The Relative Importance of Different Trust Constructs for Sellers in the Online World
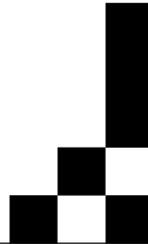
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INTRODUCTION

Researchers in a variety of disciplines have worked on the importance of trust for interpersonal relationships and even though their focus differs, Rousseau *et al* (1998: 395), based on a meta-analysis of articles in a special topic forum of the *Academy of Management Review*, stated that there is a common understanding: 'Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of another.' The high prominence of trust, which is reflected in a multitude of research articles dealing with trust, both offline (e.g. Doney and Cannon 1997; Ganesan 1994; Garbarino and Johnson 1999; Moorman *et al* 1993; Sirdeshmukh *et al* 2002) and online (e.g. Hoffman *et al* 1999; Ridings *et al* 2002), is not surprising. As highlighted by Shapiro (1987), specialization and social division of labour, which are the keystones of any modern economy, lead to a wide variety of agency relationships, which people are obliged to enter each day, starting from taking dirty clothes to the dry cleaner and reading information collected by reporters and presented in newspapers, to using money and other symbolic forms of wealth. Even though it is not evident if trust is

A b s t r a c t

The paper focuses on the relative importance of different trust constructs for the seller–buyer relationship in commercial transactions over the Internet. Following the work of Rousseau *et al* (1998) and McKnight and Chervany (2002), we analysed the relative importance of three different trust constructs (institutional, calculative and relational trust), covering legal, technical, financial and psychological aspects. For this analysis, we used a conjoint-analytical approach based on a survey of 1,134 companies in the German-speaking part of Europe. Our analysis has shown that trust in the regulatory framework (institutional trust) is by far the most important component of trust for sellers in the online world, accounting for 56% of relative importance. The difference between calculative and relational trust is weaker, with relational trust being more important than the former (27% vs 17% respectively), at least for some industry sectors.

Keyword: institutional trust, calculative trust, relational trust, conjoint analysis

'perhaps the most efficient mechanism for governing economic transactions' (Gulati 1995: 107) or 'has super-normal costs associated with it' (Zucker 1986: 67), it is an important parameter that avoids the complete paralysis of any society, by making people enter necessary agency relationships.

Trust has a central role, especially in the area of e-commerce, and Reichheld and Schefter (2000) even state that 'price does not rule the web, trust does' (Reichheld and Schefter 2000: 107). But even though it is not only the buyer who decides if he is willing to shop online, but also the seller who provides the opportunity, most empirical studies in this field only focused on the consumer's point of view (e.g. Chow and Holden 1997; Hoffman *et al* 1999). Some authors have tried to include both parties by defining their concept of trust very broadly (e.g. McKnight and Chervany 2002) but empirical research on this topic has so far been very limited.

Our intention is to close this gap by focusing on trust-related factors relevant to the seller. To our knowledge, this focus is quite exceptional for trust research, which typically has a buyer perspective. Additionally, we do this not only conceptually, but also by using empirical evidence based on a survey of 1,134 companies in the German speaking-part of Europe. Again, in contrast to the mainstream of trust research, this data collection did not focus on the actual behaviour of sellers but on collecting a preference rating over a set of artificial scenarios. This approach follows the recommendations of Mayer *et al* (1995), who stated that 'separating the willingness to be vulnerable from actually being vulnerable constitutes a finer distinction. To measure trust itself, a survey or other similar methodology that taps into a person's willingness to be vulnerable to the trustee is needed, because this is distinct from observable RTR [risk taking in relationship]' (Mayer *et al* 1995: 729).

In the next section, we review relevant literature on trust, before presenting our research hypotheses, methodology and results. The paper finishes with a discussion of the limitations and implications of our research.

LITERATURE REVIEW

Due to the specific characteristics of the Internet (Yoon 2002), users pay increased attention to trust-related issues in the online world (Ratnasingham 1998). From a consumer's point of view, providing basic information already requires a high level of trust, since an untrustworthy seller might act opportunistically by combining this information with other data and, as a result, gather knowledge, which the consumer does not wish him to have. In the online world, this is especially favoured by a general opaqueness of the seller's actions, due to the separation of buyer and seller by time and/or space (Kollock 1999). On the other hand, the consumer might use pseudonyms to disguise his (online) identity, which again favours opportunistic behaviour from his side (Friedman and Resnick 2001) and generates significant additional transaction costs (Gulati 1995). This all leads to increased information asymmetry between the two business parties (Tan and Thoen 2000) and requires a higher level of trust, as 'trust counteracts the fear of opportunistic behaviour and as a result is likely to limit the transaction cost associated with an exchange' (Gulati 1995: 93).

Consequently, a lot of research has been done concerning factors that may influence the creation of trust, both on- and offline. George (2000) found that trust in online transactions is influenced by the perception of overall Internet security, privacy and experience with the Internet. Similarly, Yoon (2002) showed that website trust is affected by transaction security, personal traits and consumer awareness of the Internet site. Gefen (2000) highlighted the relevance of a potential buyer's experience with a specific vendor and showed the importance of an overall trusting disposition, which 'might be thought of as the general willingness to trust others' and depends on factors such as personality type and cultural background (Mayer *et al* 1995: 715). Jarvenpaa *et al* (2000) showed that the perceived size and reputation of an Internet store have an influence on trust. The specific importance of reputation was also a topic for Friedman and Resnick (2001) and Kollock (1999). Even though their focus was not on traditional buyer-to-consumer concerns, but on auction sites and consumer-to-consumer activities, they showed the significant impact that easily obtainable pseudonyms have on the importance of reputation. Friedman and Resnick (2001) proved from a game theoretical point of view that in a world with cheap pseudonyms, the optimal strategy is to distrust unknown parties and Kollock (1999) gave examples where this strategy was implemented in auction sites and newsgroups.

Several psychological theories can be used to explain the relationship between trusting beliefs and trusting intentions or trust-related behaviour (see McKnight *et al* (1998) for a clear definition of these terms). One example is social exchange theory, as applied by Gefen *et al* (2003), which 'views interactions in a similar manner to economic exchange: being composed of costs paid and reward received'. Since 'rewards cannot be guaranteed' trust in a social exchange can be seen as a means to 'increase the perceived certainty concerning other people's expected behaviour and reduces the risk of being exploited' (Gefen *et al* 2003: 61). Morgan and Hunt (1994) also applied social exchange theory to explain the high importance of commitment and trust for cooperative relationships. Another theory that can be applied is the theory of reasoned action, which states that attitudes (e.g. attitude toward trustworthiness) lead to intentions which again influence actual behaviour (e.g. willingness to interact — see George (2000) for more details).

Several researchers have tried to summarize these empirical findings in an overall model explaining the determinants of trust. For our analysis, we follow the models of Rousseau *et al* (1998) and McKnight and Chervany (2002). Rousseau *et al* (1998) found that trust can be split into three different components: institutional, calculative and relational trust. Institutional trust is confidence in regulatory factors, which promote the creation of trust, e.g. a legal system that protects individuals' rights and property. Calculative trust is based on a rational choice (risk—return calculation) and emerges when the trustor perceives that the trustee intends to perform an action where the expected outcome is beneficial for the trustor. It is 'based on the assumption that while other people may not be necessarily good, they are rational, calculative, act in their own best self-interest, and, as such, will refrain from inflicting harm upon themselves' (Gefen *et al* 2003: 64). Finally, relational trust is derived over time from repeated interactions between trustor and trustee and covers such factors as familiarity and experience with each other. This view was also confirmed by McKnight and Chervany (2002). Both carried out a meta-analysis of 65 articles about trust and identified an interdisciplinary model of high-level trust constructs that covered three components leading to trusting beliefs, trusting intentions and trust-related behaviour: dispositional trust, institutional trust and interpersonal trust.

RESEARCH HYPOTHESES

Our work focuses on factors influencing the trust of a seller, which leads her to carry out transactions with a potential buyer online, using the work of Rousseau *et al* (1998) and McKnight and Chervany (2002). Our analysis is, therefore, based on three different trust constructs: institutional, calculative and relational.

Where the relative importance of institutional trust is concerned, we build on the work of Zucker (1986), who analysed the importance of different trust-building mechanisms in the USA during 1840 and 1920. She found that in an environment that is characterized by a high degree of heterogeneity and turnover among the actors, trust can no longer be built based on 'expectations tied to past or expected exchange' (Zucker 1986: 82), i.e. interpersonal factors. In such a situation, interpersonal trust will be replaced by institutional trust when (a) there is social and/or geographical distance between those engaging in a transaction and (b) transactions are tied into a framework of inseparable transactions. As both conditions are fulfilled for the special case of e-commerce, we postulate institutional trust being far more important than the other two types.

Even though some researchers (e.g. Gefen *et al* 2003; Pavlou 2002; Pavlou and Gefen 2002), state that this is only true in situations where familiarity and experience

are too low to build interpersonal trust we argue that in a regulatory framework in which all relevant laws are in place, a seller can always enforce his right, by taking his case to court. Therefore, any business within this framework (i.e. which is not illegal) constitutes, in principle, only very limited risk. As long as one has perfect confidence in the framework, one will always be willing to do business involving high financial risk even with a complete stranger, since, even though it may be associated with some cost (e.g. cost of a lawyer, opportunity cost of time), one can be sure of being able to claim one's right. This is also in line with the work of Zucker who states that, 'reputation may be irrelevant if an escrow account is used' (Zucker 1986: 65). In a perfect framework, therefore, trust based on interpersonal or calculative mechanisms becomes irrelevant. This leads to the following hypotheses:

> H_{1A}: For the seller, the relative importance of institutional trust is significantly higher than that of calculative trust.
> H_{1B}: For the seller, the relative importance of institutional trust is significantly higher than that of relational trust.

Unfortunately, in reality one can never assume the regulatory framework to be perfect in the sense stated above, for at least three reasons. First, the two parties may have a different view of the situation, making a legal solution of a potential problem far from easy or even impossible. Second, no legal system in the world can take account of every conceivable crime in advance. Therefore, written law will always follow reality, giving room for a certain grey area of unregulated situations. Finally, even if one party has acquired a legal title, it is still not certain that it can be effectively enforced, since the other party may be out of reach or simply not be able to pay the resulting damages. A sufficient level of trust which leads to the decision to perform transactions online, is, therefore, rarely built solely through institutional mechanisms, but also takes account of calculative and interpersonal factors.

Concerning the relative importance of calculative and relational trust, Rousseau *et al* (1998) and Ratnasingham (1998) proposed that with increased time of relationship, calculative trust becomes less and relational trust more important. This indicates that people only use calculative trust when they do not have sufficient information about the other party to build relational trust and tend to replace calculative by relational trust as soon as there is a sufficient history of transactions between the two parties. This was also confirmed by the empirical work of Gefen (2002a), who states that: 'Nonetheless, tentatively, these results imply that trust, at least in this limited domain of e-commerce where real risk is relatively low, deals more with social complexity reduction than with the risk of being exposed to opportunistic behaviour' (Gefen 2002a: 40). Therefore, calculative trust seems to be less valuable than relational trust and we conclude that:

H_2: For the seller, the relative importance of relational trust is significantly higher than that of calculative trust, given that there is sufficient experience between the two parties to build relational trust.

METHODOLOGY

In order to measure the relative importance of institutional, calculative and relational trust, we decided for conjoint analysis, as this method is especially suited to determine the relative importance of different decision-relevant parameters, taking into account potential trade-offs between them. Where the operationalization of our constructs is concerned, we used the same approach as Gulati (1995) and focused on trust-building mechanisms as a proxy for measuring trust, based on the intuition that these factors are likely to lead to the development of trust.

As laid out in the literature review, institutional trust covers confidence in the regulatory framework in which the seller and buyer are acting. As highlighted by McKnight *et al* (1998), it consists of two different components: beliefs about structural assurance and situational normality. Structural assurance beliefs cover the idea of procedural norms and structural constraints as defined by Shapiro (1987) and include legal recourse, guarantees and regulations (Gefen *et al* 2003) or monitoring, third-party certification, and escrows (Pavlou and Ratnasingham 2003). Situational normality beliefs 'stem from the appearance that things are normal' (McKnight *et al* 1998: 478). In the area of e-commerce they can be reflected by the concept of technology trust, which is defined as:

> the subjective belief by which an organization believes that the underlying technology infrastructure and control mechanisms are capable of facilitating a particular transaction according to its confident expectations … Technology trust is defined as a higher-order construct comprising of transaction confidentiality, integrity, authentication, non-repudiation, access control, availability, and best business practices' (Pavlou and Ratnasingham (2003)

(see also Ratnasingham (1998) for a definition of these terms).

Consequently, in an online environment, there are two main dimensions of institutional trust: technical and legal. The technical dimension covers all aspects necessary to prove that a certain buyer exchanged information with a certain seller and the legal dimension summarizes all rules which help one party (e.g., the seller) to achieve its rights (e.g., obtaining the agreed price), given the assumption that all relevant actions took place (e.g., order placed and product shipped). These two dimensions are very closely interwoven: Technical aspects (e.g., A received an email encrypted by B) only make sense, if they are interpreted in a legal way (e.g., B wanted to

order a product from A), and legal obligations are only feasible when they can be implemented technically. Additionally, from a seller's point of view, separating them is only of limited usefulness. After having received an order from a potential buyer, the decision about accepting the order and delivering the product is driven by the question: Does this order constitute a legally binding contract, which enables me to claim my right at court if I run into some kind of problem with the potential buyer? For the seller, it is irrelevant if a negative answer to this question is due to a weak regulatory framework or missing security-related standards. This split seems artificial and may even lead to wrong conclusions, e.g., overemphasizing the importance of network security. From a scientific point of view, measuring these two dimensions (legal and technical security) in one construct may make the results more difficult to interpret, but we question the practical usability of highly interpretable results, which are achieved by measuring these two concepts separately. This point of view was also confirmed by our pre-test, which showed that respondents were unable to distinguish properly between these two dimensions and found the split into two constructs to be an artificial one. We decided, therefore, to measure both as one construct and operationalized institutional trust by the attributes integrity, provability and legal binding of the online order, defined on the two levels ensured and not ensured.

As described in the literature review, calculative trust is built through a careful weighting of expected risks and gains associated with the decision to trust another party and, normally, the seller will choose to trust a buyer if the expected outcome of the business is positive for him (Reagle 1996). As shown by the work of Nooteboom *et al* (1997), relational risk consists of two dimensions, namely size and probability of loss, whereas trust decreases the perceived probability of loss. In the special case of e-commerce, the maximum size of loss for the seller is the value of the product shipped, which is realized when the buyer acts opportunistically and does not pay after receipt of the product. On the other hand, the potential return can also be expressed as a function of product value, namely product value times the profit margin of the seller. Consequently, both risk and return are a function of the value of the underlying product and we therefore chose to measure calculative trust by the attribute value of goods being ordered online, defined on the two levels, high and low.

Two points of this operationalization need comment. First, we decided to use soft categories (high vs low) instead of monetary values to reflect the substantial differences existing across industries — a cheap product in retail may be worth some cents, in the construction industry it can easily be valued at thousands of dollars. Second, the personal interpretation of these two levels of the attribute is dependent on the risk preference of the respondent. A risk-loving person may consider high value

as the better alternative, while a risk-averse person would prefer a low-value situation. This is due to the fact that each respondent calculates the expected outcome of the business based on his personal risk preference. However, from a conjoint-analytical point of view, which one of the two levels of the attribute is the preferred one for a given respondent is unimportant. The only relevant point is that both levels are perceived as being significantly different from each other, which is given independently from individual risk preferences.

Where relational trust is concerned, it is a consequence of repeat interactions between the two parties, 'based on the premise that through ongoing interaction, firms learn about each other and develop trust' (Gulati 1995: 92). It is, therefore, closely related to the concept of familiarity, and the work of Gulati (1995) gives empirical evidence that 'familiarity between organizations through prior alliances does indeed breed trust' (Gulati 1995: 105). This is also supported by the work of Gefen who argues that 'familiarity counteracts concerns that the other party may be opportunistic, based on a reliance on past joint activities when that did not happen' (Gefen *et al* 2003: 63). To cover this aspect, relational trust was described by a situation in which business is done with either a regular or a new customer and therefore operationalized by the length of the client relationship.

There are two potential criticisms of this operationalization. First, it does not allow for certain problems that may arise from long-term relationships, for example, perceived opportunism and rising expectations (Grayson and Ambler 1999; Moorman *et al* 1993). Second, familiarity only breeds trust if the other party is indeed trustworthy, i.e. if it is based on positive experience (Gefen *et al* 2003). Concerning the first point, we argue that 'the exact nature of these relational dynamics remains elusive' (Grayson and Ambler 1999), which means that there is not sufficient knowledge about this relationship up to now, which can be reflected in construct operationalization. With regards to the second point, we hold the view that a customer, who is not trustworthy, will never become a regular customer of a company. No e-vendor can avoid having bad experiences with some of its new customers, but it is highly unlikely that she will be willing to perform a second transaction with a client, who had already been untrustworthy. Therefore, the concept of a regular customer implicitly assumes the existence of positive past experience.

For data collection, we decided to use the full-profile method instead of the trade-off procedure, meaning that we asked respondents to rank all potential scenarios and not just a subset of them. This was due to previous research which had shown that the full-profile method is the better approach, if the focus is to determine the relative importance of different constructs (Müller-Hagedorn *et al* 1993). Green and Srinivasan (1990) also recommend the full-profile method, if it is possible to keep a low number of attributes. Previous research has indicated, that the relative importance of an attribute increases as the number of levels on which it is defined increases, even if the minimum and maximum values for the attribute are fixed (Green and Srinivasan 1990). We, therefore, used the same number of levels for each attribute (two) to eliminate this effect (Wittink *et al* 1990). We also constructed the different stimuli so that the construct measuring institutional trust was always put at the end of the stimulus description, as there seem to be significant positional effects in conjoint analysis (Johnson 1989; Kumar and Gaeth 1991), and attributes in the top places tend to be rated higher than attributes at the end, at least in simple cases with only a few attributes (Johnson 1989). Since we had already assumed that institutional trust is more important than the other two constructs, we preferred to underestimate its importance rather than overestimate it.

Our final design, therefore, consisted of eight (2^3, three attributes at two levels each) scenarios. In each one, we described a situation in which a potential customer (either regular or new, measure of relational trust) wished to buy goods online (either high or low value, measure of calculative trust) in an environment in which integrity, provability and legal binding of the online order were either ensured or not ensured (measure of institutional trust). Each respondent was asked to rate his willingness to sell a product under the given circumstances on a nine-point rating scale defined from −4 (not likely) to +4 (very likely).

We are fully aware that this approach differs from the recommended way for the operationalization of key constructs, i.e. the use of pre-tested multi-item measures (Churchill 1979) defined on a rating scale with an appropriate number of response alternatives, preferably five, seven or nine (Cox 1980), and, therefore, does not follow the recommendations for construct operationalization in IS research of Boudreau *et al* (2001). Unfortunately, our specific analysis made it impossible to fulfil these requirements, as our research question required the use of a conjoint analysis, for the reasons stated above. Increasing the number of response alternatives from two to three, or the number of items per construct from one to two, would have increased the number of scenarios to be rated from 8 (2^3) to 27 (3^3) or 64 (2^6), respectively. Data collection would only have been possible under these circumstances when using a trade-off procedure rather than the full-profile method, but our pre-test showed that respondents had severe problems with this more complex design, resulting in an unacceptably low response rate. Therefore, we decided on a simpler operationalization with one dichotomous item per construct as one of the first attempts to incorporate legal, technical, financial and psychological aspects into one empirically testable model. Additionally, we regret that our data collection was carried out too early to take into

Table 1. Scenarios of e-commerce

Under which conditions would you decide to carry out transactions via e-Commerce/the Web? Please try to assess each of the following eight scenarios. Please mark the appropriate number with an X.

#	Person [...]	... orders goods of [...] value from you online,	integrity, provability, and legal binding of the online order are [...].	−4 = 'not likely' to +4 =' very likely'
1	regular customer	low	ensured	−4 −3 −2 −1 0 +1 +2 +3 +4
2	regular customer	low	not ensured	−4 −3 −2 −1 0 +1 +2 +3 +4
3	regular customer	high	ensured	−4 −3 −2 −1 0 +1 +2 +3 +4
4	regular customer	high	not ensured	−4 −3 −2 −1 0 +1 +2 +3 +4
5	new customer	low	ensured	−4 −3 −2 −1 0 +1 +2 +3 +4
6	new customer	low	not ensured	−4 −3 −2 −1 0 +1 +2 +3 +4
7	new customer	high	ensured	−4 −3 −2 −1 0 +1 +2 +3 +4
8	new customer	high	not ensured	−4 −3 −2 −1 0 +1 +2 +3 +4

Source: Schoder and Yin (2000).

account the excellent work on operationalization of trust of McKnight *et al* (2002) and Gefen (2002b).

We then used this research design to conduct interviews among e-business decision makers in 1,308 companies, 1,004 in Germany, 158 in Austria, and 146 in Switzerland, between May and June 2000. By using a multi-level sampling approach (see Strauss and Schoder (2000) for further details), we managed to make our sample representative of all German-speaking European countries (Germany, Austria and the German-speaking part of Switzerland) in terms of industry sectors and company size. Of these 1,308 companies, a surprisingly low number of 106 failed to answer the questions and only 68 answers were excluded due to too many ties. The analysis was, therefore, based on 1,134 datasets. A Chi-Squared-Test showed that these did not differ significantly from the raw database of 1,308 in terms

of industry sectors (asymptotic significance of 0.7744). Therefore, the following results can still be considered to be representative for the German-speaking part of Europe in this dimension. All statistical analysis was performed using SPSS for Windows, release 10.1.3.

RESULTS

To control for industry specific differences in the relative importance of the three different trust constructs, we grouped the companies into industry sectors using the 1987 US SIC logic and most (98%) could be allocated to one of the nine industry sectors (see Table 2). The aggregated analysis of all 1,134 datasets resulted in part-worths (indicated as PW) for institutional trust of +/−1.6149, for calculative trust of +/−0.4753 and for relational

Table 2. Part-worth and relative importance of institutional, calculative and relational trust by industry sector

Industry sector	Datasets		Inst. trust		Calculative trust		Relational trust	
	No.	In %	PW	Imp. (%)	PW	Imp. (%)	PW	Imp. (%)
Manufacturing	430	37.9	1.5628	52	0.5052	17	0.9116	31
Retail trade	164	14.5	1.6441	59	0.4230	15	0.7370	26
Service industry	162	14.3	1.6150	58	0.4776	17	0.6890	25
Construction industry	100	8.8	1.6587	60	0.4337	16	0.6537	24
Wholesale trade	83	7.3	1.5030	54	0.4006	15	0.8554	31
Transportation, Comm., Utilities	76	6.7	1.5674	56	0.5937	21	0.6595	23
Finance, Insurance, Real estate	76	6.7	1.8487	61	0.5526	18	0.6480	21
Mineral industries	11	1.0	1.8636	69	0.3182	12	0.5000	19
Public administration	5	0.4	2.2500	87	-0.2000	8	0.1500	6
Subtotal	1,107	97.6	1.6127	56	0.4790	17	0.7827	27
ND	27	2.4	1.7037	59	0.3241	11	0.8796	30
Total	1,134	100	1.6149	56	0.4753	17	0.7851	27

trust of $+/-0.7851$. In this notation, the positive value indicates the part-worth for the preferred level of a particular attribute.

The relative importance of each attribute can be calculated by using the difference between the maximum and minimum part-worth and dividing it by the sum of those differences over all attributes (Green and Srinivasan 1978). This resulted in a relative importance (indicated as Imp.) of 56% for institutional, 17% for calculative and 27% for relational trust. The quality of the conjoint analysis can either be measured by Kendall's tau-b or Pearson's R. Both measures showed very high values (1.000 for Kendall's tau-b and 0.992 for Pearson's R), indicating excellent quality.

In order to test the hypotheses stated above, we calculated the difference between the part-worth for institutional and calculative trust (ΔPW_{1A} in Table 3), institutional and relational trust (ΔPW_{1B}) and relational and calculative trust (ΔPW_2). Using a t-test we determined the significance of these being different from 0 (indicated as Sig.). It can be seen that at 5% level the part-worth of institutional trust is greater than that of calculative trust for all industry sectors, which supports H_{1A}. Additionally, it is also greater than the part-worth of relational trust for all industry sectors, except Public administration. However, since this sector only contains 5 datasets, the result must be interpreted with caution, and the whole analysis can be seen as support for H_{1B}. Where the difference between calculative and relational trust is concerned, H_2 must be rejected at 5% level for at least two industry sectors, namely Transportation, Communications and Utilities, and Finance, Insurance and Real Estate.

Of course this analysis is subject to an accumulated alpha error as for each hypothesis ten different significance tests were carried out, one for each of the nine industry sectors and one for the set of companies which could not be allocated to an industry (further called ND). If each of these tests is based on a significance criterion $\alpha\star$, the probability that at least one false rejection will occur can be calculated as $1-(1-\alpha\star)^{10}$. However, even if we correct for this accumulated error and set $\alpha\star = 0.005$ (calculated as $0.050/10$ and called a Bonferroni adjustment, see Fletcher *et al* 1989), Table 3 shows that the only change in our results is the rejection of H_{1A} for Mineral industries and Public administration, of H_{1B} for Mineral industries and ND and of H_2 for ND. As all three of these groups contain only very few datasets (between 5 and 27, compared to 76 for the next smallest group), this cannot be seen as a severe problem for the reasons stated above. Therefore, we conclude that our findings still hold true even after accumulated alpha errors have been taken into account.

Finally, we compared the part-worths of the three trust constructs across industry sectors for the 1,107 datasets where information about the industry sector was available. Using a one-way ANOVA, the omnibus F-Test indicated no significant differences for the part-worths for institutional trust (significance of 0.491) and calculative trust (significance of 0.171) at 5% level. For relational trust, the F-Test indicated at least one significant difference (significance level of 0.002), but this could not be confirmed by a Tukey-Kramer post-hoc test. We concluded, therefore, that the significance of the F-Test was due to an accumulated Alpha-error and/or a violation of the normal distribution assumption, both of which are not applicable to the Tukey-Kramer test (Driscoll 1996), and state that there are no significant differences in the part-worths of the three different trust constructs across industry sectors.

Table 3. t–Test of significant differences between part–worth of different trust constructs

Industry sector	Datasets		H1A		H1B		H2	
	No.	In %	ΔPW_{1A}	Sig.	ΔPW_{1B}	Sig.	ΔPW_2	Sig.
Manufacturing	430	37.9	1.0576	0.000	0.6512	0.000	0.4064	0.000
Retail trade	164	14.5	1.2210	0.000	0.9070	0.000	0.3140	0.000
Service industry	162	14.3	1.1373	0.000	0.9259	0.000	0.2114	0.005
Construction industry	100	8.8	1.2250	0.000	1.0050	0.000	0.2200	0.003
Wholesale trade	83	7.3	1.1024	0.000	0.6476	0.000	0.4548	0.000
Transportation, Comm., Utilities	76	6.7	0.9737	0.000	0.9079	0.000	0.0658	**0.567**
Finance, Insurance, Real estate	76	6.7	1.2961	0.000	1.2007	0.000	0.0954	**0.375**
Mineral industries	11	1.0	1.5455	*0.010*	1.3636	*0.012*	0.1818	**0.390**
Public administration	5	0.4	2.4500	*0.031*	2.1000	**0.067**	0.3500	**0.556**
Subtotal	1,107	97.6	1.1337	0.000	0.8299	0.000	0.3037	0.000
ND	27	2.4	1.3796	0.000	0.8241	*0.030*	0.5556	*0.008*
Total	1,134	100	1.1396	0.000	0.8298	0.000	0.3097	0.000

Note: A significance level of 0.000 means that the significance level is less than 0.0005.

DISCUSSION

Overall, the three hypotheses were at least partially supported by the analysis. We have shown that for sellers in all industries, institutional trust is far more important than relational and calculative trust (H_{1A} and H_{1B}). The difference between calculative and relational trust is weaker, with relational trust being significantly more important than the former (H_2) for five industry sectors. Of course, our analysis is subject to some limitations arising from two fields: the raw database and the statistical procedures applied.

Concerning the raw database, we limited our analysis to the German-speaking part of Europe. Although there is an indication that rising international collaboration leads to increased similarity between different nations (Schoder and Yin (2000), see also Jarvenpaa *et al* (1999) and Yoon (2002) for empirical evidence), trust is always a culture- and experience-dependent construct (Gefen 2000). Our results cannot, therefore, be considered to be representative of other regions and countries, but they can give an indication of likely relationships and be a starting point for further research.

In the calculation of relative importance, all limitations of the conjoint-analytical approach are applicable. This means that our analysis is based on the implicit assumption of a rational decision maker who wants to maximize utility. Additionally, we collected the respondents' preferences by a ranking of different stimuli, which is not equivalent to a real life selection process (Green and Srinivasan 1978), based on the assumption that all relevant attributes were included in our analysis (Backhaus *et al* 2000). However, this is unlikely to be the case, since we left out some attributes deliberately (e.g., overall disposition to trust) and may have overlooked others.

It may be seen as a severe limitation that we did not include the overall disposition to trust into our analysis, even though it is an important factor, especially in the initiation phase of a relationship (Gefen 2000). However, we think that in our case, excluding this factor, was acceptable since the work of Moorman *et al* (1993) gives an indication that 'trust may be more a function of interpersonal factors than of individual factors' and, therefore, trust is more 'a product of the relationship between two parties opposed to a personality trait exhibited by either party' (Moorman *et al* 1993: 93), at least in a business-to-business setting. Our work analysed decision making in a company, as in Moorman *et al* (1993), rather than the mainstream of trust research, which focuses on decision-making processes of individuals (i.e. buyers) and it can be expected that the personal traits of the decision maker (such as disposition to trust) influence decision making to a lesser degree in this case. Consequently, we expected the overall disposition to trust to be far less important for the seller than the three constructs covered in our research and decided, therefore, to exclude it from our analysis, in order to reduce the complexity of our survey and keep the number of relevant attributes low.

Furthermore, the model we used to estimate the part-worths was a linear one, which estimates only the main effects, and does not consider any interactions between the different attributes (Green and Srinivasan 1990). Even though a full factorial design was available, which would have allowed a test for interaction terms, we decided against this as testing individual interaction terms would have left so few error degrees of freedom that the tests would have been effectively lacking in power to determine higher-order interactions (Ostrom and Iacobucci 1995: fn 9). Our model was estimated using a regression-like process. It is, therefore, subject to the same problems as any regression model, particularly the instability of estimated parameters in the face of various sources of error variance (Green and Srinivasan 1990). Finally, the part-worth of institutional trust may have been overestimated and that of calculative and relational trust underestimated, since institutional trust turned out to be a dominant attribute (Müller-Hagedorn *et al* 1993).

Despite all these limitations, we consider that our analysis makes a significant contribution to the research on trust in electronic markets for the following three reasons: First, we focused on the importance of trust for the seller and not for the buyer. To the best of our knowledge, this special focus has not so far been part of any publication. Second, all our findings can be considered to be representative of the German-speaking part of Europe. Third, we did not focus only on theoretical research about different trust constructs or trust components, but covered the question of their relative importance to each other. Our work is, therefore, a further step in the research of trust following the direction of Rousseau *et al* (1998) and McKnight and Chervany (2002).

A closer look at the three different trust constructs shows that institutional trust seems to be the area in which to focus further research, mainly for two reasons: First, its relative importance is higher than that of the two other constructs combined. Therefore, a lack of institutional trust can hardly be compensated for by the other two factors. Second, the risk of the regulatory framework is the only one that cannot be hedged completely by the seller. A lack of calculative trust can be compensated for by selling the corresponding risk to an insurance company. By paying a certain fee (which may depend on the strength of the regulatory framework), the seller can always be sure of being paid, either by the buyer or by the insurance company. Similarly, relational trust can be increased by using information provided by rating companies. This gives room for new intermediaries who provide additional information for a potential seller, which can be used to identify the trustworthiness of a new client. These intermediaries are similar to trusted third parties who help a potential buyer identify a trustworthy seller (Head and Hassanein 2002; Loebbecke 2003;

Palmer *et al* 2000). For example, the online auction house e-Bay provides this kind of service by compiling ratings of members according to their previous interactions with other members, thus allowing a certain reputation to be built. The specific characteristics of this rating system, though not perfect, make it a very powerful tool, even in a world where people change identities very quickly and try to undermine it (Kollock 1999). Other parties, who might be able to supply similar information, are rating companies such as Dun & Bradstreet who sell data about the solvency of companies, which is especially important in the business-to-business market. In contrast, institutional trust cannot be increased by purchasing a service provided by another company. Even though one might argue that having a good lawyer may increase the trust in the regulatory framework, regulation in terms of legal obligation always requires governmental action (e.g., giving a digital signature the same legal status as a traditional one, as defined by the German digital signature act). Consequently, it is dependent on the external environment in which the seller is acting and can only be increased indirectly (e.g., by influencing governmental decision-making process).

To summarize, our analysis has taken the work of Rousseau *et al* (1998) and McKnight and Chervany (2002) one step further. We have shown that institutional, calculative and interpersonal trust all have a significant impact on the attitude towards selling products online, but with differences in their relative importance. While the difference between calculative and relational trust is less marked, trust in legal and technical issues (institutional trust) is as important as the two other constructs combined.

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