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POST-ADOPTION TRANSFERRING BETWEEN NON-SUBSTITUTABLE TECHNOLOGIES: THE CASE OF INSTANT MESSENGER AND PORTAL

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Abstract

In this study, we focus on post-adoption transfer behavior between technology products that are not substitutable. Drawing upon the theories and findings of entitativity, the self-perception theory, and technology acceptance model, we proposed a research model. We then validated it through cross-sectional field data collected from users on their post-adoption transfer from one instant messenger, QQ, to its portal, QQ.com. Findings suggest that the usage behavior can be transferred indirectly, and the perceived entitativity is an important factor influencing the transferring behavior. This research finds that perceived usefulness and perceived ease of use can be transferred. If the perceived entitativity is high, then perceived usefulness and perceived ease of use will be transferred between non-substitutable technology products. This research contributes to both research and practice by advancing our understanding of users' post-adoption behavior in general and, more specifically, their transferring behavior between non-substitutable technology products.

Keywords: Post-adoption behavior, transfer behavior, entitativity

Introduction

Consumer technologies such as instant messenger systems and portals are becoming increasingly popular. These technologies are characterized by their ease of procurement by users, and by the ease with which users can upgrade, abandon, or transfer between non-substitutable technology products. Instant messenger is an Internet-based application that provides close to real-time communication between people, and plays a crucial role in online communication. Because of the rapid diffusion of instant messenger, some researchers have focused on its adoption (e.g., Li et al. 2005). The portal is the first site people see when using the Web, and it offers a broad array of resources and services, such as email, forums, search engines, and on-line shopping malls. Some studies have also examined the antecedents of website usage behavior (e.g., Kim et al. 2005). However, most research examined the usage behavior of different products in isolation. In the online environment, because of the widespread existence of mutual linkage, the usage behavior of different services or products may be correlated. In this study, we examine

users transferring between non-substitutable technology products. Specifically, we focus on post-adoption transferring from one instant messenger, QQ, to its portal, QQ.com.

Examining users' transferring behavior between non-substitutable technology products is critical for two reasons. First, many online companies are trying to make use of a well-known technology product to promote other non-substitutable technology products. For example, Google, having gained great success in the search engine market, launched an email service. After success with Hotmail and MSN, Microsoft launched online news and search engine services. The underlying assumption for these technology vendors is that the usage behavior can be transferred between non-substitutable technology products. This poses two interesting problems for technology vendors: what is the main factor that influences the transfer between non-substitutable technology products, and how can online corporations make full use of users' transferring behavior to promote new technology products?

Second, user transferring behavior between non-substitutable technology products is also interesting to research because it is a form of post-adoptive behavior that is unexplored in the IS literature. Although there has been an abundance of research on technology adoption and acceptance (Davis et al. 1989; Venkatesh and Davis 2000; Venkatesh et al. 2003), only recently have researchers begun to focus on post-adoptive issues (Jasperson et al. 2005). We believe that we are one of the first to focus on consumer transferring behavior related to non-substitutable technology products. We are concerned with *perceived* rather than *actual* factors because we believe that it is user perception of particular attributes of technology products that influence the transferring behavior.

The rest of the paper is organized into four sections. We first review the relevant literature in IS and marketing. Then, we present theoretical foundations and the proposed model. Data analysis is presented in the third section. The paper closes with discussions of findings, limitations, and implications for research and practice.

Literature Review

Two streams of literature provide key insights regarding technology users' post-adoption transferring behavior: post-adoption user behavior research in the IS literature, and umbrella branding research in the marketing literature.

Post-Adoption Research in the IS Literature

Information systems (IS) researchers have long been interested in why some people accept a certain computing technology but others are reluctant to do so (e.g., Davis et al. 1989; Venkatesh and Davis 2000; Venkatesh et al. 2003). Accordingly, a number of theories have been advanced to explain user adoption and acceptance, such as theory of reasoned action (TRA) (Sheppard et al. 1988), theory of planned behavior (TPB) (Ajzen 1991), technology acceptance model (TAM) (Davis et al. 1989), and the unified view of information technology acceptance (UTAUT) (Venkatesh et al. 2003). Although initial use is an important indicator of IS success, successful adoption does not always predict continued use and overall IS success; therefore, researchers have recognized the need to study the issue of post-adoption user behavior (Bhattacharjee 2001; Jasperson et al. 2005; Kim and Malhotra 2005).

Bhattacharjee (2001) created a model of IS continuance based on Expectation-Confirmation Theory (ECT), which draws on the consumer behavior literature. This study is one of the earliest to conceptualize and test a theoretical model of IS continuance that takes into account the distinctions between acceptance and post-acceptance behaviors. Bhattacharjee (2001) suggested that users' continuance intention is determined by their satisfaction with IS use and perceived usefulness. Similar to the Bhattacharjee (2001) study, most of subsequent post-adoption studies also focused on what drives users' continued use after initial adoption. Kim and Malhotra (2005) proposed a unified framework that sheds light on the four different mechanisms underlying post-adoption phenomena: the technology acceptance model, sequential updating mechanisms, feedback mechanisms, and repeated behavioral patterns.

A few recent studies have also looked beyond the innovation adoption literature and applied different theoretical perspectives to understanding post-adoption behavior. Cheung and Limayem (2005) studied the role of habit in information systems continuance, and found that the moderating effect of habit on the relationship between intention and usage increased over time, and the impact of intention on IS continued usage weakened. Grounded in the theory of trying (an extension to theory of reasoned action), Ahuja and Thatcher (2005) found that overload and autonomy

are antecedents of trying to innovate with information technology. Ye et al. (2006) examined factors that influence users' post-adoption switching between technology products that are near-perfect substitutes.

While most of the research in post-adoption behavior has focused on users' continued use, it generally does not distinguish between the innovations and the relationships between the specific technology products that represent them (Ye et al. 2006). In reality, some technology products are similar in functionality and thus highly substitutable; other products are non-substitutable. In economics, a substitute good refers to a good which is to some extent interchangeable with another good. Therefore, a user's decision to use a specific technology product may be accompanied by termination or reduction in usage of another product that has similar functions. We defined non-substitutability of two technology products as the two products having different functions that thus cannot be used for the same purpose. Therefore, non-substitutable technology products are not interchangeable. Consider, for example, a user who used the instant messenger and portal. The instant messenger is an application that provides real-time communication between people. The portal is the first site people see when using the Web. It offers a broad array of resources, such as online news, email, and on-line shopping malls. The instant messenger and portal have different functions: these two services are non-substitutable. The usage behavior associated with one technology product may be influenced by the usage behavior of other relevant technology products. However, there are only a few empirical studies in the IS literature addressing related issues.

Umbrella Branding Research in the Marketing Literature

In the marketing literature, the concept of umbrella branding (Wernerfelt 1988; Tulin 1998) can partly explain post-adoption transferring behavior between products that share the same brand. The concept of umbrella branding, where the same brand name is used for several products, suggested that a multi-product firm can use the brand name of an established product as a symbol for quality to promote others. The experience of the established product, which provides consumers with relevant information about the new product, could help to reduce the uncertainties and perceived risk associated with the new one. The experience of one product could also affect other products with the same brand name (Tulin 1998). Therefore, the transfer of parent brand awareness and associations to other products is a critical successful factor for brand extension (Aaker 1991).

Although the concept of umbrella branding can partly explain post-adoption transferring behavior, the relevant research does not fully explain user transferring behavior between non-substitutable technology products, for several reasons. The concept of umbrella branding has the most power to explain the consumption of products that are differentiated in price, purchased by risk-aversion consumers, and not free (Wernerfelt 1988; Tulin 1998). These conditions are not always true of technology products. For example, the instant messenger application is always free and consumers can download it easily from the website of the vendor. The concept of umbrella branding, however, stems from signaling theory in information economics, which ignores consumers' different judgment processes for individual and group targets. More importantly, we must pay special attention to the rich set of technology-specific characteristics that have been discovered in the IS literature when we try to theorize about an issue where the IT artifact is clearly present (Orlikowski and Iacono 2001). Take the hypertext linkage as an example. Hypertext linkage is a core feature of Internet technology. The Web allows vendors to easily associate one online service with another by providing hypertext links. Hypertext linkages between different services may cause the consumers to perceive a positive relation (Stewart 2003).

Theoretical Background and Hypotheses

Entitativity

Entitativity refers to the degree to which a collection of individual entities is perceived as being bonded together in a coherent group (Campbell 1958). This concept can be applied to both physical objects and social groups equally (Campbell 1958). Entitativity is considered to be an important dimension on which groups are compared, and perceptions of entitativity would strongly influence information impression formation, representation, and processing (Hamilton and Sherman 1996; McConnell et al. 1997; Crawford et al. 2002; Johnson and Queller 2003). It has been found that the perception of interaction, common goals, common outcomes, group importance, and group

member similarity are strongly interrelated and highly correlated with the perception of entitativity (Campbell 1958; Lickel et al. 2001).

Perceivers tend to form on-line impressions for individual targets, and memory-based impressions for group targets (McConnell et al. 1994). When perceivers engage in on-line information processing, they tend to form organized and coherent impressions. At this time, the initial information serves as a basis for the individual impression, and subsequently encountered information is encoded to integrate into this impression. Memory-based impression, in contrast, is rather poorly organized; it involves separately storing pieces of information about the group as they are received. Impressions are formed only until there is a need for judgments (McConnell et al. 1997).

The degree of perceived entitativity will determine the information impression formation, and thereby the information processing mechanism (Hamilton and Sherman 1996; McConnell et al. 1997; Johnson and Queller 2003; Crawford et al. 2002). Crawford et al. (2002) investigated the influences of perceived entitativity of a group on the processing of behavioral information about individual group members and the extent to which information was transferred to other group members. The research demonstrated that the perception of high entitativity involves the abstraction of a stereotype of the group and the transfer of that stereotype across all group members. High entitative groups are perceived as constituting a coherent unit in which the members of the group are bonded together. The transference of traits from one group member to other group members is strong for groups with high perceived entitativity. Low entitative groups are perceived as aggregates of individual members; members are treated separately. That is, no general characterization or stereotype is formed, making the transference of traits to group members more difficult.

Research Model and Hypotheses

TAM, which is an adapted version of TRA, was developed to explain user acceptance of a new information technology (Davis et al. 1989). According to TAM, an individual's decision to adopt a new technology depends on two beliefs: 1) perceived ease of use (the individual's perception concerning the amount of effort required to use the new technology), and 2) perceived usefulness (the individual's perception concerning the degree to which using the technology will improve performance). Gefen et al. (2003) suggest that TAM has heuristic value because it explains computer usage behavior and offers insights concerning how use acceptance is influenced by information system characteristics (Davis et al. 1989). TAM presumes that perceived ease of use has a positive impact on perceived usefulness, and that, subsequently, both factors positively influence intention (Venkatesh and Davis 2000). Intention to adopt represents the aim to behave in a certain way in the future, rather than actual behavior in the present. Actual usage behavior plays a key role in the success of new technology products. Hence, this proposed model chooses actual usage behavior as the dependent variables. Hence, we hypothesize as follows:

H1: Perceived usefulness of new technology products is positively associated with the usage of new technology products.

H2: Perceived ease of use of new technology products is positively associated with the usage of new technology products.

H3a: For new technology products, perceived ease of use also has a positive impact on perceived usefulness.

H3b: For incumbent technology products, perceived ease of use has a positive impact on perceived usefulness.

Self-perception theory posits that people do not form specific evaluations of routine behavior until they are asked to do so (Kim and Malhotra 2005). When explicitly asked, people may give their answers using an external observer's perspective. For example, someone may respond to a question about his attitudes toward using an instant messenger by saying, "I use this instant messenger everyday, hence, I think I like it." As Bem (1972) noted, this decision-making process is the same one that others would use to infer people's internal states from their behavior: "I guess they like this instant messenger; they are always using it." That is, in some cases, people do not carefully calculate the benefits of their usage behavior. Instead, the usage behavior will form the basis of user evaluations. Self-perception theory posits that the greater the usage, the more favorable the user evaluations (Ouellette and Wood 1998; Melone 1990; Kim and Malhotra 2005). Melone (1990) drew upon research in social psychology to propose that the relationship between behavior and beliefs/attitudes was one of mutual influence. Some empirical research has supported this theory. Bajaj and Nidumolu (1998) examined individuals' use of a debugger tool and demonstrated that past use had significant influence on the perceived ease of use. Kim and Malhotra (2005) found

that past use has positive influence on perceived ease of use and perceived usefulness in the context of personalized portal website usage behavior. Therefore, we can hypothesize as follows:

H4: The usage of incumbent technology products is positively associated with perceived usefulness.

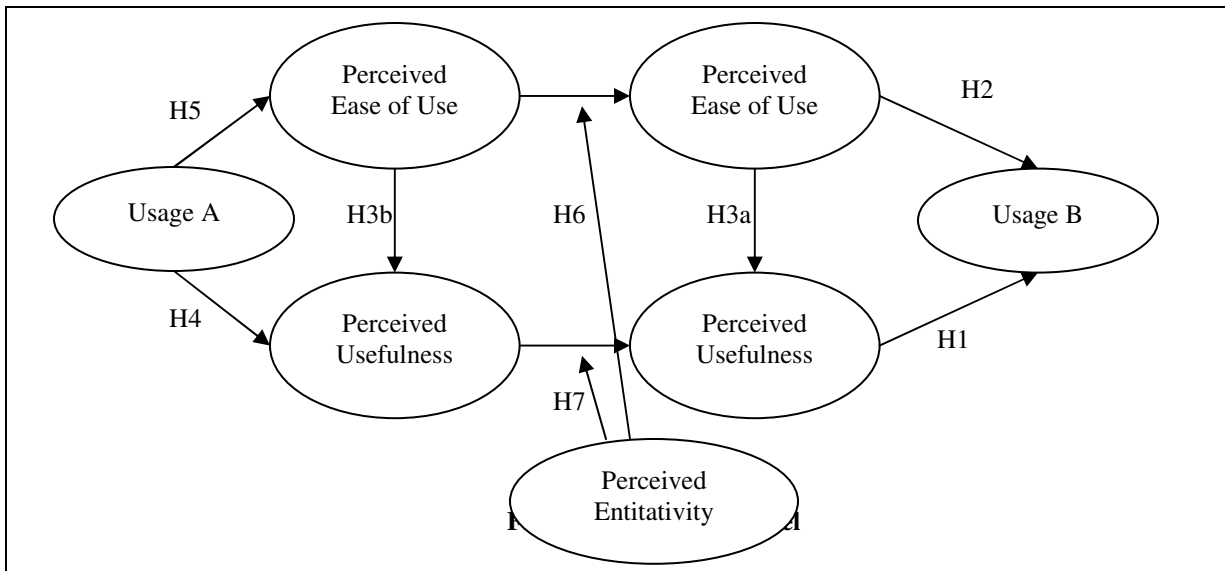
H5: The usage of incumbent technology products is positively associated with perceived ease of use.

According to the theory and findings of entitativity, if the perceived entitativity is low, the products in question will be perceived as an aggregate of individual members, which will make the transference of traits to group members more difficult. If the perceived entitativity is high for two technology products, the group will be perceived as being a coherent unit; users may then focus more on the group traits and similarities among the group members, rather than individual differences, and the transference of traits from one group member to other group members will be strong (Crawford et al. 2002). While the theories of entitativity have been applied to study transference of trust between systems (Stewart 2003; Stewart 2006), findings of entitativity can also be used to explain the transference of other perceptions. Hence, we can hypothesize as follows:

H6: If the perceived entitativity is high, then the perceived usefulness of an incumbent technology product will be positively associated with perceived usefulness of new technology products.

H7: If the perceived entitativity is high, then the perceived ease of use of an incumbent technology product will be positively associated with perceived ease of use of new technology products.

Figure 1 illustrates our research model and basic hypotheses.



Note: A — incumbent technology product; B — new technology product

Research Methodology

Tencent’s instant messaging service platform, “QQ,” was formally launched in February 1999. It has maintained its dominance in the instant messenger market since the late 1990s, despite the existence of free alternatives, including MSN and Skype (CNNIC 2006). In March 2006, the number of total registered instant messenger user accounts had expanded to 530 million. Online user accounts had grown to 16 million by June 2005. Tencent announced that QQ had reached a new record of 20 million peak simultaneous online user accounts on June 3, 2006 (CNNIC 2006). QQ.com is a web portal for QQ launched by Tencent in December 2003. Only one year after being launched, QQ.com had become one of the most popular websites in China. By the end of 2006, QQ.com was the third most popular website in China (CNNIC 2006). This indicates that many existing QQ users have gradually accepted QQ.com.

There are several reasons why we consider consumers transferring from the instant messenger, QQ, to its portal, QQ.com, as an ideal example for our investigation. The first reason is the non-substitutability relationship between the instant messenger and the portal. Second, Tencent launched the web portal, QQ.com, nearly five years after QQ had become the most popular instant messenger in China. This ensures the direction of the users’ transferring

behavior. Third, instant messengers and portals are the most crucial and commonly used applications in the Internet age. This ensures the availability of respondents and high relevance of our study to both practitioners and end users. Finally, individuals' use of instant messengers and portals is usually volitional. This ensures that there is no influence due to organizational mandate that could confound the effects of user perceptions.

A questionnaire survey method was adopted for this study. During a one-month time period in 2007, survey invitations were promoted on more than 30 large community websites in China. All respondents were randomly chosen from online users who had prior online chatting experience. The respondents could answer either online or by filling in a Microsoft Word document. After the deadline, we held a lottery among validated respondents who completed questionnaires. The list of winners was posted online. All respondents were aware of the 10 percent chance of winning before fulfilling the survey. The final sample was comprised of 177 responses. Table 1 shows the demographics of the respondents. To better judge the sampling, we are also listing the demographics for Chinese Internet users for comparison. Overall, the sample population is representative of the user population. The percentage of old respondents is relatively smaller. This may be due to the popularity of instant messenger among young people.

| | Gender | Monthly Income (RMB) | | | | Age | | | |
|---------------|----------------------|----------------------|-----------|-----------|-------|-------|-------|-------|-------|
| | | <1000 | 1000-2000 | 2000-4000 | >4000 | <18 | 18-24 | 25-30 | >30 |
| Survey Sample | M: 60.6% F: 39.4% | 47.2% | 19.0% | 19.7% | 14.1% | 13.9% | 37.6% | 33.5% | 15.0% |
| CNNIC (2006) | M:58.3% F:41.7% | 43.4% | 24.8% | 18.5% | 13.3% | 17.2% | 35.2% | 19.7% | 27.9% |

We used items that had been validated by prior research, but modified the coding of the questionnaire to fit this particular context involving instant messenger and portal. We adapted items dealing with perceived usefulness and perceived ease of use from Davis et al. (1989). Usage behavior was assessed using measures from Davis et al. (1989) and Kim et al. (2005). For measuring the degree of perceived entitativity, we use the definitions from Campbell (1958) and Lickel et al. (2001). The questionnaires use the five-point Likert scale (1 = strongly disagree, 5= strongly agree).

Data Analysis and Results

Following the widely accepted two-stage approach, we first examined the measurement model, than the structural model. We used the PLS Graph Version 3.0 to perform the analysis.

Measurement Model

Table 2 shows the descriptive statistics of the research constructs. Appendix B shows the loadings for each construct. We also dropped the PE 1 item of interaction, because this item is dispersed over factors. To validate the instruments, we examined internal consistency, convergent validity, and discriminant validity (Gefen and Straub 2005).

| Construct | Mean | Standard Deviation | Cronbach's alpha | Composite Factor Reliability |
|-----------|------|--------------------|------------------|------------------------------|
| USE A | 4.76 | 1.535 | 0.707 | 0.858 |
| PEOU A | 4.17 | 0.628 | 0.904 | 0.936 |

| | | | | |
|--------|------|-------|-------|-------|
| PU A | 3.88 | 0.794 | 0.813 | 0.877 |
| PEOU B | 3.53 | 0.909 | 0.832 | 0.899 |
| PU B | 3.07 | 0.932 | 0.874 | 0.913 |
| USE B | 2.36 | 1.672 | 0.715 | 0.913 |
| PE | 3.57 | 0.927 | 0.742 | 0.854 |

Internal consistency was examined using composite reliability. In PLS, composite reliability relies on actual loadings to compute the factor scores and is a better indicator of internal consistency than Cronbach’s alpha (Ranganathan et al. 2004). As shown in Table 2, the composite reliability and Cronbach’s alpha values for the constructs in the model were all above the suggested threshold of 0.7 (Chin 1998; Straub 1989) and thus supported the reliability of the measures.

Convergent validity measures the correlation between item measures of a given construct using different methods of measurement. Two tests were used for convergent validity. The first was to examine item reliability by its factor loading on the construct. First, the standardized factor loadings must be statistically significant. As shown in Table 3, all items had a loading above the 0.55 suggested by Falk and Miller (1992). The second test was to examine the average variance extracted (AVE) of the construct. In the study, as shown in Table 3, the AVE values for all the constructs were above the limit of 0.50 advised by Fornell and Larcker (1981). Furthermore, all estimated standard loadings were significant at the 0.01 level ($p < 0.01$), suggesting good convergent validity. The results of applying these criteria to the present study are listed in Table 3. In summary, the convergent validity was supported.

| Construct | Smallest Std. Loading | AVE |
|-----------|-----------------------|-------|
| USE A | 0.815 | 0.752 |
| PEOU A | 0.801 | 0.785 |
| PU A | 0.622 | 0.641 |
| PEOU B | 0.711 | 0.749 |
| PU B | 0.685 | 0.725 |
| USE B | 0.851 | 0.792 |
| PE | 0.623 | 0.661 |

We used the method proposed by Lastovicka and Thamodaran (1991) to cross-check the discriminant validity. They suggested use the AVE, which provides information about the amount of variance captured by the construct in relation to the amount of variance due to measurement error. For every construct, if the square root of its AVE is greater than its correlation with other constructs, then discriminant validity is established (Fornell and Larcker 1981). Table 4 lists the results of discriminant validity testing pursuant to this method. The diagonal line elements are the square root of corresponding AVE, which are all greater than their correlations with other constructs. This indicates that the requirement of discriminant validity is fully satisfied.

| | USE A | PU A | PEOU A | PEOU B | PU B | USE B | PE |
|--------|--------------|--------------|--------------|--------|------|-------|----|
| USE A | 0.867 | | | | | | |
| PEOU A | 0.303 | 0.886 | | | | | |
| PU A | 0.332 | 0.402 | 0.801 | | | | |

| | | | | | | | |
|--------|-------|--------|-------|--------------|--------------|--------------|--------------|
| PEOU B | 0.067 | 0.303 | 0.320 | 0.865 | | | |
| PU B | 0.057 | 0.108 | 0.266 | 0.510 | 0.851 | | |
| USE B | 0.108 | -0.001 | 0.227 | 0.276 | 0.401 | 0.890 | |
| PE | 0.067 | 0.198 | 0.338 | 0.607 | 0.477 | 0.306 | 0.813 |

Diagonal elements are square roots of the average variance extracted (AVE)

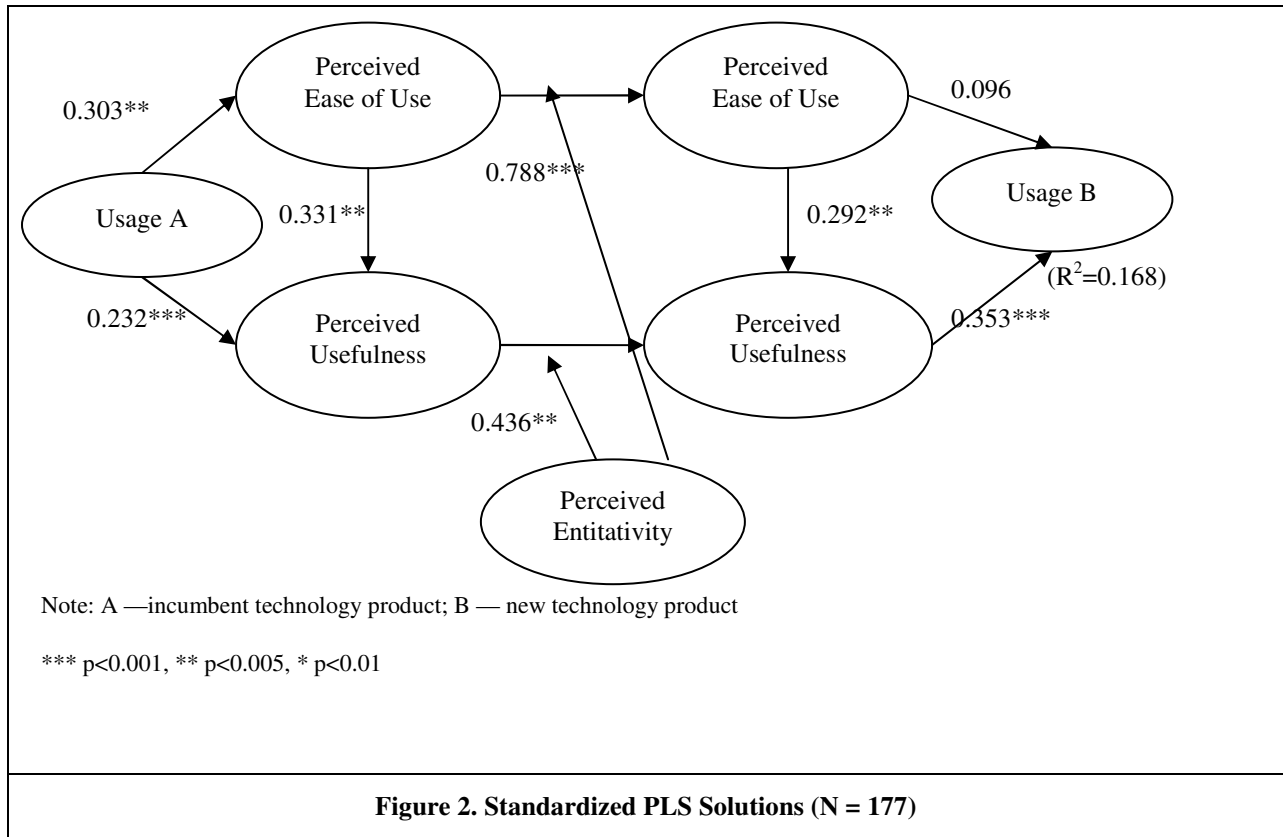
Overall, these results provide strong empirical support for the reliability and convergent and discriminant validity of the scales of our measurement model.

Structural Model

Prior to estimating the structural models, we estimated interaction terms for perceived entitativity, perceived ease of use, and perceived usefulness. First, in order to avoid computational errors by lowering the correlation between the product indicators and their individual components, we standardized and centered the indicators of each construct (Stone-Romero 1988; Chin et al. 2003). Then, we multiplied indicators of perceived entitativity by indicators of perceived ease of use and perceived usefulness. Finally, the products were used to estimate the interaction of perceived entitativity with perceived ease of use and perceived usefulness in the structural model (Chin et al. 2003; Ahuja and Thatcher 2005).

The structural model was assessed. Figure 2 presents the results of analysis with the explanatory powers and estimated path coefficients. Tests of significance of all paths were performed using the bootstrap resampling procedure. As shown in Figure 2, most of the hypothesized paths in the research model were found to be statistically significant. As predicted, perceived usefulness of a new technology product (0.353) has a significant influence on actual usage of that new technology product. Perceived ease of use of a new technology product (0.292) and perceived ease of use of the incumbent technology product (0.331) both have a significant influence on perceived usefulness of the new technology product and incumbent technology product respectively. Hypotheses 1, 3a, and 3b are supported.

Although perceived ease of use does not have direct influence on actual usage of the new technology product, perceived ease of use influences usage behavior through its effect on perceived usefulness. This is consistent with other research. Empirical studies using longitudinal samples and those focused on the post-adoption stages have found that perceived ease of use has little or no direct effect on behavioral intention after the technology has been adopted for a period of time (e.g., Chau 1996; Davis et al. 1989). Gefen and Straub (2000) also suggest that perceived usefulness, rather than perceived ease of use, may influence the individual's usage intention toward a specific technology.



Also as expected, actual usage of an incumbent technology product has a significant positive influence on the perceived ease of use (0.303) and perceived usefulness (0.232) of the incumbent technology product. Hence, Hypotheses 4 and 5 are also supported. Perceived entitativity has a significant positive influence on the relationship between the perceived ease of use of an incumbent technology product and a new technology product (0.788) and the association between perceived usefulness of the incumbent technology product and the new technology product (0.436). To further assess whether the nature of the significant interaction was consistent with the hypothesis, it was graphed in Figures 3 and 4. Figure 3 shows the effect of perceived ease of use of an incumbent product on the perceived ease of use of new products when perceived entitativity is high (at least one standard deviation above the mean) and low (at least one standard deviation below the mean). Figure 4 shows the effect of perceived usefulness of an incumbent product on the perceived usefulness of new products when perceived entitativity is high and low. The graphs show that Hypotheses 6 and 7 are also supported.

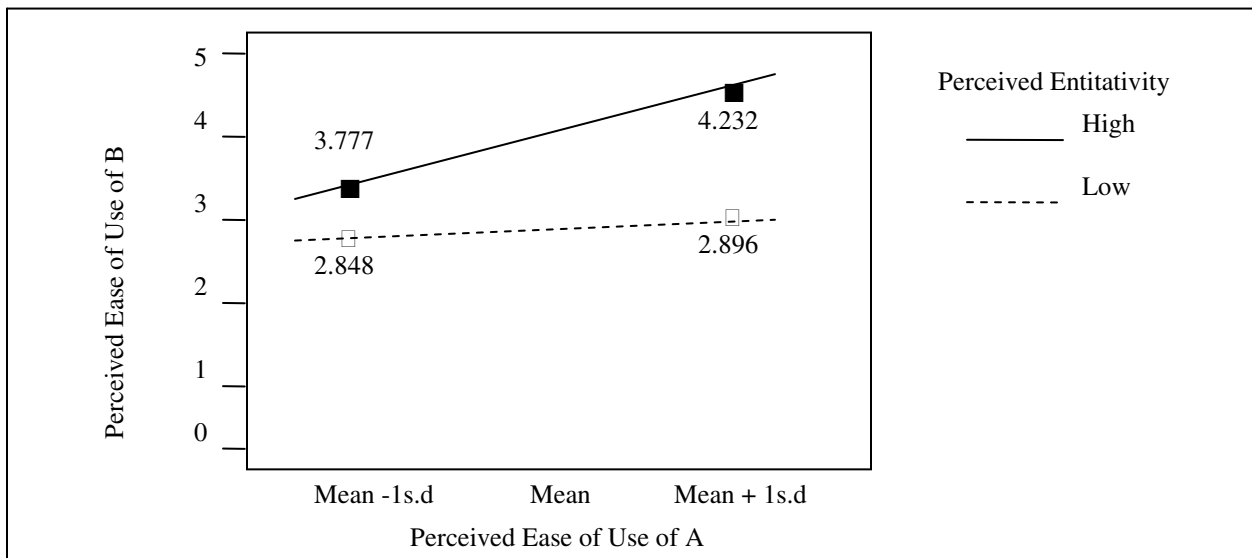
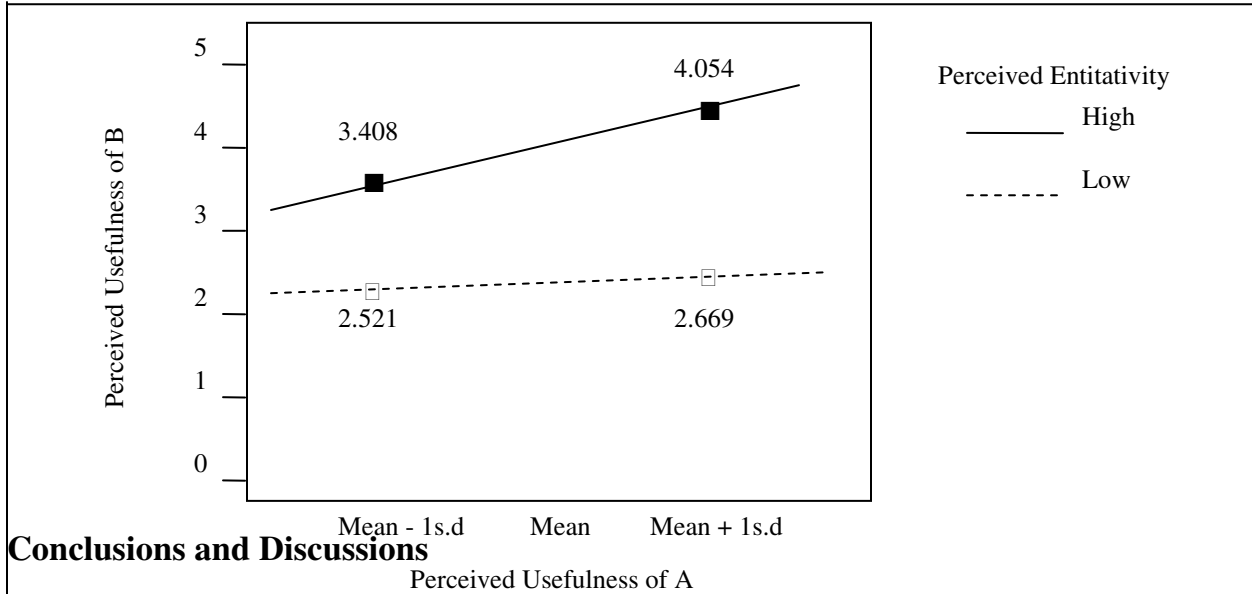


Figure 3. Interaction of Perceived Entitativity on the Transference of Perceived Ease of Use



This study finds that usage behavior can be transferred indirectly between incumbent and new technology products,

Figure 4. Interaction of Perceived Entitativity on the Relationship of Perceived Usefulness

This research demonstrates that perceived entitativity influences the transfer of perceived usefulness and perceived ease of use between non-substitutable technology products. Perceivers tend to form on-line impressions of individual targets, and memory-based impressions of group targets (McConnell et al. 1994). The degree of perceived entitativity will determine the information impression formation, and thereby the information processing mechanism (Hamilton and Sherman 1996; McConnell et al. 1997; Johnson and Queller 2003; Crawford et al. 2002). If the perceived entitativity is high, then the perceived usefulness and perceived ease of use of an existing technology product will be positively associated with perceived usefulness and perceived ease of use of the new product, respectively. Although some studies have used the theory of entitativity and found that trust can be transferred from one target to another through the hypertext links (Stewart 2003; Stewart 2006), this research empirically demonstrates that perceived usefulness and perceived ease of use can also be transferred.

This study also finds that, in particular contexts, the self-perception process plays an important role in the formation of judgments and intentions. Kim et al. (2005) found that in the context of habitual usage, users' decision-making process would occur spontaneously, with little conscious effort. Considering that the usage of this instant messenger is high (mean = 4.76), it is reasonable to say that such usage is relatively routinized. Hence, many respondents' instant messenger behavior can be explained through self-perception theory. Our results further suggest that, for certain information systems used on a routine basis in daily life (e.g., email, online news, and instant messenger), omission of self-perception theory in the conceptual framework may be problematic. This research demonstrates that the technology acceptance model has significant power to explain user acceptance of new technology products. Perceived usefulness is positively associated with usage behavior, and perceived ease of use can positively influence usage behavior indirectly through its influence on perceived usefulness.

Implications

This study has significant implications for research. First, it advances our understanding of users' post-adoption behavior. Most research in post-adoption behavior has focused on users' continued use, and does not make any distinction between innovations and the specific technology products that represent them (Ye et al. 2006). In reality, for any given technology, some products are similar in functionality but others are not substitutable. To the best of our knowledge, this study is one of a very few that has attempted to investigate the associations between usage behavior and non-substitutable technology products. Second, this study opens the door to the wealth of knowledge in our field that perception can be transferred. Based on the theories and findings of entitativity, not only trust but also other perceptions, such as perceived usefulness and perceived ease of use, can be transferred. Third, this research also demonstrates that the self-perception process plays an important role in the formation of judgments and intentions for routine behavior. That is, behavior is not completely determined by beliefs and attitudes. In some cases, usage behavior will form the basis of user evaluations. Finally, this study proposes a different mechanism to

support business growth, the idea that a multi-product firm can use the brand name of an established product to promote others. Employed as a signal of quality, using the same brand for the new products can increase group member similarity, which is one aspect of entitativity. The increased degree of entitativity will facilitate the transferring of perceptions that are salient to consumers' consequent usage decisions.

Our study has important implications for business practice. Perceived entitativity is an important factor influencing transferring behavior. In order to promote new technology products, online corporations usually use the brand name of an established product. However, using the same brand for the new products can only increase perceived group member similarity, which is one aspect of entitativity. Since perception of the degree of group member interaction is the single strongest predictor of perceived group entitativity (Lickel et al. 2001), in order to promote new technology products, online corporations must pay attention to the interaction between the incumbent technology product and new products. That can be an effective way to induce consumers to perceive these non-substitutable technology products as a group with high entitativity.

This partly explains why QQ.com gained so much traffic within one year of being launched. Firstly, QQ, Tencent's instant messaging service platform, had been the most popular instant messenger in China. As early as March 2003, the total number of registered instant messenger user accounts had increased to 100 million (CNNIC 2006). Secondly, Tencent put great effort into the entitativity between QQ.com and QQ. Tencent not only used the same brand for the new portal, but also made the mutual linkage and exchange smooth, and increased the interaction level. Therefore, the degree of perceived system entitativity between QQ and QQ.com is relatively high (mean = 3.57).

This study has confirmed the important role of perceived entitativity in the transference of perceptions between incumbent and new technology products. Therefore, we suggest practitioners develop market strategies for new technology products based on perceived entitativity with the incumbent product. For high entitativity technology products, usage behavior of a new technology products system is strongly influenced by the incumbent system. Therefore, we recommend that practitioners put more effort into building or maintaining customer loyalty toward the existing product. For low entitativity technology products, users' evaluation of new technology products is less likely to be affected by the incumbent system, and users' evaluation plays an important role in determining subsequent use. Therefore, we suggest that practitioners watch closely what the users think of new technology products.

This research also points out a pathway for companies to gain success in the online market. A useful strategy is to focus first on one technology product and strive to gain a significant number of customers before exploring other markets through a high level of entitativity between new technology products and the existing product.

Limitations and Future Research

This study is subject to several limitations. Our survey is based on an instant messenger service and a portal of the instant messenger users. As a result, caution is required in generalizing our findings to other systems. Other factors, such as characteristics of tasks or mandatory environment, may play a role in the evolving of relationships of usage behavior for non-substitutable technology products. Therefore, the replication of this study in other contexts is necessary before the results can be generalized to other types of technology products and settings. Another limitation is that this study used self-reported measures for the system usage. Although subjective behavioral measures are generally accepted (Davis et al. 1989; Kim and Malhotra 2005), these measures, based on individual subjective perception, may not accurately represent the actual situation. It would be beneficial for a future study to develop items that can objectively measure system usage (Straub et al. 1995). In addition, measures of all constructs in this study were collected at the same point in time. However, the investigated constructs are not designed to remain unchanged. Thus, this cross-sectional study may not fully capture the complexity of the transference phenomenon. Therefore, the extent to which causality can be inferred is limited.

This study suggests additional directions for further research. First, as discussed earlier, this study only examined one popular instant messenger and a portal of this instant messenger provider. Thus, future research may test the model in different settings and be able to probe deeper into post-adoption research. Further, the model's external validity would be improved by studying the relationship of usage behavior between different technology products in different settings. Second, this is a cross-sectional study and may not capture the complexity of the phenomenon comprehensively. Thus, future research should use longitudinal study methods in order to infer the causality more precisely.

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Appendix A: Operationalization of Variables

Perceived Usefulness of QQ

- PU1 Using QQ facilitates my communication with others.
- PU2 Using QQ makes it easier for me to interact with others.
- PU3 Using QQ improves my efficiency.
- PU4 I find QQ useful in my daily life.

Perceived Ease of Use of QQ

- EOU1 Learning how to use QQ is easy for me.
- EOU2 My interaction with QQ is clear and understandable.

EOU3 I find QQ easy to use.

EOU4 It is easy for me to become skillful at using QQ.

Perceived Usefulness of qq.com

PU1 All things considered, this website would provide the information that I wanted.

PU2 Visiting this website would be worth my time and effort.

PU3 This website would help me to be aware of the latest information.

PU4 This website would provide the service that I wanted.

Perceived Ease of Use of qq.com

EOU1 I find qq.com easy to log on.

EOU2 It is easy for me to use qq.com.

EOU3 It is easy for me to become skillful at using qq.com.

Perceived Entitativity

PE 1 QQ and qq.com both are Tencent's important products.

PE 2 It is easy to log in qq.com through QQ.

PE 3 It is convenient to download and use QQ through logging into qq.com.

PE 4 QQ and qq.com have a strong relationship with each other.

On average, how frequently have you used QQ over the past month?

1: less than once a month; 2: once a month; 3: a few times a month;

4: once a week; 5: a few times a week; 6: about once a day;

7: several times a day;

On average, how much time did you spend a week using QQ over the past month?

1: less than 10 minutes; 2: 10 to 30 minutes; 3: 30minutes to less than one hour;

4: one hour to two hours; 5: two to three hours; 6: more than three hours;

On average, how frequently have you visited qq.com over the past month?

1: less than once a month; 2: once a month; 3: a few times a month;

4: once a week; 5: a few times a week; 6: about once a day;

7: several times a day

On average, how much time did you spend a week visiting qq.com over the past month?

1: less than 10 minutes; 2: 10 to 30 minutes; 3: 30minutes to less than one hour;

4: one hour to two hours; 5: two to three hours; 6: more than three hours

Appendix B: Construct Loadings

| | Component | | | | | | |
|---------|--------------|--------------|--------------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| USE A1 | 0.815 | 0.181 | 0.1560 | -0.080 | -0.068 | 0.081 | -0.029 |
| USE A2 | 0.869 | 0.052 | 0.079 | 0.098 | 0.067 | 0.015 | 0.032 |
| PEOU A1 | 0.166 | 0.851 | 0.144 | 0.129 | 0.006 | -0.031 | 0.112 |
| PEOU A2 | 0.115 | 0.861 | 0.232 | 0.159 | -0.06 | -0.051 | 0.035 |
| PEOU A3 | 0.089 | 0.884 | 0.119 | 0.176 | 0.045 | 0.026 | 0.017 |
| PEOU A4 | 0.158 | 0.801 | 0.124 | -0.010 | 0.097 | 0.020 | 0.065 |
| PU A1 | 0.179 | 0.138 | 0.829 | 0.139 | 0.07 | -0.021 | 0.054 |

| | | | | | | | |
|---------|--------|--------|--------------|--------------|--------------|--------------|--------------|
| PU A2 | 0.040 | 0.155 | 0.821 | 0.104 | 0.033 | 0.088 | 0.140 |
| PU A3 | 0.134 | 0.042 | 0.706 | 0.147 | 0.178 | 0.294 | 0.022 |
| PU A4 | 0.218 | 0.288 | 0.622 | -0.060 | 0.048 | 0.029 | 0.229 |
| PEOU B1 | 0.056 | 0.011 | 0.130 | 0.761 | 0.268 | 0.123 | 0.201 |
| PEOU B2 | -0.072 | 0.152 | 0.153 | 0.808 | 0.263 | 0.066 | 0.207 |
| PEOU B3 | 0.107 | 0.238 | 0.016 | 0.711 | 0.104 | 0.141 | 0.307 |
| PU B1 | -0.098 | 0.044 | 0.143 | 0.272 | 0.793 | 0.192 | 0.049 |
| PU B2 | -0.046 | 0.045 | 0.152 | 0.109 | 0.837 | 0.216 | 0.125 |
| PU B3 | 0.076 | -0.019 | 0.002 | 0.240 | 0.810 | 0.183 | 0.179 |
| PU B4 | 0.181 | 0.030 | 0.035 | 0.131 | 0.685 | 0.115 | 0.343 |
| USE B1 | 0.073 | -0.072 | 0.092 | 0.083 | 0.202 | 0.860 | -0.012 |
| USE B2 | 0.026 | 0.022 | 0.036 | 0.056 | 0.099 | 0.851 | 0.209 |
| PE 1 | 0.070 | 0.101 | 0.097 | <u>0.524</u> | 0.150 | 0.165 | 0.591 |
| PE 2 | 0.008 | -0.047 | 0.226 | 0.335 | -0.016 | 0.234 | 0.623 |
| PE 3 | -0.006 | 0.182 | 0.069 | 0.374 | 0.142 | 0.087 | 0.711 |
| PE 4 | 0.032 | 0.002 | 0.094 | 0.053 | 0.337 | 0.085 | 0.797 |