attributes (Lewicki et al., 1998). The distrusting belief attributes hold the opposite valence of the trusting belief attributes and include malevolence, deceit, and incompetence (Moody et al., 2010). Based on Moody et al. (2010), we define malevolence as the trustor's belief that the trustee has the intention to harm the trustor. Deceit is the belief that the trustee is dishonest and potentially provides false information. Incompetence means the belief that the trustee lacks the ability to accomplish a task.

Table 2 presents studies that have investigated both trust and distrust in various contexts. Some examine trust and distrust's theoretical nature both within trust's nomological network (McKnight and Chervany, 2001; Moody et al., 2010), and within other theoretical frameworks (Singh and Sirdeshmukh, 2000; Sitkin and Roth, 1993; Vlaar et al., 2007). Others are empirical studies that include both trust and distrust. These studies generally find that trust and distrust are distinct constructs as demonstrated by their discriminant validity and by differential relationships with their antecedents and consequents (Benamati et al., 2006, 2010; Cho, 2006; Dimoka, 2010; Komiak and Benbasat, 2008; Lee and Huynh, 2005; McKnight et al., 2004; McKnight and Choudhury, 2006; Moody et al., 2015; Ou and Sia, 2009, 2010). Despite the growing research, this review shows that more work is needed to examine the differential relationships trust and distrust have with other variables.

Table 2
Example research on trust/distrust.

Study	Trust/distrust variables	Antecedents[a] to trust/distrust variables	Consequents[a] of trust/distrust variables	Findings
Theoretical studies				
McKnight and Chervany (2001)	Disposition to trust/distrust, institution-based trust/distrust, trusting/distrusting beliefs,trust/distrust intention	na	na	Outlines the components of trust and distrust within the nomological trust network. Proposes that just as trust has dispositional, institutional, belief, intentional, and behavioral types, so does distrust
Moody et al. (2010)	Disposition to trust/distrust, institution-based trust/distrust, trusting/distrusting beliefs (net), trust/distrust intention (net)	na	na	Presents a unified trust-distrust model that incorporates the idea of "net" trusting and distrusting beliefs and intentions, in which each dimension (e.g., competence) represents a distinct trust-distrust continuum
Singh and Sirdeshmukh (2000)	Trusting/distrusting beliefs	na	na	Uses trust and agency mechanisms to show how trust and distrust beliefs may differentially relate to disconfirmation, expectations, satisfaction, and loyalty
Sitkin and Roth (1993)	Trusting/distrusting beliefs	na	na	Uses a case illustration to show that trust is violated by unmet expectations concerning context-specific task reliability, and distrust is engendered by unmet expectations concerning general value congruence. Trust can be increased and distrust decreased by the use of bureaucratic legalistic responses
Vlaar et al. (2007)	Trust/distrust beliefs,trust/distrust intention	na	na	Proposes that trust and distrust can impact formal coordination and control, inter-organizational performance, and the interpretations that managers attribute to the behavior of their partners
Empirical studies				
Benamati et al. (2006, 2010): a survey of online banking users	Trust/distrust beliefs, trust/distrust intention, trust/distrust disposition	na	Use Intention	Trust and distrust are distinct constructs. Trust intention influences intention to use, but distrust intention does not. Trustworthiness influences trust and distrust intention. Disposition to trust (distrust) influences trust (distrust)
Cho (2006): a web survey of book and clothing web-sites	Trust/distrust beliefs	na	Self-disclosure, willingness to commit	Benevolence impacts trust more significantly than competence, while competence affects distrust more than benevolence. Distrust affects self-disclosure more significantly than does trust. Trust affects willingness to commit more than distrust
Dimoka (2010): a lab experiment with students of a U. S. university performing tasks with/without a fMRI scanner	Trust/distrust beliefs, credibility, benevolence, dis-credibility, malevolence	na	Price premiums	The psychometric data does not clearly distinguish between trust and distrust. The brain data suggests that trust and distrust and their dimensions are distinct, and activate different brain areas, which predict price premiums

Table 2 (*continued*)

Study	Trust/distrust variables	Antecedents[a] to trust/distrust variables	Consequents[a] of trust/distrust variables	Findings
Komiak and Benbasat (2008): a verbal protocol analysis based on an experiment varying personalization of a recommendation agent.	Trust/distrust beliefs	Information sharing, awareness of the unknown, control, interface attraction verification, and expectation	na	The trust-building process is systematically different from the distrust-building process, and the trust-building (distrust-building) processes are similar under different levels of perceived personalization. The trust-building process includes information sharing evaluation, verification, and expectation evaluation. The distrust-building process includes awareness of the unknown interpretation, and expectation evaluation
Lee and Huynh (2005): a field survey of customers	Disposition to trust/distrust Mutual trust	na	na	Disposition to initial trust predicts mutual trust, and disposition to initial distrust does not
McKnight et al. (2004): a survey of users of a legal advice website.	Disposition to trust/distrust	na	Web site quality, willingness to explore the site, and trusting intention	Disposition to trust better predicts low-risk perceptions while disposition to distrust better predicts high-risk perceptions. The number of individuals that are cognitively inconsistent (high trust/high distrust or low trust/low distrust) is significant
McKnight and Choudhury (2006): a survey of students using a legal website	Institution-based trust/distrust (structural assurance), trust/distrust beliefs,trust/distrust intention	na	(Un)Willingness to follow, (un)willingness to share information, (un) willingness to purchase, perceived usefulness	Trust beliefs and intentions are distinct from distrust beliefs and intentions. Structural assurance predicts trust beliefs significantly better than no structural assurance, and no structural assurance predicts distrust beliefs significantly better than structural assurance. The comparative influence of trust and distrust intention on the dependent variables varies
Moody et al. (2015): free-simulation experiment and survey of users of a consumer website.	Trust/distrust beliefs, trusting intention	na	Ambivalence	Trusting belief and distrusting belief components interact when predicting trusting intention and ambivalence
Ou and Sia (2009, 2010): online survey of users of Web sites selling digital products, such as cameras, PDAs and MP3 players	Trust/distrust beliefs	Motivating perception, and functional perception	Buying intention	Functional perception significantly predicts distrust whereas both functional and motivating perception influences trust. Distrust has a stronger influence on buying intention than trust. The number of individuals that are cognitively inconsistent (high trust/high distrust or low trust/low distrust) is significant

[a] These are variables outside the trust nomological network.

Theoretical foundations

Two theoretical foundations for this study are trust theory and two-factor theory. Trust theory contends that trusting and distrusting beliefs may have differential relationships with other variables because not only do they differ based on perceptions of the other's positive or negative attributes, but they also differ in emotion (Lewicki et al., 1998; McKnight et al., 2004). Trust is associated with more calm and collected emotions like hope, safety, assurance, and confidence, whereas distrust embodies significant levels of fear, doubt, worry, panic, paranoia, and anger (McKnight and Chervany, 2001; McKnight et al., 2004). Trust reflects a calm state because it reduces complexity, whereas distrust by itself does not (McKnight and

Chervany, 2001). One deals with distrust by defining one's partner as the enemy, escalating controls, or building up emergency reserves. High distrust can lead to a frantic or tense state reflecting "the emotion-charged human survival instinct" (McKnight and Chervany, 2001, p. 884).

Differences between trust and distrust are further illustrated by comparing low trust and high distrust. Low trust is characterized by passivity, hesitance, and low confidence and hope, whereas high distrust is characterized by fear, skepticism, cynicism, and vigilance (Lewicki et al., 1998). This makes high distrust more negative and intense than low trust. Likewise, low distrust is characterized by no fear, absence of skepticism and cynicism, and no vigilance, which are more negatively oriented and less calm than hope, faith, confidence, and initiative, which characterize high trust (Lewicki et al., 1998).

The idea that the emotion related to distrust is stronger or more passionate than that related to trust is consistent with other theories as well. For example, it is consistent with prospect theory, which contends that people focus on losses more than gains because the disutility caused by losses is greater than the utility caused by equivalent gains (Kahneman and Tversky, 1979). It is also consistent with the general psychological principle "bad is stronger than good" that posits individuals will react more strongly to bad things as an adaptive response to their environment (Baumeister et al., 2001).

The second theoretical basis for our study is two-factor theory, also known as motivation-hygiene theory (Herzberg et al., 1959). This theory has been applied to service contexts (Chowdhary and Prakash, 2005), and to trusting and distrusting beliefs (Ou and Sia, 2009, 2010), which makes it particularly relevant to our study. Herzberg et al. (1959) developed this theory by studying people's attitudes towards their jobs. They asked accountants and engineers to describe times they felt exceptionally good or bad about their jobs. They found that people mentioned different factors when describing times they were satisfied with their jobs than when describing times they were dissatisfied. For example, people mentioned job achievement more often when describing times they felt good about their jobs, and they mentioned company policy and administration more often when describing times they felt bad.

These findings supported their main hypothesis that the factors leading to positive attitudes are different from the factors leading to negative attitudes (Herzberg et al., 1959, p. 29). They called the factors that were more likely to influence satisfaction, motivating factors, and the factors more likely to influence dissatisfaction, hygiene factors. Motivating factors give employees a sense of achievement and allow them to experience personal growth, while hygiene factors relate to employees' built-in drive to avoid pain from the environment (Herzberg, 1968).[4]

Two-factor theory has been used to investigate web design quality and service process quality (Johnston, 1995; Loiacono et al., 2007; Ou and Sia, 2009, 2010). This research focuses on customer evaluations about the interactive ordering process in B2C contexts. However, researchers acknowledge that both B2C and B2B service quality involve both process factors relating to the ordering process and service outcome factors relating to the service delivery (Chen and Kao, 2010; Collier and Bienstock, 2006; Mentzer et al., 2001). These researchers report that although consumers are concerned about Web site interactivity during ordering, their main concern is delivery. If an e-vendor fails to deliver the product or service in the manner desired, then Web site interactivity evaluations will mean very little (Collier and Bienstock, 2006).

Service literature that investigates both process and outcome factors classifies process factors as motivating factors, and service outcome factors as hygiene factors (Hui et al., 2004).[5] Process factors are motivating in the sense that they are sought-after service differentiators that motivate the customer to use one's services as opposed to those of a competitor (Chowdhary and Prakash, 2005). While higher quality ordering processes will lead to higher satisfaction and lower quality processes will lead to lower satisfaction, lower quality processes will not influence dissatisfaction as much because buyers are generally more tolerant to a not-so-good ordering process (Chowdhary and Prakash, 2005). This fits Herzberg's (1968) conceptual definition of a motivating factor (see above).

Service outcome factors are hygiene factors because they are taken for granted "must-haves." For example, an outcome such as delivery is considered a basic and essential part of the service (Chowdhary and Prakash, 2005). Customers would not be willing to accept inadequate performance on deliveries (e.g., untimely, inaccurate, or incomplete deliveries). Poor delivery performance can leave customers dissatisfied and even drive them away (Chowdhary and Prakash, 2005; Hui et al., 2004). Outcome factors cannot be classified as motivators because they do not differentiate among vendors. Rather, customers want *every* vendor to at least deliver the product. Thus, delivery performance will have a stronger influence on dissatisfaction than on satisfaction. Dissatisfaction will increase as delivery performance gets worse and will decrease as delivery performance gets better. This fits Herzberg's (1968) conceptual definition of a hygiene factor as described above.

While two-factor theory has typically been used in satisfaction and dissatisfaction studies (Herzberg et al., 1959; Matzler and Sauerwein, 2002), it can also be used to study other positive- and negative-valent perceptions, such as trusting and distrusting beliefs (Ou and Sia, 2010). Ou and Sia (2010) argue this connection exists because prior research shows that trusting and distrusting beliefs, much like satisfaction and dissatisfaction, are influenced by different factors (e.g., Komiak and Benbasat, 2008). Lewicki et al. (1998) argue that "there are elements that contribute to the growth and decline of trust,

[4] This is generally consistent with expectation-disconfirmation theory research. Because people expect hygiene factors whereas motivating factors are more unexpected, hygiene factor expectations may be higher than motivating factor expectations. In turn, unmet hygiene expectations would lead to stronger negative disconfirmation than unmet motivating factors, thereby influencing dissatisfaction more than satisfaction. Unmet motivating factors having weaker disconfirmation would influence satisfaction more than dissatisfaction. This notion is supported in the B2B trust context as Seppänen and Blomqvist (2006) find that unmet buyer expectations were the main source of supplier distrust.

[5] This literature calls motivating factors vantage factors, and hygiene factors qualifying factors (Chowdhary and Prakash, 2005; Hui et al., 2004; Johnston, 1995).

and there are elements that contribute to the growth and decline of distrust" (p. 440). This is consistent with the premise of two-factor theory that certain factors will be more likely to affect positive-valent perceptions, while other factors will be more likely to affect negative-valent perceptions (Ou and Sia, 2010).

Research model and hypothesis development

Our research model incorporates antecedents and consequents of both trusting and distrusting beliefs to show how they operate differently in a B2B data exchange environment (Fig. 2). Extending the model by Nicolaou and McKnight (2006) (Fig. 1), we include information, system, and service outcome quality. Based on two-factor theory, we hypothesize that these quality factors will have differential effects on trusting and distrusting beliefs (H1–3). We also extend Fig. 1 model by examining relationship commitment (Morgan and Hunt, 1994), in addition to perceived risk, as a trusting and distrusting belief outcome. Based on trust theory, we predict differential effects of trusting and distrusting beliefs on these two variables (H4 and 5), and predict that both relationship commitment and perceived risk will influence usage continuance intention (H6 and 7).

Differential effects of antecedents on trusting and distrusting beliefs

In our study, quality represents B2B exchange performance in terms of perceived information quality, system quality, and service outcome quality.[6] Quality can impact trusting and distrusting beliefs because people make trust-related assumptions based on what they know (McKnight et al., 2002a).[7] Information quality is defined as the merit or excellence of a system's informational content (Xu et al., 2013). Information quality dimensions can be intrinsic or contextual. Intrinsic information quality is the agreement between the data values presented by the system and the actual values the data represents in the real world, and is depicted by the data's accuracy (Nelson et al., 2005). Contextual information quality measures the degree to which the information is helpful in completing a particular task—for example, its relevance, completeness, and currency. While information quality is related to information content, system quality relates to the information processing system that produces the information (Nelson et al., 2005). System quality refers to a system's technical characteristics including its usability and accessibility (Xu et al., 2013). Finally, service outcome quality has been defined as a judgment relating to the results or consequences associated with the encounter (Ma and Dubé, 2011). Service outcome quality is operationalized in our study as order fulfillment or the extent to which one perceives that promises made about order delivery are fulfilled (Parasuraman et al., 2005). In this way, it represents the functional terms of the service, such as timely and complete deliveries (Ma and Dubé, 2011).

We classify information quality as a motivating factor based on the conceptual definition of motivating factors (as discussed earlier) and on prior research. It is a motivating factor because it helps the buyer evaluate data exchange performance during the ordering process when the buyer is interacting with the vendor and/or the vendor's system (Chen and Kao, 2010; Hui et al., 2004). Information quality motivates buyers because it enhances their tasks during the ordering process (Lee et al., 2009). For example, providing relevant information, such as detailed product descriptions, quantities on hand, and information about related products can make ordering a more pleasant and interesting process. Information quality can also differentiate vendors because information qualities such as accuracy, consistency, and completeness during the ordering process can encourage purchasing agents to continue using the supplier's services over a different vendor whose information does not have these qualities. Further, buyers may be able to overlook incomplete or inaccurate information during ordering, at least much more so than failures in service outcomes/deliveries (Collier and Bienstock, 2006). Classifying information quality as a motivating factor is also consistent with prior service research (Chen and Kao, 2010; Collier and Bienstock, 2006; Lee et al., 2009).

We classify system quality as a motivating factor for similar reasons. Like information quality, system quality differentiates the exchange while customers are interacting with the website during the ordering process (Chen and Kao, 2010). Further, system quality factors are motivating because they relate to making the service process more efficient and pleasant (Chen and Kao, 2010). System qualities like response time, navigation, and ease of use make a system more end-user friendly, thereby enhancing and improving the ordering process (Chow, 2004). A system that is easy to use and navigate can differentiate in buyer-seller relationships. Similar to what we argued for information quality, customers may overlook an ordering process with a system that is harder to navigate more so than they will overlook poor service outcomes. Classifying system quality as a process factor is also consistent with other research (Chen and Kao, 2010; Lankton and McKnight, 2012; Rafiq et al., 2012)

Finally, we classify service outcome quality as a hygiene factor because purchasing managers will take it for granted that products are delivered. They will consider delivery factors such as on-time and accurate delivery of a purchase order to be a

[6] Some researchers in addition to quality performance also investigate quality expectations and disconfirmation (e.g., McKinney et al., 2002). However, doing so is beyond the scope of this research. Only examining quality 'performance' is consistent with Nicolaou and McKnight's (2006) model that we use for our baseline model. Investigating only quality performance also follows other studies examining how information, system, and service quality impact trusting beliefs (Kim et al., 2004; Zahedi and Song, 2008; Zhou, 2011a,b).

[7] In developing our hypotheses, we treat trusting and distrusting beliefs as unitary concepts. Although information, system, and service outcome quality may relate to the separate components of trusting beliefs (i.e., integrity, benevolence, and competence), studies show that quality factors can also influence the unitary trust concept (Kim et al., 2004; McKnight et al., 2002a). This approach is consistent with the conceptual definition of trusting beliefs as the belief that the other party has positive attributes.

normative standard for performance. It is not a differentiator because buyers will expect all suppliers to have adequate, if not high, fulfillment performance. This coincides with the conceptual definition of hygiene factors (Herzberg, 1968).

The B2B literature is consistent with prior research related to these motivator/hygiene classifications. For example, Mentzer et al. (1997) discuss how logistics value was once solely a function of delivery attributes like delivery timeliness and quality. However, this basic quality has now been broadened to include numerous value-added tasks including those involved in the ordering process to maintain customer service and competitiveness (Mentzer et al., 1997). Thus, product delivery is an important component of customer service just to maintain the status quo (a hygiene factor), and (like motivators) the value-added services can provide competitive advantage in the marketplace (Gordon, 1989). In another study, purchasing managers explained that delivery performance (e.g., accurate and on-time delivery) is a "must-have" (p. 123) or core offering of key suppliers (hygiene factors) (Ulaga and Eggert, 2006). Qualities like information provision as a component of service support and order handling were considered differentiating suppliers (motivators). Because some suggest accuracy and timeliness of information in supply chains is notoriously poor (Li and Lin, 2006), increasing information quality could be a differentiator. These studies support information and system quality as motivating (process) factors and service outcome quality as a hygiene (outcome) factor.

Based on these conceptual classifications, we predict differential effects of the quality factors on trusting and distrusting beliefs. We first predict that service outcome quality will have a stronger influence on distrusting beliefs than trusting beliefs. The reason for this is that poor service outcome quality will make one more inclined to believe the alliance partner does not have trustworthy characteristics. Good service outcome quality lessens distrusting beliefs and makes the data exchange experience seem more ordinary and standard—no delays or inaccuracies in delivery. Good service outcome quality will not greatly affect buyers' perceptions of the vendor's trustworthy characteristics.

B2B trust research supports this prediction. Similar to how Herzberg et al. (1959) asked employees to describe good and bad things about their jobs, Seppänen and Blomqvist (2006) asked organizational buyers to describe well-functioning and poorly-functioning buyer–supplier relationships. The most frequently mentioned factor in poorly-functioning relationships was unreliable deliveries (delays, quality problems, delivering the wrong product). This supports the notion that service outcome quality will have a larger influence on distrusting beliefs than trusting beliefs. Further, researchers find that disruptions, including delivery failures, increase a firm's dissatisfaction with a supplier because of the many negative outcomes these failures can produce (Bode et al., 2011; Primo et al., 2007). Firms may also react to these disruptions by questioning their lack of control over the exchange, and the stability of the exchange itself (Bode et al., 2011), which in turn could also increase a firm's distrusting beliefs in the supplier. Finally, because service outcomes are also closely associated with emotion (Dabholkar and Walls, 1999; Johnson et al., 1998), they might evoke stronger emotions such as those associated with distrusting beliefs (fear, doubt, worry, panic, paranoia, and anger). Based on this theory and research, we predict:

H1. Service outcome quality will have a stronger absolute influence on distrusting beliefs than on trusting beliefs.

On the other hand, we predict that information and system quality will more strongly influence trusting beliefs than distrusting beliefs. Requirements for increasing trusting beliefs go beyond ordinary conditions and address a higher level of buyer needs (Ou and Sia, 2010), including information and system quality during the ordering process. Chen and Kao (2010) find that information and system quality during the ordering process have a greater influence on satisfaction than service delivery quality. Further, Mentzer et al. (2001) find that in B2B relationships, an easy-to-use and efficient ordering process more strongly influences satisfaction than does a delivery that is timely. These studies suggest that changes in information and system quality may have greater positive valence effects than negative valence effects, thereby having a greater influence on trusting beliefs than distrusting beliefs. Other evidence to support this comes from the Seppänen and Blomqvist (2006) study in which organizational buyers said information sharing was a prerequisite for the development and maintenance of trust in the supplier.

Based on this research, we predict that as information and system quality increase, so will buyer perceptions of the supplier's trusting attributes because it makes ordering more efficient and pleasant. Further, poor information and system quality performance (for examples of this see Everard and Galletta, 2005; Moody et al., 2015) will decrease trusting beliefs. Although poor information and system quality may also influence distrusting beliefs, based on the above research we predict this effect will not be as strong as it is on trusting beliefs.

H2. Information quality will have a stronger absolute influence on trusting beliefs than on distrusting beliefs.

H3. System quality will have a stronger absolute influence on trusting beliefs than on distrusting beliefs.

Differential effects of trusting and distrusting beliefs on consequents

We next predict differential effects of trusting and distrusting beliefs on two consequents: relationship commitment and perceived risk. Relationship commitment is a key to B2B exchanges, and is defined as an exchange partner's belief that an ongoing relationship with another is important enough to warrant maximum efforts to maintain it (Morgan and Hunt, 1994). A committed party believes the relationship is worth working on to ensure that it endures forever (Morgan and Hunt, 1994). Relationship commitment refers to relational continuity and loyalty between exchange partners (Dwyer

et al., 1987). Shared values and relationship benefits that outweigh costs can increase relationship commitment between organizational buyers and sellers (Brown et al., 1995; Morgan and Hunt, 1994).

Strategically, firms can signal commitment to their partners through short-term and longer-term actions like influencing partners to adopt new programs, hiring well-trained personnel, offering exclusive territories and distribution, and investing in relationship specific assets (Brown et al., 1995). Committed relationships between firms can develop quickly because partners assess potential transaction growth early in a relationship (Weitz and Jap, 1995). Further, shared values may form an affective commitment in the early stages of a relationship (Ketchand and Strawser, 1998).[8]

We predict that trusting beliefs will have a stronger influence on relationship commitment than distrusting beliefs because relationship commitment relies on positive feelings about the relationship (Moorman et al., 1992), and trusting beliefs represent beliefs about positive trustee attributes. Further, relationship commitment is less emotionally charged in that committed partners do not have the constant and frenzied charge to investigate alternate partners (Dwyer et al., 1987), and are more likely to give constructive complaints rather than to take more drastic actions such as leaving the relationship (Lee et al., 2009). Therefore, the calmness of trusting beliefs makes it more likely to be associated with relationship commitment. The more frenzied nature of distrusting beliefs makes it less likely it will affect relationship commitment. Supporting this argument, Cho (2006) finds empirically that in a B2C relationship trust affects willingness to commit more than does distrust. We predict:

H4. Trusting beliefs will have a stronger absolute influence on relationship commitment than will distrusting beliefs.

Researchers find that trusting beliefs influence perceived risk (Jarvenpaa et al., 2000; Nicolaou and McKnight, 2006; Pavlou and Gefen, 2004), which illustrates how trust reduces uncertainty and provides a sense of assurance when outcomes are unclear (Gefen et al., 2003b; Holmes, 1991).[9] However, these studies did not examine both trusting and distrusting beliefs. We predict that distrusting beliefs will have a stronger influence on risk than trusting beliefs. Perceived risk means perceptions that a non-zero probability of loss or negative consequences exists, or simply the likelihood of negative outcomes (McLain and Hackman, 1999, p. 155). Having distrusting beliefs that give one a more urgent, defense-minded posture should be associated with high-risk relationships (McKnight et al., 2004). Further, Lewicki et al. (1998) depict high distrust as a situation in which parties need to use caution, controls, and have "multifaceted reciprocal interdependence" (p. 447), which indicates high perceived risk because more things can go wrong. Empirically, McKnight et al. (2004) find that disposition to distrust influences high-risk Web perceptions more than does disposition to trust. We predict that users will rely more on their wary, suspicious side to assess the data exchange's risk, thus reducing the importance of trusting beliefs.

H5. Distrusting beliefs will have a stronger absolute influence on perceived risk than will trusting beliefs.

Predictors of continuance intention

We also predict that relationship commitment and perceived risk will influence continuance intention. Continuance intention means users' long-term plans to continue using the data exchange system. Relationship commitment should lead to increased usage continuance intentions because of its focus on continuity. Because partners often identify commitment as a key to valuable outcomes, they will want the relationship to endure and will be willing to work at it. Commitment can lead to cooperative behaviors that promote productivity, efficiency, and effectiveness (Morgan and Hunt, 1994). In our study, the intention to continue using the data exchange is an expression of cooperative resolve.

H6. Relationship commitment will positively influence continuance intention.

We predict perceived risk will negatively influence continuance intention. This is based on risk theory that suggests risk perceptions will negatively affect willingness to perform a risky behavior (Keil et al., 2000; Sitkin and Pablo, 1992). Using a data exchange is risky because transactions may not go as expected. Also, providing and retrieving information electronically introduces certain vulnerabilities that make electronic exchanges risky (Hart and Saunders, 1998). Further, perceived risk can reduce perceived control over the vendor's opportunistic behavior and the technical environment, making one less likely to intend to continue using the exchange (Pavlou, 2003). For example, partners can feel reluctant to use the exchange because they are anxious the other partner will misuse their information (Nicolaou et al., 2013). Prior research finds risk negatively influences intention to transact with a B2C web vendor (Jarvenpaa et al., 2000; Pavlou, 2003), and intention to use a B2B data exchange (Nicolaou and McKnight, 2006; Nicolaou et al., 2013).

H7. Perceived risk will negatively influence continuance intention.

[8] This is important to our experiment. Although the case informs respondents that an exchange history exists between the buyer and seller, the buyer has limited interaction with the seller's system during the experiment. Thus, commitment, as well as trust, must form quickly.

[9] While researchers continue to discuss whether trusting beliefs influence perceived risk or vice versa, most evidence suggests that trust influences perceived risk because of the psychological account of how trust reduces uncertainty and risk (see Gefen et al. (2003b) and Nicolaou and McKnight (2006) for discussions).

Methodology

We tested the hypotheses using a laboratory experiment. To incorporate sufficient variance in our study's exogenous variables to strengthen hypothesis testing (Cyr et al., 2007), we created six experimental B2B data exchange environments. Based on prior research, we manipulated two information-sharing design features: control transparency and outcome feedback, using a 2 × 3 between subjects design (Nicolaou and McKnight, 2006; Nicolaou et al., 2013).[10] The control transparency manipulation (present, not present) provided format and data content validation controls. We manipulated control transparency to achieve variance in information quality based on the extent to which it provides cues about how well the ordering process is proceeding. It should also provide variance in system quality because a system that provides these checks would be easier to use. The outcome feedback manipulation (positive, neutral, and negative) includes initial order fulfillment and shipment status data. This initial outcome feedback can provide variance in information quality based on factors like its relevancy, completeness, and reliability. It can also increase variance in service outcome quality based on the information it provides about the outcome—whether the order will be fulfilled. Because the purpose of varying the information-sharing design features was to provide variation similar to real exchange conditions, we do not hypothesize any main or interactive effects of these features on our model variables. Through manipulation effect testing, we found the manipulations were successful in producing the desired variation. See Appendix A for more details regarding the experimental manipulations and their results.

Participants completed two experimental sessions over a two-week period. In both sessions, participants completed practice and actual transactions using the experimental data exchange system. There was a different website and instruction set for each experimental treatment. In the first transaction, subjects were asked to read a short introduction about B2B web-based data exchanges in the modern business environment. Next, participants followed step-by-step hands-on instructions to enter two practice transactions. This familiarized them with registering as a new customer, logging in, completing a raw materials order form, and viewing transaction data validation information and feedback information depending on their treatment condition.

Following the practice transactions, the experimental materials instructed all subjects to play the role of purchasing managers in a manufacturing plant ordering raw materials (aluminum sheets) required for their plant's production process. Role-playing scenarios like this are well established in many academic disciplines, including information systems and B2B research, to elicit subject judgments or preferences based on responses to scripted materials and other sources (Hui et al., 2004; Keil et al., 2000; Nicolaou and McKnight, 2006; Rungtusanatham et al., 2011; Tangpong et al., 2010). In our study, subjects were instructed that the raw materials were needed within five business days, because their plant produces expensive products for large industrial customers, and because they operate on a just-in-time basis with very short lead times. This gave them a sense of urgency in processing and receiving their orders on time. Next, we told subjects that while in the past they had placed telephone and fax orders for raw materials, one of their plant's suppliers (PanAmerican Industries, Inc.) had recently implemented the web-based ordering exchange on which they had just practiced. Using the data exchange would help make the ordering process more efficient and would help them maintain their relationship with the supplier. Subjects were then instructed to access the exchange and enter an actual order transaction for 5000 aluminum sheets. In the second session held two weeks later, the same procedure was followed with practice and actual transactions.

Participants completed the questionnaire after the two experimental sessions. The questionnaire items used to measure the research variables are based on established constructs from several sources (Appendix B). We also included items for three control variables: disposition to trust (predicting trusting beliefs), disposition to distrust (predicting distrusting beliefs), and familiarity (predicting all dependent variables). Table 3 presents the means and standard deviations for all variables.

By designing the study as a laboratory experiment, we traded off some realism for control. As McGrath (1981) argues, every study trades off either rigor or relevance, either control or realism. We were trying to control extraneous conditions such that the manipulations would be the only differences across the treatments, and they would provide variance in the three quality variables. This could not have been accomplished if we had used a field experiment or survey of actual B2B data exchange system users. While control is an experimental strength, a weakness is that our setting is not fully "real" for the participants.

However, we believe that our sampling, procedures, and design helped increase realism and the validity of our scenarios in several ways (Rungtusanatham et al., 2011). First, the task involved a scenario that promoted a real-life B2B situation involving purchase objectives, decision complexity, payment, product and supplier relationships characteristic of B2B purchasing (Table 1). This helped reinforce the B2B context and distinguish it from a B2C buying context. Second, our subjects were 55 full-time graduate students and 90 professionals. The majority of students reported having real-world business experience, and nearly half of the 145 participants reported having specific purchasing management responsibilities during their career.[11] Real-world experience helped respondents relate to the B2B exchange buyer role. Third, in developing the manipulations we examined actual exchange sites and then designed the manipulations to attempt to reflect real conditions. The particular treatments were chosen because they represent specific design choices that we found to be common to data

[10] The current study differs from these previous works in some of the experimental details, and in its purpose, which is to investigate differential quality effects on both trusting and distrusting beliefs in a B2B setting.

[11] T-tests detected no significant differences on any construct between students and professionals or between those who did and those who did not have purchasing responsibility experience.

Table 3
Mean, standard deviation, D.G. Rho, Cronbach's Alpha, and Average Variance Extracted (AVE).

Construct	Mean	Standard deviation	D.G. Rho	Cronbach's Alpha	AVE
Information quality	3.83	1.47	0.95	0.94	0.72
System quality	5.15	1.22	0.94	0.93	0.65
Service outcome quality	4.28	1.55	0.96	0.94	0.90
Trusting beliefs	4.14	1.13	0.94	0.92	0.72
Distrusting beliefs	4.12	1.23	0.94	0.92	0.71
Relationship commitment	4.31	1.27	0.95	0.93	0.82
Perceived risk	4.16	1.55	0.95	0.93	0.78
Continuance intention	3.89	1.82	0.96	0.95	0.87
Disposition to trust	4.06	1.35	0.94	0.92	0.80
Disposition to distrust	4.15	1.30	0.84	0.61	0.72
Familiarity	2.70	1.77	0.97	0.95	0.77

exchanges. Fourth, we built relational realism into the treatments by stating that the respondent had previously placed orders with PanAmerican Industries (among other suppliers). Subjects were told that PanAmerican Industries, Inc. had a data exchange system that could make the ordering process more efficient and help them maintain this supplier relationship. Finally, we allowed two weeks between orders so that subjects could further develop relationship perceptions about the supplier. Although it is not a long time, it at least provided a feel that the relationship and use of the system was not a one-time order placement situation and could continue in the future.

We used several methods in developing our questionnaire to prevent common method bias. First, we mixed several open-ended questions (e.g., one about improvements they would like to make to the data exchange) among the quantitative questions to give respondents an occasional mental break. Second, we used different scale headers for different questions, changing, for example, between the Strongly Agree–Strongly Disagree scale, the Extremely Unlikely–Extremely Likely scale, and the Very Poor–Excellent scale. Third, we grouped items by construct so as not to disrupt the instrument's logical flow (Podsakoff et al., 2003).

One hundred and forty-five participants completed the questionnaire. Since the sample size is modest, we performed an *a priori* power analysis. The sample size for a PLS model requires a statistical power analysis based on the portion of the model with the largest number of predictors (Chin and Newsted, 1999). We used five as the number of predictors because in our research model, trusting and distrusting beliefs each have five predictors (three research variable predictors and two control variable predictors). We used G*Power3.1 (Faul et al., 2007, 2009) to run an *a priori* power analysis using an expected power (1-β error probability) of 0.80 as suggested by Cohen et al. (2003), an alpha (α) error probability of 0.05, five predictors, and an effect size at 0.10 to represent a small to medium effect size (R^2 of approximately 0.13). We found the minimum required sample size was 134, thus, our sample size of 145 is large enough to detect small to medium effects. We also performed the test using eight predictors because in a supplemental test of mediating effects we test the direct effects of all the other research variables (seven in total) and the control variable familiarity on continuance intention. While this more conservative test results in a required sample size of 158 for a 0.10 effect size, it results in a minimum required sample size of 144 if the effect size is only slightly increased to 0.11. We conclude our sample size is appropriate for detecting the effects hypothesized.[12]

Data analysis

We used PLS (XL-Stat PLSPM) to test both the measurement and structural models. We chose to use PLS, a component-based structural equation modeling approach versus a covariance-based approach for several reasons.[13] First, PLS can handle small sample sizes as long as there is adequate power and any outliers or missing data have been identified and treated (Ringle et al., 2012). Our sample size (145) is small, however there is adequate power as discussed above. Also, there were no extreme outliers and no missing data. We also used PLS because it can handle slightly non-normal data (Ringle et al., 2012). PLS is in fact robust to small or moderate skew or kurtosis (up to skew = 1.1 and kurtosis = 1.6) (Goodhue et al., 2012). However, extremely skewed data (skew $\geqslant$ 1.8 and kurtosis $\geqslant$ 3.8) can result in lower power (Goodhue et al., 2012). We feel that using PLS is appropriate because most of our items have skewness and kurtosis between +1 and −1, indicating only minor non-normality. Only 15 out of the 52 items have skewness and/or kurtosis greater than 1, with the largest skewness statistic at 1.5 and the largest kurtosis statistic at 2.9—all within the Goodhue et al. (2012) 1.8 and 3.8 guidelines. Finally, we used PLS because it can better handle complex models, with prior studies that have used PLS having an average of 8 latent constructs, 27 indicators, and 11 structural relationships per model (Ringle et al., 2012). Our model has 11 latent constructs with 52 indicators and 19 structural model relationships, which is higher than the average, implying that our model is complex, so PLS is appropriate.

[12] We also used the danielsoper.com website (Ringle et al., 2012) to assess *a priori* power. It recommended a sample size of 134 for 5 predictors and 159 for 8 predictors, which are both similar to the above recommendations.

[13] We also ran the model using EQS, a covariance-based SEM tool, and found that the same hypotheses were supported/not supported in EQS as in PLS.

To assess convergent validity, we ran the measurement model and found that internal consistency is acceptable because the Dillon-Goldstein's rho (D.G. rho) reliabilities range from 0.84 to 0.97, exceeding the recommended 0.70 minimum (Vinzi et al., 2010) (Table 3). Also, the Cronbach's alphas range from 0.92 to 0.95, also exceeding the 0.70 minimum (Nunnally and Bernstein, 1994), except for the control variable disposition to distrust that has a Cronbach's alpha of 0.61 (Table 3). We decided not to drop disposition to distrust from the model because Cronbach's alpha is just one indicator. Though this alpha is low, disposition to distrust has an acceptable D.G. rho in this study, 0.84, indicating reliability, and an average variance extracted (AVE) of 0.72, indicating convergent validity. Overall, we found the AVEs for our constructs range from 0.65 to 0.90, which exceeds the suggested 0.50 minimum (Bagozzi and Yi, 1988; Fornell and Larcker, 1981; Gefen and Straub, 2005) (Table 3). Finally, in support of convergent validity, we found that PLS loadings are all above 0.70, except for the second disposition to distrust item that loaded at 0.52. We dropped this item from the analysis. Before doing so, we checked to make sure this does not change the construct's nature. Also, we ran the structural model both with it and without it, and the results were almost identical. Table 4 presents the item loadings without the second disposition to distrust item.

Table 4
PLS loadings and cross-loadings.

	1	2	3	4	5	6	7	8	9	10	11
Information quality 1	**0.77**	0.38	0.47	0.60	−0.42	0.41	−0.64	0.56	0.18	−0.12	0.12
Information quality 2	**0.78**	0.31	0.52	0.55	−0.42	0.31	−0.59	0.56	0.25	−0.13	0.22
Information quality 3	**0.86**	0.38	0.57	0.65	−0.44	0.46	−0.60	0.67	0.32	−0.16	0.10
Information quality 4	**0.85**	0.35	0.57	0.63	−0.40	0.45	−0.56	0.66	0.34	−0.17	0.11
Information quality 5	**0.90**	0.47	0.67	0.69	−0.55	0.57	−0.68	0.73	0.21	−0.10	0.06
Information quality 6	**0.90**	0.44	0.62	0.71	−0.54	0.63	−0.66	0.68	0.20	−0.08	0.08
Information quality 7	**0.87**	0.42	0.57	0.68	−0.58	0.50	−0.64	0.62	0.25	−0.14	0.07
System quality 1	0.49	**0.78**	0.54	0.45	−0.45	0.38	−0.50	0.51	0.19	−0.11	0.11
System quality 2	0.30	**0.84**	0.33	0.34	−0.33	0.33	−0.32	0.37	0.16	−0.07	0.12
System quality 3	0.18	**0.75**	0.21	0.19	−0.20	0.23	−0.21	0.24	0.08	−0.00	0.05
System quality 4	0.27	**0.85**	0.31	0.30	−0.26	0.23	−0.26	0.30	0.12	−0.04	0.06
System quality 5	0.47	**0.84**	0.45	0.42	−0.36	0.30	−0.42	0.44	0.17	−0.09	0.08
System quality 6	0.45	**0.84**	0.38	0.46	−0.30	0.34	−0.42	0.42	0.10	−0.03	0.06
System quality 7	0.34	**0.80**	0.30	0.39	−0.33	0.27	−0.37	0.38	0.17	−0.18	0.03
System quality 8	0.35	**0.78**	0.28	0.34	−0.33	0.26	−0.38	0.39	0.19	−0.10	0.02
Service outcome quality 1	0.52	0.42	**0.91**	0.45	−0.56	0.36	−0.60	0.69	0.11	−0.05	0.05
Service outcome quality 2	0.69	0.43	**0.98**	0.58	−0.54	0.45	−0.71	0.78	0.23	−0.08	0.07
Service outcome quality 3	0.70	0.45	**0.96**	0.59	−0.53	0.45	−0.71	0.77	0.24	−0.07	0.08
Trusting beliefs 1	0.62	0.33	0.43	**0.85**	−0.49	0.46	−0.52	0.55	0.16	−0.10	0.16
Trusting beliefs 2	0.61	0.38	0.52	**0.85**	−0.54	0.49	−0.58	0.60	0.15	−0.05	0.09
Trusting beliefs 3	0.50	0.38	0.27	**0.78**	−0.44	0.39	−0.39	0.33	0.28	−0.19	0.07
Trusting beliefs 4	0.60	0.41	0.54	**0.82**	−0.55	0.51	−0.51	0.52	0.32	−0.15	0.08
Trusting beliefs 5	0.73	0.43	0.50	**0.89**	−0.53	0.54	−0.62	0.64	0.18	−0.06	0.06
Trusting beliefs 6	0.76	0.44	0.59	**0.89**	−0.61	0.55	−0.69	0.70	0.22	−0.11	0.14
Distrusting beliefs 1	−0.37	−0.35	−0.50	−0.45	**0.80**	−0.25	0.51	−0.50	−0.26	0.11	0.02
Distrusting beliefs 2	−0.34	−0.39	−0.43	−0.47	**0.83**	−0.27	0.50	−0.47	−0.22	0.10	0.02
Distrusting beliefs 3	−0.37	−0.36	−0.35	−0.46	**0.80**	−0.32	0.48	−0.42	−0.11	0.03	0.05
Distrusting beliefs 4	−0.50	−0.30	−0.41	−0.55	**0.86**	−0.33	0.51	−0.46	−0.18	0.10	−0.02
Distrusting beliefs 5	−0.63	−0.36	−0.60	−0.62	**0.89**	−0.39	0.68	−0.65	−0.24	0.10	−0.08
Distrusting beliefs 6	−0.57	−0.34	−0.54	−0.57	**0.88**	−0.35	0.66	−0.61	−0.24	0.12	−0.05
Relationship commitment 1	0.48	0.26	0.32	0.50	−0.32	**0.88**	−0.34	0.41	0.09	0.04	0.06
Relationship commitment 2	0.49	0.30	0.36	0.51	−0.30	**0.90**	−0.35	0.42	0.05	0.08	0.11
Relationship commitment 3	0.56	0.39	0.46	0.56	−0.34	**0.94**	−0.42	0.55	0.21	0.01	0.07
Relationship Commitment 4	0.51	0.39	0.45	0.55	−0.40	**0.89**	−0.43	0.57	0.20	0.03	−0.03
Perceived risk 1	−0.71	−0.46	−0.66	−0.64	0.57	−0.41	**0.85**	−0.74	−0.17	0.08	−0.03
Perceived risk 2	−0.64	−0.32	−0.56	−0.53	0.50	−0.27	**0.78**	−0.63	−0.11	0.18	−0.04
Perceived risk 3	−0.63	−0.42	−0.63	−0.58	0.63	−0.40	**0.93**	−0.68	−0.18	0.00	−0.02
Perceived risk 4	−0.63	−0.38	−0.61	−0.58	0.63	−0.37	**0.93**	−0.65	−0.23	0.00	−0.03
Perceived risk 5	−0.65	−0.47	−0.68	−0.59	0.63	−0.42	**0.93**	−0.71	−0.19	0.01	−0.01
Continuance intention 1	0.76	0.48	0.77	0.68	−0.62	0.59	−0.74	**0.97**	0.28	−0.10	0.07
Continuance intention 2	0.75	0.51	0.79	0.69	−0.63	0.56	−0.76	**0.98**	0.30	−0.10	0.07
Continuance intention 3	0.73	0.49	0.77	0.66	−0.62	0.49	−0.74	**0.96**	0.32	−0.14	0.10
Continuance intention 4	0.56	0.34	0.59	0.46	−0.46	0.37	−0.65	**0.83**	0.16	−0.01	0.05
Disposition to trust 1	0.26	0.17	0.16	0.23	−0.23	0.14	−0.18	0.25	**0.93**	−0.37	0.05
Disposition to trust 2	0.24	0.15	0.15	0.20	−0.23	0.14	−0.16	0.24	**0.90**	−0.35	0.03
Disposition to trust 3	0.30	0.15	0.24	0.28	−0.23	0.17	−0.21	0.29	**0.90**	−0.24	0.11
Disposition to trust 4	0.25	0.21	0.17	0.18	−0.21	0.09	−0.18	0.26	**0.85**	−0.28	0.10
Disposition to distrust 1	−0.14	−0.12	−0.07	−0.15	0.10	−0.02	0.05	−0.11	−0.30	**0.88**	−0.01
Disposition to distrust 3	−0.10	−0.05	−0.05	−0.05	0.09	−0.11	0.05	−0.04	−0.28	**0.82**	−0.14
Familiarity 1	0.08	0.02	−0.02	0.00	0.07	0.00	0.07	0.01	0.00	−0.02	**0.81**
Familiarity 2	0.09	0.01	−0.01	0.03	0.05	0.00	0.03	0.01	0.01	−0.04	**0.82**
Familiarity 3	0.12	0.08	−0.07	0.11	−0.01	0.05	−0.02	0.07	0.08	−0.08	**1.00**

We then tested discriminant validity. We found that all PLS item-to-construct loadings are greater than the cross-loadings (Gefen and Straub, 2005) (Table 4). We also compared the variable inter-correlations with the square roots of the AVEs. Each correlation is lower than the square root of the AVEs of the two correlated variables (Fornell and Larcker, 1981) (Table 5). These tests support discriminant validity.

We also tested to see if trusting and distrusting beliefs discriminate by examining whether high trust and high distrust, or low trust and low distrust coexist in individuals. Lewicki et al. (1998) argue that if trust and distrust are always consistent – people having high trust also always have low distrust (or low trust with high distrust) – then it would seem that they are just opposite ends of a continuum. However, showing there are people who have inconsistent combinations – high trust and high distrust (or low trust and low distrust) – lends further support that trust and distrust are distinct constructs. Table 6 shows the respondent counts for the inconsistent trusting and distrusting beliefs combinations. We found that a significant proportion of our sample (36%) has either high trusting beliefs/high distrusting beliefs, or low trusting beliefs/low distrusting beliefs (inconsistent combinations). This adds another data point to the growing evidence that trusting beliefs and distrusting beliefs are distinct constructs.

We also tested our data for multicollinearity and common method bias. Multicollinearity is not a problem as the highest variance inflation factor is 3.65, which is well below the suggested cutoff of 5.00 (Menard, 1995). Also, no variable has both a condition index above 30, and two variance decomposition proportions greater than 0.50 (Belsley et al., 1980). We assessed common method bias two ways. First, using the method by Polites and Karahanna (2012), we found the lowest correlation is 0.003, and there are a large number of non-significant item-to-item correlations in the dataset (321, or 24%). The lowest correlation between pairs of items in a given dataset can be viewed as the upper limit to how much method bias can be present in the data (Lindell and Whitney, 2001; Malhotra et al., 2006), and having many low correlations shows that common method bias is not widespread. Second, following Pavlou et al. (2007), we used a marker variable to test for common method bias. According to Lindell and Whitney (2001) a marker variable is a construct that is theoretically unrelated to at least one other construct in the questionnaire. Pavlou et al. (2007) used a modified method where they employed a construct that is weakly related to other constructs. We used perceived web risk (McKnight et al., 2002b) (Appendix B), which is theoretically unrelated or weakly related to most of our constructs. Using this method, high correlations among other constructs' items and perceived web risk items would indicate common method bias since the perceived web risk construct should be weakly related to most of our constructs. We found that its average correlation is low ($r = 0.15$, $p > 0.05$), indicating minimal evidence of common method bias. These tests show common method bias is not a problem.

Fig. 3 presents the structural model results. Service outcome quality has a more significant influence on distrusting beliefs ($\beta = -0.32^{***}$) than on trusting beliefs ($\beta = 0.05$ ns). Testing path coefficient differences of the absolute values (Keil et al., 2000), we find the path coefficient from service outcome quality to distrusting beliefs is significantly larger than that to trusting beliefs ($t = 2.02$, $p < 0.05$). This supports H1. Information quality has a significant effect on trusting beliefs ($\beta = 0.64^{***}$) and distrusting beliefs ($\beta = -0.29^{**}$). H2 is supported because the coefficient for the path from information quality to trusting beliefs is significantly larger than the absolute value of that from information quality to distrusting beliefs ($t = 2.88$, $p < 0.01$). System quality also has a significant effect on both trusting ($\beta = 0.13^{*}$) and distrusting beliefs ($\beta = -0.13^{*}$). Because the absolute values of these coefficients are not significantly different, H3 is not supported.

Trusting beliefs has a significant effect on relationship commitment ($\beta = 0.57^{***}$), whereas distrusting beliefs does not ($\beta = -0.02$). The difference in the absolute value of the path coefficients is significant ($t = 4.43$, $p < 0.001$), supporting H4. H5 is not supported as trusting beliefs ($\beta = -0.40^{***}$) and distrusting beliefs ($\beta = 0.42^{***}$) have similar absolute effects on perceived risk ($t = 0.17$, $p > 0.05$). Both relationship commitment ($\beta = 0.26^{***}$) and perceived risk ($\beta = -0.66^{***}$) have significant effects on continuance intention, supporting H6 and H7. The control variables (disposition to trust, disposition to distrust, and familiarity) have no significant effects.

Our research model is a fully mediated model in that it does not predict any direct effects of information quality, system quality, service outcome quality, trusting beliefs, or distrusting beliefs on continuance intention. However, prior research finds such direct effects (Gefen, 2002; Nicolaou and McKnight, 2006; Ou and Sia, 2010; Teo et al., 2008–9; Wang and Lin, 2011). Therefore, we tested whether the effects of these independent variables on continuance intention are fully or partially

Table 5
Correlation matrix (square root of average variance extracted on the diagonal).

	1	2	3	4	5	6	7	8	9	10	11
1. Information quality	**0.85**										
2. System quality	0.46	**0.81**									
3. Service outcome quality	0.67	0.45	**0.95**								
4. Trusting beliefs	0.76	0.47	0.57	**0.85**							
5. Distrusting beliefs	−0.56	−0.41	−0.57	−0.62	**0.84**						
6. Relationship commitment	0.56	0.37	0.45	0.58	−0.38	**0.91**					
7. Perceived risk	−0.73	−0.47	−0.71	−0.66	0.67	−0.43	**0.89**				
8. Continuance intention	0.75	0.49	0.79	0.67	−0.63	0.54	−0.77	**0.93**			
9. Disposition to trust	0.30	0.19	0.21	0.25	−0.25	0.31	−0.20	0.29	**0.90**		
10. Disposition to distrust	−0.16	−0.09	−0.08	−0.12	0.11	−0.11	0.07	0.09	−0.34	**0.85**	
11. Familiarity	0.12	0.09	0.07	0.12	−0.02	0.05	−0.03	0.08	0.08	−0.08	**0.88**

Table 6
Trusting/distrusting belief counts.[a]

	Inconsistent combinations		Total	Consistent combinations		Total
	Low trusting/low distrusting beliefs	High trusting/high distrusting beliefs		Low trusting/high distrusting beliefs	High trusting/low distrusting beliefs	
Number (%)	27 (19%)	24 (17%)	51 (36%)	47 (32%)	47 (32%)	94 (64%)

[a] The counts presented in this table are based on splitting the sample by the means for trusting and distrusting beliefs following Ou and Sia (2010).

mediated by our research model. Baron and Kenny (1986) provide a causal steps approach for establishing mediation. First, the independent variable must significantly influence the outcome (path *c*). Second, the independent variable must significantly influence the mediator (path *a*). Third, the mediator should significantly affect the outcome variable (*path b*) controlling for the effect of the independent variable on the outcome (path c′). In this latter step, if *c*′ is nonsignificant full mediation exists, and if *c*′ is significant partial mediation exists.

Whereas the Baron and Kenny (1986) method has traditionally been used to test for mediation effects, another more statistically advanced approach has been suggested for testing mediation in more complex models with multiple mediators (MacKinnon et al., 2002; Preacher and Hayes, 2008; Vance et al., 2015). This approach tests the total indirect effects of the independent variable on the outcome via all the mediators (the total of all *ab* path combinations), controlling for the direct effect of the independent variable on the outcome (path c′). Mediation exists if the total indirect effects are significant via a bootstrapping analysis. Further, as in the Baron and Kenny (1986) approach, if path c′ is significant partial mediation exists, and if it is not significant full mediation exists.

Because our model has multiple mediators we used this more advanced approach. Specifically, we tested a model with all the hypothesized mediated paths, and the direct paths from information quality, system quality, service outcome quality, trusting beliefs, and distrusting beliefs to continuance intention. We find that in this model the total indirect effects from each of the five independent variables to continuance intention are significant, meaning mediation exists (Table 7). Further, c′ (the direct path in this model) is not significant for the paths to continuance intention from system quality, trusting beliefs, and distrusting beliefs, indicating these variables are fully mediated. However, c′ is significant for the paths to continuance intention from information quality and service outcome quality, indicating they are partially mediated.

Discussion and contributions

Quality, trust, and distrust are important factors for realizing B2B data exchange system benefits. Yet no work to our knowledge has examined how these factors influence intentions to continue using a B2B system (Table 2). Understanding this is important because B2B systems provide both strategic and operational benefits. Our study is the first to examine how three quality factors differentially influence trusting and distrusting beliefs in data exchange partners, and how trusting and distrusting beliefs differentially impact relationship commitment and perceived risk. We find support for five out of seven hypotheses in a laboratory experiment in which individuals role-play as purchasing managers using a system modeled after real-life B2B exchange systems. The model predicts variance in trusting beliefs, distrusting beliefs, relationship commit-

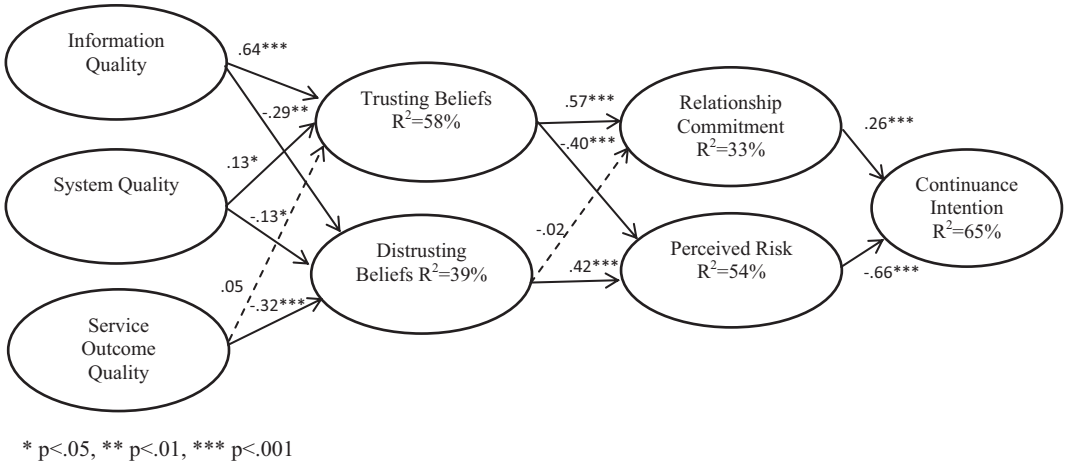

Fig. 3. Hypotheses test results.

Table 7
Mediation tests.

Hypothesized mediated research model plus all direct paths from the independent variables to continuance intention				
	Dependent variable–continuance intention			
Independent variables	Direct effects (*path c'*)	Indirect effects (the total of all *ab* path combinations)	Total effects	Mediation test
Information quality	0.17**	0.18***	0.36****	Partial mediation
System quality	0.04 ns	0.05*	0.09**	Full mediation
Service outcome quality	0.37****	0.07**	0.44****	Partial mediation
Trusting beliefs	0.04 ns	0.17**	0.21**	Full mediation
Distrusting beliefs	−0.07 ns	−0.10**	−0.18**	Full mediation

Direct effects = path coefficient directly from independent variable to dependent variable, unmediated.
Total indirect effects = path coefficient representing the total influence of the independent variable on the dependent variable mediated by at least one intervening variable.
Total effects = direct effects + indirect effects.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.
**** $p < 0.001$.

ment, perceived risk, and continuance intention that compares favorably to the variance explained in other studies (Moorman et al., 1992; Nicolaou and McKnight, 2006; Ou and Sia, 2010) (Fig. 3).

Contribution 1: differential influences of quality on trusting and distrusting beliefs

Our main contribution is being the first study to examine how three quality factors differentially influence trusting and distrusting beliefs in data exchange partners. This fills a key gap in the strategic information systems literature because quality dimensions have general applicability, but the relative importance of each dimension depends on the specific system and setting (Wixom and Todd, 2005). Further, both quality and trust in B2B suppliers can lead to strategic and operational benefits. While others have examined how quality impacts trust and distrust in various settings (Kim et al., 2004; Nicolaou and McKnight, 2006; Ou and Sia, 2009, 2010; Zhou, 2011a,b, 2012), our unique contribution is examining the differential effects of all three quality factors, information, system, and service outcome quality on trusting and distrusting beliefs in an online data exchange system context.

Our differential effects hypotheses follow the basic premise from Herzberg's et al. (1959) two-factor theory that motivating factors will have stronger effects on positive attitudes and hygiene factors will have stronger effects on negative attitudes. We revise this theory slightly to include trusting and distrusting beliefs rather than satisfaction and dissatisfaction. This is a "contribution to theory" because it improves on existing theory (Hong et al., 2014; Whetten, 2009) This is also a "contribution of theory" because it applies a broadly accepted theory (two-factor theory) to a different phenomenon (B2B data exchanges) (Hong et al., 2014; Whetten, 2009). Utilizing this theory contributes beyond just showing that higher quality leads to more trust and less distrust. Instead our results show how quality differentially affects trust/distrust, and ultimately system usage continuance intention.

We find that service outcome quality has no effect on trusting beliefs, but does influence distrusting beliefs. This is consistent with theory, but contradictory to prior research that discusses and shows positive relationships between service outcome quality and trust (Hui et al., 2004). This inconsistency could exist because the prior research does not include distrusting beliefs. We include both trusting and distrusting beliefs, and find that service outcome quality only influences distrusting beliefs. This new finding is important because the emotions and reactions evoked by distrusting beliefs are very different from those evoked by trusting beliefs. For example, increased distrust as a result of an unfavorable delivery can lead to fear and skepticism rather than passivity and hesitance (Lewicki et al., 1998). It could also lead to more pronounced monitoring of the supplier or eventual termination of the data exchange relationship (Lewicki et al., 1998; Vlaar et al., 2007).

We also find, again consistent with our theory, that information quality has a stronger effect on trusting beliefs than on distrusting beliefs. In their study about B2C web design quality, Ou and Sia (2009, 2010) find just the opposite—that information quality has a weaker (indirect) effect on trusting beliefs than distrusting beliefs. This discrepancy in findings could be contextual because we examine a B2B rather than a B2C context, and we examine the whole service experience, rather than just the web design attributes. This result highlights the need for future research to sort out these contextual influences.

We did not find any predicted differential effect for system quality. In addition, the effects of system quality on trusting and distrusting beliefs are fairly small compared to those of information and service outcome quality. Researchers argue that the nature of Internet technology makes it difficult to evaluate the trustworthiness of an Internet vendor from the system quality perspective because it is easy and not very costly, even for untrustworthy parties, to achieve adequate system quality (Grazioli and Jarvenpaa, 2000; Kim et al., 2004). This could be a reason for our system quality finding.

The contribution of our differential effects of quality on trusting and distrusting beliefs has direct implications for strategic information systems research on data exchange relationship trust and distrust. To-date most of this research has either

solely examined trust (e.g., Nicolaou and McKnight, 2006), or has been anecdotal in nature about distrust (e.g., Seppänen and Blomqvist, 2006). In fact, as compared to the empirical data about trust, very little empirical data on B2B distrust exists (Table 2). Our study supports and extends this research, which is important given the lack of personal contact and the increased technology risks that could lead to distrust in these technology-mediated strategic business relationships. We extend the model by Nicolaou and McKnight (2006) to include distrust, and system and service outcome quality. Our finding that service outcome quality has more of an influence on distrusting beliefs confirms the interviews by Seppänen and Blomqvist (2006) that late deliveries are a source of partner distrust. Given the interest and prevalence of trust research in inter-organizational data exchange relationships, our research lays the groundwork for additional work in this area, including examining trusting and distrusting beliefs in the technology itself, and examining trusting and distrusting beliefs over longer-term use of the data exchange system.

This contribution also suggests other possible strategic information systems research on the influence of quality on trust, distrust, and continuance intentions. While we examine three quality factors, one new venture would be to explore other quality-related factors like whether these systems help fulfill strategic goals, and if they have spillover effects on other firm activities (Ariño, 2003). Also, while we examine the effects of quality on trusting and distrusting beliefs, another avenue for future research might be to examine the disconfirmation process that takes place behind the quality and trusting linkages. We suggest that stronger (weaker) disconfirmation may relate more to distrusting (trusting) beliefs (footnote 3), however it was beyond our scope to empirically test this. Expectation disconfirmation theory has been used to study not only quality, but also trust/distrust, relationship commitment, risk, and strategic information systems (Lankton and McKnight, 2012; McKinney et al., 2002; Sitkin and Roth, 1993; Vlaar et al., 2007). Future research could investigate these issues further.

Contribution 2: differential effects of trusting and distrusting beliefs

Our results about the differential effects of trusting and distrusting beliefs on outcomes also contributes to the literature. Most surprising was our finding that both trusting and distrusting beliefs have similar influences on perceived risk, Prior literature has theorized that distrusting beliefs will have stronger effects than trusting beliefs on such constructs as risk because prospect theory argues that losses loom larger than gains (Cho, 2006). However, we find that was not the case. We find trusting and distrusting beliefs have similar influences on perceived risk. If theory holds that distrusting beliefs are associated with more high-risk negative factors, our finding could mean our users did not associate perceived risk as solely a negative factor. Our risk items have endpoints that refer to the possibility of a "significant opportunity," "potential for gain," and "positive situation." It could be that individuals needed to rely on beliefs about positive and negative attributes to respond to these items.

Also contributing is our finding that trusting beliefs have stronger effects on relationship commitment than do distrusting beliefs. In fact, distrusting beliefs do not significantly influence relationship commitment. This suggests that only beliefs about positive attributes significantly contribute to wanting to move forward in the relationship. Beliefs about negative attributes do not affect this commitment. This makes sense because individuals will not want to make extra efforts to continue a relationship in which opportunism or other negative traits are in the forefront. While this finding is not new (Cho, 2006 also finds that trusting beliefs have a stronger influence on relationship commitment than distrusting beliefs), our study takes this one step further and informs strategic information systems research by showing that relationship commitment influences data exchange system continuance intention. The fact that relationship commitment fully mediates the trusting beliefs-continuance intention relationship is grounded in Morgan and Hunt's (1994) theory of relationship commitment, and shows how critical this factor is from a strategic information systems perspective.

Practical contributions

Our findings also have practical contributions. For example, organizations should try to decrease the impacts of fulfillment failures that our study shows can increase distrust. Apologizing for a poor process will not be as important as solving delivery issues. Delivery failure impacts may be reduced if the supplier organization is not to blame, they communicate the failure early, the buying partner has slack to absorb the failure, and the failure does not recur (Primo et al., 2007). This suggests actions exchange partners can take to reduce distrust. For example, suppliers can quickly resolve delivery failures through escalation processes, and they can remove failure causes from their systems to ensure the failure will not recur (Primo et al., 2007). Our study shows that addressing service outcome quality will decrease distrust, which affects perceived risk and then continuance intentions. We show poor choices in improving service outcome quality could have more disastrous effects like increasing distrust, which may be hard to remedy. Managerial actions like continuous improvement processes and a commitment to learn from supply chain failures can help firms become more responsive to these failures (Bode et al., 2011).

Our study also implies that organizations should gauge their exchange partners as to what combination of trust and distrust prevail in each relationship. It is well known that the trusting qualities of the relations between strategic alliance partners are critical for successful collaboration, yet the challenges of speed, quality, and global reach, which require trust, also involve managing distrust (Lewicki et al., 1998). Data exchange partners relate to each other in multiple ways, and as the experience, bandwidth, and richness of these relationships increase, it is more likely that individuals will harbor both high

trust and high distrust (Lewicki et al., 1998). In our study, in which experience with the exchange partner was low, 17% of respondents felt both high trust and high distrust (Table 6). This percentage could be higher for longer-term relationships. Managers should realize the practical importance of building and maintaining trusting relationships, while also treating the exchange partner with suspicion. They should understand that having high trust and low distrust in their exchange partner may be too naïve (Vlaar et al., 2007), and could increase relationship commitment in nonproductive ways.

Managers should also be aware that choosing an intervention strategy to enhance partner trust and minimize partner distrust is not always straightforward. In a distrusting situation, partner actions intended to restore trust may increase suspicion and distrust, alienating partners further (Vlaar et al., 2007). As mentioned above, our study shows that focusing too much on the ordering process to the detriment of delivering goods on time, could increase distrusting beliefs. By contrast, acts to improve trust in high trust/low distrust relationships will likely be viewed positively by the partners (Vlaar et al., 2007). Thus, if remediating trust is deemed necessary, it can require different strategies depending on the levels of distrust (Lewicki et al., 1998).

Limitations

This study has certain limitations we tried to mitigate. One is that 38% of subjects were graduate students, not professionals. However, most student subjects had real-world experience, and testing showed no differences between student and nonstudent responses. Another limitation is that the nature of a laboratory experiment could make it hard for some respondents to imagine what they would do if they were a purchasing manager. For example, it may be difficult for them to imagine a continued relationship. We paid close attention to our procedures to ensure subjects both adopt and maintain the role of a purchaser so they can answer about both their current perceptions and projections about their future relationship commitment and exchange system continuance intention. We first brought subjects into the role of a purchaser by having them read the experimental materials that put them in the purchaser role and then by having them practice the purchaser role. Then, to emphasize that this role extends into the future, we used a preface to the continuance intention items that says, "Assume you have a continuing role as a purchaser" (Appendix B). Underlining this in their materials makes sure they see it and understand the importance of their maintaining this role. (We also use a phrase like this in the preface to the relationship commitment items.) Then the way we phrase the continuance intention items encourages them to stay in the purchaser role. We use the word "would" instead of "will" to emphasize that the role is a role-play. We also include within the items phrases that reinforce their future purchasing role, such as, "If I was faced with a similar purchasing decision in the future. . ." Also, we made the experimental materials as realistic and as characteristic of a B2B context as we could (Table 1). Finally, the purchasing experience that almost half the subjects had and the two repetitions of the experiment helped them relate to a more realistic exchange buyer role, and reinforced their perceptions of possible future exchange relationships. Locke (1986) compared laboratory results to field setting results in several research streams. He found that the field results and the laboratory results were basically consistent across these research streams. To us, this provides evidence that people in laboratory studies really do act as proxies for those in real world settings if prompted by reasonably realistic experimental stimuli.

Using experimental scenarios also precluded respondents from experiencing the actual delivery, which could have made service outcome quality more difficult to judge and perhaps confused service outcome quality with information quality. However, our method of informing participants as to the delivery specifics rather than having them experience an actual delivery follows prior service research that investigates service outcome quality (Hui et al., 2004). Further, the experimental materials were designed to help participants focus on the delivery when responding to the service outcome questions. We also find different results for information and service outcome quality, which shows that the variables were perceived differently.

Finally, we used only part of the trust nomological network to explain relationship commitment, perceived risk, and continuance intention. While we find that disposition to trust and distrust have no significant effects in our model, constructs like institution-based trust/distrust and trust/distrust intention may provide additional explanatory power.

Conclusion

This study is one of the first, to our knowledge, to examine three types of quality—information, system, and service outcome quality—and both trusting and distrusting beliefs in a B2B data exchange context. We examine these quality types using Herzberg's two-factor theory that differentiates motivating factors and hygiene factors. We find differential impacts of quality on trusting and distrusting beliefs. Information quality, a motivating factor, has a stronger impact on trusting beliefs, whereas service outcome quality, a hygiene factor, has a stronger impact on distrusting beliefs. Further, we show that trusting and distrusting beliefs play different roles in explaining data exchange usage continuance. While the impact of trusting beliefs on continuance intention is mediated by both relationship commitment and perceived risk, the impact of distrusting beliefs is only mediated by perceived risk. This study provides a starting point for researchers to further investigate the interplay between quality and trust/distrust in data exchanges and similar relationships.

Appendix A. Experimental manipulations

The experiment was a 2 × 3 between subjects design, with two levels of control transparency (present versus not present) and three levels of outcome feedback (positive, neutral, and negative). The control transparency manipulation reflects the availability of adequate information to verify or assess the data exchange taking place (Nicolaou and McKnight, 2006). In the condition with control transparency, the system validated the format and content of the transaction data entered by users including the customer number, quantity ordered, and item number. This included programmed edit checks on input data, and also evaluated validity of input values through real-time verification against values stored in a Web accessible database. Users in the control transparency treatment saw an additional screen notifying them about the successful or unsuccessful outcome of controls applied (example: "this order is correctly entered"). In the condition without control transparency, the system did not validate the format and content of the transaction data or provide users with this information.

The outcome feedback manipulation reflects the availability of specific information about exchange outcomes, that is, fulfillment or shipment information. The positive feedback group was informed by the system that the whole quantity ordered was shipped and that it was expected to arrive by the required delivery date. Subjects in the negative feedback group were informed by the system that only a partial quantity of the order was shipped and was expected to arrive after the required delivery date. Subjects in the neutral feedback group were informed that their order was accepted and it would be shipped the next business day.

We performed manipulation checks for the treatments. These questions were included at the end of the questionnaire. For the control transparency manipulation check item, we asked subjects whether, "The exchange provides adequate information to assess the reliability, validity, and accuracy of the data exchanged." On a 7-point Likert scale from (1) Strongly Disagree to (7) Strongly Agree, subjects in the no control transparency treatment ($n = 76$) had a mean 3.09, and subjects in the control transparency treatment ($n = 69$) had a mean 4.16. The difference is significant at $p < 0.001$, meaning the manipulation was successful. For the outcome feedback manipulation check, the subjects responded to three items: "The exchange tells me that my order has been accepted and will be shipped on the next business day" (neutral feedback), "The exchange tells me that the whole quantity of my order has been shipped and that it is expected to arrive by my required delivery date" (positive feedback), and "The exchange tells me that a partial quantity of my order has been shipped and that it is expected to arrive after my required delivery date" (negative feedback). For the neutral manipulation check, subjects in the neutral feedback treatment scored significantly higher (5.31, $p < 0.001$) than subjects in the other feedback treatments (3.60–positive treatment, 3.04–negative treatment). Similarly, for the positive manipulation check, subjects in the positive feedback treatment scored significantly higher (4.87, $p < 0.001$) than subjects in the other treatments (3.37–neutral treatment, 2.81–negative treatment). Also, for the negative manipulation check, subjects in the negative feedback treatment scored significantly higher (5.47, $p < 0.001$) than subjects in the other two treatments (2.51–neutral treatment, 3.00–positive treatment). These results show that subjects perceived different outcome feedback according to their treatment conditions.[14]

Because we manipulated control transparency to increase variance in information and system quality, we also analyzed whether the information and system quality variable means differed by treatment. Subjects in the no control transparency treatment had a mean 3.14 for information quality and a mean 4.96 for system quality, and subjects in the control transparency treatment had a mean 4.60 for information quality and a mean 5.32 for system quality. The difference for information quality is significant at $p < 0.001$, and the difference for system quality is significant at the $p < 0.10$ level ($p = 0.077$). This means the manipulation was successful in creating variance for information and system quality.

We had also manipulated outcome feedback to produce variance in information and service outcome quality. Analyzing the difference in the information and service outcome quality variable means by the three outcome feedback treatments, we find that while the ANOVA tests are significant ($p = 0.044$ for information quality and $p = 0.000$ for service outcome quality), the only contrast that is significant is between the positive and negative outcome feedback conditions for service outcome quality. So we combined the positive and neutral treatments. Then we find that subjects in the positive/neutral treatment had mean information quality of 4.04 and mean service outcome quality of 4.65. Subjects in the negative feedback treatment had mean information quality of 3.40 and mean service outcome quality of 2.55. The difference in information quality is significant at $p < 0.05$, and the difference in service outcome quality is significant at $p < 0.001$, showing that the manipulation was successful in creating variance.

Appendix B. Measurement items

The measurement items for our study were adapted from previous research (Table 8). We used seven measurement items to measure information quality. The first two items refer to "up-to-date information" and data being "never outdated," both of which measure currency or the degree to which information is up to date (Wixom and Todd, 2005; Xu et al., 2013). The next two items refer to "no accuracy problems" and data being "completely error-free." These measure the accuracy dimension of information quality or the user's perception that the information is correct (Wixom and Todd, 2005; Xu et al., 2013).

[14] We did not specifically ask subjects if they thought the feedback was positive, neutral, or negative. However, evaluating their interpretation of the manipulation is less important than determining if they perceived the manipulation, because we are not hypothesizing effects of the manipulations on other variables.

Table 8
Measurement items.

Research variables

Information Quality (7-point Likert scale from Strongly Disagree to Strongly Agree)The exchange provides up-to-date information with regard to past transactions. [currency]The data this exchange provides is never outdated. [currency]There are no accuracy problems in the data I use or needed in this exchange. [accuracy]Data provided by this exchange is completely error-free. [accuracy]The information content of the exchange meets my needs. [relevancy]The exchange maintains the right data for my purposes. [relevancy]Based on my needs, this exchange has no missing data items. [completeness]

System Quality (7-point Likert scale from Strongly Disagree to Strongly Agree)
The data exchange website I used:
1. is *responsive* to my requests. [access]
2. In general, provides *good access*. [access]
3. has a *simple layout* for its contents. [usability]
4. is *easy to use*. [usability]
5. is *well organized*. [usability]
6. In general, is *user-friendly*. [user-friendliness]
7. it provides *a few clicks* to locate information. [navigation]
8. In general, is *easy to navigate*. [navigation]

Service Outcome Quality (7-point scale from (1) very poor, to (4) fair, to (7) excellent)
Please rate the supplier's performance on fulfilling each of the following goals:
1. Timeliness of expected delivery [timeliness]
2. Completeness of order fulfillment [accuracy]
3. Accuracy of order fulfillment [accuracy]

Trusting Beliefs (7-point Likert scale from Strongly Disagree to Strongly Agree)
1. If I required help, the supplier would do its best to help me. [benevolence]
2. The supplier is interested in my well-being, not just its own. [benevolence]
3. I would characterize the supplier as honest. [integrity]
4. The supplier would keep its commitments. [integrity]
5. The supplier performs its role of providing the data exchange very well. [competence]
6. Overall, the supplier is a capable and proficient Internet data exchange provider. [competence]

Distrusting Beliefs (7-point Likert scale from Strongly Disagree to Strongly Agree)
1. I am not sure this supplier would act in my best interest. [malevolence]
2. I suspect that the supplier is interested in just its own well-being, not in my well-being. [malevolence]
3. I am worried about whether the supplier would be truthful in its dealings with me. [deceit]
4. It is uncertain whether the supplier would keep its commitments. [deceit]
5. I am skeptical about whether the supplier is competent and effective in providing this data exchange. [incompetence]
6. I feel nervous about how knowledgeable the supplier is about issues of web based data exchanges. [incompetence]

Relationship Commitment (7-point Likert scale from Strongly Disagree to Strongly Agree)
Indicate your disagreement or agreement with each of the following questions assuming you have a continuing role as a purchaser:
1. The relationship that my firm has with this supplier:
2. Is something we are very committed to
3. Is something my firm intends to maintain indefinitely
4. Deserves our firm's maximum effort to maintain
5. I expect my firm's relationship with this supplier to last a long time.

Perceived Risk (7-point Likert scale, endpoints below)
Considering the case assigned to you, how would you rate the overall risk of carrying out transactions using this data exchange?
1. Extremely low to Extremely high
2. Much lower than acceptable level to Much higher than acceptable levelHow would you characterize the possibility of using this data exchange offered by this supplier to carry out purchasing transactions?
3. Significant opportunity to Significant threat
4. Potential for gain to Potential for loss
5. Positive situation to Negative situation

Continuance Intention (7-point Likert scale from (1) extremely unlikely to (7) extremely likely)
Please evaluate the following statements according to their likelihood of occurrence. Assume you have a continuing role as a purchaser.
1. What is the likelihood that you would continue using this exchange in the future to carry out transactions similar to the ones described in your case?
2. If I was faced with a similar purchasing decision in the future, I would use this same data exchange again.
3. If a similar ordering need arises in the future, I would feel comfortable using this data exchange again to place my order.
4. If I continued to do such purchasing as this, I would not intend to continue transacting with this data exchange. (*reversed*)

Control variables

Disposition to Trust (7-point Likert scale from Strongly Disagree to Strongly Agree)
1. It is easy for me to trust a person/thing.
2. My tendency to trust a person/thing is high.
3. I tend to trust a person/thing, even though I have little knowledge of it.
4. Trusting someone or something is not difficult.

Disposition to Distrust (7-point Likert scale from Strongly Disagree to Strongly Agree)
1. I worry that people are usually out for their own good.
2. It concerns me a lot that people pretend to care more about one another than they really do. (dropped)
3. I fear that most people inwardly dislike putting themselves out to help other people.

(*continued on next page*)

Familiarity (7-point Likert scale from Strongly Disagree to Strongly Agree)
1. I am familiar with searching for industrial metal products on the internet.
2. I am familiar with purchasing industrial metal products on the internet.
3. I am familiar with inquiring about industrial metal products on the internet.

Marker variable

Perceived Web Risk (7-point Likert scale from Strongly Disagree to Strongly Agree)
1. I think it is risky to provide one's credit card information to Web-based vendors.
2. It seems dangerous to enter personal information like my name, address, and phone number on the Web.
3. Entering personal information over the Web is unsafe.

Relevancy, or the extent to which information is applicable and helpful for the task at hand (Knight and Burn, 2005), was also measured using two items that refer to how the information content "meets my needs" and is right "for my purposes." The final element of information quality we measured refers to "no missing data items" and relates to completeness, the degree to which the system provides all necessary information (Wixom and Todd, 2005).

We used eight items to measure system quality that were mostly adapted from McKinney et al.'s (2002) system quality dimensions. The first two measurement items "responsive" and "good access" relate to McKinney et al.'s (2002) access item. The next three items ("simple layout," "easy to use," and "well organized") relate to their usability construct. "User-friendly" was used by Gorla et al. (2010) as one of nine items to measure system quality. Both of the final two measurement items, "a few clicks" and "easy to navigate" were adapted from the two items McKinney et al. (2002) used to represent their navigation construct.

We used three service outcome quality items based on the Collier and Bienstock (2006) outcome quality dimensions of delivery/order fulfillment: order timeliness and accuracy. We added an item for completeness as another measure of accuracy. We asked subjects to rate the supplier's performance on fulfilling these three goals. Because the only interaction our subjects had with the data exchange partner and website was to order products, this question stem served to remind them that these were service outcomes. Based on the information provided during the ordering process, and the importance given the delivery in the case materials, subjects should have enough information about interim outcomes to rate the supplier's performance on these goals.

We adopted the trusting belief items from the 11-item McKnight et al. (2002a) trust scale. We used a subset of their scale to reduce the survey length. Of the six items we chose, two represent benevolence, two represent integrity, and two represent competence. This captures the three common components of trusting beliefs (McKnight et al., 2002a). For distrusting beliefs, we adopted six items from the 11-item McKnight and Choudhury (2006) scale. These authors created distrusting belief items from the McKnight et al. (2002a) trust measures by adding a negation word and/or a negative emotion word. We chose two items to represent each of the three components of distrusting beliefs: malevolence, deceit, and incompetence (Moody et al., 2010). Again, we chose a subset of their scale to reduce the survey length.

Relationship commitment was measured using the three-item scale developed by Morgan and Hunt (1994). We added an additional item to reflect expectations that the relationship would last a long time. The perceived risk and continuance intention items were adapted from Nicolaou and McKnight (2006). Two control variables were adapted from Lee and Turban (2001–disposition to trust), and McKnight et al. (2004–disposition to distrust). We created the control variable familiarity to refer to users' familiarity with searching for, purchasing, and inquiring about industrial metal products (the focal product in the experiment) on the Internet. The marker variable, perceived web risk, was adapted from McKnight et al. (2002b).

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