

Understanding the Role of Consistency during Web-Mobile Service

Transition: Dimensions and Boundary Conditions

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Abstract

With the advancement of mobile technologies, numerous web service providers have begun to extend their web services to the mobile context. To understand users' mobile service adoption behavior in the context of the web-mobile service transition, this study investigates the role of consistency between web and mobile services by proposing a typology of consistency and examining the extent to which and the boundary conditions under which consistency works. Specifically, consistency is classified into behavioral consistency (e.g., operational consistency) and object-based consistency, which includes consistency in information, system and service in terms of the information systems success model. We also contend the mediating effect of operational consistency and the interaction effect of trust in web services and operational consistency. A field survey with 235 mobile service users confirms our mediating and moderating hypotheses. The implications for theory and practice are also discussed.

Keywords: Mobile services; service transition; consistency; trust; IS success model; word-of-mouth services.

1. Introduction

Mobile devices such as smartphones and tablets (e.g., iPad) have become widely used instruments for users to access a variety of services, including banking, commerce, chatting and gaming (Deng, Lu, Wei, & Zhang, 2010; Lin, 2010; Lopez-Nicolas, Molina-Castillo, & Bouwman, 2008). Even Bill Gates, who has been engaged in the traditional personal computer (PC) business for a long time, has to admit that the portable devices would become the most popular form of computing instrument within five years (Berger & Niccolai, 2012). The war in terminal devices impels the content or service providers to extend their traditional web services to the mobile context to keep or expand their user population. Thus, service providers are engaging in developing the mobile applications that are customized to the features of mobile devices, such as Amazon Mobile, Mobile Facebook and Mobile YouTube. Users of the original web services may or may not continue using the corresponding mobile services. Thus, it is interesting to discover the factors influencing users' mobile service adoption behavior in the context of the web-mobile service transition.

Most previous studies on mobile service adoption tended to treat mobile services as a special technology or innovation and to examine users' adoption behavior by drawing on general technology acceptance theories, including the technology acceptance model (TAM) (e.g., Davis, 1989), innovation diffusion theory (IDT) (e.g., Moore & Benbasat, 1991) and task-technology fit theory (TTFT) (e.g., Goodhue & Thompson, 1995). For example, based on TAM and IDT, Wu and Wang (2005) investigated the role of perceived usefulness, perceived ease of use, compatibility, perceived risk and cost in mobile commerce acceptance. Lopez-Nicolas et al. (2008) also proposed that mobile service adoption is determined by perceived usefulness, perceived ease of use, perceived benefits and social influence. Similar propositions can also be found in other studies, such as Mallat et al. (2009), Gu et al. (2009) and Wu et al. (2011).

However, the mobile services discussed in our research context are different from previous studies. Unlike those mobile services, which originated in the mobile domain, mobile services transited from web services have several unique features. First, these mobile services possess a strong *relationship* with their predecessor web services. This relationship can be reflected in the consistency

or similarity (Stewart, 2003) between the mobile services and the web services. Second, users' perceptions about the mobile services may be inherited from their perceptions about the web services through the mechanism of *perception transfer* (Delgado-Ballester & Hernandez-Espallardo, 2008). All of these call for viewing the adoption of this type of mobile service from a new perspective.

To capture the unique features of service transition, this study tries to understand how perceptions about web services are transferred to perceptions about mobile services. Specifically, regarding trust in a technology as a critical issue for new technology adoption (Wang, Shen, & Sun, 2013), this study focuses on the trust transfer mechanisms operating during the web-mobile service transition. As the perception transfer theory suggests, a better understanding of service transition should recognize the role of the association between web services and mobile services. However, this issue has rarely been investigated in previous studies. Furthermore, a practical issue for mobile service design is whether to keep mobile services consistent with the associated web services (i.e., standardization of services). It calls for theoretical understanding of the role of perceptions regarding consistency between web and mobile services. Specifically, two related research questions can be proposed:

1. How should consistency be measured between web and mobile services?
2. To what extent and how should consistency between web and mobile services affect users' intention to use the mobile services?

To answer these two research questions, this study tries to provide a typology of consistency to clarify the measurement issues of consistency between web and mobile services and to develop a research model to articulate the mechanisms underlying the impacts of consistency perceptions on mobile service adoption.

The study contributes to the literature on mobile services in several ways. First, unlike most previous studies that explain mobile service adoption behavior using general technology acceptance theories, this study provides a research model to capture the unique features of the web-mobile service transition. Second, this study offers a typology of consistency and investigates the hierarchy of effects between different types of consistency perceptions. Third, this study empirically examines the conditions under which consistency perceptions affect behavioral intentions.

2. Theoretical background

2.1. Consistency between web and mobile services

When extending web services to the mobile context, one question that service providers have to answer is whether to keep the services consistent in the two different contexts. In our study, consistency between web and mobile services is defined as *the extent to which the mobile services are similar to the web services*. This consistency can be treated as a construct with multiple dimensions. To clarify the dimensions of this concept, we will propose a typology of consistency between web and mobile services.

Based on the distinctions between object-based beliefs and behavioral beliefs (Wixom & Todd, 2005; Xu, Benbasat, & Cenfetelli, 2013), we propose that consistency between web and mobile services can be captured using both object-based beliefs and behavioral beliefs. Object-based beliefs refer to users' beliefs about *the characteristics of the system*, whereas behavioral beliefs refer to beliefs about *using the system* (Xu, et al., 2013). Object-based beliefs such as information quality, system quality and service quality are derived from the information systems (IS) success model (DeLone & McLean, 2003). In contrast, behavioral beliefs such as perceived usefulness, perceived ease of use and perceived enjoyment are derived from the technology acceptance model and its derivatives (Davis, 1989; Venkatesh, Morris, Davis, & Davis, 2003). Based on the theory of reasoned action (Fishbein & Ajzen, 1975), which states that external variables shape behavioral beliefs, Wixom and Todd (2005) first distinguish object-based beliefs from behavioral beliefs and assert that object-based beliefs precede behavioral beliefs. Within this study, we try to use different constructs to measure users' object-based and behavioral beliefs regarding consistency between web and mobile services. Specifically, to capture users' behavioral beliefs about this consistency, we define a new construct, *operational consistency*, as *the similarity between using web services and using their associated mobile services*. This can be viewed as a construct that captures users' overall perception about *using* these two types of services.

Following the IS success model (2003), which takes *information, system and service* as three dimensions to evaluate information systems, we argue that there are three key object-based beliefs

about consistency, namely information consistency, system consistency and service consistency. Specifically, information consistency refers to *the extent to which the information characteristics of the mobile services and the web services are similar*. Actually, considering that the processing speed and network stability of mobile devices are not as good as those of traditional PCs, the amount of information available via mobile services may be less than via the corresponding web services. Thus, we use this construct to capture this difference. System consistency refers to *the extent to which the system characteristics (e.g., interface) of mobile services and web services are similar*. As the screen of mobile devices is relatively small and the information input of mobile devices is not so convenient, the system design of web services and mobile services may be different, making system consistency an issue. Service consistency refers to *the extent to which the service characteristics of mobile services and web services are similar*. Service providers may remove certain service functions when extending their services from the web context to the mobile context. For example, a discussion forum may be available via web services but not provided via mobile services.

By distinguishing behavioral beliefs (i.e., operational consistency) from object-based beliefs (i.e., information consistency, system consistency and service consistency) about the consistency between web and mobile services, we will further discuss their different roles in shaping users' mobile service adoption behavior in the following.

2.2. Perception transfer theory

In the web-mobile service transition context, users' beliefs about the mobile services are not formed simply based on users' direct interactions with the mobile services because their prior perceptions about the web services can be transferred to their evaluations of the mobile services. This mechanism is called perception transfer (Delgado-Ballester & Hernandez-Espallardo, 2008; Hong & Cho, 2011). The perception transfer theory asserts that an individual's perceptions about a target object may be transferred from his or her perceptions about a reference object that is associated with the target object. During the perception transfer process, the strength of the association between the reference object and the target object can determine the individual's perceptions about the target object

(Stewart, 2003, 2006). In this study, regarding the importance of trust in adopting mobile services (Kim, Shin, & Lee, 2009; Liu, Guo, & Lee, 2011), we focus on the trust transfer mechanisms.

According to the perception transfer theory or the trust transfer theory in particular, users' attitudes towards mobile services or intentions to use mobile services can be determined by their associations between the web services and the mobile services. As described in the last section, the associations between the web services and the mobile services can be captured by the consistency between these two types of services. Therefore, based on the typology of the consistency and the perception transfer theory, we propose our research model as shown in Figure 1.¹ We also include users' experience with mobile services in the model as a control variable.

==INSERT FIGURE 1 ABOUT HERE==

3. Hypotheses

3.1. Operational consistency and behavioral intention

The relationship between operational consistency and intention to use mobile services can be explained by the perception transfer theory (Delgado-Ballester & Hernandez-Espallardo, 2008) or, in particular, the trust transfer theory (Stewart, 2003, 2006). According to the perception transfer theory, users' perceptions or attitudes towards the target object is determined by their perceptions about the source object and the association between the source and the target. In our research context, taking their trust in web services as the trust in the source object and operational consistency as the overall evaluation of the association between the source and the target, these two constructs should shape users' perceptions and attitudes towards the mobile services.

Specifically, when individuals trust the web services, if s/he consider that there is a close association between the mobile services and the web services (i.e., operational consistency), s/he will

¹ According to the trust transfer theory, trust in mobile services should mediate the impacts of operational consistency and trust in web services on behavioral intention. We have conducted several complementary analyses and confirmed the mediating role of trust in mobile services. However, because this study focuses on the dimensions of consistency and the interaction effect between operational consistency and trust in web services, to maintain parsimony we have not included in the research model trust in mobile services and its mediating effects.

more likely trust the mobile services and use them accordingly. Here, we assume that the trust perceptions about the web services are high. As will be explained in the interaction effect hypothesis, if the trust perceptions about the web services are low, operational consistency between the two types of services may have negative rather than positive impacts on perceptions about the mobile services (Stewart, 2006). This assumption is consistent with previous studies that propose positive impacts of source-target relationships on perceptions about the target (e.g., Stewart, 2003). Thus, given the high trust in web services, we hypothesize that

H1: Operational consistency is positively associated with an intention to use mobile services.

3.2. *Interaction effect of operational consistency and trust in web services*

There are two competing explanatory mechanisms about the interaction effect of trust in web services and operational consistency on intention to use mobile services. On the one hand, according to the perception transfer theory, when users' trust in web services is very low, operational consistency may have a negative effect on intention to use mobile services because the negative evaluations of the web services can be transferred to the evaluation on the mobile services (Stewart, 2006). In this case, the association between operational consistency and intention to use mobile services should be negative. In contrast, when the trust in web services is high (which is the case in our study), there should be a positive relationship between operational consistency and intention to use mobile services. This suggests a *positive* interaction effect of operational consistency and trust in web services on intention to use mobile services (Stewart, 2006).

On the other hand, when users' trust in web services is very high, users may primarily evaluate mobile services based on their trust perceptions about the web services and pay less attention to the consistency between the web and mobile services. In this case, compared with the situation with moderate level of trust in web services, the relationship between operational consistency and intention to use mobile services should be relatively weak. This suggests a *negative* interaction effect of operational consistency and trust in web services on intention to use mobile services. Consistent with this argument, Fang et al. (2013) postulate that when trust is very high, the effectiveness of e-

commerce institutional mechanisms becomes less important. To reconcile these two mechanisms, we propose that the moderating effect of trust in web services should be graphed as an inverted-U shape (as shown in Figure 2).

==INSERT FIGURE 2 ABOUT HERE==

When trust in web services is very low, the relationship between operational consistency and intention to use mobile services is weak. Following an increase of trust in web services, the relationship between operational consistency and intention to use mobile services becomes stronger. However, when trust in web services is very high, the relationship between operational consistency and intention to use mobile services becomes weak. That is to say, the valence of the moderating effect (positive or negative) depends on the level of trust in web services per se. If trust in web services is at a low to moderate level, the moderating effect should be positive. In contrast, if trust in web services is at a moderate to high level, the moderating effect should be negative. Thus, we propose two competing hypotheses as

H2a: Trust in web services strengthens the relationship between operational consistency and intention to use mobile services when trust in web services is relatively low.

H2b: Trust in web services weakens the relationship between operational consistency and intention to use mobile services when trust in web services is relatively high.

3.3. Object-based beliefs and behavioral beliefs about consistency

The overarching theoretical explanations of the impacts of information consistency, system consistency and service consistency on operational consistency are based on Wixom & Todd's (2005) arguments on the relationships between object-based beliefs and behavioral beliefs. As stated before, because information, system and service consistency capture the consistency in *physical features* of the two types of services, they should be regarded as object-based beliefs. In contrast, as operational consistency reflects the extent to which users consider the *usage* of these two types of services similar,

it should be treated as a behavioral belief. Because the physical features of an object determine how the object can be used (Fishbein & Ajzen, 1975), object-based beliefs should influence behavioral beliefs; i.e., information, system and service consistency affect operational consistency within our research context.

Specifically, because the processing speed of mobile phones is slower than that of personal computers (PCs), service providers tend to reduce the quantity of information when extending their online services to mobile devices. In this situation, users may be able to find a given message when using their PCs on the web, but this message may be removed in the mobile context. Such inconsistency in information prevents users from using the services as they do when using their PCs online, suggesting that information consistency will lead to operational consistency. Furthermore, we argue that information consistency can influence intention to use mobile services only when operational consistency is achieved. When users recognize that there are differences in information across these two contexts, for example, discount information is available via a PC browser, but not in the mobile context, if users have never used the discount information to make decisions, the absence of discount information will not affect their operations and will not affect their behavioral intentions. That is to say, operational consistency plays a pivotal role in bridging the relationship between information consistency and behavioral intentions. Thus, we propose

H3a: Operational consistency mediates the impact of information consistency on intention to use.

Similarly, because the screen of mobile phones is smaller than that of personal computers and the input functions of mobile phones are relatively poor compared to personal computers, service providers tend to display information on the screens of mobile phones and personal computers in different ways. This inconsistency in systems may lead users to find their needed information with more difficulty than they do in the online context. For example, users may form a habit of opening a menu on the top to search for certain information using a PC web browser, but this menu may be moved to the bottom on a mobile service. Inconsistency in systems will lead to inconsistency in operations. Furthermore, we argue that system consistency may influence behavioral intentions

through operational consistency. Users may recognize the differences in systems across the two contexts, but if these changes are irrelevant to their usage habits, operational inconsistency will not result; nor will their behavioral intentions be reduced. Therefore, we propose

H3b: Operational consistency mediates the impact of system consistency on intention to use.

Because several service functions, such as consulting services available in a PC browser online, are removed when services are extended to the mobile context, users will not be able to use this service function in the mobile context. Thus, an inconsistency in service functions leads users to change their operations. Furthermore, if some service functions are different across the two contexts but users rarely use these functions, the changes in service functions will not influence operational inconsistency and behavioral intentions. In other words, service consistency only can affect behavioral intentions when it can lead to operational consistency. Therefore, we propose that

H3c: Operational consistency mediates the impact of service consistency on intention to use.

4. Research methods

4.1. Research setting

A special type of mobile services—mobile word-of-mouth (WOM) services—was selected as a case to examine the proposed research model. Mobile WOM services derived from the web WOM services; therefore, it is consistent with the research objective to examine the mobile service adoption behavior in the web-mobile service transition context. Specifically, famous Chinese WOM website Dianping.com was selected as the research site. Initiated in 2003, Dianping.com provides users a platform to post their ratings and reviews on restaurant and other entertainment services and helps other users to make decisions on the consumption of these services. According to a March 2011 report, Dianping.com has more than 30 million active users; its reviews cover one million vendors across 2,000 Chinese cities. To extend its service scope, Dianping.com successfully launched a mobile application in 2010. These services enable users to obtain relevant information anytime and anywhere.

Smartphones were selected as the target mobile devices in our study because smartphones had a broader range of coverage than other mobile devices such as tablet PCs. Furthermore, as smartphones are more portable than other devices, they were often used to check information when users were outdoors.

4.2. Measures

All of the constructs except for consistency perceptions in this study were measured using multi-item scales adapted from validated measures in prior studies (see Appendix). Minor changes in the wording were made to fit the specific research context of mobile Dianping.com. A seven-point Likert scale was used for all items. Specifically, three items adapted from Kim and Han (2009) were used to measure intention to use mobile WOM services. Trust in web services was measured using three items adapted from McKnight et al. (2003). To make our results comparable with Stewart's (2006) study, which focused on the integrity dimension of trust, only the integrity dimension of trust was used in our study, as well. The measures for operational consistency were developed to capture the extent to which users perceive operations of the web and mobile WOM services were similar. Information consistency, system consistency and service consistency were measured using the items addressing the similarity between web and mobile services in a variety of design issues. Before the formal survey, we interviewed several users of the WOM services to learn what aspects they considered important in the evaluation process. These aspects were classified into three categories: information, system and service. In the formal survey, subjects were asked to evaluate the similarity between web and mobile services on these aspects. Specifically, information consistency was evaluated on six aspects including vendor, reviews, users, community, discounts and notice information. System consistency was evaluated on four aspects including interface, search, ranking and navigation. Service consistency was evaluated on three aspects: online consulting, user complaints and conflict resolution. These were employed as the formative constructs. The face validity of the instruments was first assessed by

several PhD students majoring in information systems and then by several actual users of Dianping.com. Statistical validity was further assessed and reported in the data analysis section.

4.3. Data collection procedure

A web-based online survey was used to collect the data. Because this study examined users' adoption of mobile eWOM services, target participants needed some experience in the mobile application of Dianping.com. Participants were recruited through several channels. First, we sent invitation letters to the registered users of Dianping.com, whose contact information can be found on Dianping. Second, because Dianping.com had a micro-blog account, we could search for the potential participants by sending short messages to followers of the company's micro-blog account. In the invitation letter or short message, we provided a brief description of the research objective as well as an URL of the online questionnaire webpage. To encourage their participation, certain incentives (e.g., a prepaid calling card) were provided through a random draw.

In total, approximately 2000 invitation letters were sent out. A total of 235 usable responses were received, a response rate of 12%. Of these, 47.7% were male; more than 70% were 26 years or older; over 75% had a bachelors or higher degree; over 80% had more than seven years of experience using the Internet; more than 60% had more than three years of experience of using Dianping.com; and more than 60% had more than three months of experience of using the Dianping.com mobile application.

5. Data analysis

Partial Least Squares (PLS), SmartPLS in particular, was used to analyze the data and examine the hypotheses. As a second-generation multivariate technique, PLS could simultaneously assess the measurement model and the structural model. Compared to the covariance-based structural equation modelling (SEM), PLS requires a relatively small sample size, has no restriction on normal distribution, and is more appropriate for exploratory analysis and for handling formative constructs (Chin, Marcolin, & Newsted, 2003). Thus, PLS is more suitable for the current study. Following the

two-step analytical procedures (Hair, Anderson, Tatham, & Black, 1998), we examine the measurement model and the structural model respectively.

5.1. Measurement model

The measurement models for reflective and formative constructs were examined in different ways. The reflective constructs including intention to use, operational consistency and trust in web services were examined by checking reliability and validity. The reliability was assessed by checking the composite reliability (CR) and the average variance extracted (AVE). As shown in Table 1, the CR values for all of these constructs were above 0.70, and AVE values for all of these constructs were above 0.50, suggesting these constructs had good reliability (Fornell & Larcker, 1981). The validity includes both convergent validity and discriminant validity. Convergent validity was assessed by checking whether the item loadings were great enough. As shown in Table 1, the item loadings for all of these constructs were above 0.80 and significant, suggesting these constructs had good convergent validity (Fornell & Larcker, 1981). The discriminant validity was assessed by checking whether the square root of the AVE was greater than the correlations relevant to this construct. As shown in Table 3, the AVE square roots were greater than the correlations, suggesting good discriminant validity for these constructs.

==INSERT TABLE 1 ABOUT HERE==

The measurement model for formative constructs (i.e., information consistency, system consistency and service consistency) was examined by checking the item weights. As shown in Table 2, some item weights were not significant. According to the rules suggested by Petter et al. (2007), the variance inflation factors (VIF) and item loadings should be checked further. The results showed that the VIFs for all of the items were below the suggested threshold value of 3.3 (Hair, et al., 1998). The loadings for all of the items were greater than 0.50 and significant, suggesting that these items had

significant absolute values (Petter, et al., 2007). Thus, according to the suggestions of Petter et al. (2007), these items were retained in the analysis to ensure the completeness of the concept.

==INSERT TABLE 2 ABOUT HERE==

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Furthermore, because the cross-sectional data may suffer the threat of common method bias, we examined this issue using the approach proposed by Liang et al. (2007). As shown in Table 4, the substantive or trait factors explained 76.9% of the overall variances, while the method factor explained less than 1% of the variances, suggesting that common method bias did not threaten the validity of the study's results.

==INSERT TABLE 4 ABOUT HERE==

5.2. *Structural model*

The PLS results of the structural model were reported in Figure 3. The results showed that operational consistency had a significant effect on intention to use ($\beta=.319$, $t=4.755$), supporting H1. The results also showed that information consistency ($\beta=.256$, $t=4.020$), system consistency ($\beta=.279$, $t=4.919$) and service consistency ($\beta=.350$, $t=6.060$) had significant effects on operational consistency, lending support to H3a, H3b and H3c. The results also showed that the control variable—users' experience of mobile services had a significant effect on intention ($\beta=.123$, $t=2.395$) and that the relationship between trust in web services and intention to use mobile services was also significant ($\beta=.347$, $t=5.412$). The interaction effect between trust in web services and operational consistency was tested using the multiplicative approach (Chin, et al., 2003). The impacts of the interaction component on intention to use mobile services was negative and significant ($\beta=-.142$, $t=1.975$), suggesting that H2b was supported while H2a was not supported. When further examining the value of trust in web services, we found that the mean value of this construct was 5.613 with a standard

deviation of 0.966, suggesting that the trust in web services was relatively high. The interaction effect is illustrated in Figure 4.

==INSERT FIGURE 3 ABOUT HERE==

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Furthermore, we analyzed the mediating effects of operational consistency according to method described in Baron and Kenny (1986). As shown in Table 5, the impacts of information consistency and service consistency on intention to use were fully mediated by operational consistency, while the relationship between system consistency and intention to use was partially mediated by operational consistency. However, when including in the research model the direct effect of system consistency on intention to use, the results showed that the direct effect of system consistency ($\beta=0.056$, $t=1.023$) on intention to use mobile services became insignificant. This direct effect therefore was removed from the model.

==INSERT TABLE 5 ABOUT HERE==

6. Discussions and implications

6.1. Discussions

This study attempts to examine the role of consistency in shaping mobile service behavior within the research context of the web-mobile service transition. Specifically, we provide a typology of consistency perceptions and propose a research model to shed light on the role of these consistency perceptions. Findings from our empirical investigation raise several points of interest.

First, operational consistency is found to partially or fully mediate the influences of information consistency, system consistency and service consistency on intention to use mobile services. The study extends Wixom and Todd's (2005) model of the integration of object-based beliefs and behavioral beliefs to the web-mobile service transition context and confirms that object-based beliefs (i.e.,

information consistency, system consistency and service consistency) can shape behavioral beliefs (i.e., operational consistency). Compared with Wang et al.'s (2013) study, which focuses on the role of behavioral consistency beliefs, this study provides a more comprehensive understanding of the typology of consistency perceptions and examines the inter-relationships between these consistency perceptions.

Second, a negative interaction effect of operational consistency and trust in web services on intention to use mobile services is found. This effect is opposite to those found in previous studies of trust transfer, which assert the existence of a positive interaction effect between trust perceptions about the source and the relationship between the source and the target (e.g., Stewart, 2006). In Stewart's (2006) study, because the initial trust beliefs were controlled using the reputation of the organizations in the experiment, it was found that the linkage between organizations had a positive effect for the group with high initial trust beliefs, but a negative effect for the group with low initial trust beliefs. Actually, according to our theorization, the findings may support only the left side of the inverted-U moderating effect. In contrast, in our study, because most of the subjects had relatively high trust perceptions regarding the web services, the right side of the inverted-U effect was confirmed. This is also consistent with the findings of Fang et al. (2013), which suggest that when trust is very high, the effectiveness of e-commerce institutional mechanisms becomes less important.

6.2. Limitations

Before discussing the implications of the study, several limitations should be acknowledged. First, this study investigates one single mobile service (i.e., mobile WOM services) in a single culture (i.e., China). Caution is needed when applying the conclusions to other research contexts. Future research on mobile services should consider the distinctions between other mobile services and mobile WOM services and consider potential moderators. Furthermore, in different societies with different cultures, the power of the perception transfer mechanism may be different. In a collectivistic society, where relationship and collectivism are respected, perception transfer may be more powerful than in an individualistic society, where people behave more independently (Hofstede, Hofstede, & Minkov,

2010). This potential difference provides an opportunity for future studies to examine cross-cultural issues of perception transfer. Furthermore, we did not control the brand of smartphone that subjects used in the survey, leaving for future research the investigation of whether the brand of smartphone plays a role in mobile service adoption.

Second, several other factors may influence mobile services adoption intention, but are not considered in our study because of our research focus on the trust transfer mechanism. These factors should be included in future research to increase the R-square of the dependent variable. Furthermore, there may be other dimensions used to measure information consistency, system consistency and service consistency in other research contexts. Therefore, when using our measures in other contexts, researchers should pay attention to context-specific features to ensure the validity of those measures.

Third, as this was an exploratory study, the measures of consistency perceptions were not developed based on a rigorous construct development procedure. In contrast, we interviewed several PhD students and users of the target services to discover key aspects to be addressed during the consistency evaluation process. Then, we used the formative measures to capture users' consistency perceptions about these aspects. This context-specific construct development approach may limit the applicability of the measures in other research contexts. Thus, more valid and generalizable measures should be developed in future studies.

Finally, because the trust perceptions about the web services were relatively high for all of the subjects, only the right side of the inverted-U moderating effect was found in our study. Future researchers could consider setting three different levels of initial trust perceptions (e.g., low, moderate and high), using the experiment to fully examine the inverted-U moderating effect.

6.3. Theoretical implications

This study has several implications for theories regarding mobile services. First, this study enriches the literature on mobile services by providing a mobile service acceptance model in the context of web-mobile service transition. Previous studies on mobile service adoption treat mobile services as a new technology and then analyze mobile service adoption behavior using general

technology acceptance theories such as the technology acceptance model (Davis, 1989), the innovation diffusion theory (Moore & Benbasat, 1991), the IS success model (DeLone & McLean, 2003) and the task-technology fit theory (Goodhue & Thompson, 1995). The phenomenon of service transition has not been recognized and examined for a long time. Thus, this study is among the earliest studies to investigate the technology adoption issue in the context of service transition. The research framework and conclusions can be used as a basis for future research.

Second, this study advances theoretical understanding of the role of consistency perceptions during service transition by providing a typology of consistency perceptions and investigating the inter-relationships between these consistency perceptions. Based on Wixom and Todd's (2005) model of the integration of object-based beliefs and behavioral beliefs, we propose concepts of object-based consistency beliefs and behavioral consistency beliefs. These concepts distinguish beliefs about the consistency in the *characteristics* of the two types of services from the consistency in *using* these two types of services. Specifically, operational consistency is equated to behavioral consistency beliefs. The object-based consistency beliefs have been captured using three constructs, namely information consistency, system consistency and service consistency, according to the evaluation framework of the IS success model (DeLone & McLean, 2003). Furthermore, according to the logic that object-based beliefs can shape behavioral beliefs (Wixom & Todd, 2005; Xu, et al., 2013), this study further proposes and tests the mediating role of operational consistency. The classification of the consistency perceptions can be used as a framework to understand the consistency issues in future research on service transition. The integrative model of the object-based consistency beliefs and the behavioral consistency beliefs can shed light on the understanding of the inter-relationships between different types of consistency perceptions.

Third, this study advances theoretical understanding of the trust transfer theory by proposing an inverted-U moderating effect hypothesis and providing partial empirical support to this hypothesis. This study challenges the classical statements regarding the positive interaction effect of the trust in source and the relationship between the source and the target in the trust transfer theory (Stewart, 2006) by arguing that the positive interaction effect may only reflect the situation when trust in source is low

to moderate. In this study, we assert that when trust in web services (i.e., trust in source) is relatively high, it may weaken the relationship between operational consistency (i.e., the relationship between source and target) and intention to use mobile services. These findings complement the previous trust transfer theory and provide two competing mechanisms for the moderating role of trust in source. The proposed inverted-U moderating effect hypothesis further identifies the boundary conditions under which the moderating effect is positive or negative. This theorization advances the traditional trust transfer theory by developing a new theory with greater generalizability.

6.4. Practical implications

This study has several practical implications too. First, the study provides the practitioners with a framework to evaluate users' consistency perceptions. Specifically, when measuring the consistency perceptions, both the object-based beliefs and the behavioral beliefs should be considered. As to the object-based consistency, information, system and service consistency should be taken into account.

Second, the study also suggests the practitioners to recognize the trust transfer mechanism when building users' perceptions about the mobile services. If users have relatively high trust in web services, the service providers should stress on the relationship between the web services and the mobile services to leverage the positive impact of operational consistency.

Third, the study also shows that trust in web services will weaken the relationship between operational consistency and trust in mobile services. Thus, when service providers find that users' trust in web services is very high, they need not pay so much attention on the operational consistency between the web services and the mobile services because the operational consistency is not a key decision factor. In this situation, service providers do not need to design the mobile services by copying the web services. In contrast, they can employ a more innovative design style.

Appendix: Measures

Intention to Use (INTU) (Kim & Han, 2009)

INTU1. I intend to use mobile Dianping.com in the future.

INTU2. I expect that I would use mobile Dianping.com in the future.

INTU3. I plan to use mobile Dianping.com in the future.

Trust in Web Services (TWS) (McKnight, et al., 2003)

TWS1. Web Dianping.com is truthful in its dealings with me.

TWS2. I would characterize Web Dianping.com as honest.

TWS3. Web Dianping.com is trustworthy.

Operational Consistency (OC) (Developed)

OC1: The operations of web and mobile Dianping.com are *very close*.

OC2: Users can operate the web and mobile Dianping.com in *similar* way.

OC3: The operations for the web and mobile Dianping.com are *consistent*.

OC4: There is *no significant difference* between the operations of the web and mobile Dianping.com.

Information Consistency (IFC) (Developed)

Please assess the extent to which the following information provided by the web and the mobile Dianping.com is similar:

IFC1: Vendor information

IFC2: Review information

IFC3: User information

IFC4: Community information

IFC5: Discount information

IFC6: Notice information

System Consistency (SSC) (Developed)

Please assess the extent to which the following system functions provided by the web and the mobile Dianping.com are similar

SSC1: Interface

SSC2: Search

SSC3: Ranking

SSC4: Navigation

Service Consistency (SVC) (Developed)

Please assess the extent to which the following service functions provided by the web and the mobile Dianping.com are similar

SVC1: Online consulting

SVC2: User complaint

SVC3: Conflict solution

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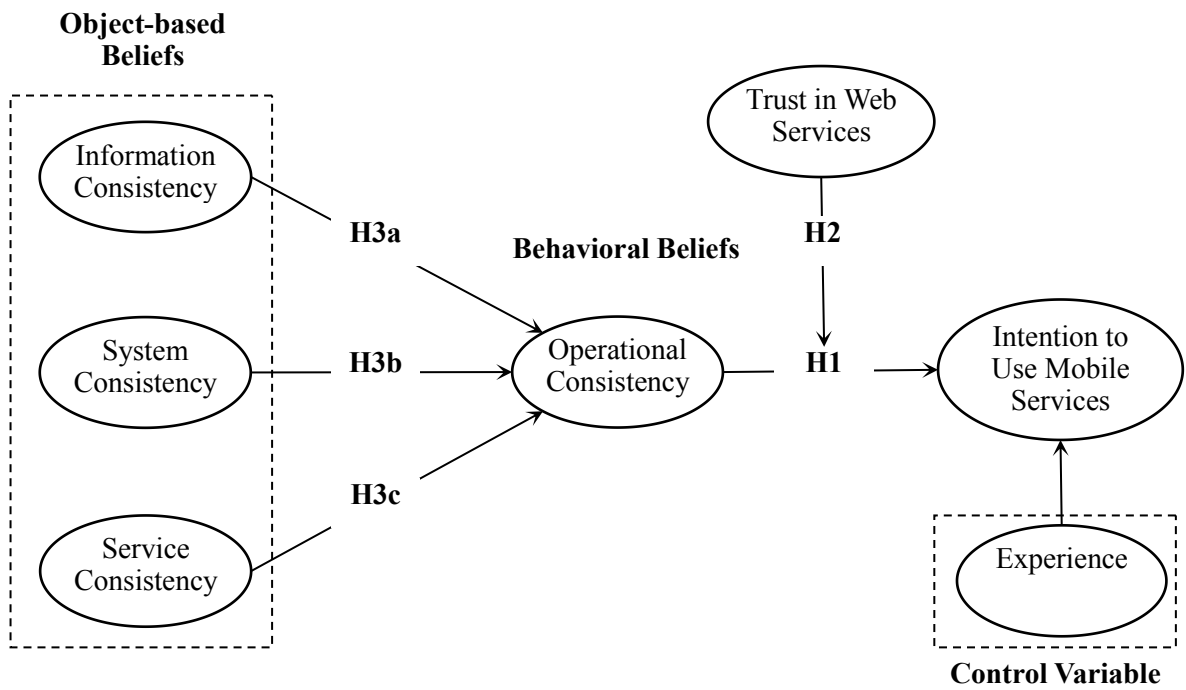


Fig. 1. Research model

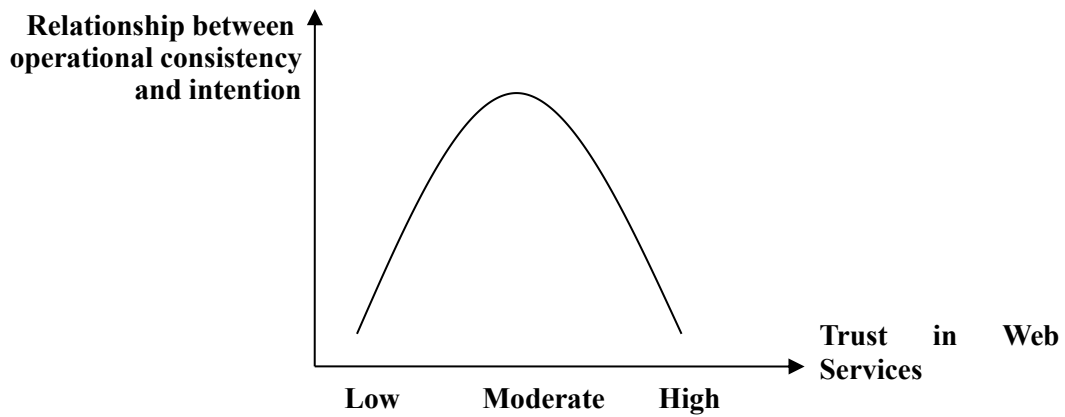


Fig.2. The inverted-U moderating effect of trust in web services

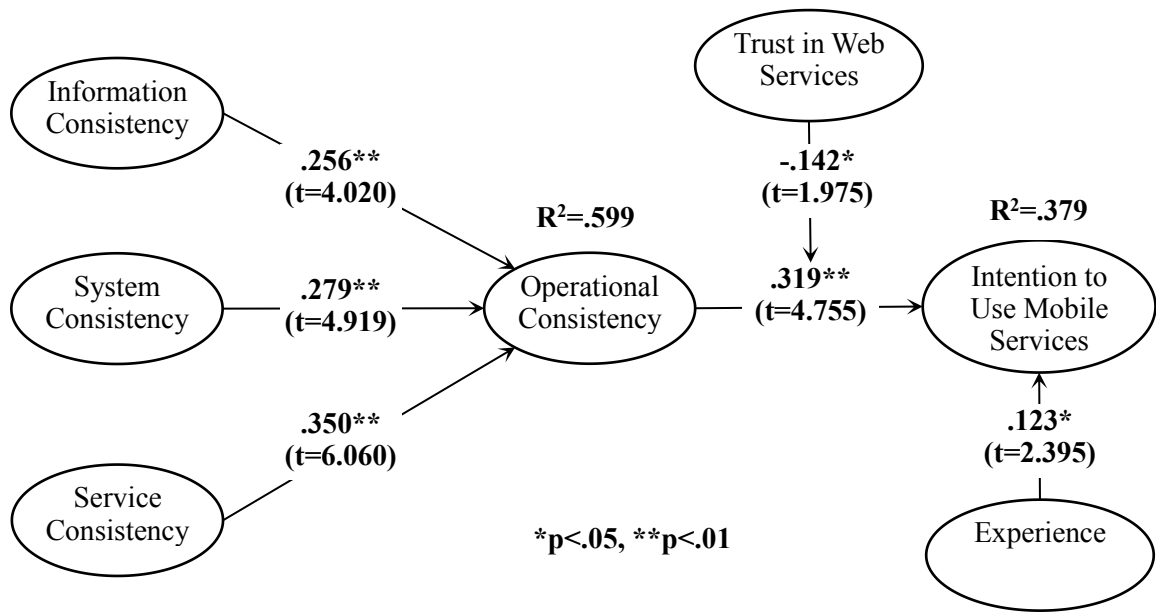


Fig. 3. PLS results

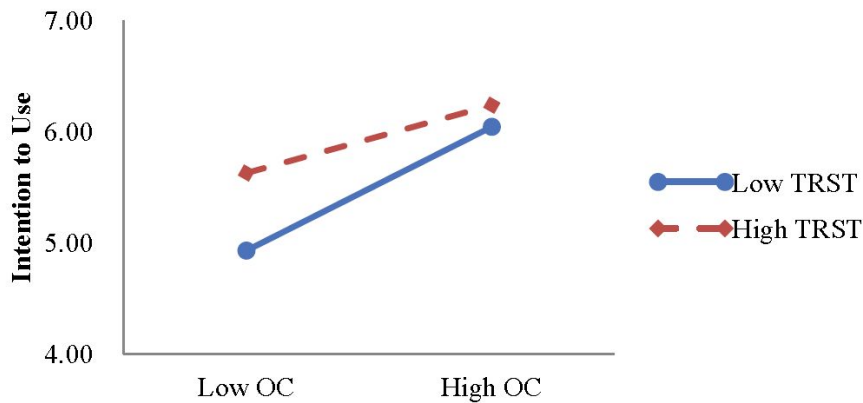


Fig. 4. Interaction effect between operational consistency and trust

Note: OC=Operation consistency; TRST=Trust in web services.

Table 1
Reliability and loadings of reflective constructs

Reflective Constructs	CR	AVE	Items	Loadings	T-statistics
Intention to Use (INTU)	.951	.866	INTU1	.917	59.095
			INTU2	.934	68.620
			INTU3	.941	93.029
Operational Consistency (OC)	.939	.795	OC1	.893	63.877
			OC2	.886	48.895
			OC3	.906	70.046
			OC4	.881	58.001
Trust in Web Service (TWS)	.937	.832	TWS1	.891	49.841
			TWS2	.938	106.378
			TWS3	.907	63.720

Table 2
Weights of formative constructs

Formative Constructs	Items	Weights	T-statistics
Information Consistency (IFC)	IFC1	.303	2.193
	IFC2	-.130	0.950
	IFC3	.028	0.218
	IFC4	.336	3.192
	IFC5	.023	0.203
	IFC6	.600	5.951
System Consistency (SSC)	SSC1	.442	3.858
	SSC2	.234	2.145
	SSC3	.222	1.894
	SSC4	.232	1.980
Service Consistency (SVC)	SVC1	.479	4.773
	SVC2	.504	4.297
	SVC3	.092	0.813

Table 3
Correlations and discriminant validity

	Mean	SD	INTU	OC	TWS	IFC	SSC	SVC
INTU	5.689	1.018	0.931					
OC	5.059	1.028	0.474	0.892				
TWS	5.613	0.966	0.526	0.465	0.912			
IFC	5.377	0.920	0.347	0.643	0.479	NA		
SSC	5.237	0.995	0.395	0.676	0.465	0.608	NA	
SVC	5.091	1.140	0.370	0.702	0.349	0.620	0.691	NA

Notes: INTU=Intention to use, OC=Operation consistency, TWS=Trust in web services, IFC=Information consistency, SSC=System consistency, SVC=Service consistency; The numbers in the diagonal row are square roots of the AVE.

Table 4.
Common Method Bias Test

Indicator	Substantive Factor Loading (R_1)	R_1^2	Method Factor Loading (R_1)	R_2^2
IFC1	0.819	0.671	-0.028	0.001
IFC2	0.954	0.910	-0.181	0.033
IFC3	0.917	0.841	-0.085	0.007
IFC4	0.632	0.399	0.172	0.030
IFC5	0.832	0.692	-0.044	0.002
IFC6	0.650	0.423	0.169	0.029

SSC1	0.903	0.815	-0.010	0.000
SSC2	0.874	0.764	-0.019	0.000
SSC3	0.845	0.714	0.040	0.002
SSC4	0.892	0.796	-0.010	0.000
SVC1	0.869	0.755	0.050	0.003
SVC2	0.897	0.805	0.042	0.002
SVC3	0.902	0.814	-0.091	0.008
OC1	0.868	0.753	0.030	0.001
OC2	0.919	0.845	-0.035	0.001
OC4	0.890	0.792	0.016	0.000
OC4	0.890	0.792	-0.012	0.000
ITWS1	0.914	0.835	-0.023	0.001
ITWS2	0.888	0.789	0.068	0.005
ITWS3	0.936	0.876	-0.047	0.002
INTU1	0.919	0.845	0.000	0.000
INTU2	0.956	0.914	-0.030	0.001
INTU3	0.919	0.845	0.030	0.001
Average	0.873	0.769	0.000	0.006

Table 5
Mediating effects of operational consistency

IV	M	DV	IV → DV	Coefficient in Regressions		Mediating	
				IV → M	IV + M → DV		
					IV	M	
IFC	OC	INTU	.414**	.635**	.130	.392**	FULL
SSC	OC	INTU	.433**	.672**	.172*	.359**	PARTIAL
SVC	OC	INTU	.375**	.701**	.077	.421**	FULL

Note: IFC=Information consistency; SSC=System consistency; SVC=Service Consistency; OC=Operational consistency; INTU=Intention to use; IV=Independent variable; M=Mediator; DV=Dependent variable. *p<.05, **p<.01.