UNDERSTANDING THE EFFECTS OF TECHNOLOGY READINESS, SATISFACTION AND ELECTRONIC WORD-OF-MOUTH ON LOYALTY IN 3C PRODUCTS

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ABSTRACT

This research examines the exogenous antecedents of loyalty in the purchase of 3C products. In the proposed model, we assess how the direct effects of technology readiness, satisfaction, and electronic word-of-mouth on consumers' loyalty and the indirect effects of technology readiness on loyalty via satisfaction and electronic word-of-mouth. Data was collected via online survey from experienced buyers and users of the leading 3C internet forums in Taiwan. Structural Equation modeling was applied to examine the proposed model. According to the analysis results, loyalty is influenced significantly by technology readiness, satisfaction and electronic word-of-mouth. And, technology readiness has the mediation effects on loyalty via satisfaction and electronic word-of-mouth. Finally, detailed research findings and managerial implications are discussed.

Keywords: *Technology Readiness, Satisfaction, Electronic Word-of-mouth, Loyalty*

1. INTRODUCTION

Since information technologies were developed, the spread of information has been much faster than before. Traditional advertisements, such as television advertisements, radio advertisements and newspaper advertisements, are not sufficient for companies to promote their products and services. However, due to the overload information of advertisements, consumers do not have enough time to review by themselves and are compelled to ignore most of the advertisements. Instead, they usually prefer to gain opinions and experiences about products or services which they want to purchase from their friends, colleagues or families. It is easier for people to search information about all kinds of products on the Internet. Therefore, Word-of-mouth plays a very important role in consumer behavior and it has the effect on consumers' decisions of long-term and short-term procurements (Dolen et al., 2007). Furthermore, internet offers the fastest and most convenient channel for consumers to exchange information, so more and more people exchange their opinions and experiences about products and services on the Internet. Such exchanging behavior is regarded as the electronic word-of-mouth (Hennig-Thurau et al., 2004; Litvin et al., 2008; Casalo et al., 2008).

The rapid development of internet technologies has led the growth of computer relative industries which is called 3C (Computers, Communications and Consumer-electronics) industries. Nowadays, more and more consumers survey other consumers' experiences and opinions posted on the internet when they purchased 3C products and services. Companies have to force to develop new strategies for interactive marketing. However, 3C industries are highly competitive and have changed very fast. Manufacturers have to be highly sensitive to face the market changes and the feedback from consumers. Utilizing the electronic word-of-mouth is the efficient approach to deliver information about new products to customers as well as gain the feedback from them. In order to promote new 3C products more effectively, 3C manufacturers have paid more and more attention to the electronic word-of-mouth. There are many professional and famous online discussion forum which provide internet forums for internet users to share their experiences and opinions on 3C products such as Tom's Hardware (http://www.tomshardware.com/), Hard Forum (http://hardforum.com), Mobile01 (www.mobile01.com) and My Mobile Life (www.mml.com.tw).

On the other hand, the degree of accepting or resisting new information technologies from consumers' personalities is worthy to explore it either in the context of work or home (Chen et al., 2009). Parasuraman (2000) proposed the technology readiness (TR) which represented multidimensional psychographic constructs and offered a way to segment online customers based upon underlying the positive and negative technology beliefs. On account of technologies' adopting and purchasing characters in 3C products, it is necessary to understand customers' readiness to use new 3C products such as iPad, Smart Phone, Tablet. Therefore, technology readiness and consumers' satisfaction directly affect 3C manufacturers' profit and market share. This research assessed the effects of technology readiness, satisfaction, and electronic word-of-mouth that affect the loyalty of consumers in 3C products purchase. Consumers' satisfaction and loyalty represented that if consumers will purchase products again, recommend products to others and increase their loyalty of the 3C manufacturers. This study attempted to develop a conceptual model for explaining the loyalty towards 3C products purchase and its related factors. First, to distinguish from previous research that discussing the influence of TR on satisfaction and behavioral intention (e.g. Lin and Hsieh, 2007; Chen et al., 2009), we examined and clarified the influence of technology readiness, electronic-word-of-mouth and satisfaction on loyalty. Second, this study reviewed the relevant literature on technology readiness, customer satisfaction, electronic-word-of-mouth and the loyalty. Third, we presented the research framework and hypotheses along with research methodology and results. This research applied Structural Equation Modeling (SEM) to demonstrate the measurement model for reliability and validity and the results of hypotheses testing. Finally, based on the analysis results, some recommendations (managerial implications) of improving the effectiveness, research limitations and suggested further research directions were given.

2. RESEARCH FRAMEWORK AND HYPOTHESES DEVELOPMENT

2.1 Electronic-Word-of-mouth

Westbrook (1987) defined word-of-mouth as the opinion which consumers communicate to others in an unofficial way after they have used a product or taken a service. Bristor (1990) mentioned that word-of-mouth as the approach to obtain others' experiences through the interaction of social network. This information communication is normally thought more neutral and more reliable, because it is mostly generated directly by consumers rather than by companies. Some people think that marketing is about advertisements and promotions. Engel, Blackwell and Miniard (2001) suggested that the post-purchase behavior is reactions after consumers purchased a product. There are two types of reactions which are feeling satisfied and feeling dissatisfied. According to Hennig-Thurau et al. (2004), the definition of electronic word-of-mouth (eWOM) is online customers or potential customers often seek out information on products or companies and share their knowledge, experiences and opinions, both positive and negative.

The development of the internet has promoted the growth of electronic word-of-mouth. Information and opinions are exchanged and spread by plenty different platforms such as emails, MSN messenger, BBS (Bulletin Board System), online discussion forums, message boards, newsgroup, Industrial portal discussion area, chat room and so on. The traditional word-of-mouth is instantaneous and passed face to face, but the electronic word-of-mouth could be spread faster, in anytime, and in a way of one to many. Researchers believed that that the information which is communicated via the internet is a kind of word-of-mouth (e.g. Gelb and Johnson, 1995; Gelb and Sundaram, 2002; Litvin, Goldsmith and Pan, 2008). Because the electronic word-of-mouth is not limited by time and distance, and it is more effective, more convenient and broader. In the physical world, if a customer felt dissatisfied, he/she may tell the other six people about his/her dissatisfaction. However, in the world of internet, if a customer feels dissatisfied, his/her dissatisfaction can be delivered to more than six thousand people by internet platforms. Therefore, even though the electronic word-of-mouth could not replace the traditional word-of-mouth, the electronic word-of-mouth has been thought as the most powerful potential marketing approach.

2.2 Technology readiness

While adopting new technologies is easy for some people, it might be difficult for others. Parasuraman (2000) defines technology readiness index as "people's propensity to embrace and use new technologies for

accomplishing goals in home life and work". Technology readiness can be seen as a psychological status. There are two kinds of forces in psychology affecting the willingness to use new technologies, which are enablers and inhibitors. Parasuraman and Colby (2001) cooperated with Rockbridge Associates Inc. and interviewed customers of Rockbridge Associates Inc. with focus groups. After interviews, they summarized the positive and negative feelings about facing new technologies. According to this research, Parasuraman and Colby (2001) propose four dimensions of measuring technology readiness index, which are the optimism, innovativeness, discomfort and insecurity. These four dimensions are explained in the following.

(1) The optimism means positive views on new technologies, and it means that people feel more controllable, flexible and efficient when using new technologies. People who are optimistic about technology think that they have the ability to make good use of new technologies, and believe that new technologies can help them improve their life and work.

(2) The innovativeness means the intention to become a pioneer of technology and thought leader. People with the perception of the innovativeness feel like trying new technologies all the time.

(3) The discomfort means the feelings of lack of control over new technologies. People with the perception of discomfort are not confident in using new technologies and are overwhelmed by using them.

(4) The insecurity means the distrust of new technologies. People with the perception of insecurity doubt whether technology could work properly or not.

By using technology readiness index, it is clearer to understand customers' beliefs and feelings about adopting new technologies.

2.3 Customer satisfaction and loyalty
Cardozo (1965) is a pioneer who discussed customer satisfaction in marketing area. He addressed that because the market has become so competitive, more and more companies have paid more attentions to customer satisfaction. Customer satisfaction has become a big issue in business governance. Customer satisfaction can affect consumers' intention to purchase the same products again or purchase other products.

Customer satisfaction can be discussed from two different angles: psychologically and economically. From customers' psychological point of view, if the purchase result is better than what a customer expects, the customer will feel satisfied. From customers' economical viewpoint, if the benefit of the product or service is worthier than the time and money a consumer has invested, the consumer will feel satisfied. Otherwise, the consumer will be dissatisfied (Howard and Sheth, 1969). Researchers suggested customer satisfaction as an emotional reaction which results from a purchase experience (e.g. Oliver, 1981; Oliver, 1993; Meuter et al., 2000; Maxham, 2001; Yu et al., 2005; Froehle, 2006; Chen and Chen, 2009). Anderson, Fornell and Lehmann (1994) thought that customer satisfaction is an overall accumulative evaluation of a company after consumers have experienced their products or services. There is no point in fascinating old customers after losing them, especially the cost on attracting a new customer is five times more than the cost on retaining an existing customer (Bhattacherjee, 2001).

To sum up the literatures mentioned above, customer satisfaction is an emotional reaction after consumers purchase and experience a product or service. These accumulative reactions have become the customer satisfaction with a company. The positive customer satisfaction results in the higher customer loyalty and the higher willingness to repurchase. Since customer relationship is a virtual asset of enterprise, higher customer satisfaction brings higher profits and higher market share for companies. Therefore, aiming high customer satisfaction is one of important goals for the majority of the enterprises. Thus, in this research, we discussed how technology readiness index and the electronic word-of-mouth affect customer satisfaction.

2.4 Research framework
Based on the existing theoretical streams, Chen et al. (2009) and Lin and Hsieh (2007) suggested technology readiness has the significant influence on satisfaction and behavioral intention towards self-service technologies.

Lin et al. (2007) mentioned that technology readiness could integrate into technology acceptance model (proposed by Davis, 1989). Bansal and Voyer (2000) pointed that word-of-mouth has the influence with a services purchase decision environment. The research results by Casalo et al. (2008) showed that satisfaction with previous interactions has significant influence on both word-of-mouth and loyalty.

Therefore, this research proposed a model of technology readiness, satisfaction, electronic word-of-mouth, and loyalty for more comprehensive model to assess the loyalty of 3C products. Through the literature review as above, we consolidated the associated variables for understanding and explaining the loyalty towards 3C products purchase. The research model is represented in Figure 1, whereas the research hypotheses among theoretical factors are summarized in Table 1.

[Insert Figure 1 about here]
[Insert Table 1 about here]

3. RESEARCH METHODOLOGY

3.1 Measures

To understand and assess the research model, we adopted the survey methodology. The measurement items in the questionnaire were developed from the existing literature. The formal questionnaire contains 6 parts. The first part of the questionnaire asked respondents about their usage experiences of 3C products and online discussion forum. The second part is about their willingness to refer to the electronic word-of-mouth before purchasing on website. The remaining measurement items, constructs and sources were as follows (the constructs studied herein are measured using 7-point Likert scales):

    (1)   Technology readiness: eighteen items were adopted from Parasuraman (2000), Yen (2005) and Lin and Hsieh (2006, 2007); a sample item: technology gives people more control over their daily lives.

    (2)   Satisfaction: three items were modified from Olvier (1993), Bhattacherjee (2001) and Lin and Hsieh (2007); a sample item: overall, you are satisfied with the 3C product(s) offered by [Name of company].

    (3)   Electronic word-of-mouth: four items were slightly modified from Dolen et al. (2007) and Maxham (2001); a sample item: I will recommend this 3C product(s) made by [Name of company] when someone seeks my advice in the 3C's internet forums.

    (4)   Loyalty: three items were modified from Zeithaml et al. (1996) and Yu et al. (2005); a sample item: I will continue using or buying the 3C product(s) offered by [Name of company].

3.2 Subjects

For ensuring the reliability and validity of the measurement items, we conducted a pretest on 30 graduate students during 1 week. After pretest, inappropriate items were eliminated and web survey questionnaires were broadcasted by a professional marketing survey agency headquartered in Taipei, Taiwan and posted on the questionnaire collection website http://www.mysurvey.com, from 1 January to 15 February, 2011. Comparing with traditional paper based surveys, web survey have more advantages (Hsu and Lu, 003). To stimulate this research program, we offered two dollar worth of keepsakes as an incentive. After eliminating invalid participants through data filtering, the web survey yielded 260 responses as the sample finally. Seventy-one percent of the participants were male, and 29% were female. Most of the participants were in the age bracket of 20-29 (over 74%). The majority (72%) owned the university education and 68% of the participants had 5-10 times of online shopping experience.

4. ANALYSIS AND RESULT

This study used structural equation model (SEM) as a data analysis method by AMOS. There are several software packages that could explore and assess confirmatory factor analysis and SEM models, such as LISREL, EQS, SEPATH, and so on. Among them, AMOS is the best choice for producing valid results (Arbuckle, 2005; Shih, 2009). Therefore, we applied AMOS (version 18) for assessing the research model. Descriptive statistics and standardized factor loadings for each item were presented in Table 1.

[Insert Table 1 about here]

4.1 Reliability and validity test

Reliability was first checked. Each construct in the research model was measured using at least three indicators (measurement items). Nunnally (1978) recommended that reliability is achieved if Cronbach's alpha is higher than 0.7. We found that the coefficients of Cronbach's alpha of the four constructs were higher than 0.7, which indicated that they owned the internal consistency for each constructs, respectively (as shown in Table 2). The average variance extracted is used to test the convergent validity. Fornell and Larcker (1981) suggest that 0.5 is the minimum level for the value of the average variance extracted. Besides, Cronbach's alpha of each construct is greater than 0.7 and factor loading of each item is also significant. As shown in Table 2, it means that the convergent validity is acceptable.

[Insert Table 2 about here]

The chi-square difference tests were used to estimate the discriminant validity of two constructs by computing the difference of the chi-square values between the constrained (the covariance between each pair of constructs was fixed at one) and unconstrained models (all constructs were allowed to covary freely) (Hatcher, 1994). Since the reliability and validity test of the questionnaire are all acceptable, the result of the analysis can be seen as believable.

[Insert Table 3 about here]

4.2 Overall model fit

Ten common model goodness-of-fit measures were examined: Chi-square Divided by Degrees of Freedom ($\chi^2/d.f$), Goodness-of-fit Index (GFI), Adjusted Goodness-of-fit Index (AGFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), Parsimony Goodness-of-fit Index (PGFI), Parsimonious Comparative Fit Index (PCFI), Parsimonious Normed Fit Index (PNFI), Root Mean Square Residual (RMR) and Root Mean Square Error of Approximation (RMSEA). After estimating the model fit criteria by AMOS 18, the values are shown as following: $\chi^2/d.f$ is 2.00, GFI is 0.89, AGFI is 0.83, CFI is 0.95, TLI is 0.93, IFI is 0.95, PGFI is 0.60, PCFI is 0.74, PNFI is 0.70, RMR is 0.059, and RMSEA is 0.09. Thus, the results indicated that the model fit criteria were satisfactory ($\chi^2/d.f$ lower than 3.0; CFI, TLI, and IFI higher than 9.0; AGFI higher than 8.0; PGFI, PCFI, and PNFI all lower than 9.0; RMR and RMSEA all lower than 0.08 except GFI slightly lower than 0.9).

4.3 Hypotheses testing results

The path analyses were estimated by SEM to examine 6 hypotheses in the proposed model. In this study, because the measurement model is equivalent with the structural model, model fit criteria are the same between the measurement model and the structural model. Based on the entire samples, 6 paths are all significant at the 0.05 level. Properties of the casual paths, including standardized path coefficients, critical ratios (t-values), and hypotheses testing results are shown in the Table 4.

[Insert Table 4 about here]

Loyalty is influenced by satisfaction ($\beta= 0.25$), electronic word-of-mouth ($\beta= 0.31$), and technology readiness ($\beta= 0.36$), which jointly explained 66% of the variance in loyalty. Electronic word-of-mouth is influenced by satisfaction ($\beta= 0.33$) and technology readiness ($\beta= 0.34$), with jointly 39% of the total variance explained. And, technology readiness ($\beta= 0.78$) determines satisfaction and explain 61% of error variance. Thus technology readiness devotes it direct and indirect effects on satisfaction, electronic word-of-mouth, and loyalty.

Besides, we examine the Sobel test (Sobel, 1982) to confirm the mediation effects of technology readiness on loyalty via satisfaction and electronic word-of-mouth independently of each others. First, the indirect effect from technology readiness to loyalty via satisfaction was 0.20. Results revealed that the indirect path was significant at *p-value*<0.05. Second, the indirect effect from technology readiness to loyalty via electronic word-of-mouth and satisfaction was 0.19. Results revealed that the indirect path was also significant at *p-value*<0.05. Hence, the two mediation paths were proven significant.

5. DISCUSSION AND CONCLUSION

A consumer's loyalty towards 3C products purchase should incorporate satisfaction of usage experience and personal characteristics. Several managerial implications can be derived from this study. First, this study indicates that loyalty is influenced electronic significantly and positively by word-of-mouth. Hence, e-retailers should cooperate with professional online discussion forums and pay attentions to customers' opinions on the internet. Nowadays, there are too many advertisements in the public media, and customers are forced to ignore most of them. Therefore, the electronic word-of-mouth has become one of the most efficient approaches for consumers to gain the information about new services. There are many professional online discussion forums which provide platforms for internet users to express their experiences and opinions.

Second, satisfaction influences directly on loyalty and is the indirect influencer of loyalty via electronic word-of-mouth. This study proposes the supplementary support of Bhattacherjee (2001) and Bhattacherjee et al. (2008). Besides, the dissatisfying customers express their complaints on professional online discussion forums instead of responding to the customer service department of e-retailers. E-retailers have to pay attentions to online discussion forums and give resolutions to consumers' problems and complaints. In this way, customer satisfaction can be improved and the positive electronic word-of-mouth can be increased as well. Nowadays, manufacturers and retailers should promote and advertise their products and services by different media such as internet forums, Blogs, virtual communities and so on.

Finally, technology readiness plays an important role in forming satisfaction, electronic word-of-mouth, and loyalty. And, technology readiness is the most motivator of loyalty in this study. The effect of technology readiness on loyalty is much greater than satisfaction and electronic word-of-mouth. According to Parasuraman and Colby (2001), both the perception of optimism and innovativeness are the contributors of technology readiness, and people with the traits of optimism and innovativeness and lower discomfort and insecurity prefer adopt new information technologies. This means e-retailers should assess thoughtfully how to mine the psychological characteristics of technology readiness for increasing satisfaction, electronic word-of-mouth and loyalty.

This paper attempts to investigate the casual relationships among technology readiness, satisfaction, electronic word-of-mouth, and loyalty. Technology readiness was theorized to be the antecedent of both satisfaction and electronic word-of-mouth, which consequently influence loyalty towards online shopping. To differentiate the research results with Lin et al. (2007), this study also employed electronic word-of-mouth to investigate its effects on an individual's loyalty. According to the analysis results, it is obvious that the electronic word-of-mouth plays an important role in the e-shopping environment.

Due to the limited time and resources, the main limitation is that the sampling countries and regions should be extended in this research work. There are 260 participants which are analyzed in this research. The second limitation is the potentiality of a common method bias by adopting a single questionnaire to measure all constructs. The third limitation is that we should survey the possible influence caused by the sub factors of technology readiness may be taken into consideration in the future.

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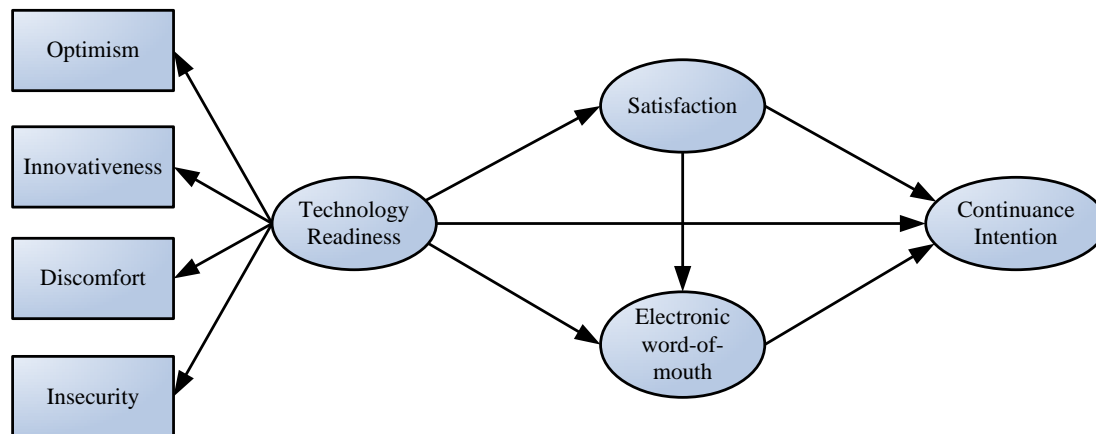
Figure 1: Research model

Table 1: Research hypotheses

Hypothesis 1	Satisfaction has a significant influence on loyalty
Hypothesis 2	Electronic word-of-mouth has a significant influence on loyalty
Hypothesis 3	Satisfaction has a significant influence on electronic word-of-mouth
Hypothesis 4	Technology readiness has a significant influence on loyalty
Hypothesis 5	Technology readiness has a significant influence on satisfaction
Hypothesis 6	Technology readiness has a significant influence on electronic word-of-mouth

Table 2: Summary of measurement scales

Construct	Indicators	Mean	S.D.	Standardized loading
Technology Readiness	Optimism	6.00	1.12	0.85
	Innovativeness	5.73	1.19	0.66
	Discomfort	5.49	1.29	0.74
	Insecurity	6.01	0.90	0.55
Satisfaction	SAT1	5.85	0.97	0.78
	SAT2	5.51	1.06	0.86
	SAT3	5.28	1.12	0.85
	SAT4	5.36	1.06	0.86
Electronic Word-of-mouth	EOM1	6.16	0.99	0.66
	EOM2	5.57	1.23	0.58
	EOM3	5.91	1.08	0.87
Loyalty	LO1	6.16	0.82	0.88
	LO2	5.83	0.99	0.72
	LO3	6.07	0.91	0.92

Table 3: Correlation matrix, Cronbach's α, and average variance extracted

Construct	Cronbach's α	Average variance extracted	TR	SAT	EWOM
TR	0.79	0.50	1.00		
SAT	0.90	0.70	0.78	1.00	
EWOM	0.75	0.51	0.59	0.59	1.00
LO	0.88	0.71	0.74	0.72	0.68

Note: TR= Technology readiness; SAT= Satisfaction; EWOM= electronic word-of-mouth; LO= Loyalty

Table 4: Chi-square difference tests for examining discriminant validity

Construct pair (Unconstrained) χ^2= 142.01 ($d.f.$= 71)	Constrained χ^2 ($d.f.$= 72)	χ^2 difference
(TR, SAT)	167.37	25.36**
(TR, EWOM)	170.68	28.67**
(TR, LO)	173.81	31.80**
(SAT, EWOM)	171.46	29.45**
(SAT, LO)	175.16	33.15**
(EWOM, LO)	170.06	28.05**

Note 1: TR= Technology Readiness; EWOM= Electronic Word-of-mouth; SAT= Satisfaction; LO= Loyalty
Note 2: ** significant at the 0.01 overall significance level by using the Bonferroni method

Table 5: Summary of hypotheses testing results

	Hypotheses	Standardized Path Coefficients	Critical Ratio (t-value)	Results
H1	SAT positively influences LO.	0.25*	2.08	Supported
H2	EWOM positively influences LO.	0.33*	2.14	Supported
H3	SAT positively influences EWOM.	0.31***	3.48	Supported
H4	TR positively influences LO.	0.36**	2.72	Supported
H5	TR positively influences SAT.	0.78***	7.93	Supported
H6	TR positively influences EWOM.	0.34*	2.17	Supported

Note 1: TR= Technology Readiness; EWOM= Electronic Word-of-mouth; SAT= Satisfaction; LO= Loyalty
Note 2: * p-value <0.05; ** p-value <0.01; *** p-value <0.001