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Relative Advantage and Perceived Usefulness: The Adoption of Competing ICTs

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Abstract: Relative advantage and perceived usefulness are often used interchangeably in the literature. We argue that this limits the understanding of the adoption of ICTs, especially when there are multiple alternatives. To address this issue, we reexamine relative advantage in relation to perceived usefulness by illustrating the conceptual differences between these two constructs, providing a re-specification of relative advantage stressing explicit comparison between ICTs, and then empirically testing a model that explores the roles of these constructs in explaining and predicting the adoption of a new technology in the presence of an existing ICT. The results demonstrate that perceived usefulness and relative advantage are indeed related but distinct constructs - relative advantage is a function of the perceived usefulness of new and existing technologies. While the perceived usefulness of a technology does explain the adoption of it to some extent, its relative advantage allows us to incorporate the influence of other technologies that would be otherwise ignored.

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1. INTRODUCTION

Information and Communication Technology (ICT) adoption is a topic extensively examined in the IS field. However, most ICT adoption studies seem to focus on the contexts where either only one ICT is available or alternative ICTs are unspecified or ignored (e.g., Agarwal and Karahanna 2000; Agarwal and Prasad 1998; Bhattacherjee and Premkumar 2004). With the advance of ICTs, it is not uncommon that organizations provide employees with multiple ICT options to support different aspects of work or/and fit unique settings. Hence, for potential users, the decision to make nowadays is more of "which one to use", or "whether an ICT is better", rather than "whether to adopt or not"; these questions have not been as well examined in the literature.

A key factor involved in such a decision is *relative advantage* (RA), which emphasizes the comparison of multiple innovations (Rogers 2003). Nevertheless, RA has been largely treated as identical to another construct, *perceived usefulness* (PU). For example, Moore and Benbasat (1991) declared that "the similarities between these constructs [perceived usefulness and perceived ease of use] and Rogers' perceived relative advantage and perceived complexity are clear (p.197)", implying that they are synonymous. In a similar manner, Adams et al. (1992) stated that relative advantage "can be considered analogous to usefulness (p.231)". Plouffe et al. (2001) made the argument clearer by stating that "the set of constructs used in TAM is essentially a subset of those proposed by PCI (Perceived Characteristics of Innovation) (p.211)".

Treating RA as identical to PU could be problematic when explaining and predicting the adoption of an ICT in the contexts where alternative ICTs are available, because it could be perceived very useful but still not adopted. Taking push mail on mobile devices as an example, although office workers may believe that it helps enhancing their productivity especially when moving around, it may not be perceived to have remarkable relative advantage over traditional e-mail. Therefore, it is of great importance to distinguish between RA and PU in ICT adoption research, especially in the contexts where there are multiple ICT alternatives.

As an attempt at this task, this study sets out to examine the relationship between RA and PU and explore their roles in ICT adoption both theoretically and empirically. Theoretically, we intend to provide an accurate account of existing conceptualizations and operationalizations of RA and PU in the literature. Empirically, we examine the effects of RA and PU on individuals' intentions to adopt an ICT in a representative context, the adoption of a pair of comparable ICTs (m-mail and e-mail). The findings of this study will help researchers select appropriate constructs to study ICT adoption in various contexts. They can also offer insights into how to campaign for technology adoption when multiple ICTs are available to potential users.

In section 2, we re-visit the conceptualizations and applications of PU and RA. Section 3 introduces a model to test the relationships between PU and RA and their roles in explaining the adoption of a new ICT in the presence of an existing ICT. Section 4 and 5 summarize the methodology and results. We discuss theoretical and managerial implications in Section 6 and conclude the paper in Section 7.

2. REEXAMINING RELATIVE ADVANTAGE

Several researchers have suggested that relative advantage and perceived usefulness are interchangeable in studying IT adoption. For instance, Karahanna et al. (2006) asserted that "perceived usefulness in TAM is equivalent to Rogers' relative advantage (p.782)". A reasonable question that one may ask in turn is "is this always appropriate?" To address this question, we first go back to the original sources of relative advantage and perceived usefulness and compare their conceptualizations and operationalizations.

Original conceptualizations and operationalizations of PU and RA

Perceived usefulness (PU) was defined as "the degree to which a person believes that using a particular ICT would enhance his or her job performance" (Davis 1989, p.320) and has been widely adopted by followers (e.g., Adams et al. 1992; Taylor and Todd 1995; Venkatesh and Davis 2000; Venkatesh et al. 2003). In this definition, Davis (1989) didn't specify any ICT alternatives explicitly as a comparison basis for users.

Relative advantage (RA) was introduced by Rogers in his book of *Diffusion of Innovations* (Rogers 1962). Originally, RA was employed to capture the relative superiority of an innovation (in a very broad sense) and was defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers 2003, p.229).

Compared to the definition of PU, the definition of RA is different in two ways. First, the definition of RA explicitly mentions another innovation(s), i.e., the precursor of the current one under study. In this regard, the definition of PU is quite fuzzy; it does not clarify the existence or nonexistence of any alternative ICTs. Second, the definition of RA does not specify exactly in

which aspects the ICT under consideration is superior to its precursor or competitor. While the definition of PU primarily focuses on the utilitarian benefits pertaining to job performance, other considerations such as *economic profitability*, *initial cost*, *decrease in discomfort*, *saving of time and effort*, *social prestige*, and *immediacy of reward*, also contribute to RA (Rogers 2003, p.233). Hence, although there clearly seems to be a relationship, RA and PU are conceptually different constructs.

In Davis' (1989) work, six items to measure perceived usefulness were recommended. Relative advantage was first operationalized as a survey instrument by Moore and Benbasat (1991) using five items. These two groups of items are quite comparable. In particular, RA1 is identical to PU1; RA3 is the same as PU5; RA5 is comparable to PU3; and RA4 is equivalent to PU4 (See Table 1). Moreover, *quality of the work* (as phrased in RA2) is semantically pertinent to *job performance* (PU2). Therefore, although the original conceptualizations of PU and RA are not identical, they are measured similarly, largely by the items proposed by Davis (1989).

Insert Table 1 about here

Research that follows Moore and Benbasat's (1991) approach essentially equate RA with PU because the role of an ICT's precursor or competitor as mentioned in the original definition of RA is not captured explicitly by the measures. In the contexts where there are alternative ICTs, whether this treatment is appropriate is open to question. When choosing from comparable ICTs, individuals usually examine them side-by-side, rather than evaluate each one against prior practices without ICTs respectively (Choudhury and Karahanna 2008). Leaving out the comparison with other ICTs may thus disguise the actual mechanisms at work to form the

intention to adopt an ICT, leading to problematic conclusions.

Relative Advantage: Working Definition

To distinguish between PU and RA in the contexts where multiple ICTs coexist, we offer a working definition of RA in this study. We define relative advantage as "*the degree to which using a particular ICT is perceived as being better in terms of enhancing job performance than using its preceding/competing technologies*". This definition stresses explicit comparison and emphasizes the performance improvement aspect of ICTs within organizational contexts.

Examining only the performance improvement aspect of RA is justifiable because, although Rogers' (1962) initial conceptualization of RA is fairly rich, most of the elements have been extracted and captured by other constructs. For instance, *economic profitability* of innovations emphasized by Rogers is captured by the construct of *payoff* (Fliegel and Kivlin 1966); *initial Cost* is reflected by *perceived cost* (Jones et al. 2002; Yang and Peterson 2004); *decrease in discomfort* is similar to *saving of discomfort* (Fliegel and Kivlin 1966); and *social prestige* can be gauged through *image* (Moore and Benbasat 1991) or *social approval* (Fliegel and Kivlin 1966). Therefore, in the ICT adoption literature, the emphasis of RA is indeed on performance improvement; we choose to focus solely on this aspect accordingly in this study.

Moreover, RA has been alternatively conceptualized as a multidimensional construct in the literature. For example, in the context of electronic channels adoption, Choudhury and Karahanna (2008) conceptualized relative advantage as a formative construct consisting of three sub-dimensions: *convinience*, *trust*, and *efficacy of information acquisition*. However, a multidimensional view of RA would not serve the research objective of distinguishing it from PU.

Hence, we define relative advantage in a general sense in this study without specifying detailed advantage dimensions regarding performance.

We adapt existing items to measure RA in light of our working definition. In each question, an alternative/rival technology (or rival technologies) is explicitly specified to serve as a basis of comparison.

3. EMPIRICAL TEST

Having discussed the issues with existing use of RA in the literature and proposed a re-specification, we put it through an empirical test to explore further its relationship with PU and test its effect on ICT adoption in the presence of multiple comparable ICTs. In this test, we focus on the context where there are only two competing technologies: an existing technology (IT_E) and a new technology (IT_N). In particular, we choose to study traditional e-mail (IT_E) and electronic mail on mobile devices, named m-mail (IT_N), as a pair of competing ICTs as they essentially provide very similar functions. Figure 1 summarizes the theoretical model.

Insert Figure 1 about here

Perceived Usefulness of the New Technology (PU_N)

Within organizational contexts, people are usually rewarded for good performance (Davis 1989). Thus, for ICTs perceived as useful in terms of enhancing job performance, individuals will have the motivations and intentions to utilize them. Therefore, we expect the perceived usefulness of a new technology (PU_N) to have a positive impact on the intention to this technology (INT_N).

H1: Perceived usefulness of IT_N is positively related to the intention to use IT_N.

In the contexts of multiple ICTs, the perception of the superiority of one particular ICT should be based on the comparison of all the ICT options available (Ridings and Gefen 2000; Rogers 2003). The usefulness of other ICTs being constant, the more useful one ICT option appears (in an absolute sense) in terms of improving work performance, the higher level of advantages will be perceived in relative to its competitors. Thus, we propose:

H2: Perceived usefulness of IT_N is positively related to the RA of IT_N.

Perceived Usefulness of the Existing Technology (PU_E)

Since the two technologies under scrutiny are comparable, the superiority or advantage of one technology will make its rival less appealing because they compete for users' attention (Rogers 2003). Thus, assuming that the *Perceived Usefulness* of the new technology is fixed, the more useful the existing technology (IT_E) in terms of performance improvement is, the less the added value of IT_N should be perceived. Therefore, we expect:

H3: Perceived usefulness of IT_E is negatively related to the RA of IT_N.

Whereas the direct effects of PU_E and PU_N on RA are straightforward, one less obvious but possible effect is the interaction effect of PU_E and PU_N on RA. That is, if a new technology has a very compelling rival (IT_E), the contribution of the usefulness of the new technology to its relative advantage may be undermined (Ridings and Gefen 2000). Therefore, besides a direct relationship between PU_E and RA, PU_E may also affect the effect of PU_N on RA such that such effect is higher when PU_E is lower. Thus, we hypothesize:

H4: Perceived usefulness of IT_E moderates the effect of PU_N on RA such that the effect is stronger when perceived usefulness of IT_E is lower.

Relative Advantage of the New Technology (RA)

Relative advantage has been underscored to be the key factor accounting for the adoption of an innovation (Rogers 2003). As discussed in previous sections, in the context of ICT adoption, the more beneficial an ICT appears in relative to its competitors, the more users are motivated to adopt it. Therefore, a positive relationship between RA of IT_N and the intention to use IT_N (INT_N) is expected.

H5: Relative advantage of IT_N is positively related to the intention to use IT_N.

4. METHODOLOGY

Instrument Development

This study involves many well-established constructs in the ICT adoption literature. For such constructs, we adapted existing measures to fit the current research context and transformed them to 7-point Likert scales when applicable. Because most of the adapted measures have demonstrated good quality in prior research, no pilot test was conducted. Appendix I lists all constructs and corresponding items.

Special attention was paid to the items of *perceived usefulness of* m-mail. We emphasized the absolute sense of usefulness by adding "o*n its own*" in each question (see Appendix I). The expectation was that, by wording them this way, respondents would provide their beliefs about the degree of usefulness of m-mail without comparing it with other technologies.

Data collection

We recruited undergraduate students taking a business course at a public university in Canada as respondents. As per the policy of this course, students had the chance to earn 0.5

credits for participating in research. The participation was voluntary and the students could quit whenever they wanted without any punishment.

The questionnaire was administrated on the internet. 350 responses were obtained in a period of 6 weeks with 1 response not usable. The average age of the respondents was 18.4 years and 51.6% were male. Participants had an average of 10 years of computer experience and 7.6 years of e-mail experience. About 31.5% of the respondents had m-mail experience.

Data analysis

We used Partial Least Squares (PLS) to test the research model as PLS permits the estimation of the measurement model within the theoretical context (Barclay et al. 1995; Chin 1998). SmartPLS (Version 2.0.M3) was employed (Ringle et al. 2008) as the analytical tool and bootstrap resampling approach (500 subsamples) was used to determine the significance of the hypothesized relationships.

Besides the variables depicted in Figure 1, a set of variables have been identified by prior research to be predicators of *intention* or moderators of the relationships between PU and *intention*. Therefore, we controlled for the effects of the following variables in the analysis: *Perceived Ease of Use* (Davis 1989; Venkatesh and Davis 2000), *Others' Use* (Compeau et al. 1999; Compeau and Higgins 1995; Compeau et al. 2007), *Perceived Behavior Control (PBC)* (Taylor and Todd 1995), *Age* (Morris and Venkatesh 2000; Venkatesh et al. 2003), *Gender* (Gefen and Straub 1997; Venkatesh and Morris 2000), *Compatibility with Preferred Work Style*, *Compatibility with Existing Work Practices*, *Compatibility with Prior Experience* and *Compatibility with Values* (Karahanna et al. 2006), and *purchasing cost* (Yang and Peterson

2004).

5. RESULTS

Table 2 summaries the descriptive statistics of key constructs. In general, e-mail was perceived by respondents as highly useful (with a mean of 6.05 out of 7) while m-mail was perceived as somewhat useful (with an average of 4.71). This result suggests that although m-mail was beneficial to performance improvement in itself, it was not very appealing. A similar conclusion can be obtained from the average of relative advantage of m-mail (3.92), which is a little lower than the neutral value of 4, suggesting that respondents might slightly favor e-mail.

Insert Table 2 about here

Measurement Model

To test the measurement model, we checked individual item reliability, internal consistency, convergent validity, and discriminant validity (Barclay et al. 1995; Gefen et al. 2000).

To achieve acceptable individual item reliability, the loading of each item with its corresponding construct needs to be greater than 0.7, implying that 50% or more variance in this item is explained by the construct (Barclay et al. 1995). An initial test revealed a few problematic items that had loadings lower than 0.7. Two of them belonged to *PBC* of m-mail (MPBC2, MPBC4) and one measured *Compatibility with Existing Work Practices* for m-mail (MCEXST4). In addition, of all the four items of *Compatibility with Prior Experiences*, only MCEXP1 had a loading larger than 0.7, whereas the loading of MCEXP2 was negative and the remaining two items' loadings were smaller than 0.4. We dropped the unreliable items and *Compatibility with Prior Experiences* as a control variable. As shown in Table 3, all remaining items of reflective

constructs demonstrate adequate reliability except for one item belonging to *Purchasing Cost* of m-mail (MUCOST3), which has a marginally acceptable loading of 0.65 (see Table 3).

Insert Table 3 about here

Table 4 describes the intercorrelations and internal consistency reliabilities of the constructs. All reliability indicators are 0.8 or higher, well above the recommended level of 0.7 (Fornell and Larcker 1981), suggesting adequate internal consistency.

Insert Table 4 about here

Convergent validity is acceptable if a construct has an average variance extracted (AVE) of 0.5 or above (Fornell and Larcker 1981). As shown in Table 4, the AVE of each reflective construct is higher than the cutoff value, indicating adequate convergent validity.

To show satisfactory discriminant validity, the square root of the AVE of each construct should be greater than the correlations between this construct and other constructs in the model (Chin 1998). Illustrated in Table 4, all the constructs satisfy this criterion. In particular, the square root of the AVE of RA is 0.88, which is noticeably larger than its correlations with perceived usefulness of m-mail (0.72) and that of e-mail (0.13). In addition, the loadings of RA's items on their construct are considerably larger than their cross loadings on perceived usefulness of m-mail or e-mail with a minimal margin of 0.2[2]. Hence, the empirical evidence supports that RA and PU are indeed distinct constructs (e.g., Wixom and Todd 2005).

Structural Model

The test of structural model involves the estimation of path coefficients and significance levels of these coefficients. As shown in Figure 2, 4 of the 5 hypothesized relationships are

[2] The loadings and crossloadings table is available from the authors upon request.

significant.

Insert Figure 2 about here

As expected, perceived usefulness of IT_N significantly influences intention to use IT_N (H1) and relative advantage of IT_N (H2) and the effects are in the predicted directions. Perceived usefulness of IT_E has a significant negative effect on relative advantage of IT_N (H3), which in turn has a significant positive effect on intention to use IT_N (H5). However, the interaction effect of PU_E and PU_N on RA is not significant (H4). Overall, the model explains 67.2% of the variance in INT_N and 50% of the variance in RA.

Among the control variables, *perceived ease of use* of m-mail, *other's use* of m-mail, and *purchasing cost* have significant effects on *intention* to use m-mail.

6. DISCUSSION

We set out to examine the relationship between PU and RA and their roles in the adoption of ICTs when multiple alternatives coexist. Empirical evidence supports that PU and RA are related but distinct constructs - RA is a function of the PU of new and existing technologies and is a significant antecedent of intention to use the new technology.

The findings underscore the importance of including RA as originally intended in studying ICT adoption, especially when there are competing technologies. While the PU of a technology does explain the adoption of it to some extent, its RA allows us to incorporate the influence of other technologies that would be otherwise ignored. In a post hoc test to examine the mediating effects of RA, we found that RA partially mediated the effect of perceived usefulness of m-mail on intention to use m-mail but not the effect of perceived usefulness of e-mail - there was no

significant direct relationship between these two constructs. In other words, perceived usefulness of e-mail could only affect intention to use m-mail via the path through RA. This result suggests that the influence of a competing ICT may not be captured without explicitly including RA. Therefore, RA that stresses explicit comparison is able to help achieve a more comprehensive understanding of ICT adoption.

The results also provide insights into the choice of proper constructs for researchers. In contexts where the focal ICT is the only or first available one to potential adopters, it seems appropriate to use PU as a proxy of RA as the basis of comparison for both is manual work or the situation without any technology. However, when alternative ICTs coexist, potential adopters are prone to judge the superiority of the technology in question based on the evaluations of others. In this case, relative advantage cannot be deemed as the same as perceived usefulness; rather, it should be specified explicitly in the theoretical model.

For managers, this study calls more attention to comparable technologies when promoting a new technology. A new technology usually has certain attributes that are absent in existing technologies, but also shares many attributes with them. To promote the new technology, advantages of it in relative to others should be singled out and highlighted, instead of its absolute benefits that may be shared by others. One way to do so is to analyze the needs of potential users. This directs managerial attention to the attributes of different jobs, the sorts of unique support offered by the new ICT, and the match between jobs and ICTs (Goodhue and Thompson 1995).

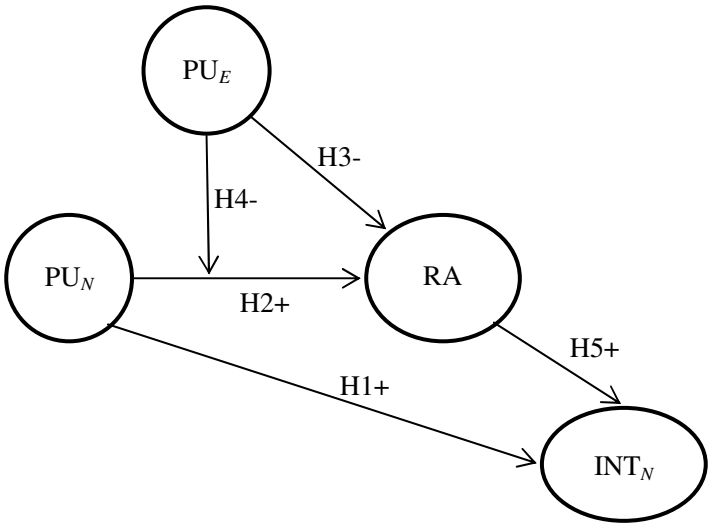
Limitations

Several limitations should be noted when interpreting the results. First, the exclusive use of

the survey method may introduce common-method bias. Careful research design and the results of reliability and validity tests make us believe that it is unlikely to be an issue (Wixom and Todd 2005). However, future research employing other data collection methods is able to provide meaningful triangulation and more confidence in the findings. Second, university students may be different from the general workforce because they tend to have low incomes and more flexible schedules, undermining the generalizability of the findings. Therefore, we encourage researchers to test the proposed theoretical model using other ICTs and/or in different organizational contexts.

7. CONCLUSIONS

With the advancement of contemporary information technology, potential adopters face more complex situations where they may have to choose among competing technologies. However, a key factor to understand such a phenomenon, namely relative advantage, may have been confounded with perceived usefulness. To make a clear distinction between RA and PU, we have examined their relationship and explored their roles in ICT adoption both theoretically and empirically. Though they could be viewed as interchangeable when the ICT in question has no rivals available, these two constructs are found to be distinct in the contexts where multiple ICTs compete for the attention of users. RA is more appropriate in the latter case as it allows a more accurate and comprehensive account for the adoption of an ICT by considering the influence of its competitors.



PU: Perceived Usefulness; INT: Intention to Use; RA: Relative Advantage; Subscript E: Existing Technology; Subscript N: New Technology.

Figure 1. Research Model

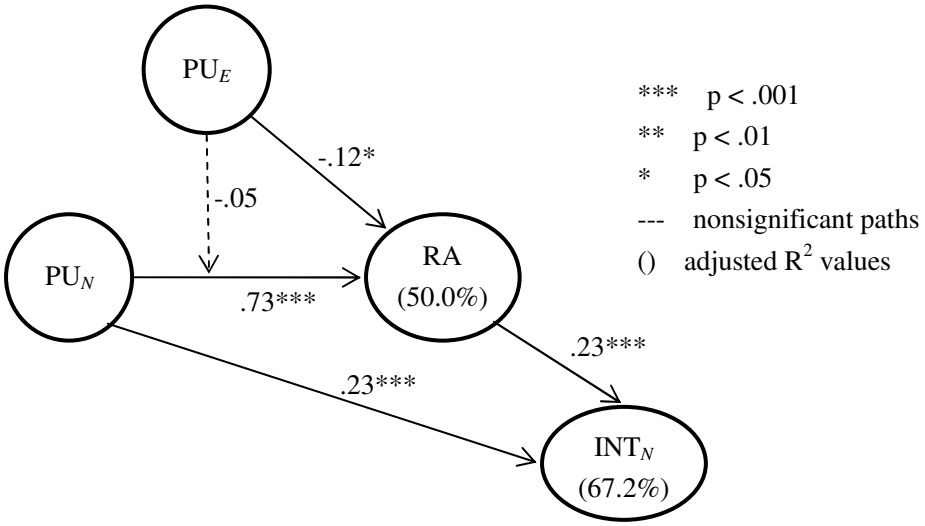


Figure 2. PLS Results

Table 1. Original Operationalizations of Perceived Usefulness and Relative Advantage

Constructs	**Items**
Perceived Usefulness (Davis 1989; Davis et al. 1989)	PU1. Using the system in my job would enable me to accomplish tasks more quickly. PU2. Using the system would improve my job performance. PU3. Using the system in my job would increase my productivity.

	PU4. Using the system would enhance my effectiveness on the job. PU5. Using the system would make it easier to do my job. PU6. I would find the system useful in my job.
Relative Advantage (Moore and Benbasat 1991)	RA1. Using the system enables me to accomplish tasks more quickly. RA2. Using the system improves the quality of the work I do. RA3. Using the system makes it easier to do my job. RA4. Using the system enhances my effectiveness on the job. RA5. Using the system increases my productivity.

Table 2. Descriptive Statistics of Key Constructs

Measure	Item Number	Mean	Standard Deviation
Perceived Usefulness (e-mail)	5	6.05	.96
Perceived Usefulness (m-mail)	5	4.71	1.24
Relative Advantage (m-mail)	5	3.92	1.44
Intention to Use (m-mail)	4	4.63	1.61

All scales are 7- point Likert scales.

Table 3. PLS Outer Model Loadings

Items	PLS Outer Model Loading	Items	PLS Outer Model Loading	Items	PLS Outer Model Loading
EPU1	.73	MPU1	.84	MRA1	.89
EPU2	.77	MPU2	.89	MRA2	.89
EPU3	.85	MPU3	.90	MRA3	.89
EPU4	.81	MPU4	.90	MRA4	.83
EPU5	.81	MPU5	.75	MRA5	.92
MEOU1	.80	MINT1	.93	MUCOST1	.85
MEOU2	.86	MINT2	.93	MUCOST2	.80
MEOU3	.91	MINT3	.93	MUCOST3	.65
MEOU4	.85	MINT4	.79	MUCOST4	.75
MCEXST1	.75	MOU1	.76	MPBC1	.93
MCEXST2	.86	MOU2	.76	MPBC3	.87
MCEXST3	.79	MOU3	.41		
MCVAL1	.87	MOU4	.75		
MCVAL2	.90	MOU5	.84		
MCVAL3	.85	MOU6	.87		

MCVAL4	.89	MOU7	.90		

MEOU =Ease of Use (m-mail); MINT =Intention to use m-mail; MOU =Other's Use of m-mail; MPBC =Perceived Behavior Control (m-mail); EPU =Perceived Usefulness (e-mail); MPU =Perceived Usefulness (m-mail); MUCOST=Perceived Purchasing Cost (m-mail); MRA=Relative Advantage of m-mail

Table 4. Reliability, Correlations and Discriminant Validity

	ICR	Alpha	EPU	MPU	MEOU	MINT	MOU	MPBC	MCEXST	MCVAL	MUCOST	MRA
EPU	0.88	0.86	**0.78**									
MPU	0.93	0.9	0.36	**0.85**								
MEOU	0.91	0.88	0.25	0.49	**0.85**							
MINT	0.94	0.92	0.19	0.69	0.57	**0.89**						
MOU	n/a	n/a	0.15	0.5	0.48	0.66	**n/a**					
MPBC	0.89	0.77	0.17	0.35	0.5	0.36	0.4	**0.9**				
MCEXST	0.84	0.72	0.32	0.61	0.64	0.55	0.5	0.5	**0.79**			
MCVAL	0.93	0.9	-0.23	-0.14	-0.2	-0.14	-0.1	-0.3	-0.22	**0.87**		
MUCOST	0.85	0.8	-0.06	-0.17	-0.24	-0.32	-0.17	-0.24	-0.21	0.13	**0.77**	
MRA	0.95	0.93	0.13	0.72	0.3	0.61	0.43	0.19	0.4	0	-0.06	**0.88**

ICR=Internal Consistency Reliability; The diagonal elements are the square root of the average variance extracted (AVE, indicating the average correlation between the construct and its measures). The off diagonal elements show the correlations between constructs.

Appendix I. Measures of Key Constructs

Perceived Usefulness (e-mail/m-mail) (Davis 1989; Davis et al. 1989)

EPU1: Using e-mail/m-mail enables me to accomplish tasks more quickly.

EPU2: In general, e-mail/m-mail is useful.

EPU3: In general, using e-mail/m-mail enhances my effectiveness.

EPU4: In general, using e-mail/m-mail increases my productivity.

EPU5: In general, using e-mail/m-mail improves my performance.

Perceived Ease of Use (m-mail) (Davis 1989; Davis et al. 1989)

MEOU1: Learning to use m-mail was easy for me.

MEOU2: I find it easy to get m-mail systems (both handsets and software) to do what I want them to do.

MEOU3: I find m-mail easy to use.

MEOU4: It was easy for me to become skilful at using m-mail.

Intention to Use (m-mail) (Taylor and Todd 1995; Venkatesh and Davis 2000)

MINT1: I intend to use m-mail in the future.

MINT2: I expect that I would use m-mail in the future.

MINT3: I predict that I would use m-mail in the future.

MINT4: I plan to use m-mail in the next several months.

Relative Advantage of m-mail (Lim and Benbasat 2000)

MRA1: m-mail enhances my job effectiveness to a greater extent than e-mail does.

MRA2: Using m-mail improves my performance more than only using e-mail.

MRA3: Using m-mail enables me to accomplish tasks more quickly than using e-mail.

MRA4: m-mail is more useful than e-mail.

MRA5: m-mail increases my productivity more than e-mail does.

Note: The measures of other constructs (i.e., control variables) were all adapted from the literature.

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