The effect of switching costs on resistance to change in the use of software

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Abstract

People tend to resist changing their software even alternatives are better then the current one. This study examines the resistance to change in the use of software from the switching costs perspective based on status quo bias theory. For this study, we select Web Browsers as software. Based on the classification of switching costs into three groups (psychological, procedural, and loss), this study identifies six types of switching costs (uncertainty, commitment, learning, setup, lost performance, and sunk costs). This study tests the effects of six switching costs on user resistance to change based on the survey of 204 web browser users. The results indicate that lost performance costs and emotional costs have significant effects on user resistance to change. This research contributes towards understanding of switching costs and the effects on user resistance to change. This study also offers suggestions to software vendors for retaining their users and to organizations for managing user resistance in switching and adopting software.

Keywords:

Software continuance; User resistance to change; switching costs; status quo bias theory

Introduction

A recent *The New York Times* article (Pogue 2006) reported that 85 percent of the Internet users continue using Microsoft Internet Explorer even after other similar web browsers are developed and available to users for free. Although Microsoft recently publicized a new version of Internet Explorer (IE7) in early 2007, previous version of Internet Explorer (IE6) was lack of several useful features which have been available in rival browsers such as Firefox and Opera for years. Based on the statistic, the article raised a question, why do users keep on using Microsoft Internet Explorer even when better ones were available? The article explained software continuance is a unique and very common phenomenon in software industry.

Similar to the concept of Information Systems (IS) continuance (Bhattacherjee 2001), software continuance means continued usage of software by adopters by institutionalizing software use as a part of ongoing activity. According to the causes of status quo bias (Samuelson and Zeckhauser 1988), one possible reason of software usage continuance would be switching costs incurred for users to change software. Those users who keep on using software (e.g., Internet Explorer) are more likely to resist changing software because the change takes some costs, especially non-monetary costs such as time and effort.

This study aims to examine the software continuance from the switching costs perspective. We select web browser as the software in this study. As we discussed before, software continuance is represented in a way of user resistance to change. This study develops a new construct, user resistance to change (URC), for examining software continuance. Specifically, we seek to answer the next research questions in the context of web browser: (1) what are the sub-types of switching costs in the use of software? And (2) how the sub-types of switching costs affect URC?

This study would contribute to the IS continuance literature, specifically software continuance literature, by explaining IS continuance from the URC perspective. This study will provide an understanding of what sub-types of switching costs affect URC. This study would also contribute to the software industry in marketing arena by offering practical suggestions for retaining their users. Software continuance, however, provides different implications to companies that are considering implementing or adopting new software. If users keep on using pre-existing software (e.g., legacy system) and resist changing software, it would affect the implementation and/or adoption of new software (Nah et al. 2004). This study will provide companies additional implications for managing their users' resistance in switching and adopting software.

Conceptual Framework

This study classifies switching costs into three types in the use of web browser: psychological costs, procedural costs, and loss costs. Psychological costs mean the costs arising from mind or emotions associated with the switching. Procedural costs mean the costs arising from the monetary and non-monetary spending associated with the switching. Loss costs mean the costs arising from the loss incurred from abandoning the status quo.

Under psychological costs, we identify uncertainty costs and emotional costs. Uncertainty costs mean the psychological uncertainty or perceptions of risk surrounding the performance of an unknown or untested substitute (Guiltinan 1989; Klemperer 1995; Jones et al. 2002; Burnham et al. 2003; Lam 2004). Uncertainty is created when the performance level of a potential or alternative provider is unknown to the user (Guiltinan 1989). Uncertainty costs may bring about perceptions of the likelihood of lower performance when switching from the

current option to a new one (Jones et al. 2002). Emotional costs mean the psychological or emotional discomfort when switching from the current option to a new one due to the attachment or the loyalty that one may have with the current option (Guiltinan 1989). In the context of software usage these costs are specific to the user's current software.

Under procedural costs, we identify learning costs and setup costs. Learning costs have been classified by many researchers as an important facet of switching costs over the years (Klemperer 1987; Nilssen 1992; Jones et al. 2002; Burnham et al. 2003). Learning costs mean the time and effort costs of acquiring new skills or know-how in order to use a new product or service effectively (Burnham et al. 2003). Learning costs include the time and effort expended on information acquisition, exchange, and evaluation and can be further distinguished based on whether the costs occur prior to or after switching and whether the costs are associated with customer learning or service provider learning (Jones et al. 2002). In our research context, learning costs refer to the time and effort expended in learning to use new software proficiently. Setup costs mean the time and effort costs associated with the process of initiating a relationship with a new substitute or setting up a new product for initial use (Burnham et al. 2003, Jones et al. 2002; Whitten and Wakefiled 2006). In our research context, setup costs refer to the time and effort associated with the process of downloading and installing new software.

Under loss costs, we identify lost performance costs and sunk costs. Sunk costs mean the perceptions of investments and costs already incurred in establishing and maintaining relationship with the current object (Jones et al. 2002). For our research context, sunk costs are defined as the non-recoverable time and effort invested by the users in learning to use and being proficient with the current system. Lost performance costs are the perceptions of the benefits and privileges lost by switching between options (Jones et al. 2002). These benefits and privileges are specific to the product, service or in our context the software that is currently being used. These costs represent the loss of advantages that accrue and are directly related to continued patronage of the provider that will be lost if the relationship is terminated (Guiltinan 1989; Jones et al. 2002; Burnham et al. 2003; Whitten et al. 2006). In our research context, lost performance costs refer to the benefits brought about by the using the software and its features and the provider service quality.

Research Model and Hypotheses

Based on the theoretical discussion above, we propose the research model shown in Figure 1. Samuelson and Zackhauser (1988) posited that even when no explicit costs are associated with switching, uncertainty can lead to status quo inertia. Many people would find that uncertainty unattractive, and opt for the certain prospect. A prospect offering uncertainty induces an unpleasant reaction like anxiety (Inder and O'Brien 2003). Users thus realize that uncertainty in switching to new software is likely to cause an unpleasant psychological reaction. By taking accounting of that in their switching decision making, users would be more averse to losing something they own than they are pleased to make a gain (Inder and O'Brien 2003; Kahneman and Tversky 1979). Fear of uncertainty and anxiety thus leads to status quo bias. Regards to uncertainty and risk, uncertainty costs mean the psychological uncertainty or perceptions of risk surrounding the performance of an unknown or untested substitute (Guiltinan 1989; Klemperer 1995; Jones et al. 2002; Burnham et al. 2003; Lam 2004). As the perceived level of uncertainty costs increases, users are more likely to have stronger status quo bias, higher level of URC. Hence, we hypothesize:

H1: Uncertainty costs have positive effect on user resistance to change.

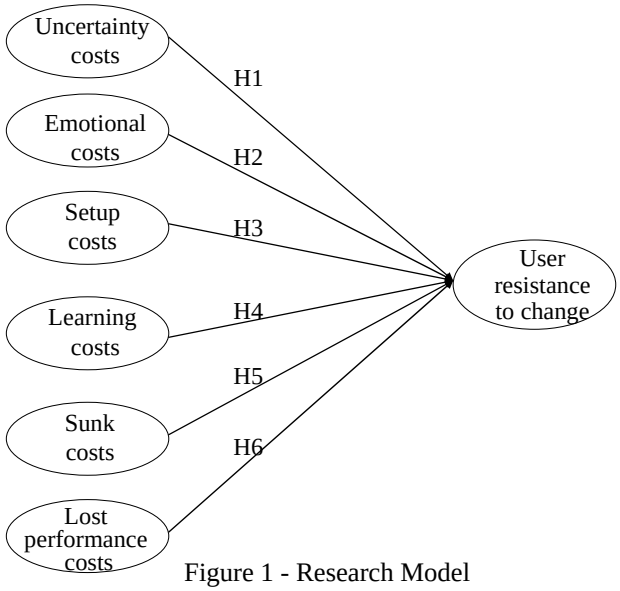

Figure 1 - Research Model

People usually find themselves in the unpleasant position of regretting the outcomes of past decisions. Such lessons of experience teach them to avoid regrettable consequences, which mean regret avoidance in decision making (Samuelson and Zackhauser 1988). Kahneman and Tversky (1982) further ague that individuals feel stronger regret for bad outcomes that are the consequences of new actions taken than for similar bad consequences resulting from inaction. Regret avoidance thus causes status quo bias. Regards to regret avoidance, emotional costs mean the psychological or emotional discomfort when switching from the status quo alternative to a new one. Users who perceive higher level of emotional discomfort in switching are more likely to have status quo bias. Hence, we hypothesize:

H2: Emotional costs have positive effect on user resistance to change.

Any switching from the status quo alternative to a new one incurs transition costs. Transition costs make any switch from the status quo costly in itself and then lead to status quo bias (Samuelson and Zackhauser 1988). Transition costs that support the status quo bias are

prevalent in the use of software. If users have to switch software then they have to identify alternative software and setup and learn it. Regards to transition costs, this study identifies setup costs and learning costs. Users first have to download alternative web browser from the relevant web site and install it, which requires and time and effort: setup costs. Uses also have to learn new web browser, which requires additional time and effort: learning costs. As the two corresponding factors to transition costs, setup costs and learning costs would thus cause status quo bias, URC in the use of software. Hence, we hypothesize:

H3: Setup costs have positive effect on user resistance to change.

H4: Learning costs have positive effect on user resistance to change.

The presence of sunk costs or other resource investments contributes to status quo bias in behavior and decision making. The larger the past investment in a decision or behavior, the greater the inclination the commitment in subsequent decisions and behaviors (Samuelson and Zackhauser 1988). In a case of profession, one might predict that all other things equal, the longer one has spent in a given job or profession, the less likely one is to switch because of previous sunk costs and investment such as time and effort. In the context of software continuance, sunk costs mean the time and effort invested by users in learning to use and being proficient with the current software. The greater sunk costs in the current software, the more strongly it will be retained. Hence, we hypothesize:

H5: Sunk costs have positive effect on user resistance to change.

Loss aversion means that individuals weigh losses heavier than gains in making decisions (Kahneman and Tversky 1979). When there are two alternatives (i.e., the status quo alternative and new substitute), taking the status quo as the reference point, the individual thus weighs potential losses from switching larger than potential gains. Because of loss aversion, the individual is biased in favor of the status quo (Samuelson and Zackhauser 1988). In the context of software continuance, lost performance costs refer to the loss of the benefits and privileges by switching software. Before making final decision and switching behavior, users would consider lost performance costs and worry about the loss in switching software. Lost performance costs would thus leads to URC because of loss aversion. Hence, we hypothesize:

H6: Lost performance costs have positive effect on user resistance to change.

Research Methodology

Existing validated scales and empirical procedures were adopted where possible for developing the measurement instrument. The measurement items were anchored on the seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). Three IS researchers reviewed the instrument for its face validity. Feedbacks on the questionnaire were gathered from 15 web browser users with regard to any ambiguity of the questions, the length of the instrument, the format of the scales, and the information to be sought from respondents. The final measurement items are presented in the Appendix.

We collected empirical data for this study via an Internet survey over two weeks. We posted messages advertising the survey at online public forums. To improve the response rate, S$5 was offered to every respondent as an incentive. A total 230 respondents participated in the survey. 26 respondents reported that they do not use Internet Explorer as the single main web browser. They use one of other web browsers or use multiple web browsers as the main ones. For controlling the type of web browser and the relevant characteristics, this study selected the subjects who use Internet Explorer as the single main web browser. The final sample comprised of 204 responses. The descriptive statistics of the sample indicate that the majority of respondents were between 21 and 30 years of age (61.8%) and were mostly undergraduates and professionals (making up a total of 60.82%). They were aware of other web browsers such as Firefox (77.45%), Opera (31.37%), and Netscape (53.43%). They have experienced Internet Explorer for 7.74 years on average (s.d. = 2.85). They access Internet 11.85 times on average (s.d. = 14.91) each day.

Data Analysis and Results

To validate the survey instrument we first performed exploratory factor analysis (EFA) followed by confirmatory factory analysis (CFA). For EFA, we examined the data using principal component analysis with varimax rotation using SPSS. All the items of the factors except one item (LRN4) were loaded on each distinct factor with eigen value greater than 1.0 and explain 74.51% of the total variance. Because LRN4 was dispersed over factors, we drop this item from the further analysis.

We conducted CFA analysis by creating a measurement model using LISREL. The measurement model in the CFA was first revised by dropping, one at a time, items which share a high degree of residual variance with other items. The purpose of this step is to purge items that obviously violate unidimensionality. We dropped two items: the first item (LPF1) of learning performance costs sharing a high degree of residual variance with URC1 and EMC4; the fourth item (SNK4) of sunk costs sharing a high degree of residual variance with LRN3 and LPF4.

For CFA, we assessed convergent and discriminant validity of the constructs using LISREL (see Table 1). The standardized path loadings were all significant (t-value > 1.96) and greater than 0.7 except for UNC3 (0.61). The CR and the Cronbach's α for all constructs exceeded 0.7. The AVE for each construct was greater than 0.5. Since the loading for RTC2 was close to the recommended cut-off (0.7) and it satisfied the remaining two criteria, the item was not dropped. By and large, the convergent validity for the constructs was supported.

Table 1 - Results of Convergent Validity Testing

Item	Std. Loading	t-value	AVE	CR	Cronbach's α
UNC1	.74	11.22	.59	.81	.78
UNC2	.93	14.93			
UNC3	.61	8.97			
LRN1	.84	14.33	.75	.90	.90
LRN2	.91	16.35			
LRN3	.84	14.25			
LPF2	.85	14.49	.82	.60	.82
LPF3	.74	11.75			
LPF4	.73	11.50			
SNK1	.90	16.14	.78	.91	.91
SNK2	.95	17.62			
SNK3	.79	13.26			
EMC1	.73	11.76	.64	.84	.85
EMC3	.87	15.35			
EMC4	.80	13.29			
STP1	.71	11.01	.68	.86	.85
STP2	.87	14.20			
STP3	.88	14.46			
URC1	.85	15.02	.83	.95	.95
URC2	.91	16.85			
URC3	.96	18.55			
URC4	.92	17.00			

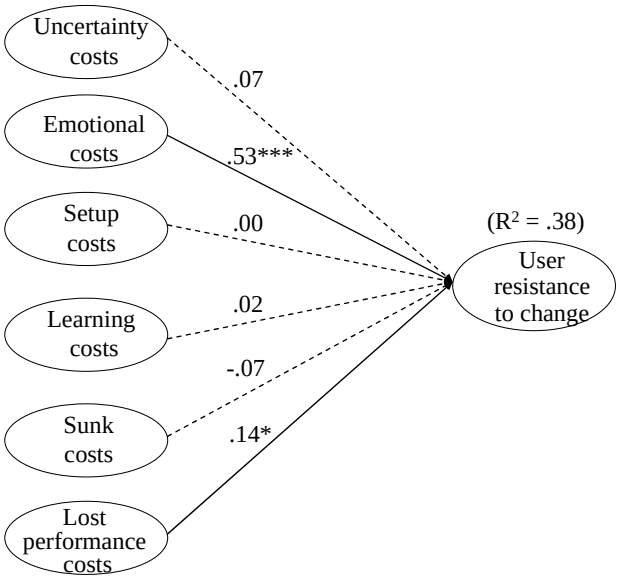

Figure 2 – Testing results of the structural model
normed $\chi^2 = 1.89$, RMSEA = 0.064, NFI = 0.94, CFI = 0.97, GFI = 0.87, AGFI=0.82 (*: $p < 0.05$, ***: $p < 0.001$)

Next, we assessed the discriminant validity of the measurement model by comparing the square root of AVE for each construct with the correlations between the construct and other constructs. The square root of AVE for each construct (diagonal term) exceeded the correlations between the construct and other constructs (off-diagonal terms). Hence, discriminant validity of the instrument was established.

After establishing the validity of the measurement model, we examined the structural model using LISREL. The results of testing the structural model are shown in Figure 2. The structural model satisfied the threshold for all indices except GFI. However since the GFI (0.87) closely approximated the recommended threshold, the structural model appears to adequately fit the data. The standardized path coefficients were then used for testing the hypotheses.

Discussion of Findings

There are several salient findings of this study. The first finding is that emotional costs as a type of psychological costs have significant effects on URC. This finding is consistent with the argument of status quo bias theory (Samuelson and Zackhauser 1988) which identified regret avoidance as one of the causes of status quo bias. It explains software (i.e., Web browser) users worry about the bad outcomes as the results of switching software. They feel stronger regret for the bad outcomes resulting from switching than the similar bad outcomes resulting from non-switching (Samuelson and Zackhauser 1988). Because of this regret avoidance, software users keep on using the current software and resist changing.

The second finding is that lost performance costs as a type of loss costs have significant effects on URC. This finding is also consistent with the argument of status quo bias theory which identified loss aversion as one of the causes of status quo bias. Loss aversion is considered one of the best-known generalizations about risky choices involving gains (Kahenaman and Tversky 1979). Users worry about the loss of some benefits (e.g., skills and familiarity with the current software) that they can enjoy with the current software and the loss of task performance (e.g., efficiency, quality) resulting from switching software. Because of loss aversion in decision making and behavior, users keep on using the current software and resist changing.

However, the model has four insignificant relationships. First, uncertainty costs as a type of psychological costs have insignificant impact on the resistance to change of web browser users. This could be due to the characteristics of subjects. Many subjects had already experienced other web browsers before (Firefox: 66.2%, Opera: 15.7%, Netscape: 53.4%). Because they experienced other web browsers, they might not perceive high level of uncertainty costs in switching. For this reason, uncertainty costs might not affect URC.

Sunk costs as a type of loss costs also have no significant impact on the resistance to change of software users. The possible reason could be that users do not weigh time and effort spent for learning the current web browser much. Actually, Microsoft Internet Explorer is quite easy to understand and learn. Samuelson and Zackhauser (1988) posited that people have grater inclination to continue status quo as they have invested more in the status quo. Because it has not taken so much time and effort for learning Internet Explorer, user's URC might be less influenced by sunk costs in this study.

Two sub-types (set up costs and learning costs) of

procedural costs have no significant effects on the resistance to change of software users. Similar to the insignificant impact of sunk costs on URC, users could possibly think that learning a new Web Browser does not require so much time and effort. Especially, most subjects are highly experienced in the use of computers because they have used computers for several years. Many subjects also had already experienced other web browsers before. Since other web browsers are not totally different from Internet Explorer, it will not take so much learning costs for users. Because learning costs do not take so much, the costs might not have significant impact on user's decision whether to continue or switch software. Similar to learning costs, it does not take much time and effort for setting up a new web browser. Because of the low set up costs, the costs seem not to affect URC.

Limitations

The results of this study should be interpreted in the context of its limitations. First, the data for this study was collected from the users of web browser, Internet explorer. It would be useful to replicate this study across different software. Second, this study classified switching costs into three groups and six subtypes by considering the context of web browser. Depending on the characteristics of focal software, switching costs could be classified into different sub-types. Third, this study considered only the cost aspects in examining software continuance. Future studies could examine both cost and benefit aspects together in a same model and compare the relative impact on software continuance.

Implications and Conclusion

This research offers several implications for theory and practice. From the theoretical perspective, this study has examined software continuance from the cost perspective while most previous research (Bhattacherjee 2001; Kim and Malhotra 2005; Kim et al. 2007; Thong et al. 2006) on software continuance including IS continuance has examined it mainly from the benefit perspective. To examine the effect of cost aspects on software continuance, this study has adopted switching costs. This study classifies switching costs into three categories (psychological, procedural, and loss) and then identifies six sub-types of switching costs over the three categories in the context of web browser usage. This study has further measured the switching costs in the context of web browser usage and continuance.

This study also has introduced the new construct of *user resistance to change* for examining the software continuance. Most previous research has focused on IS continuance or post-adoption with behavioral intention based on the expectation-confirmation theory, theory of planned behavior and technology acceptance model. As an extension of previous research, this study has demonstrated how status quo bias theory (Samuleson and Zackhauser 1988) can be applied in IS research to explain software continuance with user resistance to change. This study further identified and examines the effect of sub-types of switching costs on user resistance to change based status quo bias theory.

From the practice perspective, this study shows where software companies should expend effort to retain their users from switching costs perspective. This study has demonstrated that a software company can retain their users by instilling in them the resistance to change software with switching costs. Hence, software (i.e., web browser) companies need to invest in efforts that can enhance switching costs of software users, especially emotional costs and lost performance costs. For enhancing emotional costs, the companies can consider gaining user trust, improving service quality, and providing a pleasurable usage experience to users. For enhancing lost performance costs, the companies can consider enhancing the software quality which can improve users' performance, providing convenience in the use of software, and upgrading software periodically.

The results of this study offer different suggestions to organizations about how to alleviate user resistance when they adopt or implement new software instead of the current one. Management should become aware of the critical effect of switching costs on user resistance to change. Especially, users are salient to emotional costs and lost performance costs in determining their resistance to change software (i.e., web browser). Management should thus aim to reduce emotional costs and lost performance costs perceived by users. To reduce the effect of emotional costs on URC, management can consider providing incentives in adopting new software. Also, management can consider publicizing the benefits of new software instead of current one. To reduce the effect of lost performance costs on URC, management can consider tolerating some loss of performance during the transition period (because users may become less productive) without reflecting it in user performance evaluations.

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Appendix: Measurement Instrument

User resistance to change (Bovey and Hede 2001)
- URC1: I oppose any change to using a new web browser instead of my current one
- URC2: I do not accept any change to using a new web browser instead of my current one
- URC3: I do not support any change to using a new web browser instead of my current one
- URC4: I do not comply with any change to using a new web browser instead of my current one

Uncertainty costs (Jones et al. 2002)
- UNC1: I am not sure how my task performance would be affected if I switched to a new web browser
- UNC2: If I were to change web browsers, the level of my task performance would be uncertain
- UNC3: The level of my task performance with another web browser could be worse than what it is now

Emotional costs (Burnham et al. 2003)
- EMC1: I am more comfortable using my current web browser than I would be if I switched web browsers
- EMC2: I would miss using my current web browser if
- EMC3: I would miss using my current web browser if I s

Learning costs (Burnham et al. 2003)
- LRN1: Learning to use the features of a new web browser, as proficient as I use my current one, would take time
- LRN2: Understanding the features of a new web browser would take time and effort
- LRN3: Even after switching, it would take effort to be proficient with a new web browser
- LRN4: Getting used to how a new web browser works would be easy ®

Setup costs (Jones et al. 2002)
- STP1: If I changed web browsers, it would take a lot of time and effort for me to setup the new browser.
- STP2: Switching web browsers involves an unpleasant setup process
- STP3: There is not much time and effort involved when I start using a new web browser. ®

Lost performance costs (Jones et al. 2002)
- LPF1: I would lose certain benefits if I changed web browsers
- LPF2: My current web browser provides me with certain benefits I would not receive by using a new one
- LPF3: By continuing to use the same web browser, I receive certain benefits that I would not receive if I switched to a new one
- LPF4: There are certain benefits I would not retain if I were to switch web browsers

Sunk costs (Jones et al. 2002)
- SNK1: A lot of time have gone into learning and getting proficient at my current web browser
- SNK2: A lot of effort have gone into learning and getting proficient at my current web browser
- SNK3: All things considered I have spent a lot of time and effort with my current web browser
- SNK4: I have not invested much in learning and getting proficient at my current web browser ®