

Exploring the Impact of Switching Costs on Customer Retention in the Technology Standard Competition Market

Yong Zhang¹, Xi Chen¹, Yuhong Zhao², Qiong Yao¹

¹Management School, Jinan University, Guangzhou, China

²The Bank of China, Pearl River Branch, Guangzhou, China

Email: tzyong@jnu.edu.cn

Received 8 May 2014; revised 4 June 2014; accepted 1 July 2014

Copyright © 2014 by authors and Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

As the competition in the market is increasingly fierce, increasing consumers' switching cost has already become an important strategy for enterprises. However, existing research lacks discussion about switching costs in the standard competition market. This research develops a model of switching costs' impact on customer retention in the standard competition market. The findings suggest that in the standard competition market, different factors that affect customer switching costs have different effects on switching costs. Technology standard complexity, technology upgradability, and customer investment have significant positive influences on switching costs, but the customer experience presents the negative correlation with switching costs. Furthermore, switching cost is positively related with customer retention, especially the lost benefit cost which has the largest impact on customer retention. This study improves the researches of switching costs antecedent influencing factors, and it is of much importance for enterprises in the standards competition to manage switching costs better and implement customer retention.

Keywords

Standard Competition, Switching Costs, Customer Retention, Technology Standard Complexity, Technology Upgradability

1. Introduction

Along with the increasing speed of technological change and innovative acceleration, retaining customers become a crucial task of the enterprise. Among many factors of customer retention, switching costs become a

widely concern by scholars. Due to the existence of the switching cost, consumers are willing to remain loyal to its current product/technology and its upgraded product/technology, and they even purchase the complementary product that is compatible with the current product/technology. In addition, competition around the technology standard is increasingly intense in many industries. An important feature of standard competition market is the network externalities. It refers to the phenomenon that the utility of the goods consumed by consumers increases with the increase of the quantity of users and consumers [1]. Due to the presence of network externalities, the gaining and retaining customers are crucial to the success of standard competition. Therefore, how to manage switching costs will become an important strategic decision in the standard competition market.

Research on switching costs has been conducted by a large amount of economics, management and marketing researchers. In the field of economics, research is mainly around the impact of switching costs to industry competition structure, inelastic pricing [2], market barriers to entry [3] and so on. Management and marketing mainly discussed the relationship within switching costs, product forecast [4], repeat purchase behavior [5], customer loyalty [6], technology development strategy [7], etc.

As the competition in the market is increasingly fierce, improving consumer switching costs has already become an important strategic choice for enterprises. The research of switching costs has been widely promoted by the academia and the business, but existing research lacks discussion about switching costs in the standard competition market. The effect of technical standards and consumer characteristics to switching costs also remains unclear. This study will explore the relationship between switching costs and customer retention in the technology standards competition market. First, this study will discuss the influence of different types of switching costs on customer retention in the technology standards competition market. Second, it will explore the influence of two different characteristics on switching costs. The two antecedent influencing factors respectively embody the technology standard and consumer characteristics, and have significant influences on switching costs. In addition, this study discusses the impact of switching costs on customer retention mechanism in the standard competition market; it perfects the study on the effect of switching costs antecedent influencing factors; and for enterprises in the standards competition, it is of important guiding significance to manage switching costs better and implement customer retention.

2. Literature Review

2.1. Technology Standard

Technology standard has gradually had an impact on the network, communication and other industries such as high-tech industries, even traditional industries [8]. In the market with network externalities, more and more enterprises try to rely on technical standards in order to control the market, because once enterprises are in control of the standards, making itself become the standard of the industry or the market, they can control the market through the technology standard. The standard competition refers to the competition between two or more technical standards that are mutually incompatible and struggle for the market power [9]. In the fierce standard competition, when compared to other technical standards, a certain technical standards will bring greater network externalities and market share if there are the advantages of the technology, network range and the user habit. For consumers, once they opted for a technical standard, they will faces a bigger switching cost and overcome switching barriers if they need to switch and use other technical standards. Therefore the technical standards have become a magic weapon of the enterprise to win the market competition.

At present most of the researches on standard competition focus on the perspective of enterprise and industry, while researches on the perspective of the consumer research literature is relatively limited. In limited literatures, discussions are about the variables effect on the consumer purchase decision in the standard market. Chakravarti and Xie (2006) [10] discussed different advertising strategy from the ways of information communication in the standard competition. Luo *et al.* (2009) [11] proposed that consumers' expectations associated with delayed purchase strategy. And Tao *et al.* (2009) [12] pointed out that the standard competition will increase switching costs of consumers, as consumers shift from a technical standard to another technical standard, and the profits from the current use of technical standards is less than in the exit of switching costs, which the phenomenon is called "standard locking". While switching cost is a common phenomenon in the standard competition markets, existing researches have not deeply argued the influence of different types of switching cost on customer retention and switching costs antecedent influencing factors in the standard competition environment.

2.2. Switching Costs

The concept of switching costs derived from economics. Porter (1980) [13] was the first who introduces the concept into marketing management field. He illustrated that switching costs is one-time transaction costs generated by consumers from a product or service provider to another provider. With the deepening of research on switching costs, scholars found that switching costs itself is variables which involves various kinds of subjective and objective factors and perceived by customer in the process of consumption switching. Klemperer (1987) [14] argued that switching costs includes transaction costs, learning costs and contract costs. In addition, Burnham (2003) [15] divided the complex variables into procedural switching costs, financial switching costs and relational switching costs. On this basis, Jones *et al.* (2007) [16] suggested that switching costs are made up of procedural switching costs, lost benefits costs and social switching costs. The procedural switching costs refer to the customer in the process of switching products or services expectations of the time, energy or may encounter obstacles. The lost benefits costs refer to the potential loss of specific interests when customer shifted one product or services to another product or services. The social switching costs refer to the customers with existing suppliers and other consumers, while the networks built may have suffered. To sum up, owing to the scholars' study in different industry field, who have different understanding of switching costs, switching cost are divided into different dimensions. Jones's research on switching costs is accepted by most of the scholars, and the dimension of switching costs which put forward by Jones is consistent with consumer's switching costs. In order to adapt to new technical standard of products, consumer invest all kinds of interests, social relationship and psychological cost. Thus the following parts are based on this kind of classification method.

2.3. Switching Costs Antecedent Influencing Factors

With regard to the influencing factors of switching costs, Sengupta *et al.* (1997) [17] suggested that the influencing factors that affect customer switching cost includes adaptation of suppliers, the degree of stimulation from supplier to the customer, and customer's own investment. In the study of network game consumer behavior, Wei (2006) [18] suggested that research on the antecedent influencing factors should be discussed respectively from the two aspects of game operators and personal players, and put forward influencing factors including the quality of products or services, customer relationship management (CRM), the player's investment as well as the online gaming experience. And Burnham *et al.*'s (2003) [15] study has strong representative, which divided the influencing factors into market/industry characteristics, consumer's investment, industry experience. Pae and Hyun (2006) [7] studied switching costs in the high-tech industries, and found that the effect of switching cost is significant; technical compatibility and upgradability have important influence on switching costs. To sum up, there are numerous influencing factors of switching cost. Most scholars discussed the influencing factors mainly from the market/industry and consumer characteristics. In the technology standard competition, the market characteristics of technical standards and the choice of consumer are equally important to the influencing factors. Therefore, this study will discuss antecedent influencing factors from the two aspects. In terms of the characteristics of technical standards market, this study will choose the technical compatibility and upgradability as two important characteristics of technical standards. In terms of consumer characteristics, customer investment and customers experience will be discussed.

2.4. Customer Retention

In the existing literature of customer retention, some scholars equate customer loyalty with customer retention. Even if customers show loyalty in attitudes, these also can't guarantee the customers for continuing to maintain the relationship with enterprises in behavior. As Patterson and Smith (2003) [19] suggested, psychological loyalty and behavioral loyalty are the most important elements for the customer retention. In other words, connotation of customer retention is more detailed and comprehensive than customer loyalty. When customer's behavior is consistent with customer's attitude to loyalty; the purpose of customer retention has been achieved. Fornell (1992) [20] absorbed the concept of switching costs into the theory of customer retention, and pointed out that switching costs perceived by customers plays an important role in maintaining customers. Maute and Forrester (1993) [21] emphasized that switching cost helps to maintain customer relationships. To some extent it can also be regarded as a kind of obstacles, to prevent customers from the current service relationship. Weiss and Anderson (1992) [22] also found that considering replacement of new products or services, the switching costs which is perceived by customers can hinder the actual switching. It is with no doubt that customer reten-

tion and switching costs are highly related. Besides, Lam *et al.* (2004) [23] illustrated that switching costs on customer retention will have direct and significant effect. Therefore, this research will explore how customers' perceived switching costs have directly effect on customer retention in the technology standard competition market.

3. Research Hypothesis

3.1. Technology Standard Factors and Switching Costs

Technical complexity refers to the level of difficulty perceived by consumer to the technology. In the technology standard competition market, different standards are usually incompatible with each other, and their complexity is inconsistent. When standard suppliers offered consumers technology standard containing multiple steps, the technology standard is regarded as complex. It brought barriers to consumers in the process of switching product or service, which affects the choice of different technical standards. The more complex technical standard is, the more consumers have to pay time and energy in order to learn and adapt the technology standards. Accordingly, the procedural switching costs they perceived will be high. With the complexity of the technical standards increasing, consumers believe that switching new technical standards can cause additional lost in investment, and produce higher lost benefits cost. The one of the most direct loss is caused by price difference. In order to reduce the discomfort from technical complexity, consumers rely on suppliers and other users, to get technical support during the use of products or services. Based on the above analysis, we introduced the following hypothesis:

H1a: In the technology standard competition market, complexity of technology standard has a positive influence on the customer's the procedural switching costs.

H1b: In the technology standard competition market, complexity of technology standard has a positive influence on the customer's the lost benefits costs.

H1c: In the technology standard competition market, complexity of technology standard has a positive influence on the customer's the social switching costs.

Technical upgradability refers to the technical standard and its complementary product application's ability to continue to upgrade. Consumers rely on a particular technology upgrading to help them successfully converted to more advanced technology products. After the technical standard upgrading, supplier also will develop more varieties of complementary products to promote the technology upgrade, meanwhile consumers can gain greater network externalities. Technical standard upgrade brings more new features for consumers. It also makes the consumers to spend more time and energy to adapt to these new features, and increase procedural switching costs. At the same time, technical standard upgrade needs consumers to spend more money for new features, which increases the consumer's sunk costs. Additionally, for the sake to adapt to the technology upgrade of standards and complementary products, consumers need to establish relations with new suppliers or other customers, resulting in higher social switching costs. Based on the above analysis, we proposed the following hypothesis:

H2a: In the technology standard competition market, technology upgradability has a positive influence on the customer's the procedural switching costs.

H2b: In the technology standard competition market, technology upgradability has a positive influence on the customer's the lost benefits costs.

H2c: In the technology standard competition market, technology upgradability has a positive influence on the customer's the social switching costs.

3.2. The Consumer Factors and Switching Costs

Customer investment refers to consumer in the process of using investment of time, money and energy, etc. Burnham *et al.* (2003) [15] pointed out that the more customer input, the switching costs will be higher. In the standard competition market, the consumer's purchase decision has a great deal of uncertainty. In order to reduce uncertainty, consumers need more investment to ensure more long-term interests during the use of products. The interests will become an obstacle for the customer's switching in the standard competitive market. More formally, we hypothesized that:

H3a: In the technology standard competition market, customer investment has a positive influence on the customer's the procedural switching costs.

H3b: In the technology standard competition market, customer investment has a positive influence on the

customer's the lost benefits costs.

H3c: In the technology standard competition market, customer investment has a positive influence on the customer's the social switching costs.

Customers' experience refers to customer's cognition on the suppliers of technical standards and products they supplied. Burnham *et al.* (2003) [15] found that customer's experience or expertise has a negative impact on switching cost in a certain field. In the technology standards competition market, if customers are more familiar with the technical standards, the ability of comparing or evaluating different technical standards is stronger. The ability to make it easier for customers to switch embodies that customers can pay less time and energy, invest lower costs, and more easily establish the relationship with suppliers and other customers in the transformation. More formally, we hypothesized that:

H4a: In the technology standard competition market, customer experience has a positive influence on the customer's the procedural switching costs.

H4b: In the technology standard competition market, customer experience has a positive influence on the customer's the lost benefits costs.

H4c: In the technology standard competition market, customer experience has a positive influence on the customer's the social switching costs.

3.3. Switching Costs and Customer Retention

In the standard competition market, customers may face different psychological cost and economic costs during the process of switching products or technology. These costs are what we call switching costs or switching barriers. It can change the customer's psychological intention to switch new products, and maintain loyalty on behavior, so as to achieve the unity of the psychology and behavior. Jones *et al.* (2007) [16] confirmed that the switching costs have positive influence on customer retention, but different types of switching costs have different effect on customer retention. Procedural switching costs are perceived by customers when they begin to use new technology standard products. Customers are usually willing to continue to use the current technical standard products, because they prefer to avoid unnecessary troubles in the process of switching. If customers switch to using new products, they have to actively give up the interests of the existing. However, most of customers will rationally avoid the happening of this kind of loss. Similarly, customers voluntarily maintain harmonious social relationship network which involves the suppliers and other consumers of current technical standard. Based on the above analysis, different types of switching costs have different effects on customer retention. Therefore we put forward the following hypothesis:

H5: The procedural switching cost has a positive influence on the customer retention.

H6: The lost benefits cost has a positive influence on the customer retention.

H7: The social switching cost has a positive influence on the customer retention.

4. Study Design

4.1. Stimuli and Sample

This study is set in smartphones standard competition, because smartphones existing hardware and software aspects of competition, which conforms to the characteristics of standard competitive environment. Sample mainly comes from undergraduates, graduates, MBA students and part-time students of some universities in south China, while MBA students and Part-time students are social samples. There are several reasons for selecting students as sample of this study. Firstly, according to China's urban smartphone user survey report that released by Google, smartphone users are given priority to young people in China's urban residents, 73% of whom aged between 18 to 34 years old, and 69% of whom have bachelor degree or above. Students sample conforms to the demographic characteristics of the survey. Secondly, students groups have dependence on smart phone in a large degree, and they have a wide range of application of smart phone. Their average daily use length is longer, and they have more understanding of smartphone operating system, so they can better understand the background of this research. Thirdly, because of the limitation of budget and time, the off-campus sampling is difficult to conduct. At the same time, participants' attitude in the public places is likely to affect the reliability of the questionnaire. The advantage of the campus of sampling is that participants can have enough time to read and understand the background information, and fill in the questionnaire.

4.2. Measurement

We used existing scales as much as possible; adapted some existing scales from the literature; modified scales according to the background of this article actual research. The measures used are the 7-point Likert-type scales with the anchors 1 = strongly disagree to 7 = strongly agree. In order to make the measurement more efficient, the questionnaire is also equipped with two reverse problems. First of all, we simply presented research background to all of the participants; introduced briefly the relevant situation of smartphone operating system; and emphasized the meaning of “replacing the operating system”. Next, we investigated the customer evaluation to the switching cost of antecedent influencing factors, including technical standard complexity, technical upgradability, customer investment and customer experience. Simultaneously, the questionnaire measured the different types of switching costs perceived by customer when they switched smartphone operating system. Finally, participants need to response by some customer retention problems using smartphone operating system, such as reputation evaluation, and recommend to others with willingness to continue to use.

4.3. Data Collection

This study mainly adopts the method of random sampling through on-the-spot questionnaire to collect data. We distributed a total of 450 questionnaires, recycled 407 questionnaire, excluded 40 questionnaires do not conform to the requirements. Therefore the final number of effective questionnaire was 367, and the effective rate was 90.17%. In the 367 samples, male participants accounted for 30.8%, thus the female participants accounted for 69.2%. From the age of the structure, participants less than 18 years old accounted for 7.6%, between 18 - 25 years old accounted for 65.7%, 26 to 25 accounts for 26.2%, more than 35 years old accounts for 0.5%. For the education of structure, 62.7% of the participants are undergraduates, 35.1% of the participants are graduates. From this data distribution, it can be found that participants' age and level of education to some extent is concentrated, but it is still in line with the background of this study, smartphone users are mainly composed of young and middle-aged with higher education.

5. Results

5.1. Reliability and Validity

By using SPSS18.0 to analyze the reliability and validity of the questionnaire, the result shows that “customer retention” Cronbach's alpha coefficient was 0.672, which belongs to the acceptable reliability. And other latent variable reliability is higher than 0.7, belong to the high criteria of reliability. It is indicated that internal consistency of each variable is better (see [Table 1](#)).

This study adopts the factor analysis method to test the validity of the questionnaire structure. First, the use of KMO test and Bartlett sphere test to determine whether each item is suitable for factor analysis. Then, using the “principal component factor analysis” to find out the main composition of the switching cost antecedent influencing factors, the main composition of the customer switching costs and customer retention, and distinguish between dimensions, explain the communalities. According to the results of data that the communalities of each item were greater than 0.6, the item design reasonable and effective, and can better explain the results.

5.2. The Results of SEM

From the above, the reliability and validity of the variables and their dimensions have achieved basic criteria to establish the structural equation model. After carrying out AMOS18.0 software, the fit of model is satisfactory ($\chi^2 = 569.2$; $\chi^2/df = 1.735$; GFI = 0.901; RMSEA = 0.045; CFI = 0.903; TLI = 0.919). The test and the results of the model data is shown in [Table 2](#). It indicates that the model has very strong powers of persuasion for hypothesis argument.

Different antecedent influencing factors of the switching cost in the standard competition market have different impact on the three different types of switching cost. Technology standard complexity in the influential factors proves the positive effect on three kinds of switching costs, particularly the procedural switching cost and the lost benefits cost are relatively strong. Path coefficient is greater than 0.6. In addition to this path which customer investment to the procedural switching cost was refused, technology standard factors of upgradability and consumer factor of customer investment both have influence on the three dimensions of switching cost. However,

Table 1. Results of the reliability and validity analysis.

| Constructs | Code name | Cronbach's α | Factor loadings | Communalities |
|--------------------------------|-----------|---------------------|-----------------|---------------|
| Technology standard complexity | A1 | 0.860 | 0.874 | 0.774 |
| | A2 | | 0.897 | 0.810 |
| | A3 | | 0.875 | 0.776 |
| | A4 | | 0.911 | 0.837 |
| Technology upgradability | A5 | 0.939 | 0.931 | 0.869 |
| | A6 | | 0.948 | 0.903 |
| | A7 | | 0.884 | 0.782 |
| | A8 | | 0.816 | 0.713 |
| Customer investment | A9 | 0.837 | 0.878 | 0.788 |
| | A10 | | 0.843 | 0.750 |
| | A11 | | 0.786 | 0.619 |
| Customer experience | A12 | 0.728 | 0.794 | 0.636 |
| | A13 | | 0.789 | 0.690 |
| | A14 | | 0.765 | 0.659 |
| Procedural switching cost | B1 | 0.728 | 0.784 | 0.636 |
| | B2 | | 0.763 | 0.697 |
| | B3 | | 0.796 | 0.673 |
| | B4 | | 0.784 | 0.708 |
| | B5 | | 0.736 | 0.629 |
| Lost benefits cost | B6 | 0.748 | 0.870 | 0.779 |
| | B7 | | 0.781 | 0.783 |
| Social switching cost | B8 | 0.791 | 0.800 | 0.691 |
| | B9 | | 0.879 | 0.808 |
| | B10 | | 0.799 | 0.865 |
| Customer retention | C1 | 0.672 | 0.794 | 0.622 |
| | C2 | | 0.806 | 0.757 |
| | C3 | | 0.730 | 0.625 |
| | C4 | | 0.506 | 0.650 |

the influence is relatively weak. It shows that in the technology standard competition environment, market environment is special, and influence mechanism is more complex. It has no marked impact on customer investment while this may be associated with stimuli. Customer's investment includes the breadth of investment, the depth of investment, and the degree of customization. Due to smartphone operating system (technical standards) its characteristics of high technology and complexity, consumers on the application platform in a passive position, the vast majority of users are unable to participate in the development of the operating system upgrade or customized modification. But customer's experience has a negative impact on the three kinds of switching cost. Besides, three different types of switching costs have directly different influence on customer retention, but the lost benefits cost impact on customer retention is the largest, path coefficient is 0.882, while the influence of the procedural switching cost and the social transformation cost is relatively weak.

Table 2. Results of path coefficient estimation.

| Path | Hypothesis | Standardized estimates parameter | T-value | P |
|---|------------|----------------------------------|---------|-------|
| Complexity → Procedural switching cost | H1a | 0.654 | 3.346 | *** |
| Complexity → Lost benefits cost | H1b | 0.600 | 3.317 | *** |
| Complexity → Social switching cost | H1c | 0.282 | 3.221 | 0.001 |
| Upgradability → Procedural switching cost | H2a | 0.317 | 4.229 | *** |
| Upgradability → Lost benefits cost | H2b | 0.145 | 2.098 | 0.036 |
| Upgradability → Social switching cost | H2c | 0.291 | 2.207 | 0.027 |
| Investment → Procedural switching cost | H3a | 0.008 | 0.190 | 0.849 |
| Investment → Lost benefits cost | H3b | 0.205 | 3.554 | *** |
| Investment → Social switching cost | H3c | 0.243 | 2.794 | 0.005 |
| Experience → Procedural switching cost | H4a | -0.304 | -2.911 | 0.004 |
| Experience → Lost benefits cost | H4b | -0.223 | -2.477 | 0.013 |
| Experience → Social switching cost | H4c | -0.633 | -3.043 | 0.002 |
| Procedural switching cost → Retention | H5 | 0.260 | 2.254 | 0.029 |
| Lost benefits cost → Retention | H6 | 0.882 | 4.482 | *** |
| Social switching cost → Retention | H7 | 0.185 | 2.076 | 0.038 |

Note: ***The level of significance is less than 0.001 ($P < 0.001$).

6. Discussions

This research studies the influence of four different antecedent influencing factors of the switching cost to three different types of switching costs in the technology standards competition environment, and three different types of switching costs to the customer retention. The purpose is to reveal the difference between the standard competition market mechanism and common market mechanism, and it can help enterprise for better understanding about consumer behavior, and provide marketing strategies for the enterprises.

6.1. Theoretical Contribution

First, this paper puts forward the theory framework of the antecedent influencing factors of the switching cost in the technology standards competition. Existing researches confirmed that the antecedent influencing factors of the switching cost mainly include the market characteristic, customer investment, and professional knowledge [15]. On the basis of previous studies, this study is combined with the characteristics of the technical standards. The antecedent influencing factors of the switching cost can be divided into two kinds, specifically the characteristics of technical standard (complexity and upgradability) and consumer (customer investment and experience). And this study also verifies that these antecedent influencing factors have significant effects on consumers' perception of switching cost. This study enriches the existing literatures, and lay a theoretical foundation for properly understanding the source of the customer perceived switching cost in the standard competition market.

Second, this paper discussed the influence of the switching cost to customer retention in standard competition markets. Existing literatures of the switching cost had focused on consumer purchase decision in the common market environment, but researches on the influence of the switching cost to customer retention lack in the incompatible technical standards market. Through the empirical research, it was found that three dimensions of the switching cost have significant influence on customer retention, which is similar with the previous conclusion. However we found that lost benefits cost is the strongest influence for customer retention, and procedural switching cost and social switching cost is relatively weak. It also reflects products that come from the standard competitive market and high-tech market is often a complex combination of hardware and software. Once consumers switch products, it often means that the hardware and software simultaneously change, and they had to

face greater lost benefits cost.

6.2. Marketing Implication

When two or more incompatible technology standards compete in the market, the key of success for the enterprise is to win the installed base of users. Thus in the technical standards competition environment, how to manage switching cost and retain customers effectively has become vital decisions for enterprises. The marketing implication of this study is mainly manifested in the following three aspects.

First, attention needs to be paid to the management of customer perceived switching cost, realization of customer retention, and improvement of the ability of standard competition. In the standard competition market, procedural switching cost, lost benefits cost, and social switching cost of customer retention play positive role on customer retention. Involved in standard competition of enterprise, it is necessary to strengthen the management of customer perceived switching costs, to create barriers of switching cost, and to improve the level of customer retention. Meanwhile, it is also important to provide support to form and expand the installed base of users, and improve enterprise's ability to participate in the standard competition.

Second, it is important to set the appropriate technical standards complexity, constantly update and upgrade technology standard, and open matching complementary products. Technical standard complexity and upgradability are the important factors influencing the switching cost. Improving technical standard complexity is beneficial to formation of switching costs, but it has a negative effect on consumer's purchase decision [10]. Therefore, enterprise needs to properly set the complexity of technical standards, weaken its impact on consumer purchase decisions, and promote customer retention through the formation of switching cost. Standard suppliers also need to continuously update the current technical standard, enhance upgradability of technical standards, and provide customers with more quality products. In order to achieve the purpose of customer retention, enterprises should establish strategic cooperation with other enterprises, increase support the technical standard of complementary products, and form a larger network effects.

Third, it is crucial to arouse the enthusiasm of customer participation, and establish platform of communication and learning. Customer investment had proved positive effect on three kinds of switching costs, while the influence of customer investment to social switching cost is the largest. Therefore, motivating customer participation and promoting their participation are important tasks of the enterprise. With the increase of the technical standards of complexity, the difficulty of the customer in using product is increasing. Enterprises need to set up platform in which the user can communicate and learn experience, and encourage customers to actively participate in platform. On the one hand, through the interaction between enterprise and customer or the interaction between customers, it increases customer's investment. On the other hand, through customer communication and learning, it reduces the risk of customer perceived.

6.3. Limitations and Directions for Further Research

Finally, we would like summarize defects and shortcomings of this study, and moreover, highlight a few issues that warrant further investigations. This research only chooses the smartphone operating system as the stimuli; it to a certain extent affects the explanatory power of the model. And the samples are relatively concentrated. There are some limitations. In the technology standards competition market, consumer decision is affected by a variety of other factors other than network effects and switching costs. Further research can introduce new variables, such as the compatibility of technical standards, the intensity of standards competition, and consumer's expectations. These factors are likely to have an influence on consumer decision-making process, which will be discussed in future research.

Acknowledgements

This study was supported by the National Natural Science Foundation of China (71002085), and the Humanity and Social Science Youth foundation of Ministry of Education of China (09YJC630101).

References

- [1] Katz, M.L. and Shapiro, C. (1985) Network Externalities, Competition, and Compatibility. *The American Economic Review*, **75**, 424-440.

- [2] Farrell, J. and Shapiro, C. (1988) Dynamic Competition with Switching Costs. *The RAND Journal of Economics*, **19**, 123-137.
- [3] Karakaya, F. and Stahl, M.J. (1989) Barriers to Entry and Market Entry Decisions in Consumer and Industrial Goods Markets. *The Journal of Marketing*, **53**, 80-91.
- [4] Eliashberg, J. and Robertson, T.S. (1988) New Production Preannouncing Behavior: A Market Signaling Study. *Journal of Marketing Research*, **25**.
- [5] Heide, J.B. and Weiss, A.M. (1995) Vendor Consideration and Switching Behavior for Buyers in High-Technology Markets. *The Journal of Marketing*, **59**, 30-43.
- [6] Barroso, C. and Picón, A. (2012) Multi-Dimensional Analysis of Perceived Switching Costs. *Industrial Marketing Management*, **41**, 531-543. <http://dx.doi.org/10.1016/j.indmarman.2011.06.020>
- [7] Pae, J.H. and Hyun, J.S. (2006) Technology Advancement Strategy on Patronage Decisions: The Role of Switching Costs in High-Technology Markets. *Omega*, **34**, 19-27. <http://dx.doi.org/10.1016/j.omega.2004.07.019>
- [8] Katz, M.L. and Shapiro, C. (1994) Systems Competition and Network Effects. *Journal of Economic Perspectives*, **8**, 93. <http://dx.doi.org/10.1257/jep.8.2.93>
- [9] Van den Bulte, C. (2000) New Product Diffusion Acceleration: Measurement and Analysis. *Marketing Science*, **19**, 366-380. <http://dx.doi.org/10.1287/mksc.19.4.366.11795>
- [10] Chakravarti, A. and Xie, J. (2006) The Impact of Standards Competition on Consumers: Effectiveness of Product in Formation and Advertising Formats. *Journal of Marketing Research*, **43**, 224-236. <http://dx.doi.org/10.1509/jmkr.43.2.224>
- [11] Luo, P.L. and Yin, H.X. (2009) Dominating Expectations and Standard Alliances in Standard Competition and Its Welfare Effects. *Journal of Management Science*, **12**, 1-11.
- [12] Tao, A.P. and Sha, W.B. (2009) Technical Standard, Locking Effect and Technology Innovation. *Science and Technology Management Research*, **29**, 59-61.
- [13] Porter, M.E. (2005) *Competitive Strategy*. Huaxia Press, Beijing.
- [14] Klemperer, P. (1987) Markets with Consumer Switching Costs. *The Quarterly Journal of Economics*, **102**, 375-394. <http://dx.doi.org/10.2307/1885068>
- [15] Burnham, T.A., Frels, J.K. and Mahajan, V. (2003) Consumer Switching Costs: A Typology, Antecedents, and Consequences. *Journal of the Academy of Marketing Science*, **31**, 109-126. <http://dx.doi.org/10.1177/0092070302250897>
- [16] Jones, M.A., Reynolds, K.E., Mothersbaugh, D.L. and Beatty, S.E. (2007) The Positive and Negative Effects of Switching Costs on Relational Outcomes. *Journal of Service Research*, **9**, 335-355. <http://dx.doi.org/10.1177/1094670507299382>
- [17] Sengupta, S., Krapfel, R.E. and Pusateri, M.A. (1997) Switching Costs in Key Account Relationships. *Journal of Personal Selling & Sales Management*, **17**, 9-16.
- [18] Wei, S.K. (2006) *Network Game Customer Loyalty Research Based on Switching Costs*. Master Thesis, Zhejiang University, Zhejiang.
- [19] Patterson, P.G. and Smith, T. (2003) A Cross-Cultural Study of Switching Barriers and Propensity to Stay with Service Providers. *Journal of Retailing*, **79**, 107-120. [http://dx.doi.org/10.1016/S0022-4359\(03\)00009-5](http://dx.doi.org/10.1016/S0022-4359(03)00009-5)
- [20] Fornell, C. (1992) A National Customer Satisfaction Barometer: The Swedish Experience. *Journal of Marketing*, **56**, 6-21. <http://dx.doi.org/10.2307/1252129>
- [21] Maute, M.F. and Forrester Jr., W.R. (1993) The Structure and Determinants of Consumer Complaint Intentions and Behavior. *Journal of Economic Psychology*, **14**, 219-247. [http://dx.doi.org/10.1016/0167-4870\(93\)90001-2](http://dx.doi.org/10.1016/0167-4870(93)90001-2)
- [22] Weiss, A.M. and Anderson, E. (1992) Converting from Independent to Employee Salesforces: The Role of Perceived Switching Costs. *Journal of Marketing Research*, **29**, 101-115. <http://dx.doi.org/10.2307/3172496>
- [23] Lam, S.Y., Shankar, V., Erramilli, M.K. and Murthy, B. (2004) Customer Value, Satisfaction, Loyalty, and Switching Costs: An Illustration from a Business-to-Business Service Context. *Journal of the Academy of Marketing Science*, **32**, 293-311. <http://dx.doi.org/10.1177/0092070304263330>

Scientific Research Publishing (SCIRP) is one of the largest Open Access journal publishers. It is currently publishing more than 200 open access, online, peer-reviewed journals covering a wide range of academic disciplines. SCIRP serves the worldwide academic communities and contributes to the progress and application of science with its publication.

Other selected journals from SCIRP are listed as below. Submit your manuscript to us via either submit@scirp.org or [Online Submission Portal](#).

