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79. Winning Back Technology Disadopters¹

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Abstract

This paper addresses the issue of winning back disadopters of an earlier generation of technology when a new technology generation appears on the market. Integrating research on innovation management, attitude strength and change, and consumer win-back, we propose a re-adoption model to predict disadopters' intentions to come back. Data were collected from 274 disadopters of earlier mobile internet generations facing the advent of 3G. We found that perceived superiority of a new technology generation, prior usage experience, and price value are significant enablers, and their influences are moderated by the reason for disadoption. These findings have significant managerial and theoretical implications.

Keywords: Disadoption, Customer Win-back, Re-adoption, Mobile Internet

Introduction

The Information and Communication Technology (ICT) industry rolls out new generations of technology at a very fast pace. These advancements in computing allow companies to provide better quality, more diversified, and more personalized services much easier than before. This trend is most evident in the ICT service market, where service providers keep innovating their offerings when new generations of technology are introduced. However, the rapid introduction of technology innovations also raises the possibility of inferior performance in a particular generation, resulting in negative consequences. An example is the early mobile Internet services based on Wireless Application Protocol (WAP). The slow connection and data transfer, tiny and black-and-white display, and expensive billing of WAP services led to WAP being described as a "Wait-And-Pay" experience, which drove away many mobile Internet users (see <http://en.wikipedia.org/wiki/WAP>). These disenchanted end users are what we call disadopters, i.e., end users who adopted an innovation early but finally gave up altogether on that category of technology – e.g., mobile Internet (Hogan, Lemon and Libai 2003).

According to Hogan et al. (2003), early disadopters of ICT are the most damaging to lose because they are essentially innovators and they can exert negative social influences against innovation diffusion. Research has shown that disadoption accounts for 75% of the total revenue loss to a firm and can even slow the sales growth of the overall technology category (Hogan et al. 2003). On the other hand, if firms can successfully draw these disadopters back to the technology category, it will help the diffusion of the newer technology generations. Thus, under rapid ICT evolution, winning back disadopters is crucial not only to a particular firm, but also to the success of all the firms that serve the same market, e.g., the market for mobile Internet services.

While there is substantial IS research on technology adoption focusing on non-adopters, there is no research to our knowledge on *IT re-adoption induced by a new superior technology*

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generation. For instance, though the “Wait-And-Pay” experience of 2G WAP services has driven away many mobile Internet users, mobile operators have kept introducing technology innovations such as the third generation (3G) mobile platform. Thus, a pertinent question is: can mobile operators win back disadopters of mobile Internet by introducing 3G? The marketing literature on customer win-back will be relevant to this research. However, the technology element is usually assumed to be invariant and the focus is either on customer value (e.g., Hogan et al. 2003) or on the pricing strategy (e.g., Thomas, Blattberg and Fox 2004). Little research has been done on the disadopters’ considerations when faced with a new technology generation. This paper will address this gap in the literature. The overriding issue is whether innovation superiority can change disadopters’ prior negative attitudes toward the technology category and therefore facilitate their re-adoption decision.

Theoretical Foundation

Information Systems Research on Technology Adoption

IS research on technology adoption has focused on end users in general (see Venkatesh, Morris, Davis and Davis 2003) and non-adopters in particular (e.g., Brown and Venkatesh 2005). While there is research on post-adoption behavior that examines determinants of IT discontinuance (e.g., Parthasarathy and Bhattacharjee 1998), our literature review suggests that little work has been done on the end users’ re-adoption decision. Unlike technology adoption (e.g., Venkatesh et. al. 2003) and continuance (e.g., Bhattacharjee and Premkumar 2004) that involve mainly the process of attitude formation and change in magnitude, ICT re-adoption demands attitude change in both direction and strength. That is, to attract disadopters back to the technology diffusion trajectory, we need to reduce and reverse their prior negative attitudes toward the technology category. This negative attitude is probably formed through experiences with older technology generations of inferior performance. When a new generation is introduced, its superior performance may change disadopters’ overall attitude toward the technology and stimulate intention to resume the usage. Thus, theoretical exposition is needed to understand the impacts of prior usage experience and the superiority of the new generation on re-adoption intention.

Marketing Research on Customer Win-back

While customer acquisition and retention have received considerable attention from marketing researchers, customer win-back is becoming a new focus (e.g., Stauss and Friege 1999; Griffin and Lowenstein 2001). According to Hogan et al. (2003), lost customers can be categorized into two types – *defectors* who defect to another company and *disadopters* who give up altogether on the technology category (e.g., mobile Internet services). Disadoption is much more damaging to firms than defection because it threatens the growth and even survival of the overall business sector. These disadopters are worth 50% more to the firm than early adopters and four times as much as the last ones to sign on (Hogan et al. 2003).

Given the significant value of disadopters, several works addressed strategies to win back lost customers. For instance, Stauss and Friege (1999) offered a solution for customer regain management which consists of three components – regain analysis, regain actions, and regain control. They identified the importance of prior usage experience and the reason for terminating the relationship. Griffin and Lowenstein (2001) expanded the framework by adding the role of defection-proof strategies. Much of this research focused on the strategic and managerial process for customer win-back with only a brief discussion of the customers’ decision making process. An exception is Thomas et al.’s (2004) research on the impact of pricing strategy on customer win-back. They found that prior experiences and price differences are the two key predictors. In summary, three important factors have been

identified in the marketing research on customer win-back: 1) prior experience; 2) the reason for defection; and 3) price.

There are some limitations in applying the findings of existing research to the context of IT re-adoption induced by a new generation. First, marketing research on customer win-back so far focuses only on defectors, that is, those who defect to a competitor with similar service. The reasons for disadoption of the whole technology category and the differentiating variables that influence re-adoption have not been thoroughly discussed (Hogan et al. 2003). Second, the role of innovation in improving the overall performance of the technology category has not been considered. While defection may be caused by the inferior service quality or unfavorable pricing strategy of a particular firm (Keaveney 1995; Ganesh, Arnold and Reynolds 2000), the main reason for disadoption is the poor performance of an inferior technology generation. For example, disadopters of mobile Internet based on WAP are disillusioned with their “Wait-And-Pay” experience. Therefore, the introduction of new IT innovations that address the limitations of earlier technology generations may help to regain lost users. While the existing marketing research on winning back defectors will be relevant, we still need to consider their efficacy in the understudied context of winning back disadopters.

Theory of Information Integration and Attitude Change

The current research takes the information integration approach to IT re-adoption. Information integration theory explores how attitudes are formed and changed through the integration of new information with existing information, cognitions, or thoughts (Anderson 1981). A new persuasive message is considered as information input, and each relevant piece of information has two qualities: value and weight. The value is information evaluation (either favorable or unfavorable) and the weight is the perceived importance of the information. New information is integrated with the old to affect people’s overall attitudes.

In the case of IT re-adoption, the disadopters’ prior experience with the old technology generation serves as existing information based on which their prior attitude (probably negative) toward the technology category was formed. When an innovation or a new technology generation is introduced, disadopters receive new information about it and change accordingly their overall attitude, which in turn influences their re-adoption decision. Thus, a potential model of IT re-adoption will consist of two major components – prior experiences as existing information, and the beliefs based on new information regarding the latest IT innovation.

Since the prior negative attitude is an obstacle against re-adoption, the attitude change literature is relevant to the current research. We refer particularly to studies on attitude strength, defined as the durability and resistance to persuasion of an attitude (e.g., Fazio 1986; Holland, Verplanken and Knippenberg 2003). Research on attitude strength suggests that repetition, recency, and frequency of interactions with the object can increase the strength of subjects’ attitude and therefore their behavior intention. For instance, Fazio (1986) theorized that attitude strength is determined mainly by memory-based attitude accessibility, which is in turn influenced by frequency and/or recency of interactions with a focal object. Holland et al. (2003) found that by simply increasing the repetition of attitude expression, the resistance to persuasion was strengthened. Similarly, in the case of IT re-adoption, prior experience with an inferior technology generation can be characterized by repetition, recency, and frequency of usage. These three factors determine the strength and direction of disadopters’ prior attitude, which in turn influences end users’ re-adoption intention.

Research Model and Hypotheses

As a starting point, we examined Thomas et al.'s (2004) model to win back customers who defected to competitors. Thomas et al.'s (2004) model was targeted at a mature service – newspaper subscription with the implicit assumption of a static technology. In their model, prior experiences and price are the two major predictors of customer win-back. The characteristics of prior experiences include *tenure* and *duration of defection*. In our proposed re-adoption model, we replaced duration of defection with *duration of disadoption* to fit the IT re-adoption context. Also, based on research on attitude strength (e.g., Fazio 1986), we added one more variable – *usage frequency* – under the umbrella of prior experience. In relating to the attitude change theory, tenure, duration of disadoption, and usage frequency are surrogates for repetition, recency, and frequency of interactions with the old technology respectively. Note that since different disadopters begin and end use of mobile Internet at different points in time, there is no perfect linear relationship among the three characteristics. Besides the prior experience characteristics, our re-adoption model has three additional features. First, we incorporate the role of technology innovation – *superiority of the new technology generation* as a key determinant of end users' re-adoption intention. Second, to control for the effect of price, we added consumers' *perceived price value*. Finally, we included *reason for disadoption* as a moderator. In the literature, two major reasons for disadoption are unfavorable pricing and unsatisfactory performance (Thomas et al. 2004; Hogan et al. 2003). The complete model is depicted in Figure 1.

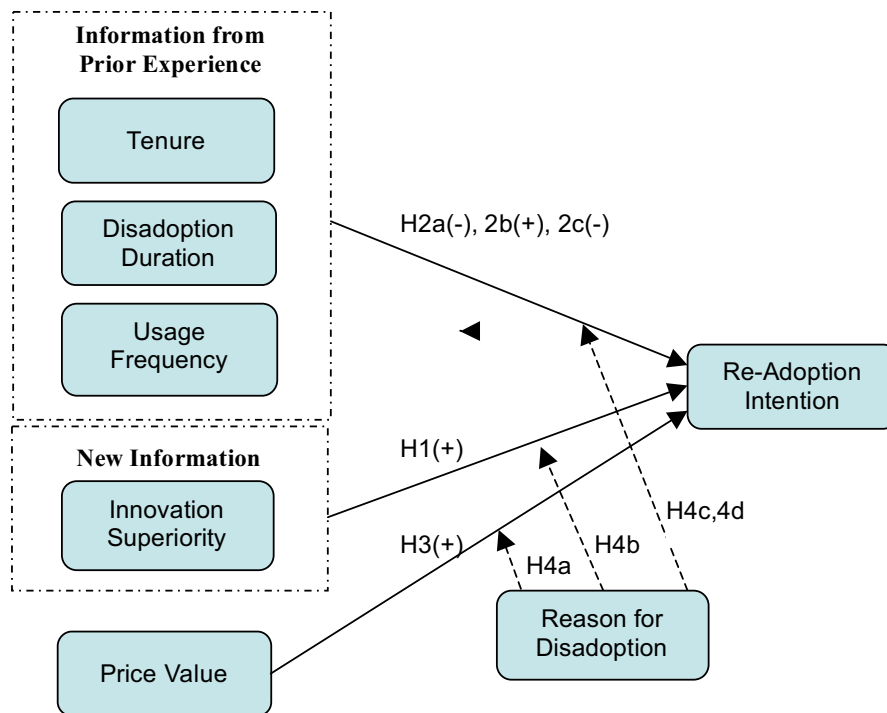


Figure 1. Mobile Internet Re-adoption Model

Innovation Superiority

We introduce a new construct to represent the advancement in a new technology generation – *perceived superiority of the new technology generation*, defined as the degree to which a consumer believes novel contents are embodied in the new generation of technology when compared with previous generations. This construct is an extension of the construct of radicalness of technology innovation by Gatignon, Tushman, Smith, and Anderson (2002). The novel contents as perceived by consumers include innovations in any aspects of the new generation. For instance, in the case of 3G, broadband data capabilities and improvements in device functionalities serve as the superior platform based on which improved existing services such as faster MMS, and more advanced applications, such as mobile video services and mobile business applications, are offered (Tilson and Lyytinen 2005). As discussed earlier, the re-adoption decision induced by a new technology generation mainly involves a comparison between the information about the new and the older technology generations. The greater the superiority of the new generation, the more benefits – improved performance and more functionality – disadopters can gain from re-adoption.

H1: Perceived superiority of the new technology generation will have a positive impact on disadopters' re-adoption intention

Characteristics of Prior Experience

Tenure is the length of time the disadopters had used the old technology. While Thomas et al. (2004) found that tenure was positively related to defectors' reacquisition probability, we posit that tenure has a negative impact on disadopters' re-adoption of the technology category. Since in the past, the disadopters generally held a negative attitude toward the technology category due to the unsatisfactory experience, a longer tenure would increase the strength of the negative attitude toward and the level of distrust in subsequent IT innovation. This can be caused by the psychological process of confirmation bias (e.g., Nickerson 1998). As suggested by Boulding, Kalra, and Staelin (1999), people tend to attend to and weigh more heavily information that confirm their prior beliefs. For example, on the first day of using WAP services, potential disadopters initially formed a negative impression or belief due to either the expensive bill or the poor performance. As time went by, the accumulation and reinforcement of unpleasant experience would reach a threshold when the negative attitude was formed that led to disadoption. Because individuals have different levels of threshold, tenure will differ across disadopters. A longer tenure means a longer period of time for consumers to repeatedly confirm their initial negative belief, which strengthens the negative attitude. Moreover, disadopters' prior attitude and distrust can bias both their perceptions of the new IT innovation and their attitudes toward re-adoption (Boulding et al. 1999).

H2a: Tenure will have a negative impact on disadopters' re-adoption intention.

Duration of disadoption is the length of time from when users stopped using the old technology and when the new technology generation is introduced. Thomas et al. (2004) suggested recency has a negative effect on customers' restart behavior, as the longer the duration of defection, the more accustomed a consumer gets to a competitor's services, and the less likely he/she is inclined to change the current status (i.e., the stronger the status quo bias, Samuelson and Zeckhauser 1988). Thus, the duration of defection may have a negative impact on consumers' intention to come back. In the case of IT disadoption, the status quo bias may also prevent disadopters from re-adoption. The longer the duration of disadoption, the less likely the consumers want any change to their current status of not using mobile Internet services.

On the other hand, the duration of disadoption could have a positive effect on re-adoption intention through the low accessibility of prior negative attitude. As suggested by the attitude strength literature, the strength of memory-based prior attitude depends mainly on attitude accessibility - how easily and strongly subjects recall from memory information about an object and then, based on that information, forms an attitude (Hastie and Park 1986). Thus, attitude based on more recent experience is stronger than that based on events a long time ago. In the case of IT disadoption, the longer the duration of disadoption, the less accessible are the prior negative attitudes, and the fewer obstacles against re-adoption. Whether the effect of duration of disadoption is positive or negative is debatable. However, to be consistent with the attitude strength research (e.g., Holland, et. al. 2003), we propose:

H2b: Duration of disadoption will have a positive impact on re-adoption intention.

Usage Frequency. Usage can be distinguished into two dimensions – rate and variety (Shih and Venkatesh 2004). *Rate of use* is the number of interactions with the attitude object per unit of time. *Variety of use* refers to the different ways a product or technology is used. Rate of use is equivalent to usage frequency, which is believed to have a positive impact on prior attitude accessibility and strength (Fazio 1986). In the case of mobile Internet services, a variety of application innovations are available on the new platform and re-adoption is essentially a meta-decision that involves the evaluation of a portfolio of technology applications. Thus, usage variety is also important to prior attitude and the re-adoption decision. We define usage frequency as a composite of both variety and frequency of use per unit of time. Consistent with the attitude strength literature and similar to the case of tenure, usage frequency may also strengthen the prior negative attitude through the mechanism of confirmation bias (Nickerson 1998). The difference is that while the tenure effect depends on the length of time, the usage effect depends more on usage intensity per unit of time (see Figure 1). Thus, we hypothesize the effect of usage frequency to be negative.

H2c: Usage frequency will have a negative impact on disadopters' re-adoption intention.

Price Value

Pricing has been identified as the major reason for disadoption and also the primary strategy for recapturing lost customers (Thomas et al. 2004). In general, price value, defined as consumer's cognitive tradeoff between the quality of the applications and the monetary sacrifice for using them, has been found to have a positive effect on consumer evaluation of products and purchase intention (Dodds, Monroe and Grewal 1991). Thomas et al. (2004) found that lowering price (thus increasing the value of service) could attract lost customers back to the original service provider. Technology innovation can potentially increase the value of a new technology generation by improving the functionality and performance of applications, given reasonable level of price. Therefore, we control for the price effect by including price value in our model.

H3: Price value will have a positive effect on consumer re-adoption intention.

Reason for Disadoption

Thomas et al. (2004) identified unfavorable pricing as the main reason for defection. In our research, unsatisfactory performance of an inferior technology generation may be another important reason for IT disadoption. We include both reasons in our model and hypothesize the reason for disadoption will moderate the effects of the previously discussed factors.

First, we propose that when evaluating a new technology generation, consumers will assign more weight to the factors pertaining to their negative experience and reason for disadoption.

Negative experience with a previous technology generation - be it excessive payment or poor performance - can be considered generally as losses that loom larger to consumers (Kahneman and Tversky 1979). This leads to consumers' higher involvement in that particular aspect (i.e., price value or performance) of the technology when facing a new technology generation, which in turn influences the focus of their attention and information processing (Celsi and Olson 1988; Darke and Ritchie 2007). Thus, if an end user disadopted mobile Internet for a particular reason, he/she will pay more attention and assign greater weight to this factor when considering re-adoption. Disadopters in the unfavorable-price category will be more price value sensitive, while those in the unsatisfactory performance category will emphasize more on the superior performance of the new generation.

H4a: The effect of price value will be stronger for disadopters who emphasized unfavorable pricing.

H4b: The effect of perceived superiority of the new technology generation will be stronger for those who emphasized unsatisfactory performance.

Second, the reason for disadoption may also moderate the enhancement effect of prior experience characteristics on the prior negative attitude. Between the two primary reasons, price is more closely related to providers' service pricing while performance is to the technology. That is, while the price-based attitude is mainly enhanced by repeated high-level payment, the performance-based attitude is strengthened through increasing number of interactions with the old technology. Each characteristic of prior experience may enhance different types of prior attitude - i.e., price-based or performance-based - to a different extent, which results in the moderation effect of the disadoption reason.

Greater usage per unit of time may increase both monthly payment and accumulate poor usage experience, which influences both types of attitude. However, there is research suggesting that higher usage of product or service may increase user perceived payment equity, or justifiable pricing (Bolton and Lemon 1999). This is because given the price paid, the greater the usage, the greater the utilization or exploitation. This is especially true in the case of ICT service in general, and mobile Internet service in particular, where service bundling strategies are widely applied (Hitt and Chen 2005). Users usually pay on a monthly basis a fixed amount of money for a service package, with which they can use M units from a portfolio of N different types of services. Within the threshold of M , greater usage results in more justifiable payment (Bolton and Lemon 1999). Therefore, for users who hold price-based prior attitude, greater usage may partly cancel the effect of high price. In contrast, for users with performance-based attitude, greater usage will still intensify the negativity of attitude. Thus,

H4c: The effect of usage frequency will be stronger for disadopters who emphasized unfavorable performance.

Similarly, longer tenure also implies both greater payment for and longer use of the old and inferior technology, thus enhancing both types of attitude. However, while for each unit of increase in tenure, a payment is made and the price-based attitude is enhanced, longer tenure does not necessary lead to more interactions with the old technology. A user can have long tenure but light service usage, and he / she still has to make the monthly payment. As discussed earlier, the performance-based attitude is mainly based on the real usage experience or interactions with the technology, which is already captured by the usage frequency factor. Thus, after controlling usage frequency, the direct impact of tenure on the performance-based attitude will be less than that on the price-based attitude. Therefore,

H4d: The effect of tenure will be stronger for disadopters who emphasized

unfavorable pricing.

Finally, from the perspective of attitude accessibility (Hastie and Park 1986), the duration of disadoption can also make both types of attitude less accessible. However, there is no theoretical proposition or empirical evidence that supports the moderation effect of disadoption reason for this factor. Thus, we do not introduce a hypothesis here.

Methodology

Sample

An online survey was conducted in Hong Kong one month before the introduction of 3G. We put up a banner advertising the survey on a commercial website. A total of 305 persons who fit our intended profile, i.e. those who had discontinued their adoption of mobile Internet using existing generations of mobile Internet services, responded to the online survey. 31 respondents were excluded because they identified “other reasons” as their reasons for disadoption of mobile Internet services. After eliminating these responses, a final sample of 274 was used for data analysis. The sample was almost equally distributed between males (51%) and females (49%). The average age of the respondents was 28 years, and they had an average of 10 months of experience with mobile Internet services before they discontinued their usage.

Measurement

Both duration of disadoption and tenure of prior use were measured in months. The measure for usage frequency incorporates both the rate and variety of use. A portfolio of different mobile Internet services (i.e., SMS, MMS, ringtones, games, browsing websites, mobile email) was provided to respondents and they had to indicate their average usage per unit of time on a 7-point scale for each service. All the frequencies were then summed to arrive at a respondent’s overall usage frequency. As the data for the three prior experience characteristics did not follow a normal distribution, we applied log transformations to them. The scale for innovation superiority was adapted from Gatignon et al.’s (2002) four-item for perceived radicalness of technology innovation. We added three more items that were related to the performance, diversity, and value of the new generation of mobile Internet services respectively. The scale for price value of mobile Internet services was taken from Dodds et al. (1991). Finally, two items were used to measure consumers’ re-adoption intention in the case of 3G mobile Internet services. The reason for disadoption is a single item with three options – disadoption due to unfavorable pricing, unsatisfactory performance, or other reasons.

We conducted a pre-test among some university staff members who had experience with mobile Internet services. As a result, one item of the radicalness scale was dropped due to its unclear meaning and problematic psychometric properties. After the online survey, the measurement model was first established with PLS (Chin 1998). From Table 1, composite reliabilities were all greater than 0.80, indicating good measurement reliability (Fornell and Larcker 1981). We assessed measurement validity in two ways. First, we compared the square root of the average variance extracted (AVE) with the correlations among constructs. Each construct relates more strongly to its own measures than to others. Further, the average variance extracted exceeds 0.50 for all constructs (Fornell and Larcker 1981). The second test involves assessing how each item relates to the latent constructs. Table 1 reports the item loadings on the constructs. Another item of the scale for perceived innovation superiority was dropped due to high cross loadings with other factors. All the remaining factor loadings were above 0.70 and the cross loadings were below 0.35. Thus all items loaded more highly on

their own construct than on others. Collectively, these results support the convergent and discriminant validity of the constructs (Brown and Chin 2004).

Table 1. Factor Loadings and Reliability

Constructs	Items	Factor 1	Factor 2	Factor 3	Composite Reliability
Re-adoption Intention	BI1	0.31	0.14	<i>0.75</i>	0.83
	BI2	0.12	-0.08	<i>0.85</i>	
Innovation Superiority	PS1	<i>0.70</i>	-0.12	0.10	0.89
	PS2	<i>0.86</i>	0.00	0.05	
	PS3	<i>0.83</i>	0.05	0.09	
	PS5	<i>0.76</i>	-0.02	0.25	
	PS6	<i>0.71</i>	0.13	0.26	
Price Value	PV1	-0.04	<i>0.91</i>	0.01	0.95
	PV2	0.02	<i>0.94</i>	0.04	
	PV3	0.03	<i>0.94</i>	0.00	

Table 2. Descriptive Statistics, AVEs, and Correlations

	Mean	SD	Re-adoption Intention	Innovation Superiority	Price Value	Tenure	Duration of disadoption	Usage frequency
Re-adoption Intention	4.48	0.80	<i>0.81</i>					
Innovation Superiority	5.22	0.92	0.44	<i>0.78</i>				
Price Value	3.40	1.19	0.19	0.03 [#]	<i>0.91</i>			
Tenure	2.32	0.78	-0.09	-0.06 [#]	0.14	<i>N/A</i>		
Duration of Disadoption	2.13	0.67	0.15	0.06 [#]	-0.24	0.22	<i>N/A</i>	
Usage Frequency	1.51	0.78	0.28	0.01 [#]	0.14	-0.04 [#]	-0.23	<i>N/A</i>

Note: 1. [#] ~ insignificant correlations. All others are significant at the 0.05 level.

2. The diagonal elements are the square root of AVEs.

3. Tenure, Duration of Disadoption, and Usage Frequency are transformed by log scale.

Data Analysis

Structural equation modeling was employed to test our research model. PLS was chosen for model estimation because of two reasons (Chin 1998). First, our sample size is relatively small. The size of the overall sample is 274 and the sizes of the subgroups of high price-induced disadoption and poor performance-induced disadoption are 119 and 155 respectively. Second, we employed single-items for the three characteristics of prior experience, which cast difficulty in model specification and fit evaluation for LISREL but less an issue for PLS (Brown and Chin 2004). Both Wald's test and Chow's test were employed to test for group differences in the path coefficients (see <http://disc-nt.cba.uh.edu/chin/plsfaq/plsfaq.htm>). Before testing group differences, we checked the measurement invariance between the two sub samples by examining both the factor structure and item loadings (Bollen 1989). No significant differences were found for the measurement model.

Table 3. PLS Results for Hypotheses Testing

IT Re-adoption Model	Overall Sample	High Price Reason	Poor Performance Reason	Group Difference
Sample Size	274	119	155	

R ² for Re-Adoption Intention	.40	.40	.42	
Tenure	-.15 **	-.28 ***	-.09 ns	**
Duration of Disadoption	.25 ***	.30 ***	.22 **	ns
Usage Frequency	.29 ***	.23 **	.35 ***	*
Innovation Superiority	.43 ***	.42 ***	.45 ***	ns
Price Value	.23 ***	.29 ***	.18 **	*

Note: *p<0.05; **p< 0.01; ***p< 0.001.

Results and Discussion

As shown in Table 3, most of the hypotheses are supported. For all samples (including the two subgroups), our proposed model explains 40-42% of the variance in the dependent variable. Perceived superiority of the new technology generation is consistently the strongest predictor of re-adoption intention across all samples, supporting H1. While the magnitude of the coefficient for the poor-performance group is slightly higher than that for the high-price group, the difference is not significant. Thus, both groups who value performance or price will pay similar attention to the superiority of the new technology generation, which does not support H4b. One possible reason for this lack of significant group difference in the relative importance of innovation superiority may be the fact that though they emphasize different reason for disadoption, both groups are early adopters of mobile Internet. Thus, as suggested by research on innovation diffusion (Rogers 1995), both groups are likely to be innovators or early adopters who assign first priority to the innovation superiority or radicalness in the context of innovation-induced re-adoption. When considering the new technology generation, this prioritization effect may dominate the impact of reason for disadoption and lead to similar levels of weight assigned to perceived superiority (Moore 1999).

Among the three characteristics of prior experience, tenure has a significant negative effect in the overall sample but not in the poor-performance group, thus partly supporting H2a. The longer a disadopter has been using an inferior older generation, the less likely he/she will consider adopting a new technology generation. This is consistent with our prediction based on the rationale of confirmation bias. We also find a significant difference in the effect of tenure between the high-price group and the poor-performance group (-0.28 vs. -0.09), which supports H4d. Thus, a longer tenure can enhance the price-based negative attitude but will not reinforce the performance-based attitude.

The duration of disadoption has a positive impact on re-adoption intention for all the samples. This supports the logic of attitude accessibility. A longer duration of disadoption will diminish the strength of prior negative attitude, which in turn increases the likelihood of re-adoption. There is no significant difference in the effect of duration of disadoption between the subgroups. This implies that duration of disadoption reduces accessibility of end users' prior negative attitude to the same extent regardless of their reason for disadoption.

An interesting result is the positive impact of usage frequency on re-adoption intention, which contradicts our Hypothesis 2c. We explain this result by referring to Shih and Venkatesh's (2004) notion of use diffusion. Shih and Venkatesh (2004) suggested that there is an important post-adoption stage of innovation diffusion – the use diffusion, defined as a process where consumers integrate the technology into their lives and use the technology frequently in various ways. An intensive usage pattern, i.e., both high rate and variety of use, represents a deep integration of the technology into one's life, and has a positive impact on adoption of subsequent technology innovations. Similarly, although some disadopters abandoned mobile Internet services, a high prior usage may indicate that they already found mobile Internet services necessary in their lives, but disadopted it due to inferior performance

or high prices. Moreover, disadopters with intensive prior usage also benefit more from the performance and functionality improvement in the new generation because they use a variety of applications at high rates. Thus, usage has a positive impact on re-adoption intention. Further, the path coefficient of usage for the poor-performance group is significantly larger than that for the high-price group, indicating that disadopters in the poor-performance group emphasize more on continuing their prior usage pattern so as to maintain or deepen the integration of mobile Internet into their lives.

Finally, price value is also a significant predictor for re-adoption intention. This is consistent with findings in the marketing literature, where lowering price (thus creating greater value for a service based on mature technology) is the major reason for customer turn-over and the sole important strategy for customer winback (Thomas et al. 2004). Not surprisingly, the subgroup comparison also showed that price value was of a greater concern for disadopters who are price sensitive than those who are performance oriented.

Our work contributes to the IS literature on technology adoption (e.g., Venkatesh, et al. 2003) and continuance (e.g., Bhattacharjee and Premkumar 2004) by examining disadopters' re-adoption intention when facing a new and superior technology generation. It is not that surprising to find that innovation superiority is the major determinant of technology re-adoption. This result demonstrates the importance of incorporating innovation characteristics (Gatignon, et al. 2002) into research on IT service and innovation (Bitner and Brown 2006) from an end-user perspective. Also, consistent with both IS and marketing research, disadopters' prior experience plays an important role in determining re-adoption decision. However, the nature of prior experience and the mechanisms through which it influences re-adoption are different from previous research. In the research on defector win-back, the technology is invariant and the prior experience with and therefore attitude toward service providers are assumed positive, while in our research technology is under rapid evolution and the negative attitude is the result of inferior generations. Thus, our research is of more direct relevance to ICT vendors and service providers because of the technology acceleration phenomena in this industry (Westland 2002). Following the logic of attitude strength and persuasion literature, we show that both tenure and duration of disadoption have significant impacts on re-adoption intention. On the other hand, usage frequency has a more profound and positive impact as suggested by usage diffusion research (Shih and Venkatesh 2004). Finally, the reason for disadoption can change the relative importance of some influence factors such as price value and usage frequency.

As discussed at the beginning, winning back disadopters of IT is not only important to individual firms but also to the whole business sector because it influences the diffusion of the overall technology category. Our study provides strategic implications to win back the disadopters. First, our results suggest that if there was a major failure in a previous technology generation, e.g., the WAP services based on 2G mobile technology, service providers should try to differentiate the new generation by emphasizing the radicalness of change from the past. The superiority of the innovation as perceived by disadopters will have the greatest impact on their re-adoption intention. Second, we show that end users with different past experience with the technology exhibited different level of likelihood of re-adoption. Managers can utilize information about end users' usage history to define different segments of disadopters and target their marketing efforts first at the segment with the highest likelihood of re-adoption. For instance, in our case, disadopter with low tenure, high duration of disadoption, and intensive prior usage are the most likely to re-adopt mobile Internet services based on 3G. Personalized offers designed according to these users' profile can even

be made to win them back. Finally, firms also need to pay attention to the reason for disadoption and pricing issues when designing their disadopter win-back strategies.

Conclusion

In this paper, we proposed and tested a model for IT re-adoption based on attitude change and the information-integration literature. We found that disadopters did integrate their past experiences with information about the new technology generation to make their re-adoption decision. Particularly, perceived superiority of the new technology generation had the strongest effect on re-adoption intention. The effects of the three characteristics of prior experience with old generations were also significant, with usage frequency having the greatest impact. Overall, our model explained 40% of the variance in re-adoption intention. After controlling for the reason for disadoption, the moderating effects were significant for tenure, usage frequency, and price value. However, no moderating effect for perceived superiority was found. Both theoretical and practical implications were derived from our results. The current work can serve as a stepping stone for future research in the general field of winning back technology disadopters.

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