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# Measuring the Perceived Usefulness of Corporate Communication Technologies – An Empirical Study from a Bank in Singapore

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# Measuring the Perceived Usefulness of Corporate Communication Technologies – An Empirical Study from a Bank in Singapore

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## ABSTRACT

To understand the perceived usefulness of corporate communication technologies, we conducted a survey based on the coordination theory. Thereby, we found that cooperation and information sharing among employees influence the perceived usefulness of such technologies. Using survey data from 176 employees from a bank in Singapore, we found that the motivation to cooperate, cultural aspects, as well as the willingness to codify information influence the cooperation and information sharing among employees. Moreover, we explain how perceived usefulness can be measured by such a cooperation and information sharing. This paper presents a description of the theoretical background, empirical data, and the implications of our findings.

## Keywords

Corporate communication technologies, Enterprise 2.0, coordination theory, perceived usefulness.

## INTRODUCTION

The rise of the Web 2.0 and the accompanied variety of communication and cooperation possibilities is challenging corporations forcing them to adjust their enterprises communication and coordination strategies. Today, most of employees within enterprises are 'digitally enabled' already, primarily by the use of email (Robert et al., 2008). While they still use face-to-face communication increasingly substitute this form of internal information exchange by new media, such as video conferencing, social networks, and micro blogging. This contributes to the fact that employees quite often do not work together anymore as a team that is physically present at one place or even time but as a virtual distributed group across different time zones and corporate locations. Hence, a face-to-face communication and thereby direct cooperation is not always possible (Robert et al., 2008). Therefore, modern corporate communication technologies are important instruments enabling employees to cooperate and to share information across these boundaries both with synchronous communication technologies (e.g., video conferencing, instant messaging) as well as asynchronous ones (e.g., Wikis, Blogs) (Cummings et al., 2009). In this context, the acceptance and usefulness of specific corporate communication technologies (in our case of corporate Chat and video conferencing tools) plays an important role. Thereby, the possibility to cooperate and to share information influences the acceptance of the technologies. Hence, this study explores the perceived usefulness of those technologies by conducting an empirical study in Singapore among 176 participating employees of a bank (see Table A1 in the Appendix for demographic data).

Based on the coordination theory (Crowston, 1997; Malone and Crowston, 1994), we developed a structural model to measure the perceived usefulness (Davis et al., 1989) of corporate communication technologies. Specifically, we focus on potential drivers of perceived usefulness of corporate information systems and argue that perceived usefulness depends directly on the cooperation behavior (e.g., Thomas and Bostrom, 2008) and attitude towards information sharing (e.g., Bock et al., 2005) among employees. In particular, the cooperation behavior and attitude towards information sharing is influenced by motivational (e.g., Wasko and Faraj, 2005), cultural (e.g., Srite and Karahanna, 2006) forces as well as the willingness to codify information (e.g., Kankanhalli et al., 2005). Since organizational and cultural aspects might have an influence on the results, we focused our research on employees within a single bank in one country. For this purpose we conducted a survey among employees of a bank in Singapore. To the best of our knowledge, we are the first to measure the motivational forces that drive employees to use corporate communication technologies, measured by their perceived usefulness. Therefore, we

tested the newly developed constructs for our survey by deploying Q-sorting techniques (e.g., Thomas and Watson, 2002) with experts to test their validity. Consequently, the central research questions we are aiming at in this paper are:

*What are the drivers of perceived usefulness of corporate communication technologies?*

*What impact have motivational and cultural drivers, as well as effort aspects in this context?*

The remainder of this paper is organized as follows: the following section provides an overview on the theoretical background of this study. Subsequently, we describe the structural model and our hypotheses, followed by the analysis of the data and the results of the measurement model. Finally, we conclude with a short summary and discussion.

## **THEORETICAL BACKGROUND**

In this paper, we use the coordination theory (Crowston, 1997; Malone and Crowston, 1994) as a theoretical lens for our model. In general, coordination is defined as: “[...] managing dependencies between activities.” (Malone and Crowston, 1994, p. 90). In this context, the coordination theory identifies and systemically analyzes a wide variety of dependencies as well as the process to coordinate them. Related to communication technologies, the coordination theory describes how the coordination of processes and the cooperation within processes, e.g., by considering alternative communication technologies, can be realized (Malone and Crowston, 1994). For this purpose, it is important that unified communication forms and technologies are established and accepted by the users (Lee and Malone, 1990). In this regard, the technology acceptance model (TAM) explains the acceptance of a technology through the user (Davis et al., 1989). Acceptance usually depends on two perceived values: the perceived usefulness and the perceived ease of use. Whereby, perceived usefulness is defined by the individual belief that the technology will gain an individual benefit. In contrast, perceived ease of use is defined by the individual belief that the technology can be used easily (Davis et al., 1989). The following sections present a brief overview on the most important theoretical background and literature in this context. While we are not interested in the adoption behavior of communication technologies since employees in enterprises have no alternatives to choose from, we are more interested in how the offered technologies meet the needs for information sharing and cooperation which in consequence lead to perceived usefulness as dependent variable.

### **Information Sharing and Cooperation among Employees**

Usually, coordination of work processes as well as knowledge sharing among members of a group is provided through the process of information sharing (Stasser and Titus, 1985). A necessary precondition of information sharing is that cooperation exists in the group (Aguiton and Cardon, 2007). Without an appropriate cooperation, information cannot be shared. In addition, cooperation improves the relationships and the coordination among team members (Thomas and Bostrom, 2008). It enables team members to disconfirm stereotypes about each other (Zellmer-Bruhn et al., 2008) which is realized through an increased interpersonal contact (Pettigrew and Tropp, 2000). In this context, the sharing of information can enrich the cooperation and thereby influence the team decisions provided that the information is made available to the team as a whole (Okhuysen and Eisenhardt, 2002; Zellmer-Bruhn et al., 2008). The team members’ attention is aligned toward their commonalities (Gaertner et al., 1994). In this context, information sharing also reduces the perceived social costs in seeking help and exchanging information. Trust among team members is established by receiving needed information from others to accomplish an assigned task. As a consequence, the perceived similarities within the team are increased and team members are more motivated to share their knowledge or task-relevant information within the team (Zellmer-Bruhn et al., 2008). Overall, information sharing and coordination leads to more effective outcomes (Bock et al., 2005) wherefore Web 2.0 technologies provide new possibilities for enterprises to improve information sharing and subsequently higher outcomes. In this context, the technology acceptance is influencing the cooperation among people and especially vice versa (Thomas and Bostrom, 2008).

### **Motivation, Codification of Knowledge, and Cultural Differences in the Use of Communication Technologies**

An important factor to share knowledge or to contribute in electronic communication technologies is the individual motivation to access the technology and especially willing to answer to questions from other employees. Wasko and Faraj (2005) differentiate in two key aspects that directly influence the individuals motivation: the volume of knowledge contributed and the average helpfulness for others. In this context, the social exchange theory (Blau, 1964) arguments that a social reward, such as respect or status, will lead to social interaction among individuals (Von Hippel and Von Krogh, 2003). In the end, the expectation of social reward can motivate individuals to contribute knowledge to others in the absence of the likelihood of direct reciprocity (Wasko and Faraj, 2005).

However, the act of knowledge contribution involves the codification of knowledge. On the one hand, this process inhibits costs in form of time and effort (Markus, 2001; Wasko and Faraj, 2005). On the other hand, this effort establishes trust within the community or organization where the knowledge is shared (Putnam, 1993). The way employees interact with each other in a community is defined by their organizational and national cultural backgrounds. Hofstede (1980, p. 260) defines culture as "the collective programming of the mind which distinguishes the members of one human group from another". In summary, he provides four major dimensions of national culture: masculinity/femininity, individualism/collectivism, power distance, and uncertainty. Related to Hofstede, Srite and Karahanna (2006) assigned the cultural aspect to technology acceptance. Prior research had basically measured demographic and situational data, e.g., gender, age, education, etc., as control or moderator variables in their models (e.g., Davis et al., 1989; Venkatesh and Morris, 2000). However, we use Srite and Karahanna's (2006) point of view and examine national cultural values as an important set of individual difference by exploring in detail the individualistic vs. collectivistic behaviors of the employees. Thereby, this construct is defined as the degree to which the individual emphasizes his/her own needs vs. the needs of a group (Srite and Karahanna, 2006).

## RESEARCH MODEL AND HYPOTHESES

The research model developed for this study relates motivational factors with perceived usefulness, mediated by information sharing and cooperation (Davis et al., 1989) for corporate communication technologies in a bank in Singapore. Figure 1 presents our developed model with the derived hypotheses.

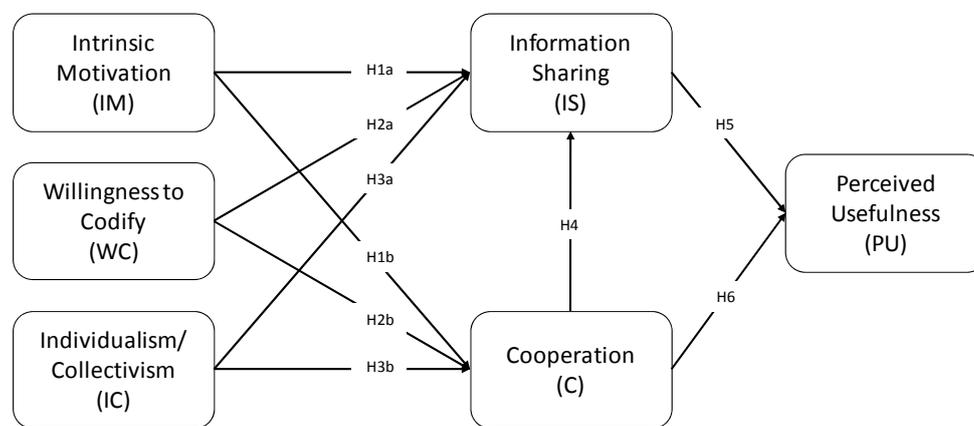


Figure 1. Structural Model

### Influence of Intrinsic Motivation to Share Information or Cooperate within Groups

Beside the motivation that sharing information and cooperating with other employees creates some new extrinsic rewards for the individual (Nahapiet and S., 1998), they receive intrinsic benefits from cooperation and information sharing (Wasko and Faraj, 2005). Especially the self-evaluation based on social competence and social acceptance is important for an individual (Wasko and Faraj, 2005), and sometimes more important than external rewards (Bandura, 1986). In this context, Kollock (1999) found that the motivation to help others positively affects the contribution and information sharing of people in electronic networks. In addition, the individual willingness to try out new communication technologies (Agarwal and Karahanna, 2000) and to help others with these technologies is of high importance for their motivation to share information or cooperate with corporate communication technologies. Thus, we test the following hypothesis:

*Hypothesis 1a: The intrinsic motivation of individuals positively affects the sharing of information among employees.*

*Hypothesis 1b: The intrinsic motivation of individuals positively affects the cooperation among employees.*

### Influence of Knowledge Codification to Share Information or Cooperate within Groups

Sharing information or cooperating with employees causes costs for the contributor (Kankanhalli et al., 2005; Markus, 2001). These costs are represented by the additional time that has to be spent to share the information with employees or to organize the cooperation among employees which can be also considered as opportunity cost (Orlikowski, 1993). However, according to Putnam (1993), codifying knowledge is not necessarily only related to costs. It also has a positive influence when trust exists within the group (Putnam, 1993) and a collectivistic culture among employees is established. Hence, the willingness to

codify knowledge can increase the cooperation among employees and their information sharing. Thus, we test the following hypothesis:

*Hypothesis 2a: The willingness to codify positively affects the sharing of information among employees.*

*Hypothesis 2b: The willingness to codify positively affects the cooperation among employees.*

### **Influence of Cultural Aspects to Share Information or Cooperate within Groups**

Srite and Karahanna (2006) explored the influence of cultural aspects on behavioral intention to use a system in a multi-level approach, focusing on the individual as well as the team or collective layer. Behavior towards individualism is basically guided by personal goals. In contrast, behavior towards collectivism is basically guided by the goals of the collective (Srite and Karahanna, 2006; Triandis, 1989). As a consequence, people who live or work in an individualistic culture are less concerned about the opinions of others (Srite and Karahanna, 2006). In contrast, people who live and work in a collectivistic culture orient themselves to the values and opinions of their group (Srite and Karahanna, 2006). Thereby, they found that a behavior towards collectivism positively moderates the relationship between subjective norms and the behavioral intention to use a system. In this context, subjective norms are defined by the social environment as well as social pressure of an individual (Fishbein and Ajzen, 1975). Hence, sharing information or cooperating within a work group needs a collectivistic behavior of the people. Thus, we test the following hypothesis:

*Hypothesis 3a: Behavior towards collectivism positively affects the sharing of information among employees.*

*Hypothesis 3b: Behavior towards collectivism positively affects the cooperation among employees.*

### **Influence of Cooperation on Information Sharing**

According to Aguiton and Cardon (2007), Web 2.0 users can be distinguished in two groups: While the first group is primarily interested in searching data and information in the Web 2.0 area, the second group can be characterized as a more altruistic motivated one that uses the Web 2.0 technologies for collective actions, community belongings, and cooperation. Through this collective action and cooperation, the knowledge and information sharing is increased (Aguiton and Cardon, 2007). Hence, cooperation can be seen as a preliminary and essential stage of information sharing. Thus, we propose that cooperation has a positive effect on information sharing:

*Hypothesis 4: Cooperation positively affects the information sharing among employees.*

### **Influence of Information Sharing on Perceived Usefulness**

The theory of planned behavior (TPB) (Ajzen, 1991) as well as the behavioral intention model to the rational actor (Ajzen and Fishbein, 1980) demonstrate that the intention to engage in a behavior is determined by an individual's attitude towards that behavior. In our model, information sharing is directly derived from Bock et al.'s (2005) attitude toward knowledge sharing which is defined as the degree of one's positive feelings about sharing knowledge. Perceived usefulness originates from TAM (Davis et al., 1989) and explains the acceptance of a technology through the user. This acceptance is influenced by perceived usefulness which is defined by the individual belief that the technology will provide an individual with benefit. Hence, we see a connection between the attitude towards knowledge sharing and the individual perceived usefulness of corporate communication technologies. Thus, we test the following hypothesis:

*Hypothesis 5: Information sharing among employees positively affects the perceived usefulness of corporate communication technologies.*

### **Influence of Cooperation among Employees on Perceived Usefulness**

Thomas and Bostrom (2008) found that on the one hand, the adaptation of technology serves as a reconfiguration of transitional space that enables better cooperation in virtual teams. On the other hand, this effect on cooperation directly influences the technology adaptation (Thomas and Bostrom, 2008) and therewith the perceived usefulness of corporate communication technologies. Thus, we assume that a higher degree of cooperation among employees positively influences the perceived usefulness or the involved corporate communication infrastructure:

*Hypothesis 6: Cooperation among employees positively affects the perceived usefulness of corporate communication technologies.*

**DATA ANALYSIS AND RESULTS**

The following subsections present the sample profile and the measurement of the developed model as well as its evaluation in terms of different quality criteria.

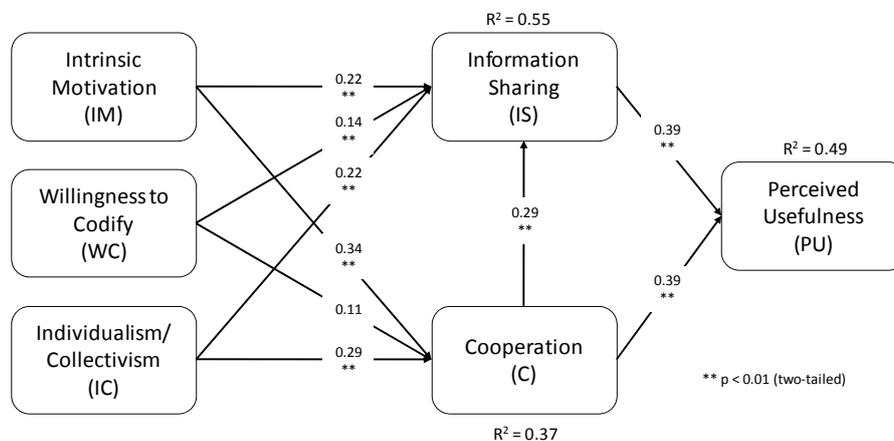
**Data Collection and Sample Profile**

To validate the research model and the associated hypotheses presented above, a questionnaire-based field study was conducted. The study aimed at the usefulness of corporate communication technologies to share information and cooperate between employees of the bank. In April 2010, 1000 randomly selected employees of bank in Singapore were invited through an email invitation with top management support. The employees were asked to respond to the survey by filling out an online questionnaire. In addition, the potential participants were asked to completely fill-out the questionnaire to avoid missing values that can cause bias due to systematic differences between observed and unobserved data. Overall, 176 responses were completed and could be used as valid data points for the measurement calculation which depicts a response rate of 17.6 percentages. The majority of the respondents was in the middle age of 30 and 50 years as well as had an affiliation to the bank of at least a few years (see Table A1 in the Appendix for demographic data). Hence, the outcomes of this survey are depicting valid data in terms of the use and usefulness of corporate communication technologies from the bank.

**Structural Model**

As a structure equation modeling technique, partial least square (PLS) comprises a measurement model as well as a structural model to estimate them simultaneously. In this study, the results for the PLS estimation are calculated with SmartPLS (Version 2.0 M3) with a path weighting scheme for the inside approximation (Tenenhaus et al., 2005). In addition, we used a bootstrapping procedure (Chin, 1998) by generating the number of 500 bootstrap samples (Tenenhaus et al., 2005) as well as conducted the bootstrap procedure to test the significance of the path estimates, factor loadings, and weights.

Figure 2 presents the results of this estimation and outlines that all path coefficients are above the minimum of 0.1 (Sellin and Keeves, 1994). Solely hypothesis H2b is not supported by the survey data since it is not significant. The squared multiple correlations ( $R^2$ ) depict the explanatory power of the structural model. In this regard, it is important that the  $R^2$  are above the minimum of 0.33, according to Chin (1998). Our model explains a moderate value of variance for the dependent latent variables. All  $R^2$ 's in our model are above this threshold.



**Figure 2. Estimated Structural Model**

**Measurement Model**

To support the measurement model from a statistically point of view, content validity, construct reliability, and construct validity has to be proofed.

To ensure the content validity, existing measures from prior empirical studies and literature were deductively derived and adapted to the context of corporate communication technologies where necessary (see Table A2 in the Appendix). Each construct of the research model is represented by a set of indicators. For all constructs reflective indicators were used and measured on a fully anchored 7-point Likert scale, ranging from “strongly agree” to “strongly disagree”.

Construct reliability depicts the internal consistency of the measurement model (Straub et al., 2004). Therefore, the average variance extracted (AVE), the composite reliability, and the Cronbach's alpha measures the reliability of the measurement model (see Table A3 in the Appendix for the values of this estimation). The recommended minimum for the AVE is 0.5, according to (Fornell and Larcker, 1981). This means that at least 50 percentage of the measurement variance is covered by the construct itself.

The composite reliability indicates how reliable the construct is represented by the indicators (Chin, 1998). The recommended composite reliability score should be a minimum of 0.7 (Hair et al., 1998) to provide evidence for sufficient reliability.

Cronbach's alpha (Cronbach 1951) is a traditional and alternative measure for estimating internal consistency. The recommended Cronbach's alpha score should be a minimum of 0.7 (Nunnally, 1978) to provide an indication of internal consistency among the construct's indicators.

Every construct in our model is above the mentioned thresholds. All constructs were tested with the Q-sorting technique (e.g., Thomas and Watson, 2002) before the survey. Q-sorting was conducted among 4 participants in 2 rounds. In the first round, the participants received 48 indicators from the constructs that should be sorted into arbitrary categories. After the first round the classification were analyzed and served as the input for the second round. In this second round, the participants had to sort selected indicators (based on the analysis of the first round) to preselected categories, e.g. the willingness to codify. We used the insights of this technique to improve the conceptualization of our model.

Construct validity refers to the outer validation of the measures (Straub et al., 2004). Construct validity evaluates the perspective of relationships between constructs as well as between constructs and their indicators. According to Campbell and Fiske (1959), this issue can be subdivided into convergent validity and discriminant validity. We evaluated the convergent validity of the constructs by measuring the degree to which the variance of an indicator can be explained by the underlying construct and, in addition, by measuring the degree to which the variance can be assessed by the indicator loadings. The recommended loading should be at least 0.707 or more (Chin 1998) to indicate that the measurement items were used adequate for measuring each construct. Every loading in our model is above the mentioned thresholds. Discriminant validity proofs whether indicators of latent constructs related or not related to each other (Andreev et al., 2009). Thereby, the cross-loadings (Chin, 1998) between the constructs are analyzed. The indicator loading has to be much higher on its assigned construct than on the other constructs (Henseler et al., 2009). The calculated square roots of the AVE score (see Table A3 in the Appendix) should be greater than the correlations between the construct and any other construct. All of these criteria are fulfilled in our model.

## DISCUSSION AND CONCLUSION

Since seven out of eight hypotheses are supported by our survey data, this paper presents how the cooperation and information sharing influences the perceived usefulness of corporate communication technologies, such as video conferencing, Wikis, and Chat in a bank in Singapore. We found that cooperation is a preliminary stage of information sharing (Aguiton and Cardon, 2007) and that both constructs lead to a higher perceived usefulness of corporate communication technologies. Thereby, motivational and cultural aspects influence both the cooperation and the information sharing among employees. However, the willingness to codify knowledge only influences the information sharing but has no significant effect on the cooperation among employees. This circumstance is rather intuitive, as we defined the willingness to codify as an positive effects when trust exists within the group (Putnam, 1993) and a collectivistic culture among employees is established. Hence, the willingness to codify can increase the information sharing among employees. However, cooperation among employees can also be conducted without an extensive information sharing. As we have discussed in the theory section, cooperation can also be modeled as prerequisite of information sharing among employees (Aguiton and Cardon, 2007).

Grounded in the well-established research stream of coordination theory (Crowston, 1997; Malone and Crowston, 1994), we developed and tested our model. Thereby, we focused on answering the research questions 'what the drivers of perceived usefulness of corporate communication technologies are' as well as 'what impact have motivational, cultural, and codification aspects' in this context. However, this study is limited due to the sample profile of the survey and the first attempt to conceptualize possible drivers of perceived usefulness. Future research in this area has to extend studies to other sample profiles as well as to refine the developed model in terms of potential drivers of information sharing and cooperation.

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## APPENDIX

Demographic	Characteristic	Count
Gender	Female	68
	Male	108
Age (years)	<22	0
	22-30	29
	31-40	95
	41-50	35
	51-60	15
	>60	2
Educational Background	Bachelor	80
	College	20
	Master	52
	Postgraduate	18
	Other	6
Bank Affiliation (years)	1-5	102
	5-10	41
	>10	33

Table A1. Demographics of the Participants

<b>Cooperation (C)</b>	7-point Likert (1 = strongly disagree; 7 = strongly agree)	(Thomas and Bostrom, 2008)
C1	Cooperation improves coordination between employees.	
C2	Cooperation makes employees more accountable.	
C3	Cooperation improves relationships among employees.	
<b>Individualism/Collectivism (IC)</b>	7-point Likert (1 = strongly disagree; 7 = strongly agree)	(Srite and Karahanna, 2006)
IC1	Being integrated in a team is more important than having autonomy and independence.	
IC2	I feel more comfortable as a member of a team than working independently.	
IC3	Team success is more important than individual success.	
<b>Information Sharing (IS)</b>	7-point Likert (1 = strongly disagree; 7 = strongly agree)	(Bock et al., 2005)
IS1	I find sharing information with my colleagues enjoyable.	
IS2	I find sharing information with my colleagues valuable and beneficial to me.	
IS3	I find sharing information with my colleagues is a wise and future oriented move.	

<b>Intrinsic Motivation (IM)</b>		7-point Likert (1 = strongly disagree; 7 = strongly agree)	(Wasko and Faraj, 2005) (Agarwal and Karahanna, 2000)
IM1	I feel good when I help colleagues solve problems with their use of corporate communication technologies.		
IM2	I enjoy helping colleagues with their use of corporate communication technologies.		
IM3	I like to experiment with corporate communication technologies.		
<b>Perceived Usefulness (PU)</b>		7-point Likert (1 = strongly disagree; 7 = strongly agree)	(Brown et al., 2008; Davis, 1989)
PU1	Generally, corporate communication technologies make my job more efficient.		
PU2	Generally, corporate communication technologies save me time with my daily tasks.		
PU3	Generally, corporate communication technologies give me greater control over my work.		
PU4	Generally, corporate communication technologies make my job more effective.		
<b>Willingness to Codify (WC)</b>		7-point Likert (1 = strongly disagree; 7 = strongly agree)	(Kankanhalli et al., 2005)
P1	With my participation in corporate communication technologies, I am willed to spend additional time on follow up questions.		
P2	With my participation in corporate communication technologies, I am willed to receive additional clarification requests.		

Table A2. Measurement Items

	Mean	SD	AVE	CR	Alpha	C	IC	IS	IM	PU	WC
C	4,46	1,41	0,87	0,95	0,93	<b>0,93</b>					
IC	5,02	1,50	0,78	0,91	0,86	0,51	<b>0,88</b>				
IS	5,40	1,38	0,92	0,97	0,96	0,61	0,62	<b>0,96</b>			
IM	4,74	1,42	0,85	0,94	0,91	0,54	0,54	0,59	<b>0,92</b>		
PU	4,75	1,36	0,89	0,97	0,96	0,63	0,50	0,63	0,51	<b>0,94</b>	
WC	4,41	1,42	0,87	0,93	0,85	0,34	0,39	0,44	0,36	0,43	<b>0,93</b>

Table A3. Means, standard deviations, AVE, composite reliability (CR), Cronbach's alphas, and correlations among constructs (off-diagonal elements), square root of AVE (diagonal elements)