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PRODUCT INTEGRATION FORMATS AND CONSUMERS' EVALUATIONS OF THE ONLINE EXTENDED PRODUCT: A PRODUCT INTEGRATION PERSPECTIVE

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Abstract

After launching new products, firms are spending substantial amount of resources into cross-product integration to attract traffic. While customers place increasing value on product integration, little is known about the influence of product integration on consumers' evaluation of extended product. Based on the product presentation perspective, this study proposed and validated a research model through a scenario-based experiment. The findings suggest that value added integration, rather than the data interface and add-on module integration, is associated with a higher level of perceived diagnosticity. Perceived diagnosticity had a significant influence on consumers' evaluations of the extended product. This study contributes to the research and practice by providing insights about product promotion within the online context.

Keywords: Product Integration, Product Presentation, Perceived Diagnosticity, Human Computer Interface

Introduction

Competition is keen among online merchants and content providers. To remain competitive, online merchants have been adopting certain strategies to attract and retain customers. A common strategy is the multi-product competition. After gaining success in one market through flagship product, online firms often continue to launch new products to capture new markets. For example, after having great success in the search engine market, Google launched email (Gmail), instant messenger (GTalk), and electronic payment (Google Checkout) services. After the success of its web portal, Yahoo launched online instant messenger services (Yahoo messenger).

Web traffic is the key asset and indicator of an online Information Technology (IT) product success. Undoubtedly, after launching new products, firms are spending substantial amount of resources into online promotion to attract traffic. According to the Interactive Advertising Bureau,

the expense on online advertisement in 2008 had rose to $23.4 billion in U.S [1]. In another study, conducted by the European Interactive Advertising Association, 70% of advertisers claimed that their allocated funds to online ads are projected to rise in 2009 [2]. Therefore, introducing a new product to existing as well as new traffic represents a critical opportunity for firms. Since cross-product integration has become an important tool to make use of existing traffic, this poses one important question: How would online product integration affect consumers' intention to use the extended product?

Although, the practice of product integration in the online environment is expanding and customers place considerable emphasis and increasing value on cross-product integration, little is known about the effects of product integration and its artifacts on users. On one hand, as early as 1970s, software engineering researchers proposed the concept of coupling to measure the strength of association established by a connection from one module to another [3]. Later, software engineering scholars generally began to focus on the measurement of coupling in different contexts and from different perspectives [4, 5]. On the other hand, in innovation management field, researchers generally pay much attention on the antecedents of product integration and the influence of technology integration on product development performance [6, 7, 8].

In contrast to the proliferation of online cross-product integration worldwide, work by Information Systems (IS) researchers in this area is scant. There is little theoretical work in the literature that considers the relationships between product integration and the cognitive, behavioral, and decision measures of users. Success in devising multi-product competition strategies through cross-product integration depends on a clear understanding of its effectiveness. Research on product integration will provide online providers with a deeper understanding of the different product integration approaches that would maximize the benefits when entering new markets

and business opportunities.

Theoretical Development

Given the importance of the cognitive stimulus as a catalyst in the online users' decision-making process, environmental psychology has been a logical theoretical foundation for studying the influence of technology product integration on online promotion effectiveness. In particular, researchers have drawn from the stimulus-organism-response (S-O-R) paradigm and posit that environmental cues act as stimuli that affect an individual's cognitive reactions which in turn affect behavior. In the next subsection, we propose that the technology product integration acts as a stimulus that influence the online users' learning efficacy when interacting with the promotion environment, which ultimately affects their intention to use the extended product.

Product Integration as Environmental Stimulus

In the online environment, IT mediates the exposure of the online promotion. Thus, it is intuitive that not only the extended product characteristics but also the interaction between extended products and promotion environment (i.e. the focal product) would influence consumer evaluations of extended product. Technology product integration is the combination of different technology products, enabling them to interact with each other. According to the nature of coupling (external or internal) and extent of coupling (comprehensive/value added or minimal), Nambisan [8] identified three main types of technology integration: value added internal integration, add-on module integration, and data interface integration. Value-added integration refers to integrating internally the focal product with extended product and merging the data and the functions of the two products in a seamless fashion [9]. Based on the coupling between the two products, value-added integration offers additional product features. The second type of product integration, add-on module integration, involves the integration of the focal product with relevant product through an external module or component (i.e., separate from the focal product itself). While the integration is achieved externally, such an add-on module would still provide the requisite support for a comprehensive integration and sharing of data and functions of the two products [8]. The third type of product integration, data interface integration, involves the external integration of the focal product with a relevant product by defining the technical interface needed to affect the transfer of data across the two products [10]. Such product interface specifications provide only a minimal level of functional integration across the two products.

Product Presentation and Learning Efficacy

Interaction with the online environment leads to cognitive reactions. Cognitive reactions to the stimulus refer to the mental processes occurring in individuals' mind when they interact with the stimulus [11]. Different concepts, such as learning efficacy, have been used to describe cognitive reactions that result from interacting with the environment. Online product presentations are designed to introduce products to consumers, to help consumers form a clear understanding of products, and, ideally, to impress consumers with superior or attractive product features [12]. in an attempt to facilitate consumers' understanding of how a product performs, current online product presentations are typically pictorial or image-based, and use vivid visual effects encompassing products' appearance, functionality, and behavior under different working conditions. Vessey and Galletta [13] suggest that different presentation formats significantly influence the quality of cognitive learning. The cue-summation theory can explain the efficacy of learning in the online environment.. The cue-summation theory posits that learning is more effective as the number of available cues or stimuli (either across channels or within channels) increases [14, 15].

Several recent education and electronic commerce studies have argued that the product presentation triggers active learning, consequently improving learners' performance and learning experiences [16, 17]. For example, Mayer [18] suggested that meaningful learning occurs when learners actively process information presented to them, and when they actively construct mental representations. In another study, Mayer et al. [19] termed this process as constructivist learning. Both studies argued that active leaning includes paying attention to the processes of selecting relevant information, mentally organizing the information into coherent representations, and integrating the representations with one another as well as with relevant prior knowledge. Carroll et al. [16] suggested that active leaning typically takes the form of learning by doing, by thinking, and by knowing. Specifically, in an active learning mode, learners prefer to try things out rather than read or follow structured systematic formulae. They prefer to make sense of their learning experiences by developing and examining hypotheses rather than by depending on rote assimilation of information. They also tend to relate their learning experiences to prior knowledge or metaphors to figure out how to perform certain processes and to decide which processes to perform [20].

Research Hypotheses

Effects of Product Integration Formats

In their study of online product experience, Jiang and Benbasat [21] used perceived diagnosticity construct to represent consumers' perceptions of a channel's ability to convey relevant product information that can assist them in understanding and evaluating the quality and performance of products promoted online. Since enhancing consumers' abilities to evaluate products is a prominent goal that drives design improvements in product presentations, perceived diagnosticity is particularly important in the present study [22]. Richer media are typically considered more capable of unambiguously conveying information; therefore, consumers' perceptions of the richness of the interfaces are likely to determine their perceptions of a channel's capability to help them learn product information [23, 24, 17].

As already mentioned, according to the cue-summation theory, learning is more effective as the number of available cues or stimuli increases [14, 15]. Value added integration involves integrating the products internally and merging the data and functions of two products in a seamless fashion [9]. Based on the coupling between the two products, value added integration offers additional product features [8]. The available cues or stimuli for learning the quality and performance of the extended product would increase. Hence, the efficacy of learning would be enhanced and consumers would be likely to improve product understanding. Although add-on module integration provides the requisite support for a comprehensive integration and sharing of data and functions of the two products, consumers can only learn the quality of the extended product through performing the shared functions. Therefore, the information presented to consumers in the value added integration format is perceived as richer compared to the information presented in the add-on module integration format.

H1a: Technology product integration in the value added internal format would lead to a higher perceived diagnosticity compared to product integration in the add-on module format.

Add-on module integration provides the support for a comprehensive integration and sharing of data and functions of the two products. This can facilitate consumers' understanding of how the extended product performs by observing the product's functionality and its behavior under integrated working conditions. Data interface integration only facilitates the transfer of data across the two products. Facing the minimal level of functional integration, users will have more difficulties to learn the quality and performance of extended product. Further, from the leaning curve perspective, the add-on module integration enables the process of integration to be transparent resulting in a lower learning curve. In the data interface integration situation, consumers can only learn through the transfer of data, which is hard to observe, and from learning experiences. Therefore, with more difficulties to learn the extended product, consumers' perceptions of the ability of focal product to convey relevant information that can assist them in understanding and evaluating the extended products would be lower. Hence, the following hypothesis were made:

H1b: Technology product integration in the add-on module format will lead to a higher perceived diagnosticity compared to product integration in the data interface format.

Effects of Product Integration Formats

Research has shown that three evaluation criteria — utilitarian, hedonic, and social values — succinctly cover a broad set of factors that individuals consider important in the context of IT use [25]. The utilitarian value relates to the effectiveness and efficiency resulting from the use of an IT application [26]. The hedonic value is associated with the fun or pleasure derived from using the application [27]. The social value refers to the enhancement of social images of users by their use of the application [28]. The salience of utilitarian, hedonic, and social values factors varies according to the research context. Furthermore, some variables other than the three value factors may emerge as salient factors, depending on the research context [28]. However, this study examines only the essential set of user evaluations to focus on its core topic, that is, intention to use the extended product.

In the context of online technology product evaluation, perceived diagnosticity represents consumers' cognitive belief that a channel facilitates their product understanding [21]. If consumers believe that a product experience is diagnostic, it is likely that their beliefs about the product will be stronger and held with more confidence [17, 29]. Higher perceived diagnosticity means that consumers are more capable of understanding products and can make decisions that are more informed. Prior research indicates that consumers' cognitive evaluations of products are positively associated with the strength of their beliefs and confidence in their own evaluations of product attributes [30]. It follows that if the advocated product information is favorable, as is often the case when online firms promote their products, higher perceived diagnosticity would enable consumers to understand the positive product information more thoroughly, thereby, improving consumers' cognitive evaluation of

products. Several studies have supported this assumption. For example, Kemph and Smith [29] observed that, in the offline promotion environment, perceived diagnosticity positively contributed to the cognitive evaluation of product attributes. Thus, it was expected that:

H2: Perceived diagnosticity will positively influence utilitarian value of extended product.

H3: Perceived diagnosticity will positively influence hedonic value of extended product.

H4: Perceived diagnosticity will positively influence social value of extended product.

       Based on the theory of reasoned action (TRA) [31], evaluations, viewed as the positive antecedent beliefs, are expected to affect people's attitudes, consequently influencing their behavioral intention [32]. In general, favorable product evaluations would lead to higher intentions to use the product simply because consumers can perceive the benefit of using the product [33]. Empirical studies on online services generally support this expectation of the positive relationship between evaluations and behavioral intention [34]. Accordingly, we expected the same logic to extend to our context.

H5: The utilitarian value of integration will have a positive influence on intention to use the integration.

H6: The hedonic value of integration will have a positive influence on intention to use the integration.

H7: The social value of integration will have a positive influence on intention to use the integration.
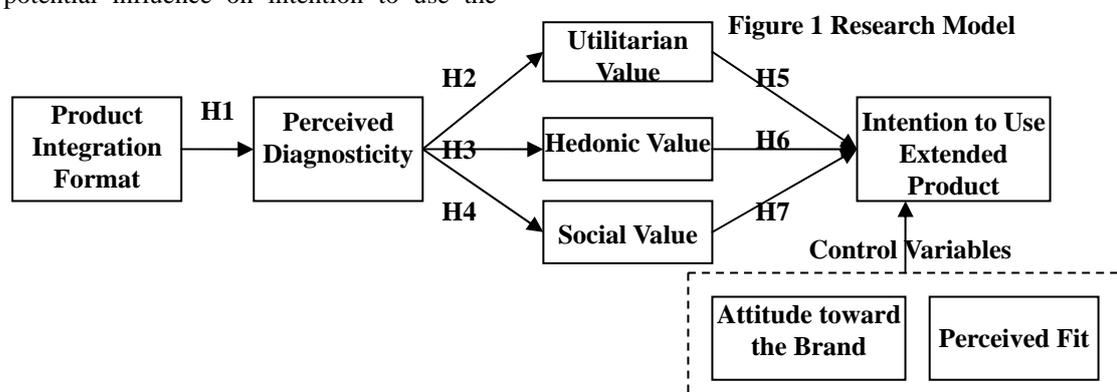
Control Variables

To account fully for the differences among brands and product categories, we also included two control variables that characterize our unit of analysis: attitude toward brand, and perceived fit. We selected these particular variables because of their potential influence on intention to use the

extended product, as suggested by the extant literature.

Prior to product integration, consumers already possess established attitudes toward the original product. When the extended product is launched, consumers evaluate it based on their existing attitude toward the brand. The effect of existing attitudes toward brand on the attitude toward the extended product could be either positive or negative. If the brand is associated with favorable attitudes, the extended product should benefit; if it is associated with unfavorable attitudes, the extended product should be harmed [35, 36, 37]. To account for the variances attributable to attitudes toward brand, we considered the differences among consumers regarding their attitude toward the brand as a control variable.

       In this study, a new extended product was defined as a new instance that can be more or less similar to the brand and existing products. The number of shared associations between the extended product and parent brand characterized the perceived fit [35]. If consumers perceive a good fit between the original and extended product, the new extension will be more easily matched with the original brand category. Therefore, with category-based processing, positive perceptions and evaluations would be transferred to the new extended product, and the new extended product would benefit. When the fit is weak, consumers will review the information available, evaluate each piece of information separately, and make a final decision [38]. In this situation, consumers may question the ability of the firm to launch the extended products [36, 39]. If the fit is incongruous, the extension may be regarded as humorous or ridiculous. Thus, we expected a positive relationship between perceived fit and intention to use the extended product. Figure 1 illustrates our research model and basic hypotheses.

Figure 1 Research Model

Research Method

To test the hypotheses in the present study, we conducted a quasi-experiment to test the

hypotheses. A quasi-experimental design was adopted because this approach allows us to manipulate key variables and exercise control over extraneous variables. We used a 3 (data interface,

add on module, and value added integration) between-subject, full-factorial design. Product integration was the manipulated factor and randomly assigned to groups. A total of 114 students from a public university participated in the experiment. Prior to the study, the subjects were informed that they would each receive $5 as a reward for their participation. The subjects were randomly assigned to one of the three experimental conditions. All the experimental sessions were conducted in a laboratory with 60 identical PCs connected to the Internet.

Manipulations
We operationalized technology product integration by using a scenario-based method. The scenario-based method has been adopted in information system research [40]. Sheng et al. [41] justified the appropriateness of using scenario-based methods for studying ubiquitous computing applications, "the use of scenarios makes it possible for researchers to study the emerging [...] phenomenon without being constrained by the timing of the study or the state-of-the-art of technology". Therefore, we manipulated three types of integration (data interface, add on module, and value added) using different scenarios. A search engine and its promoted two new products (C2C website and online Chinese encyclopedia) were adapted in this study to yield different scenarios.

In the data interface integration scenario, the vendor just uses one hyperlink to promote the new products. When logging on the search engine, if users want to use the promoted products, they need to click the links. In add on module integration scenario, there exists a pop up messenger to promote the new products. When users log on the homepage of search engine, the messenger will pop up. If users want to use the promoted products, they can click the links appeared on the messenger. In the value added integration scenario, vendors supply additional features based on the coupling between products. In the case of integration between search engine and C2C website, when users search one product in the search engine, the relevant linkages about this product in the C2C website will appear as the search suggestion. Therefore, without logging on the homepage of C2C website, users can find the product in the commerce website directly. In the case of integration between search engine and online encyclopedia, when users search one concept in the search engine, the relevant links in the online encyclopedia will also emerge as the search suggestion. Hence, without logging on online encyclopedia, users can find the explanation about

this concept in online encyclopedia directly.

Procedure and Task
All the participants were told that all instructions were provided online and that they should read the instructions carefully and complete the study independently. Because two product evaluation tasks were involved in the experiment, the order by which subjects examined products was randomized, such that half of the participants examined the search engine and C2C website integration first, while the other half examined the search engine and online encyclopedia integration first. After logon into our online system, as is commonly used in marketing research that investigates consumer behavior, a cover story was provided to all subjects. They were told that one new product (C2C website or online Chinese encyclopedia) has been introduced recently, and their feedback would be very important for the evaluation of the promotion strategy. Next, the subjects were randomly assigned one of the 3 treatment scenarios. Our Web-based system generated the scenarios randomly so that each respondent had an equal and independent chance of being put into any of the 3 scenarios. The subjects were asked to assume the role of potential user and were presented with the introduction of the integration used for promotion, which took the form of the website to enhance realism. The subjects were asked to read these materials and read as much of the information provided as possible. The experimental system logged the accesses made by the subjects to all the URLs to ensure that the subjects had actually read the manipulated condition. Finally, the subjects were asked to complete a post-session questionnaire on attitude toward the promotion and intention use the promoted products. After the experiment, 5 subjects were dropped from the sample for the following reasons: two subjects failed to complete the questionnaires. Three subjects reported inconsistent subjects. Hence, we collected 109 valid responses, which gave us 218 (109×2) observations in the following analysis.

Measurement
Theoretical constructs were operationalized using validated items from prior research. Minor changes in the wordings were made so as to fit them into the current investigation context. The measures for intention to use the extended product were adopted from Wixom et al. [42]. The measures of utilitarian value were based on Mathwick et al. [43] and Kim et al. [34]. The measures of hedonic value were based on Davis et al. [27]. Social value was measured using the three-item scale proposed by Perse [44]. Perceived diagnosticity was measured using the measurement from Jiang and Benbasat

[17]. The questionnaires use the seven-point Likert scale (1 = strongly disagree, 7= strongly agree).

Data Analysis and Results
Manipulation Check
To ensure that the subjects attended to their assigned product integration patterns, manipulation checks were included in the post-session questionnaire. An analysis of variance (ANOVA) was conducted with perceived integration level as the dependent variable and product integration patterns as the independent variable. Results revealed a significant effect of product integration patterns ($F(2, 215) = 21.19$, p<.01). The value added integration received significantly higher integration level perception (M = 5.51) than did the add-on module integration (M = 5.04) and data interface integration (M = 4.47). The add-on module integration received higher integration level perception (M = 5.04) than did the data interface integration (M = 4.47). These suggest that the product integration patterns manipulation was successful.

Measurement Model
Following the recommendation of Anderson and Gerbing [45], we tested the measurement model first before undertaking hypothesis testing. The measurement model was tested for all multi-item constructs to ensure instrument quality. Confirmatory factor analysis (CFA) was conducted to test the convergent and discriminant validity of items.

Convergent validity indicates the extent to which the items of a construct are related in actual data, and measures the correlation among items of a given construct. To assess this validity, Anderson

and Gerbing [45] suggested three criteria. First, the standardized factor loadings must be statistically significant. Second, the composite factor reliability (CFR) and Cronbach's Alpha should be greater than 0.7. Third, the average variance extracted (AVE) of each factor should be greater than 0.5. The results of applying these three criteria show that all the standardized factor loadings are statistically significant; the CFRs and Cronbach's Alphas are greater than 0.7; and that AVEs are all greater than 0.5. Thus the convergent validity was supported.

We used the method proposed by Lastovicka and Thamodaran [46] to cross-check discriminant validity. They suggested the use of the Average Variance Extracted (AVE), which provides information about the amount of variance in items that are explained by the construct. For every construct, if the square root of its AVE is greater than its correlation with other constructs, discriminant validity is established [47]. The result shows that the square roots of the corresponding AVE are all greater than their correlations with other constructs.

Results on Perceived Diagnosticity
The ANOVA analysis on the perceived diagnosticity suggests that integration formats significantly affect perceived diagnosticity. Post hoc analysis based on Scheffe test reveals (see Table 1): (1) value added integration is associated with higher level of perceived diagnosticity than the data interface integration and add on module integration; (2) add on module integration is not associated with higher level of perceived diagnosticity than data interface integration, thus providing partial support for H1.

Table 1 Results on Perceived Diagnosticity

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower bound	Upper bound
1 Data Interface (mean = 5.02)	2	-0.15	0.17	0.82	-0.60	0.30
	3	-0.58(*)	0.17	0.00	-1.03	-0.13
2 Add on Module (mean = 5.17)	1	0.15	0.17	0.82	-0.30	0.60
	3	-0.43(*)	0.17	0.05	-0.88	0.02
3 Value Added (mean = 5.60)	1	0.58(*)	0.17	0.00	0.13	1.03
	2	0.43(*)	0.17	0.05	-0.02	0.88

Impacts of Perceived Diagnosticity
Following the establishment of the measurement model, the structural model was assessed. The proposed model was tested through the structural equations modeling the (SEM) technique with PLS Graph Version 3.0. Tests of significance of all paths were performed using the bootstrap resampling procedure. Figure 2 presents the results of the analysis with estimated standardized path coefficients for this study.

As shown in Figure 2, all of the hypothesized paths in the research model were found to be statistically significant. As predicted, perceived diagnosticity has a significant influence on utilitarian value (0.672), hedonic value (0.647) and social value (0.456) of the new extended product. Utilitarian value (0.504) and hedonic value of extended product (0.238) both have a significant influence on intention to use the extended product. Hypotheses 2, 3, 4, 5 and 6 are supported. Among

the control variables, attitude toward brand has a significant coefficient in all of the paths. This is intuitive due to the fact that, when the extended product is launched, consumers evaluate it on the basis of their attitude toward the brand. If the brand is associated with favorable attitudes, the extended

product should benefit. The R squares values showed that utilitarian value, hedonic value, and attitude toward parent brand explain 72.7% of the variance in intention to use the extended product.
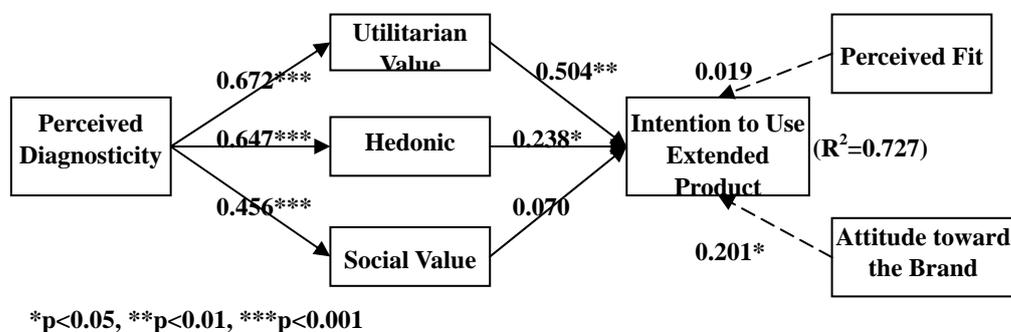

*p<0.05, **p<0.01, ***p<0.001

Figure 2 Standardized PLS Solutions

Discussion and Conclusions
Discussion of Findings
Research to date on the technology product integration has ignored the individuals' responses to product integration, which is an important consequence for product integration. Drawing on the online product presentations, active learning, and the concept of perceived diagnosticity, this research demonstrates that the integration between different online products influence perceived diagnosticity. Perceived diagnosticity positively influences customers' evaluations of extended product, and consequently customers' intention to use the extended product. When information is presented in value added integration format, consumers can learn about the quality and performance of the extended product through additional features, in addition to performing the shared functions. Compared to other forms of integration, value added integration offers more features, through which customers can obtain product information. Existing studies have found that visual and functional controls can increase perceived diagnosticity over picture-based product presentation [17, 21]. This research demonstrates that the product integration format can also positively influence perceived diagnosticity, and that this kind of influence can have an effect on customers' intention to use the extended product consequently.

Social value did not have a positive impact on the intention to use extended product in this study, a finding that is consistent with Kim et al.'s [34] conclusions. Research has shown that utilitarian, hedonic, and social values succinctly cover a broad set of factors that individuals consider important in the context of IT use [25]. The salience of each factor will vary according to

the research context. Using responses from actual users of two online news sites, Kim et al. [34] found that social value has little impact on usage intention, and this result did not vary with past use of the product. Considering that not all of the three components of value are expected to be relevant in a given context, this result is not surprising. Extant work has shown that a consumer's choice is shaped by the context, in which humans process information. Therefore, the present results further suggest that the omission of the context from within any conceptual framework may be problematic.

Limitations and Future Research
This study is subject to several limitations. First, this quasi-experiment was based on the search engine, C2C website, and online encyclopedia. As a result, caution is required in generalizing these findings to other technology products. Other factors, such as the characteristics of the tasks or the background environment, may play a role in determining the intention to use the extended product. Therefore, the replication of this study in other contexts is necessary before the results can be generalized to other types of technology products and settings. Second, search engines, C2C website, and online encyclopedia are complementary products. This study may overestimate the role of product integration in the evaluations of the extended products because of the cross network externalities. Finally, in the last few years, holistic experiences with technology as captured by constructs such as enjoyment and flow, have been studied within the computer-mediated environments and have been recommended as an important metric for assessing online consumer behavior [48]. Future research should also examine

the influence of online product integration on consumers' subjective enjoyment of the interaction between technology products (i.e. the state of flow).

Appendix

Measurement Items

Intention to Use the Extended Product

I intend to use the extended product at every opportunity in the future.

I plan to increase my use of the extended product in the future.

Perceived Diagnosticity

The existing product is helpful for me to evaluate the extended product.

The existing product is helpful in familiarizing me with the extended product.

The existing product is helpful for me to understand the performance of the product.

Utilitarian Value

All things considered, this extended product would provide very good value.

Using this extended product would be worth my time and efforts.

It would be of value for me to use this extended product.

Hedonic Value

Using this extended product is fun.
Using this extended product is a joy to me.
Using this extended product is enjoyable.
Using this extended product is very entertaining.

Social Value

Using this extended product makes people hold me in high regard

Using this extended product enhances the image which others would have of me,

Using this extended product helps me to show others who I am

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