The impact of (low) trust on knowledge sharing

Werner Rutten, Joyce Blaas-Franken and Harry Martin



Werner Rutten is Assistant Professor at Department of Management, Science and Technology, Open University, Heerlen, The Netherlands.
Joyce Blaas-Franken is IT Manager at Department of Management, Science and Technology, Open University, Heerlen, The Netherlands.
Harry Martin is based at Department of Management, Science and Technology, Open University, Heerlen, The Netherlands.

Received 16 October 2015
Revised 17 December 2015
7 January 2016
14 January 2016
Accepted 19 January 2016

Abstract

Purpose – *This paper aims to explore the differences in the level of knowledge sharing between co-workers in high versus low trust situations, for cognition-based trust and for affect-based trust as well as implicit and explicit knowledge.*

Design/methodology/approach – *The differences were examined through data provided by 102 professionals working for a financial organization in The Netherlands.*

Findings – *The differences in the level of knowledge sharing in high versus low trust situations are significant. The effect is larger for affect-based trust and for implicit knowledge.*

Research limitations/implications – *The survey has been conducted within one organization only.*

Practical implications – *Organizations should realize the importance of trust between their co-workers, and in general, there is much to gain by increasing the levels of trust between co-workers, as this will also increase knowledge sharing between co-workers.*

Originality/value – *Previous studies have not examined the situation of low trust and its effect on the level of knowledge sharing within a homogeneous group of co-workers.*

Keywords *Tacit knowledge, Knowledge sharing, Affect based trust, Cognition based trust, Explicit knowledge, Implicit knowledge*

Paper type *Research paper*

Introduction

The assurance that valid information can flow freely between co-workers is critical for a successful operation in an organization. Conversely, lack of trust among co-workers may seriously hamper sharing of important information, potentially damaging the effectiveness of business processes. The relationship between trust and information and knowledge sharing has received much attention amongst scholars. Different authors have strived to empirically validate the effects of trust on knowledge sharing. Some have discovered an empirically validated positive correlation between trust and knowledge sharing (Chang and Chuang, 2011; Chiu *et al.*, 2006; Fathi *et al.*, 2011; Hau *et al.*, 2012; Holste and Fields, 2010; Leyland, 2005; Lin *et al.*, 2009; Sankowska, 2012; Tsai and Ghoshal, 1998; Wickramasinghe and Widyaratne, 2012). Others, such as Chow and Chan (2008) and Li (2005) could not find a significant correlation between trust and knowledge sharing. In some articles, a positive correlation was discovered only for specific types of trust and knowledge, e.g. for affect-based trust (Bakker *et al.*, 2006; Swift and Hwang, 2012; Ko, 2010; Yang and Farn, 2009). Bakker *et al.* (2006) reported a negative correlation between cognition-based trust and knowledge sharing. Dhanaraj *et al.* (2004) and Yang and Farn (2009) found a positive correlation between trust with only tacit knowledge. Overall, current research suggests that trust has a significant positive effect on knowledge sharing.

However, to support these findings, still further empirical evidence is needed. Most research was based on restricted scenarios and samples designed to focus on high trust situations only. To achieve a complete picture, low trust situations need to be directly

related to high trust situations. Only one article was found to explicitly take this aspect into account. Holste and Fields (2010) measured the degree of knowledge sharing between a co-worker with whom the respondent works well and one with whom he does not. However, in their analysis they aggregated both responses, and thus, the difference between low and high trust was not explicitly analyzed.

This study had the unique opportunity to have access to a sizable homogeneous group of financial employees dealing with complex investment decisions. From a business process perspective, it is clear that much of the overall success in investment decision-making within this organization depends on the initiative of the individuals to share (sensitive) information with each other. However, due to the bonus structure, individuals may be selective about with whom to share information and with whom maybe rather not. In this situation, it was possible to explicitly distinguish between high and low trust situations, enabling research to clarify the relationship between high and low trust within the same sample. This insight may potentially help decision makers to decide whether it makes sense to make an effort to increase trust. Furthermore, different types of trust were distinguished in this study (Franken, 2013). It will be shown that the level of knowledge sharing differs significantly in low trust situations versus high trust situations. Also, it will be shown that the type of trust has a significant impact on the level of knowledge sharing.

Current literature

Literature on knowledge sharing

Knowledge sharing between co-workers is essential for organizations. Open sharing of relevant knowledge has the potential to lower costs, optimize processes, etc., whereas lack of sharing may harm organizations and even render their processes ineffective. Thus, it comes as no surprise that knowledge sharing is studied extensively in literature. Gibbert and Krause (2002) defined knowledge sharing as the willingness of individuals in an organization to share with others the knowledge they have acquired or created". This definition stresses the importance of "willingness". The reason is that (organizational) knowledge for a part only exists within people's minds. Even if significant efforts are made to codify knowledge into documents or in a knowledge management system, much knowledge is implicit and cannot be codified. Accessing this type of knowledge is only possible through active participation of the people carrying this knowledge. Gibbert and Krause (2002) argued that knowledge sharing cannot be forced, but can only be encouraged and facilitated. Motivational factors are important for sharing knowledge.

Polanyi (1966) was among the first to classify knowledge into explicit knowledge and tacit knowledge. Later, this classification has been adopted by Nonaka and Takeuchi (1995) and, in turn, has been used by many others. Explicit knowledge can be simply transferred by word or writing and is well defined in literature. On the other hand, tacit knowledge is much more difficult to grasp (tacit knowledge is in and bound to the mind of individuals, e.g. value systems may rely on rather personal experiences, difficult to formalize and subjected to change). Tacit knowledge cannot be transferred directly by word or writing and requires other means of transfer such as through mentoring and shadowing experiences.

Implicit knowledge is knowledge within people's minds, but that knowledge has not been made explicit, and therefore can be considered an additional category, somewhere between tacit and explicit knowledge. Bennet *et al.* (2015) present an extensive discussion of all three types of knowledge. They recognize that implicit knowledge does not have an unanimous definition, which in fact necessitates a clear definition in each scholarly work. They define implicit knowledge as knowledge we are not immediately aware of, and therefore it is not readily accessible. But it can be triggered (it is self-discoverable) and may then partially turn into explicit and tacit knowledge ("The why and how may remain hidden"). From this viewpoint, implicit knowledge is transient, but distinctively different from tacit knowledge.

In current literature, a classification in tacit, implicit and explicit is also often used (Griffith *et al.*, 2003; Tsoukas, 2003). Figure 1 shows the distinction that Ambrosini and Bowman (2001) make in the degree of tacitness.

Knowledge sharing is seen as an activity involving risk for the knowledge provider (Sankowska, 2012), as he or she runs the risk of losing a competitive advantage over the other by revealing valuable knowledge. But also the knowledge recipient may take equally a risk, as he or she cannot be sure of the quality of the information, which may have been conveyed with potentially bad intentions. Szulanski (1995) stated that if a source of knowledge is not perceived as trustworthy, his/her advice and knowledge might be more openly challenged and resisted. Also, for knowledge to be used by other employees, the source must have a solid reputation within the organization (Foos *et al.*, 2006; Leyland, 2005). This means that a co-worker needs to trust the abilities and competences of a fellow co-worker to take the risk and to actually make use of the knowledge that has been shared. This paper focuses only on the knowledge provider. Nonaka and Takeuchi (1995) concluded that in situations of knowledge sharing, trust is believed to mitigate the perceived risk of exploitation, failure and opportunistic behaviors. Therefore, it is generally believed that trust will increase knowledge sharing.

Literature on trust

Trust is a very broad concept, and many definitions can be found in literature. McEvily and Tortoriello (2011) found 129 definitions in over 48 years of research. This research is interested in interpersonal trust only, being the trust that exists between people (co-workers in this case). This rules out other types of trust used in literature, being inter-organizational trust (trust between organizations) and trust between organizations and customers (Dietz and Hartog, 2006).

Dietz and Hartog (2006) researched many articles and created an overview of the nine most cited definitions of interpersonal trust. For this research, we favor the definition of McAllister (1995):

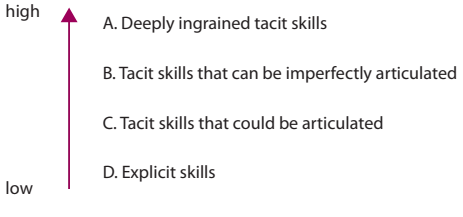
> The extent to which a person is confident in, and willing to act on the basis of, the words, actions and decisions of another.

This definition is very instrumental to the research goal. First, this definition emphasizes the action of the person that is trusting (. . . *willing to act on* . . .). Individuals need to decide actively whether to volunteer certain information or insights, known as knowledge sharing behavior. Second, the definition of McAllister is very well known and accepted, given its widespread adoption in articles on trust and knowledge sharing.

McAllister (1995) identifies two types of trust:

1. *Cognition-based trust*: This refers to the rational decision to trust or to withhold trust to another employee or group of employees. This decision type is based on whether co-workers have a history of performing capably. This type of trust is based on solid

Figure 1 Degree of tacitness



Source: Ambrosini and Bowman (2001)

and concrete connections that remove uncertainty from the relationship (Ziegler and Golbeck, 2007).

2. *Affect-based trust*: This form of trust is emotional. This type of trust evolves over a period into deep workplace relationships with others. Both the trustor and trustee(s) share an emotional investment in each other's well being. Care and concern for persons in the relationship typify this type of trust.

Literature on the effects of trust on knowledge sharing

Bakker *et al.* (2006) found a significant negative effect of cognition-based trust on knowledge sharing in a team. Though not explicitly mentioned, their research focused on measuring of explicit knowledge sharing. Their explanation is that a high level of cognition-based trust means that a co-worker is believed to be quite competent in a certain area, and therefore, he is also believed to already possess a lot of knowledge. As a result, colleagues will be reluctant to share information with the believed-to-be-competent colleague because they feel this information would be redundant and already possessed by this colleague. The net result is that a high level of cognition-based trust in a co-worker lowers the amount of knowledge sharing with that colleague.

In addition, Swift and Hwang (2012) found a small positive, but not significant effect of cognition-based trust on knowledge sharing. Moreover, Ko (2010) also did not find a significant effect for cognition-based trust.

Summing up, research seems a bit inconclusive on the effect of cognition-based trust on explicit knowledge sharing.

For implicit knowledge, Levin and Cross (2004) found a significant positive effect for cognition-based trust on knowledge sharing. O'Neill and Adya (2007) provided an explanation for this effect. They point out that professionals see the knowledge they have accumulated in their job as a valuable asset that they will share primarily with co-workers that have a good reputation for solid performance (cognition-based trust). Though not specifically mentioned, their focus seems to be on implicit and tacit knowledge, as this knowledge is not documented and therefore is seen as a valuable asset.

Ko (2010) researched the impact of affect-based trust on knowledge transfer between functional specialists and hired external consultants with a specific system expertise. Their research confirmed that the affect-based trust of the functional specialist (knowledge seeker) in the consultant (knowledge provider) as well as the affect-based trust of the consultant in the functional specialist have a significant positive impact on knowledge sharing. They provide the following reasoning for the importance for the knowledge provider to have confidence in the knowledge seeker; a high level of affect-based trust means that the knowledge provider is more willing to engage in social exchanges and cooperative interactions with the knowledge seeker (Ring and Van de Ven, 1994). As a result, more knowledge is shared. This effect is stronger for implicit and tacit knowledge, as this type of knowledge is usually transferred via social interactions, while explicit knowledge can be documented and transferred without social interactions.

For implicit knowledge specifically, Bock *et al.* (2005) found that an individual usually will not share knowledge if this knowledge is regarded as valuable or important because of a fear of losing potential advantages. Implicit and tacit knowledge sharing can be facilitated by intrinsic motivation, such as sociability and friendship (Osterloh and Frey, 2000). Thus, social relationships (affect-based trust) may be the most important factor that facilitates implicit and tacit knowledge sharing among employees within an organization (Yang and Farn, 2009).

From the previous discussion, it can be concluded that various types of trust and their effect on knowledge sharing have been researched rather extensively. However, no publications were found that explicitly addressed low and high types of trust together.

Many studies have been performed on the relation between a specific type of trust and a specific type of knowledge sharing in isolation, suggesting that for affect-based trust and implicit or tacit knowledge, the effect of trust is bigger compared to cognition-based trust and explicit knowledge. Figure 2 shows the assumed relationships as suggested in literature.

Research model

It can be concluded from the literature that trust is important for knowledge sharing, but it is not clear, to what degree higher levels of trust can lead to more knowledge sharing. In fact, literature only shows research on situations of high trust. A situation of low trust has never been explicitly taken into account. Hence, in Figure 2, only points on the right side (high trust) are known.

This article reports on a research project conducted to measure the impact of different types of trust on the level of knowledge sharing (Franken, 2013). The low trust situation is explicitly measured and compared to the high trust situation. This research will provide evidence whether there is indeed a difference in the degree of knowledge sharing between low trust versus high trust situations and that the type of knowledge also has an impact.

The base hypothesis is:

When there is low trust in a co-worker, the amount of knowledge that is shared with that co-worker will be significantly lower compared to a situation of high trust.

This hypothesis was tested for cognition-based trust and affect-based trust, as well as for explicit knowledge sharing and implicit knowledge sharing.

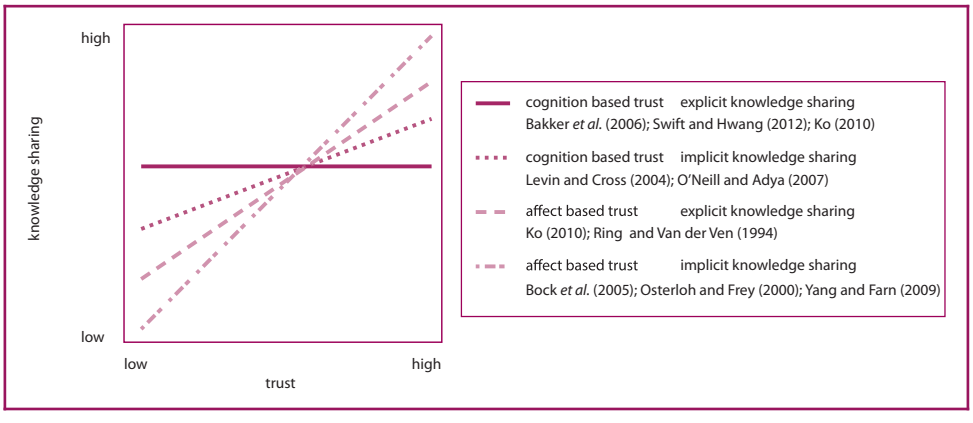
Research setup

Measures

To measure the level of cognition-based trust and affect-based trust, the measurement of McAllister (1995) is used because it is very instrumental to the research goal. This measurement contains 11 items, 5 on affect-based trust and 6 on cognition-based trust. All items are measured on a seven-point Likert scale (strongly disagree . . . strongly agree).

To measure the level of knowledge sharing, the scale of Cummings (2004) was adapted. The question of Cummings was slightly adjusted by replacing the word "group members" with asking a respondent to take a specific colleague in mind, with respect to the question: "On average, how often do or did you share each type of information with this colleague?" The respondents were then asked to indicate the level of knowledge sharing per type of information on a five-point Likert scale (never . . . a lot).

Figure 2 Assumed relationship between trust and knowledge sharing



Furthermore, the original scale of Cummings contains types of information relevant for software developers, which are not relevant for research in a financial institution. So other types of knowledge were defined that are applicable to the current case. From literature, it is expected that the impact of trust will increase when knowledge becomes "more tacit" (Figure 2). Hence, three types of knowledge are defined that are "formal" and explicit, and three types of knowledge are defined that are rather "informal" and implicit:

- *Type 1*: Work instruction that you have written yourself.
- *Type 2*: Template or format (e.g. PowerPoint template, format for memo or project report).
- *Type 3*: Email or paper brochure of a training.
- *Type 4*: A contact person within a specific department.
- *Type 5*: Informal news (rumors, gossip).
- *Type 6*: Informal tips and tricks for getting things done in the organization.

According to the definition of Nonaka and Takeuchi (1995), the first three are considered explicit knowledge. The latter three are considered implicit. When using the degree of tacitness of Ambrosini and Bowman (2001), as depicted in Figure 1, the first three can be categorized to category D and the latter three to category C. In the remainder of this article, the first three types will be depicted as explicit knowledge and the latter three types as implicit knowledge.

Process

Each respondent answered the questions in a survey for two scenarios; one with a high trust scenario and one with a low trust scenario. After reading these scenarios, respondents were asked to take an actual representative co-worker in mind for each scenario, with whom they are currently working or with whom they worked with in the past. Managers were not admissible as potential co-workers because hierarchical relations might introduce skewed results.

This setting of using two scenarios per single individual respondent eliminates effectively any influence of individual differences and value systems, which otherwise may have necessitated the introduction of a "personal differences factor" as an independent, difficult to control, variable. Also, the opportunity to have access to sufficient employees with comparable tasks and responsibilities, all working within the same organization, should contribute to a higher reliability of the study (e.g. differences in specific incentives or technological facilities for knowledge sharing may need to be taken into account otherwise). To reduce potential cultural differences, it was decided to select respondents living and working in the same country, i.e. The Netherlands in this case.

To eliminate ontological problems as much as possible, the definition of cognition- and affect-based trust of McAllister (1995) has been used to create the text of the scenarios. One half of the respondents received the scenarios for high and low cognition-based trust; the other half of the respondents received the scenarios for high and low affect-based trust. The exact wording of the four scenarios can be found in Appendix 2.

The scenarios were only used to help the respondent picture a co-worker. In each scenario, the respondents answered the same set of questions to measure the actual levels of trust and the levels of knowledge sharing.

The questionnaire was sent to all 244 co-workers of similar position, working in four departments in the case organization, i.e. a large financial organization. All employees have access to the same knowledge sharing facilities. Taking the conditions and selection criteria into account, the population is assumed to be sufficiently homogeneous.

The data were collected anonymously, via an online survey. The questionnaire can be found in Appendix 3.

Analysis

To enable the analysis, additional variables are computed:

- The trust questions per respondent are averaged to two new variables; being "affect-based trust score" and "cognition-based trust score". See Appendix 1 (factor analysis) for details.
- These trust scores have been categorized into three levels. All trust scores ≤3 are classified as low trust, scores between >3 and <5 are classified as medium trust and all trust scores ≥5 are classified as high trust. A division into these three categories has been chosen because this will allow for a direct comparison of high versus low trust. The medium trust will filter out the responses that cannot be qualified as neither high nor low.
- Finally, the questions on sharing three types of explicit knowledge are averaged into an "explicit knowledge sharing score". The questions on sharing three types of implicit knowledge are averaged into an "implicit knowledge sharing score".

As each questionnaire measures both types of trust, the complete data set can be analyzed for each type of trust.

Results

The response rate of the survey was 42 per cent. The 102 respondents have answered the questionnaire completely, which is more than sufficient for a statistical analysis. Table I shows the number of questionnaires sent out and the responses per version.

Most of the respondents are males, in the age category 30-49 years with a good representation of the different departments. This is in accordance with the actual distribution of genders and department size. See Tables II-IV with the statistics.

As every questionnaire contained two scenarios with the same questions, a data set has been created with 204 unique responses. All questionnaire response was complete, owing

Table I Response rate per version of the questionnaire

Version	*Sent out*	*Filled in*	*Response rate (%)*
Scenario 1-2: Cognition-based trust	124	55	44
Scenario 3-4: Affect-based trust	120	47	39
Total	244	102	42

Table II Respondents per gender

Gender	*No. of responses*	*Rate (%)*
Male	71	70
Female	31	30

Table III Respondents per age

Age	*No. of responses*	*Rate (%)*
<30 years	6	6
30-39 years	43	42
40-49 years	39	38
>49 years	14	14

Table IV Respondents per department

Department	*No. of responses*	*Rate (%)*
A	42	41
B	26	25
C	21	21
D	13	13

to the structure of the digital survey tool, which did not allow for partial answers. The scales were also fixed, so the responses contain no outliers.

Trust

The variables that divide the data set in responses of low, medium and high cognition-and affect-based trust are analyzed first. Tables V and VI contain the frequencies per trust score. As can be seen, respondents have apparently more difficulty in picturing a co-worker in whom they have low trust, compared to a co-worker in whom they have high trust.

Kurtosis and skewness have been calculated to determine whether the variables are distributed normally. As some variables are not normally distributed, the non-parametric Mann-Whitney U-test was used for testing the differences.

When viewing the data set from a viewpoint of cognition-based trust, there are 41 cases of low trust and 117 cases of high trust (Table V). Again Mann-Whitney tests are performed on these cases. Table VII shows the results.

As predicted from literature, the level of cognition-based trust differs significantly. But also the level of affect-based trust differs significantly.

Table V Frequency of measured trust scores for cognition-based trust

	Measured cognition-based trust frequency		
Scenario	*Low*	*Medium*	*High*
1	30	21	4
2	0	1	54
3	10	23	14
4	1	1	45
Total	41	46	117

Table VI Frequency of measured trust scores for affect-based trust

	Measured affect-based trust frequency		
Scenario	*Low*	*Medium*	*High*
1	33	20	2
2	2	8	45
3	29	16	2
4	2	3	42
Total	66	47	91

Table VII The differences between high and low trust levels, from a viewpoint of cognition-based trust

Type of trust	*Mean (low)*	*SD (low)*	*Mean (high)*	*SD (high)*	*Z-value*	p *(0.05)*
Affect	2.4683	0.7424	5.5385	1.1743	−8.8770	0.0000
Cognition	2.3512	0.4686	6.0855	0.5033	−9.5136	0.0000

When viewing the data set from a viewpoint of affect-based trust, there are 66 cases of low trust and 91 cases of high trust (Table VI). Again Mann-Whitney tests were performed on these cases. Table VIII shows the results.

Again, the level of affect-based trust differs significantly. The level of cognition-based trust also differs significantly.

Knowledge sharing

The results for the differences in knowledge sharing can be analyzed for each type of trust. Table IX shows the results based on the level of cognition-based trust, and Table X shows the results based on the level of affect-based trust.

As can be seen, all values are significantly different, which confirms the general notion that more knowledge is shared with co-workers in which the trustor has a higher level of trust.

Affect-based trust and cognition-based trust are strongly correlated. According to McAllister (1995), when affect-based trust reaches a certain level, cognition-based trust is no longer needed. Hence, a mediation effect is expected of affect-based trust on the influence of cognition-based trust. A Sobel test confirmed this effect for both types of knowledge sharing (explicit: Sobel test = 2.278, $p = 0.023$; implicit: Sobel test = 4.437, $p = 0.000$).

To determine the differences in the impact of cognition- and affect-based trust on sharing knowledge, a regression analysis was done to determine whether both types of trust have a significant impact and how big that impact actually is.

The first regression analysis was done with the computed values of affect- and cognition-based trust as independent variables on the level of explicit knowledge that is shared as dependent variable. This regression does not explain much of the variance in explicit knowledge shared (7.7 per cent), but it is significant ($F = 9.412$, $p = 0.000$). However, when controlled for affect-based trust, cognition-based trust does not have a significant impact on sharing explicit knowledge ($t = 0.312$, $p = 0.755$). Affect-based trust does have a significant impact ($t = 2.275$, $p = 0.024$). This result makes sense, as

Table VIII The differences between high and low trust levels, from a viewpoint of affect-based trust

Type of trust	*Mean (low)*	*SD (low)*	*Mean (high)*	*SD (high)*	*Z-value*	p *(0.05)*
Affect	2.2576	0.5578	6.0593	0.5723	−10.6789	0.0000
Cognition	3.2303	1.1461	6.1626	0.5391	−10.1988	0.0000

Table IX The differences in the level of knowledge sharing between high and low trust situations, based on the level of cognition-based trust

	Low trust		*High trust*			
Type of knowledge sharing	*Mean*	*SD*	*Mean*	*SD*	*Z-value*	p *(0.05)*
Explicit	3.0081	0.8579	3.4188	0.8601	−2.5425	0.0157
Implicit	2.6504	0.8464	3.5812	0.7745	−5.4857	0.0000

Table X The differences in the level knowledge sharing between high and low trust situations, based on the level of affect-based trust

	Low trust		*High trust*			
Type of knowledge sharing	*Mean*	*SD*	*Mean*	*SD*	*Z-value*	p *(0.05)*
Explicit	2.9141	0.7895	3.4835	0.8753	−4.0735	0.0001
Implicit	2.5960	0.8443	3.6593	0.7746	−6.8010	0.0000

affect-based trust is mediating the relationship between cognition-based trust and sharing explicit knowledge. There is a significant difference in the impact of both types of trust, with affect-based trust having a significant impact (B = 0.133) and cognition-based trust not (B = 0.020).

The regression model for sharing implicit knowledge has much more explanatory power (27 per cent) and is also significant ($F = 37.837$, $p = 0.000$). However, again, affect-based trust offers a significant contribution to the model ($t = 4{,}531$, $p = 0{,}000$), while cognition-based trust does not ($t = 6.661$, $p = 0.068$), although the effect is almost significant. In accordance with the previous findings, the impact of affect-based trust on sharing implicit knowledge is indeed significantly higher than the impact of cognition-based trust.

In conclusion, a high level of trust leads to a high level of knowledge sharing. This finding is in line with current literature. But this research also explicitly shows that a lower level of trust leads to a lower level of knowledge sharing (Figure 3). These differences between high and low trust are significant for cognition-based trust and for affect-based trust for both types of knowledge (explicit and implicit).

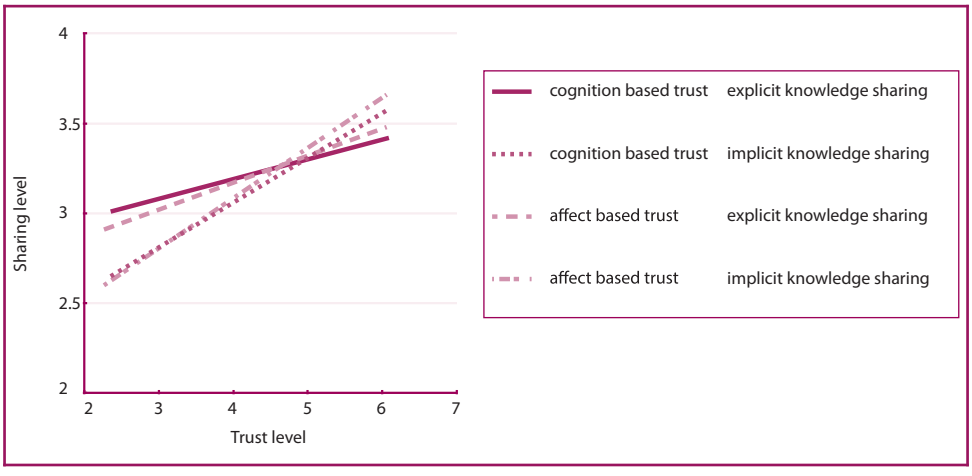
The tests show that that the differences in the level of shared knowledge are larger in case of implicit knowledge. This effect is clearly visible for both types of trust in Figure 3. Also, albeit much smaller, a difference exists between the levels of shared knowledge for cognition-based trust versus affect-based trust.

Comparing Figures 2 and 3, it can be confirmed that a positive relation between trust and knowledge sharing exists indeed. First, for sharing implicit knowledge, trust is more important compared to sharing explicit knowledge. Second, affect-based trust has a bigger impact on knowledge sharing than cognition-based trust.

Conclusions

This study explored the differences in the level of knowledge sharing between co-workers in high trust versus low trust situations. Two types of knowledge were considered, namely, implicit and explicit, and two type of trust were considered, namely, cognition-based trust and affect-based trust. In line with literature, a high level of trust leads to a high level of knowledge sharing. But this study also showed that a lower level of trust leads to less knowledge sharing. The differences in the level of knowledge sharing are significant for all situations considered. The effect is larger for affect-based trust and implicit knowledge sharing.

Figure 3 Plotted data from Tables VII to X. Please note that a linear relation is assumed for presentation purposes, although this has not been tested



All respondents in this research work for one single financial organization. This common background improved the reliability of the results. On the other hand, a certain "base level of competence" can be expected for this group of professional workers. They have been selected specifically to meet high competence job qualifications in the first place. This may have attributed to the non-significant influence of cognition-based trust in the regression analysis. Apparently, in professional working environments such as in our case, affect-based trust seems to be the dominant factor. Although the findings confirm the general findings found in literature (McAllister, 1995), it is advocated to replicate this research setup in other (types of) organizations.

At the time of this research, the organization invested in technological network solutions for sharing knowledge, but trust was not in their scope. Organizations should realize the importance of trust between their co-workers. In general, there is much to gain by increasing the levels of trust between co-workers, as this will also increase knowledge sharing between co-workers. Many organizations cultivate a company culture in which individual competitiveness is believed to maximize overall profit. For example, setting individual bonuses focuses the individual mindset to prioritize the individual net gain, possibly at the expense of their co-workers. Recent research shows the potentially detrimental effects of the so-called "bonus culture" in the financial world (Sepe and Whitehead, 2014). In such a setting, interpersonal trust may put individual gain at risk, which may result in short-term benefits at best, but at the expense of long-term benefits and exchange of information. Sepe and Whitehead suggest measures on new banking regulations in which the tension between compensation and competition between financial institutions will be addressed, which in the end should limit job-hopping and a higher internal loyalty of co-workers.

Perhaps, on a more fundamental level, emphasizing a team culture by setting team goals and providing intrinsic rewards may help to alleviate a mistrust culture. Drawing from socio-technology, free information flow and intrinsic motivation form pillars of innovation and job satisfaction among other benefits (Pandey, 2015).

In addition, individual assignments could be set in such a way that mutual interdependence and therefore knowledge sharing is encouraged for the overall team benefit.

Building trust presupposes a social setting, which can be more or less beneficial. The increasing use of information technology facilitates a decentralized and sometimes a depersonalized manner of working. Studies (Baba, 1999) indicate that although new and effective ways of information exchange are opened, mistrust may increase and the complexity of social interactions is not yet fully understood. More recently, Morita and Burns (2014) emphasize the importance of so-called trust tokens in interface design of computer-mediated communication systems.

Clearly, much more in-depth research is needed to discover effective ways to improve trust levels among co-workers, in particular in decentralized working environments.

This article measured impact of trust on the amount of knowledge shared. The "direction" of trust was from the knowledge provider to the knowledge seeker. As mentioned in the literature review, it might also be interesting to look at the opposite direction and to measure the impact of trust on the amount of knowledge received (and whether this is perceived useful). In that case, the direction of trust is from the knowledge seeker to the knowledge provider.

References

Ambrosini, V. and Bowman, C. (2001), "Tacit knowledge: some suggestions for operationalization", *Journal of Management Studies*, Vol. 38 No. 6, pp. 811-829.

Baba, M. (1999), "Dangerous Liaisons: Trust, Distrust, and Information Technology in American Work Organizations", *Human Organization*, Vol. 58 No. 3, pp. 331-346.

Bakker, M., Leenders, R.T.A.J., Gabbay, S.M., Kratzer, J. and Engelen, J.M.L.V. (2006), "Is trust really social capital? Knowledge sharing in product development projects", *The Learning Organization*, Vol. 13 No. 6, pp. 594-605.

Bennet, A., Bennet, D. and Avedisian, J. (2015), *The Course of Knowledge: A 21st Century Theory*, Mountain Quest Institute, MQIPress, WV, ISBN 978-0-9798459-6-3.

Bock, G.W., Zmud, R.W., Kim, Y.G. and Lee, J.N. (2005), "Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivators, social-psychological forces, and organizational climate", *MIS Quarterly*, Vol. 29 No. 1, pp. 87-111.

Chang, H.H. and Chuang, S.S. (2011), "Social capital and individual motivations on knowledge sharing: participant involvement as a moderator", *Information & Management*, Vol. 48 No. 1, pp. 9-18.

Chiu, C.M., Hsu, M.H. and Wang, E.T.G. (2006), "Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories", *Decision Support Systems*, Vol. 42 No. 3, pp. 1872-1888.

Chow, W.S. and Chan, L.S. (2008), "Social network, social trust and shared goals in organizational knowledge sharing", *Information & Management*, Vol. 45 No. 7, pp. 458-465.

Cummings, J.N. (2004), "Work groups, structural diversity, and knowledge sharing in a global organization", *Management Science*, Vol. 50 No. 3, pp. 352-364.

Dhanaraj, C., Lyles, M.A., Steensma, H.K. and Tihanyi, L. (2004), "Managing tacit and explicit knowledge transfer in IJVs: the role of relational embeddedness and the impact on performance", *Journal of International Business Studies*, Vol. 35 No. 5, pp. 428-442.

Dietz, G. and Hartog, D.J.D. (2006), "Measuring trust inside organisations", *Personnel Review*, Vol. 35 No. 5, pp. 557-588.

Fathi, N.M., Eze, U.C. and Goh, G.G.G. (2011), "Key determinants of knowledge sharing in an electronics manufacturing firm in Malaysia", *Library Review*, Vol. 60 No. 1, pp. 53-67.

Foos, T., Schum, G. and Rothenberg, S. (2006), "Tacit knowledge transfer and the knowledge disconnect", *Journal of Knowledge Management*, Vol. 10 No. 1, pp. 6-18.

Franken, J. (2013), "The role of trust in intra-organizational knowledge transfer and use of knowledge", MSc Thesis, Open University, Heerlen.

Gibbert, M. and Krause, H. (2002), "Practice exchange in a best practice marketplace", in Davenport, T.H. and Probst, G.J.B. (Eds), *Knowledge Management Case Book: Best practices*, Publicis MCD, Berlin, pp. 68-84.

Griffith, T.L., Sawyer, J.E. and Neale, M.A. (2003), "Virtualness and knowledge in teams: managing the love triangle of organizations, individuals and information technology", *MIS Quarterly*, Vol. 27 No. 2, pp. 265-287.

Hau, Y.S., Kim, B., Lee, H. and Kim, Y.G. (2012), "The effects of individual motivations and social capital on employees' tacit and explicit knowledge sharing intentions", *International Journal of Information Management*, Vol. 33 No. 1, pp. 356-366.

Holste, J.S. and Fields, D. (2010), "Trust and tacit knowledge sharing and use", *Journal of Knowledge Management*, Vol. 14 No. 1, pp. 128-140.

Jolliffe, I.T. (1986), *Principal Component Analysis*, 2nd ed., Springer-Verlag, New York, NY.

Kaiser, H.F. (1960), "The application of electronic computers to factor analysis", *Educational and Psychological Measurement*, Vol. 20 No. 1, pp. 141-151.

Ko, D.G. (2010), "Consultant competence trust doesn't pay off, but benevolent trust does! Managing knowledge with care", *Journal of Knowledge Management*, Vol. 14 No. 2, pp. 202-213.

Levin, D.Z. and Cross, R. (2004), "The strength of weak ties you can trust: the mediating role of trust in effective knowledge transfer", *Management Science*, Vol. 59 No. 11, pp. 1477-1490.

Leyland, M.L. (2005), "The impact of trust and reputation on the transfer of best practices", *Journal of Knowledge Management*, Vol. 9 No. 4, pp. 87-101.

Li, L. (2005), "The effects of trust and shared vision on inward knowledge transfer in subsidiaries' intra- and inter-organizational relationships", *International Business Review*, Vol. 14 No. 1, pp. 77-95.

Lin, M.J.J., Hung, S.W. and Chen, C.J. (2009), "Fostering the determinants of knowledge sharing in professional virtual communities", *Computers in Human Behavior*, Vol. 25 No. 4, pp. 929-939.

McAllister, D.J. (1995), "Affect and cognition-based trust as foundations for interpersonal cooperation in organizations", *The Academy of Management Journal*, Vol. 38 No. 1, pp. 24-59.

McEvily, B. and Tortoriello, M. (2011), "Measuring trust in organisational research: Review and recommendations", *Journal of Trust Research*, Vol. 1 No. 1, pp. 23-63.

Morita, P.P. and Burns, C.M. (2014), "Designing for interpersonal trust – the power of trust tokens", *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, Vol. 57 No. 1, pp. 339-343.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

O'Neill, B.S. and Adya, M. (2007), "Knowledge sharing and the psychological contract: managing knowledge workers across different stages of employment", *Journal of Managerial Psychology*, Vol. 22 No. 4, pp. 411-436.

Osterloh, M. and Frey, B.S. (2000), "Motivation, knowledge transfer, and organizational forms", *Organization Science*, Vol. 11 No. 5, pp. 538-550.

Pandey, M. (2015), "Strategies to increase workplace innovation related to organizational performance", *Advances in Economics and Business Management (AEBM)*, Vol. 2 No. 6, pp. 645-648.

Polanyi, M. (1966), *The Tacit Dimension*, Routledge, London.

Ring, P.S. and Van de Ven, A.H. (1994), "Developmental processes of cooperative interorganizational relationships", *Academy of Management Review*, Vol. 19 No. 1, pp. 90-118.

Sankowska, A. (2012), "Relationships between organizational trust, knowledge transfer, knowledge creation, and firm's innovativeness", *The Learning Organization*, Vol. 20 No. 1, pp. 85-100.

Sepe, S.M., and Whitehead, C.K. (2014), "Paying for risk: bankers, compensation, and competition", CFS Working Paper No. 459, Center for Financial Studies.

Swift, P.E. and Hwang, A. (2012), "The impact of affective and cognitive trust on knowledge sharing and organizational learning", *The Learning Organization*, Vol. 20 No. 1, pp. 20-37.

Szulanski, G. (1995), "Unpacking stickiness: an empirical investigation of the barriers to transfer best practices in the firm", *Academy of Management Journal*, Best Papers Proceedings, Vol. 38 No. 2, pp. 437-441.

Tsai, W. and Ghoshal, S. (1998), "Social capital and value creation: the role of Intrafirm Networks", *Academy of Management Journal*, Vol. 41 No. 4, pp. 464-476.

Tsoukas, H. (2003), "Do we really understand tacit knowledge?", in Easterby-Smith, M. and Lyles, M.A. (Eds), *The Blackwell Handbook of Organizational Knowledge Management*, Blackwell, Oxford, pp. 410-427.

Wickramasinghe, V. and Widyaratne, R. (2012), "Effects of interpersonal trust, team leader support, rewards, and knowledge sharing mechanisms on knowledge sharing in project teams". *VINE*, Vol. 42 No. 2, pp. 214-236.

Yang, S.C. and Farn, C.K. (2009), "Social capital, behavioural control, and tacit knowledge sharing – a multi-informant design", *International Journal of Information Management*, Vol. 29 No. 3, pp. 210-218.

Ziegler, C.N. and Golbeck, J. (2007), "Investigating interactions of trust and interest similarity", *Decision Support Systems*, Vol. 43 No. 2, pp. 460-494.

Appendix 1. Trust measurement

Trust measurement

Trust is measured according to McAllister (1995). Table AI shows the 11 items.

All items are measured on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Factor analysis

A factor analysis was conducted on the survey data of these trust questions to validate whether they can be averaged to a score on affect-based trust and cognition-based trust.

First, the last question was reverse scaled in SPSS, so that all questions are measured on the same scale. Second, all 11 trust questions have been analyzed using histograms. The

Table AI Trust measurement

Type of trust	*No.*	*Items*
Affect-based trust	1	We have a sharing relationship. We can both freely share our ideas, feelings and hopes
	2	I can talk freely to this individual about difficulties I am having at work and know that (s)he will want to listen
	3	We would both feel a sense of loss if one of us was transferred and we could no longer work together
	4	If I shared my problems with this person, I know (s)he would respond constructively and caringly
	5	I would have to say that we have both made considerable emotional investments in our working relationship
Cognition-based trust	6	This person approaches his/her job with professionalism and dedication-based trust
	7	Given this person's track record, I see no reason to doubt his/her competence and preparation for the job
	8	I can rely on this person not to make my job more difficult by careless work
	9	Most people, even those who are not close friends of this individual, trust and respect him/her as a coworker
	10	Other work associates of mine who must interact with this individual consider him/her to be trustworthy
	11	If people know more about this individual and his/her background, they would be more concerned and monitor his/her performance more closely

answers are quite well spread except for the last question "If people would know more about this individual and his/her background, they would be more concerned and monitor his/her performance more closely". A total of 26 per cent of the respondents answered "neither agree nor disagree", which is an indication that respondents did not really understand the question well. Therefore, this question was removed from the data set.

Next, a factor analysis has been done to determine whether all trust questions can be computed into two new variables "average affect-based trust score" and "average cognition-based trust score". The first factor analysis pointed out that all questions concerning trust can be attributed to only one factor with an eigenvalue of 7.251. This would mean that there is no statistical indication that the questions that measure trust do in fact measure two distinct types of trust. However, this analysis is based on the assumption of Kaiser (1960) that only components with an eigenvalue >1 can be seen as a factor. Nevertheless, in literature it is argued by Jolliffe (1986) that components with an eigenvalue >0.7 should be seen as factors. With this assumption, a second factor analysis is done (with Principe Component Analysis and Varimax rotation). This factor analysis resulted in two factors with an eigenvalue of 7.204 and 0.810. The first factor contains the five questions on cognition-based trust. The second factor contains the five (remaining) questions on affect-based trust. In total, both factors explain for around 80 per cent of the variance, and they are divided into two factors that are an exact match to the distinction of McAllister (1995) in affect- and cognition-based trust.

In addition to the results of the factor analysis, it is taken into account that the trust scales of McAllister (1995) have been used and validated many times in academic literature. Hence, two factors were created and averaged the questions on affect-based trust and cognition-based trust to two new variables being *affect-based trust score* and *cognition-based trust score*.

Appendix 2. Four scenarios

Scenario 1: Low cognition-based trust

Think of a colleague that you are either currently working with or have worked with in the past, that you do not consider to be competent for the job he or she is doing. This colleague for example is not able to deliver results of sufficient quality or is not able to deliver results at all. Or this colleague does not possess the right knowledge and competences to do the job right. The colleague you have in mind cannot be your (former) manager.

It is important that you have a specific colleague in mind, as you will be asked to fill in a number of questions concerning your working relation with this specific colleague.

Scenario 2: High cognition-based trust

Think of a colleague that you are either currently working with or have worked with in the past, that you consider to be sufficiently or very competent for the job he or she is doing. This colleague for example is able to deliver quality results and consistently meets deadlines. Or this colleague possesses the right knowledge and competences for the job he or she is doing. The colleague you have in mind cannot be your (former) manager.

It is important that you have a specific colleague in mind, as you will be asked to fill in a number of questions concerning your working relation with this specific colleague.

Scenario 3: Low affect-based trust

Think of a colleague that you are either currently working with or have worked with in the past, that you do not consider to be trustworthy, as this colleague is not sympathetic to your needs or concerns. For example, this colleague might gossip about you behind your back, or use information about you or your work for his or her own benefit without giving you any credits. The colleague you have in mind cannot be your (former) manager.

It is important that you have a specific colleague in mind, as you will be asked to fill in a number of questions concerning your working relation with this specific colleague.

Scenario 4: High affect-based trust

Think of a colleague that you are either currently working with or have worked with in the past, that you consider to be trustworthy, as this colleague is sympathetic to your needs or concerns. For example, you feel comfortable sharing any difficulties you experience at work with this colleague, and you are confident that this person will not gossip behind your back or take credit for work you have done. The colleague you have in mind cannot be your (former) manager.

It is important that you have a specific colleague in mind, as you will be asked to fill in a number of questions concerning your working relation with this specific colleague.

Appendix 3. Survey questions

The respondent is asked to picture a specific colleague according to one of the four scenarios as depicted in Appendix 2.

The respondent is asked to answer the following questions on the level of trust (all questions are scored on a seven-point Likert scale (strongly disagree . . . strongly agree):

1. We have a sharing relationship. We can both freely share our ideas, feelings and hopes.
2. I can talk freely to this individual about difficulties I am having at work and know that (s)he will want to listen.
3. I would feel a sense of loss if one of us was transferred and we could no longer work together.
4. If I shared my problems with this person, I know (s)he would respond constructively and caringly.
5. I would have to say that we both made considerable emotional investments in our working relationship.
6. This person approaches his/her job with professionalism and dedication.
7. Given this person's track record, I see no reason to doubt his/her competence.
8. I can rely on this person to deliver work of sufficient quality.
9. Most people, even those who are not close friends of this individual, trust and respect him/her as a coworker.
10. Other work associates of mine who interact with this individual consider him/her to be trustworthy.
11. If people know more about this individual and his/her background, they would be more concerned and monitor his/her performance more closely.

Question on knowledge sharing:

12. On average, how often do or did you share each type of information mentioned below with your co-worker?

Information types for question 12 (question is scored for each type):

- Work instruction that he/she has written.
- Template or format (e.g. PowerPoint template, format for memo or project report).
- Email or paper brochure of a training.
- A contact person within a specific department.
- Informal news (rumors, gossip).
- Informal tips and tricks for getting things done in the organization.

Scoring options for question 12: Never/rarely/sometimes/regularly/a lot

Finally, some characteristics for grouping the respondents are noted:

13. What is your gender? (choose male/female)
14. To which age category do you belong? (choose <30/30-39/40-49/>49 years)
15. For which department are you working? (choose A/B/C/D)

Corresponding author

Werner Rutten can be contacted at: werner.rutten@ou.nl