

# Customers' Acceptance of a Web Site for Product Information Search

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## Abstract

A theoretical model of consumers' acceptance of a website to search for product information is constructed and empirically assessed in this study. The results suggest that, besides perceived usefulness and perceived ease of use, the concepts of perceived costs and perceived risks should be incorporated into the technology acceptance model to account for information search behavior on the new media. Moreover, the causal relationship between use intention and its antecedents is significantly different for search goods and experience goods. To support the task of product information search on a website, product categorization and consumers' evaluation of product quality information should be taken into consideration for website design. That is, the WWW technological applications employed to support product information search for search goods should be different from those used for experience goods.

## 1. Introduction

The Internet has become a popular communication tool between organizations and consumers since its commercial applications in mid 1990's. Among various marketing functions that are possibly supported by the Internet, informativeness is reported as the most important function of the net (Palmer and Griffith, 1998; Chen & Wells, 1999; Keeney, 1999). Supporting product information search is still one the most prominent purposes for many commercial web sites.

However, many of the Web sites are not effectively managed for supporting customer's information search

(Dutta, Kwan & Segev, 1998). In particular, many commercial web sites suffer from low acceptance from consumers (Lin & Lu, 2000). The following crucial questions are yet to be answered: What factors lead consumers to use a commercial web site to search for product information? How information technology on the Internet can support consumers to search information more effectively? Should websites offer the same or different technological features to support different kinds of products? The purpose of this paper is, hence, to construct a theoretical model to account for web site acceptance as product information tool in order to explore the answers to the above questions.

As proposed by Palmer and Griffith (1998), an effective commercial web site must address two issues: technical characteristics (i.e. audio, video, hyperlinks, and etc.) and

marketing functions (i.e. information, promotion, online sales and services). In the context of product information search, the corresponding issues are product information content and the technology used to support information search. These two components are complementary and essential for using Web sites. A glitzy web site without relevant information will not satisfy consumers' needs for reducing product quality uncertainty. Similarly, a web site with ample content needs advanced information search technology to facilitate consumers to process the information. Therefore, this study assesses consumers' evaluations of a web site on these two dimensions. The theoretical model proposed in this paper will hence incorporate theories concerning both issues.

## 2. Theoretical Bases and Research Model

In the research model investigated by this paper, customers' acceptance of a web site will be described in terms of (a) consumers' perceptions of the information search technology utilized on the web site and (b) consumers' evaluation of the product information provided on the web site. Given that web sites are applications of the new technology of the Internet, the technology acceptance model (Davis, 1998; Davis, 1993; Davis, Bagozzi & Warshaw, 1989) is appropriate to serve as the theoretical basis to account for web site acceptance. As for consumers' evaluation of product information, the well-acknowledge cost-benefit framework will be employed in the research model of this study.

### 2.1. Technology Acceptance Model

In the literature of MIS, technology acceptance model (abbreviated as TAM hereafter) proposed by Davis (1998; Davis, 1993; Davis, Bagozzi & Warshaw, 1989) has been widely used to account for user acceptance of new technology. In this theory, acceptance of new information technology (IT) is measured by use intention and use behavior of IT. According to TAM, perceived usefulness (abbreviated as PU) and perceived ease of use (abbreviated as PEOU) are the central beliefs leading to use intention towards IT. Some researches have recently extended this theory to the use of the Internet and found results congruent with previous studies (Agarwal & Prasad, 1997; Lin & Lu, 2000; Teo, Lim and Lai, 1999). Given that product information search on web sites is a common usage of the Internet, user's PU and PEOU of the web site should also account for intention of product information search on the site, as stated in hypotheses 1a and 1b.

Moreover, PU is also positively influenced by PEOU, as stated in the hypothesis 1c.

**Hypothesis 1a:** *Use intention of a web site to search for product information is positively influenced by perceived usefulness of the web technology.*

**Hypothesis 1b:** *Use intention of a web site to search for product information is positively influenced by perceived ease of use of the web technology.*

**Hypothesis 1c:** *Perceived Usefulness is positively influenced by perceived ease of use in the context of WWW.*

In addition to assessment of web technology, consumers' assessment of the product information provided on the web site is also critical for reuse and acceptance of it. The cost-benefit framework is discussed to explore the product information search behavior on WWW.

## **2.2. Cost-Benefit Framework and Product Quality Information**

Marketing researches of product information search suggest that perceived benefits and perceived costs affect external product information search conducted by consumers (Beatty & Smith, 1987; Srinivasan & Ratchford, 1991; Newman, 1977). In the context of product information search, the perceived search costs refer to mental efforts, time and financial costs (Claxton, Fry & Portis, 1974; Bettman, 1979) and the perceived benefits refer to reduction of perceived risks (Taylor, 1974; Dowling & Staelin, 1994; Kaplan & Jacoby, 1974). The concept of perceived risks is defined as the uncertainty associated with purchasing a product. Perceived risks, first proposed by Bauer (1960), are used to explain for various stages of consumers' behavior, especially pre-purchase product information search (Mithell, 1992). Consumers are uncertain about the consequences of purchasing a product such that they engage in active information search from various information sources in order to reduce the uncertainty, namely perceived risks.

Nevertheless, the benefits of perceived risks reduction calls for costs of information search, which includes mental efforts, time and money as mentioned in the previous text. Stigler (1961) argued that consumers would seek for product information until the cost of doing so exceeds the benefit of further information. That is, a consumer's search for information is guided by a trade-off between the perceived costs of additional search and the expected benefits of that search.

However, perceived risks and perceived costs are different for different kinds of products and hence the trade-off relationship between perceived risks and perceived search costs might depend upon the category of the product. Products can be classified as search goods and experience goods. In the case of search goods, perceived risks are low and perceived costs are high as opposed to experience goods, for which perceived risk are high and perceived costs are low.

According to Nelson, products can be categorized by the time when product quality information is acquired. When the attribute claims can be verified through pre-purchase search activities, those attributes are called search attributes. And when the most important attribute of the product is search attribute, the product is called search product. On the other hand, when the attribute claim can only be verified after the product has been purchased and consumed, the attribute is called experience attribute. And experience products are those products whose most important attribute is experience attribute. The distinction of search vs. experience products is statistically reliable because people can reliably categorize products into search and experience (Ford, Smith & Sway, 1988).

When consumers search external information about experience qualities, they try to decrease perceived risks through information sources with low search costs. People are less willing to search for experience qualities than for search qualities (Maute & Forrester, 1991; Newman, 1977; Beatty and Smith, 1987; Jacoby, 1984; Ratchford & Gupta, 1987). perceived risk is positively related to use of informal information sources, such as word-and-mouth, opinion leaders, which usually requires lower search costs (Seth & Parvatiyar, 1995; Dowling & Staelin, 1994). In another word, in the case of information search for experience goods, perceived risks are high and perceived costs are low. It follows that to reduce perceived risks should be the major concern for consumers when searching product information for experience goods. On the other hand, in the case of search goods, people are more willing to search and more factual information is provided through advertising. This phenomenon implies that search costs are high for consumers who are engaged in searching information for search goods. Moreover, search qualities can be verified before purchasing the product and people are less skeptical of search qualities claims such that perceived risks for search goods should be low, at least lower than experience goods.

Based upon the above argumentation, it is proposed in this study that the importance of perceived risks and perceived costs are different kinds of products. That is, categorization of product plays a role as moderator for the causal relationship between perceived risks, perceived costs and use intention of WWW as an information search tool. This proposed moderator role of search and experience goods is in alignment with the findings of Maute & Forrester (1991), which have suggested that search and experience goods served as moderators of the relationship between search determinants and external search effort. Therefore, it is proposed that for search goods, reduction of perceived costs (abbreviated as RPSC hereafter) should thus positively influence use intention, as stated in hypothesis 2a. On the other hand, for experience goods, reduction of perceived risks (abbreviated as RPR hereafter) should thus have positive effect on use intention, as stated in hypothesis 2b.

**Hypothesis 2a:** *For search goods, use intention of a web site to search for product information is positively*

*influenced by perceived search costs reduced through using the web site.*

**Hypothesis 2b:** *For experience goods, use intention of a web site to search for product information is positively influenced by perceived risk reduced through using the web site.*

Given that to reduce perceived risks is an important reason to use WWW to search product information for experience goods, RPR should have positive effect on perceived usefulness of the used website in the context of experience goods. Similarly, RPSC should have positive effect perceived usefulness of the website for searching product quality of search goods.

**Hypothesis 2c:** *For search goods, RPSC positively influence perceived usefulness of the website.*

**Hypothesis 2d:** *For experience goods, RPR positively influence perceived usefulness of the website.*

Some empirical researches have reported that TAM could be extended by adding the construct of task-technology fit to serve as the antecedent of IT perceptions (Dishaw & Strong, 1999). In the following text, the task-technology fit theory will be discussed and incorporated into the theoretical model of this study.

### 2.3. Task-Technology Fit theory

The concept of task-technology fit is defined as ideal profiles of task/technology alignment between characteristics of task and technology (Zigurs & Buckland, 1998; Venkatraman, 1989). In another word, the construct of task-technology fit refers to the degree of match between the two variables: task and technology. Various empirical results suggested that effect of task-technology fit could be mediated through user's beliefs and attitudes onto use intention and behavior (Goodhue & Thompson, 1995; Dishaw & Strong, 1999). The Internet as a new technology possesses various characteristics that can help people to perform the task of information search effectively and efficiently. The empirical results of Dishaw & Strong (1999), task-technology fit should be the direct antecedent of perceived usefulness and perceived ease of use. Therefore, it is proposed that task-technology fit should be the direct antecedent of perceived usefulness and perceived ease of use for using website to search product information of both search goods and experience goods, as stated in hypotheses 3a, 3b, 3d and 3e. Moreover, match between searching task and supporting technology should also have influences on reduction of perceived risks for experience goods and on reduction of perceived costs for search goods, as stated in hypotheses 3c and 3f.

**Hypothesis 3a:** *For search goods, task-technology fit influences PU of the web site for product information search.*

**Hypothesis 3b:** *For search goods, task-technology fit influences PEOU of the web site for product information search.*

**Hypothesis 3c:** *For search goods, task-technology fit influences RPSC of the web site for product information*

*search.*

**Hypothesis 3d:** *For experience goods, task-technology fit influences PU of the web site for product information search.*

**Hypothesis 3e:** *For experience goods, task-technology fit influences PEOU of the web site for product information search.*

**Hypothesis 3f:** *For experience goods, task-technology fit influences RPR of the web site for product information search.*

In the following text, we will explore how WWW technology can be used to support these different tasks for search goods and experience goods in order to achieve desirable level of task technology fit.

### 2.4. Technological Characteristics of WWW

The task of product information search could vary upon different kinds of products. Marketing researches suggest that verifiability of product quality lead people to focus on different aspects of information. When the product quality claims are easy to verify before purchase, consumers tend to search for so-called hard information which are the well-defined standard attributes of the product. That is, product quality information can be acquired through vast information search for search attributes, such as color of clothes, smell of perfume. On the other hand, people tend to look for soft information when search product quality information for experience goods. Soft information refers to the attributes of the product provided through personal opinion and impressions, such as good taste of foods, durability of computer. Given that product quality information for experience goods can not be acquired before use of the product, people resort to the opinions of those who have used it. Based upon the concept of task-technology fit, the website needs to provide the technology characteristics that help people to search for hard information in the situation of search goods, and soft information in the situation of experience goods.

WWW possesses many powerful technological functions that can support information search. Many researches have addressed on the technological characteristics of the Internet. For instance, Newhagen and Rafaeli (1996) asserted that

the characteristics idiosyncratic to the Internet media are multimedia, hypertext, interactivity and personalization. Kenney (1999) also proposed that the characteristics of the Internet that can satisfy customers are large amount of information, time saving, privacy, personalization and interactivity. Hoffman and Novak (1996) emphasized that interactivity is the feature that distinguish old media and the new media of Internet. Moreover, some large-scale surveys have been done to describe what technological functions attract people to use the Internet. Large information quantity, personalization and privacy are reported as the most important features to account for use of this new media (Ernst & Young, 1999; Gvu, Forrester research).

Among the prominent features of the Internet are its temporal and spatial characteristics, which enable information searchers to overcome the limitations of time and space. For instance, people can search for timely information on the Internet 24 hours a day, connecting to the web sites all over the world through the function of hyperlink, even without walking out of his/her own house. At the same, the information searcher can keep his/her privacy about the action of search by keeping anonymous. The three characteristics, temporal characteristics, spatial characteristics and privacy are effective for information search.

In addition, some technological characteristics of the Internet can help providing hard information, such as information capacity, multi-media. On the other hand, search of soft information can be supported by the functions of personalization and interactivity. In conclusion, characteristics such as temporal, spatial, privacy, multimedia and information quantity are crucial to support task-technology fit in the context of search goods, as stated in hypotheses 4a-e. For experience goods, characteristics such as temporal, spatial, privacy, personalization and interactivity, as stated in hypotheses 4f-j.

**Hypothesis 4 a-e:** *For search goods, task technology fit is influenced by the following technological supports: information quantity, multimedia, privacy, temporal characteristics, and spatial characteristics.*

**Hypothesis 4 f-j:** *For experience goods, task technology fit is influenced by the following technological supports: personalization, interactivity, privacy, temporal characteristics, and spatial characteristics.*

### 3. Research Methods

#### 3.1. Operationalization of theoretical constructs

The measurement indexes of all the theoretical constructs in this research are adapted from relevant studies, to fit the situation of product information search on web sites. Please see Table 1 for related sources of constructs.

**Table 1: Literature sources of the theoretical constructs**

Construct	Measurement sources
Perceived Ease of Use (PEOU)	Davis (1989)
Perceived Usefulness (PU)	Davis (1989)
Use Intention	Chau (1996)
Reduction in Perceived Search Costs (RPSC)	Claxton, Fry & Portis, 1974; Bettman, 1979
Reduction in Perceived Risks (RPR)	Kaplan & Jacoby (1974)

Product quality information	Nelson (1986)
Task-Technology Fit	Goodhue & Thompson (1995)
Information quantity	Keeney (1999); Peterson, Balasubramanian & Bronnegerg (1997)
Multimedia	Keeney (1999); Hoffman & Novak (1996); Daft & Lengel (1984)
Temporal characteristics	Richmond (1996); Schillewaert, Langerak & Kuhamel (1998)
Privacy	Keeney (1999); Richmond (1996)
Spatial characteristics	Schillewaert, Langerak & Kuhamel (1998); Keeney (1999)
Personalization	Daft & Lengel (1984)
Interactivity	Peterson, Balasubramanian & Bronnegerg (1997)

#### 3.2. Sample

The respondents of the survey questionnaire are students randomly recruited from five university campuses in Taiwan, during January and March in 2000. In total, 272 questionnaires were distributed, and 264 of them were returned, with the response rate of 97.6%. Among the 264 returned questionnaires, 19 of them were invalid. So, the sample size was 245. Given that product quality information is hypothesized to be a moderator in our research model, the sample was split into two sub-samples: the search goods sub-sample and the experience goods sub-sample, according to how the respondent judged the assigned product. Respondents were randomly assigned to one of the six products (described in the next section of research material) chosen for this survey and were asked to judge the given product on a rating scale, from 1 to 7, with 1 referring to search goods and 7 to experience goods. The responses higher than average are categorized as experience goods and lower than average are categorized as search goods. Consequently, among the 245 valid responses, 125 were categorized into the search goods sub-sample, and 120 were categorized into the experience goods sub-sample. In order to see if other factors than product quality categorization distinguish the two sub-sample, the demographic data were analyzed. The results showed that these two sub-samples do not differ from each other in terms of the distributions of gender and age (Gender:  $\chi^2_1 = .64$ ,  $p < .20$ ; Age:  $\chi^2_5 = 4.40$ ,  $p < .42$ ). The result of this analysis suggests that these two sub-samples are demographically similar to each other.

### 3.3. Research Material

Six products were chosen to serve as the test products in this study, as demonstrated in Table 2. There were three criterion for choosing the products. First, the products have to be familiar to our respondents because people might not know what attributes are important for unfamiliar products. Secondly, the price of the products must be among the affordable range for our student respondents. Thirdly, the prices of products were controlled as close as possible because the price might affect respondents' perception of search costs and risk cost.

For each of the six products, two web sites were used for the survey. One web site is presumed to fit for supporting search goods and the other web site is presumed to fit for supporting experience good. In total, there were twelve websites chosen for this survey, and all respondents were randomly assigned to one of the website. The survey questionnaire involved two stages: pre-search section and post search section. The pre-search section includes three components: demographic information of the respondent, categorization of the assigned product and perceived search cost and risk cost of the product. The measured perceived search costs and perceived risk costs in the pre-search section will be compared against the perceived search costs and perceived risk costs of the same product measured in the post-search section, which measured the perceptions associated with website information search.

The post-search section involved measurements of the theoretical constructs in this study: product categorization, perceived usefulness, perceived ease of use, perceived risks, perceived search costs, intention to use, task technology fit and characteristics of the Internet. The construct of RPSC is measured by perceived search costs of post-search section, deducting the measurement of perceived search costs of pre-search section. The construct of RPR is measured by the same way.

### 3.4. Survey procedures

The task of respondents was to gather product quality information on the website to facilitate buying decision and also to evaluate the assigned web site for future visit. Every respondent was randomly assigned one of the above 12 web sites as the virtual space to search for shopping information. Before search, every respondent was asked to fill out the pre-search section of the questionnaire. Then, respondents searched for the product information on the assigned web site in their pace. When the search was complete, respondents were asked to evaluate the website by filling out the post-search section.

### 3.5. Data analysis

The data of both sub-samples were analyzed in the same way through Lisrel 8, developed by Joreskog & Sorbom (1993). Lisrel 8, as confirmatory factor analysis,

involves two stages: measurement model and structural model. The analysis of measurement model was first evaluated against three criterion: item reliability, composite reliability and discriminant validity. As for the structural model, the various indexes of goodness of fit were analyzed to test if the hypothetical models discussed in the previous text were suitable to describe the collected data. Moreover, direct, indirect and total effects of the independent variables on the dependent variables were analyzed.

## 4. Results Discussion and Conclusions

### 4.1. Measurement model analysis of Search Goods and Experience Goods

The assessments of both measurement models of search goods and experience goods indicate that reliability, convergent validity and discriminant validity of the hypothetical constructs are considerably adequate.

Three measures were used to examine reliability and validity of the measurement indexes: item reliability, construct reliability and average variance extracted. Those measurement indexes that did not fulfill the criteria (Bagozzi & Yi, 1988) were all deleted from further analysis. For the construct of perceived difference in search cost (abbreviated as RPSC), only one index was left, which is difference in search time. Therefore, in the following analysis, the construct of RPSC was replaced by reduction of perceived search time.

Composite reliability and the average variance extracted are calculated to assess convergent validity. The minimum value of composite construct is .60, and that of average variance extracted, .50, for evidence of convergent validity. The composite reliabilities of all the theoretical constructs are all above .60, and average variance extracted, all above .50, showing that the convergent validity of those constructs in the measurement models of both search goods and experience goods were adequate. Nevertheless, for the constructs of perceived difference in search cost, temporal characteristics, only one measurement index was left and hence the composite reliability could not be calculated.

Most of the inter-correlations of the items between constructs are smaller than the correspondent average variance extracted (89% for search goods, and 80% for experience goods), indicating high discriminant validity for both measurement model. Beside adequate convergent validity, the discriminant validity for the measurement model of experience goods is considerably fair.

### 4.2. Structural Model analysis of Search Goods and Experience Goods

The difference between the structural models of search goods and experience goods was statistically significant by using multiple sample analysis ( $\chi^2_{103} = 221.48$ ,  $p < .001$ ). That is, the causal relationships of the variables discussed

are different among search goods and experience goods. Therefore, the data of search goods and experience goods were hence analyzed separately.

The goodness-of-fit of these two structural models are measured by seven index,  $\chi^2/df$ , GFI, AGFI, RMSR, NFI, NNFI and CFI to assess if the collected data could be described by our models. For both search goods and experience goods, some goodness-of-fit measurements of the original structural models do not fulfill the minimum requirements. Therefore, the structural models are modified according to the suggestions provided by LISREL such that all the values of the seven indexes fulfill the minimum requirements. The results of the data collected in this research are examined to see if the hypotheses are supported.

### Effects on Use Intention

The results show that the construct of PU significantly affects use intention ( $\beta=.60$ ,  $p<.01$  for search goods,  $\beta=.57$ ,  $p<.01$  for experience goods). However, there is no direct effect of PEOU on use intention. Nevertheless, PEOU affects use intention indirectly through perceived usefulness. PEOU directly affects PU ( $\beta=.32$ ,  $p<.01$  for search goods and  $\beta=.17$ ,  $p<.01$  for experience goods), which further mediates the effects of PEOU on use intention ( $\beta=.19$ ,  $p<.01$  for search goods and  $.10$  n.s. for experience goods). Hypotheses 1a and 1c are supported by hypothesis 1b is partially supported by our data. In another word, use intention of WWW is directly affected by PU and indirectly affected by PEOU.

Moreover, use intention is also predicted to be affected by RPSC in the context of search goods, and to be affected by RPR in the context of experience goods, as stated by hypotheses 2a and 2b. In the context of search goods, perceived difference in search time affects use intention ( $\beta=.14$ ,  $p<.01$ ) although the effect is indirectly mediated through PU. As for experience goods, perceived difference in risk costs directly affects use intention ( $\beta=.13$ ,  $p<.05$ ). Hypotheses 2a is partially and 2b is fully supported by our data. In conclusion, use intention is affected by different factors for search goods and experience goods.

### Effects on the Perceptions

According to the hypotheses 2c, 2d, and 3a-f, the precedents of the perceptions of WWW are also different for search goods and experience goods. The construct of PU is affected by PEOU ( $\beta=.32$ ,  $p<.01$ ), RPSC ( $\beta=.24$ ,  $p<.01$ ) and TTF ( $\beta=.67$ ,  $p<.01$ ) for search goods. On the other hand, the construct of PU is affected by PEOU ( $\beta=.17$ ,  $p<.01$ ) and TTF ( $\beta=.58$ ,  $p<.01$ ) for experience goods. As for PEOU, it is not affected by TTF for search goods, but affected by TTF for experience goods ( $\beta=.54$ ,  $p<.01$ ). Hypotheses 2d, 3a, 3e and 3d are supported by the results, but hypothesis 2c and 3b are not supported. Moreover, the perceptions of both risk costs and search costs are not affected by TTF for both kinds of products. Hypotheses 3c and 3f are not supported by the results.

### Effects on Task-Technology Fit

Task-technology fit can be achieved by technological characteristics supporting “hard information” search in case of search goods, such as large information quantity, multimedia, privacy, spatial and temporal characteristics, as predicted by hypotheses 4a-e. On the other hand, task technology fit can be achieved through technological characteristics supporting search of “soft information”, such as personalization, interactivity, privacy, spatial and temporal characteristics, as stated in hypotheses 4f-j. The construct of task-technology fit is determined by different sets of technological characteristics for search goods and experience goods. For search goods, information quantity, privacy and spatial characteristics are in effect ( $\beta=.68$ ,  $p<.01$ ;  $\beta=.33$ ,  $p<.01$ ,  $\beta=-.17$ ,  $p<.01$ ). Hypotheses 4a, 4c and 4e are supported, whereas hypotheses 4b and 4d are not supported by the data. For experience goods, two more characteristics besides those three are in effect (information quantity:  $\beta=.84$ ,  $p<.01$ ; privacy:  $\beta=.14$ ,  $p<.05$ ; spatial characteristics:  $\beta=-.47$ ,  $p<.01$ ), namely personalization and multimedia ( $\beta=.50$ ,  $p<.01$ ;  $\beta=-.27$ ,  $p<.01$ ). Hypotheses 4f, 4h and 4j are supported, but hypotheses 4g and 4i are not supported by the data. Out of 23 hypotheses proposed, 15 hypotheses were supported by the data.

There are three important results found in this paper: First, use intention of a website as product information search tool is influenced by, besides PU and PEOU, perceived risks and perceived search costs of the product. Second, product categorization moderates the causal relationship between use intention and its direct and indirect determinants. Third, task technology fit plays an important role in mediating the effects of technological characteristics and product information categorization onto perceptions of a Website.

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