韓國IT서비스學會誌
第8卷 第2號
2009年 6月

품질, 취향 및 소비자 구매 의도 간의 관계에 있어 온라인 상품 정보의 역할

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The Role of Online Product Information in the Relationship between Quality, Preference and Customer's Purchase Intention

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■ Abstract ■

This paper examines how online product information changes the customers' purchase intentions from subjectivity-objectivity dichotomy perspective. Quality and Preference are proposed as product evaluation criteria and their marginal changes with product information differentiation are hypothesized. An experimental survey was conducted to 57 subjects and the hypotheses were partially supported through PLS path comparison method. The study contributes to IS research by proposing a simple and effective product evaluation framework and by abstracting the impact of product information from other factors. Finally, we suggest the utilization of product information with the optimization of the cost-benefit structure between information and purchase intention.

Keyword : Product information, customer's purchase intention, quality, preference, product type, information type, PLS

논문투고일 : 2009년 04월 21일 논문수정완료일 : 2009년 06월 06일 논문게재확정일 : 2009년 06월 08일

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1. Introduction

In a decade of steady growth in online business, much attention has been focused on customers' online purchase intentions and their strategic influence on the firm's profitability [38, 54, 63, 64]. To date, various studies have been conducted on a variety of antecedents of purchase intention such as quality and trust[24], 3-D advertising[40] and search intentions[56].

Online product information, in particular, received special attention due to its online-specific high controllability[23, 31, 42]. On the Web, a seller can add, edit, delete, and filter product information easily and even automatically. This high degree of manipulability of product information brought an impressive strategic potential to online business and has attracted many researchers to examine the impact of product information on online purchase intentions[14,15,22]. Studies examining the impact of product information on purchase intentions, however, have manifested a couple of limitations. Epistemologically, too diversified and specified antecedents of purchase intentions prevent the firm to see the situation in an integrated and systematic manner. For firms, the integrated view of product information is necessary to comprehensively understand the online business. Methodologically, most previous studies conduct cross-sectional analyses examining only the given relationship between product information and purchase intentions and failing to look into the 'the manner' on how such information actually changes the customer's purchase intentions.

In this study, we attempted to rectify these limitations by *1) providing a parsimonious but exhaustive perspective of identifying the antecedents of customer's purchase intentions,* and *2) adopting a marginal analysis method for validating the proposed hypotheses.* The study adopted the subjectivity-objectivity dichotomy in selecting the product evaluation criteria to determine the customers' purchase intentions as a theoretical framework. To validate the proposed model and hypotheses, we estimated the changes in the customer's purchase intentions using product information differentiation. This method is an empirically adapted marginal analysis which originally is a basic economic technique to determine the small and incremental changes in key variables. The analysis of the marginal impact of product information using the subjectivity-objectivity perspective effectively showed that product information changes the customer's purchase intentions.

On the basic assumptions and hypotheses of the study, this study proposed a model of quality, preference, and purchase intention. We then presented four hypotheses indicating the different impacts of product information on the different types of product. Questionnaires were developed for the study and distributed to university students to validate the proposed hypotheses. With the PLS path comparison method, the hypotheses were partially supported. We further performed a couple of *post-hoc* analyses for the additional statistical inference of the gathered data. Finally, the study's contributions to management theory and practice were discussed.

2. Theoretical Framework

The research model and hypotheses were developed in two steps. First, we proposed a customer purchase intention model to explain the epistemological aspect of product information impact on

purchase intention. In the model, the quality and preference for the product evaluation criteria were outlined, and their relations with purchase intention were expounded. Lastly, hypotheses were derived to specify the marginal impact of product information based on the purchase intention model. Information levels were further differentiated in purchase intention estimation, and the concepts of product types and information types were discussed to justify the hypotheses.

2.1 Purchase Intention Model Using the Subjectivity-Objectivity Dichotomy Perspective

The customer's online purchase intention increases when a product is highly evaluated[10, 21, 39], and to evaluate, a customer examines the product based on the specified evaluation criteria in his/her personal notion or judgement on the quality of the product. Examples of this type of evaluation process are, *"Is this product good?"* or *"Would I like this product?"*

These two questions are essential because they evoke the philosophical level of human perception and cover the two fundamental epistemological assumptions : objectivity and subjectivity. The first question determines whether this product satisfies the evaluation criteria of objectivity. In this criterion, customers evaluate objectively the measurable attributes of the product such as size, length, and capacity. The products are measured and assigned in orders based on the result of the measures. The second question determines whether this product satisfies the evaluation criteria of subjectivity. In this criterion, customers evaluate subjectively the describable attributes of the product such as design, style, and touch. These attributes are not objectively measurable. Thus, the answer to the second question would have no consensus with other customers and depend wholly on the customer's individual tastes.

The subjectivity-objectivity dichotomy is one of the widely used philosophical epistemologies in many disciplines including management[6, 46] because of its parsimoniousness and effectiveness. The two concepts are mutually exclusive and collectively exhaustive, so they prevent confusions and overlaps in the recognition[53]. This study has adopted this subjectivity-objectivity dichotomy view to provide the theoretical underpinning for the study particularly on the product's evaluation criteria, which directly determines the customer's purchase intention. We propose quality and preference each for the objectively and subjectively evaluated criteria of a product. In the rest of the theoretical development section, we explain the concepts of quality and preference and their relations with purchase intention.

2.1.1 Quality

Several disciplines have developed a range of perspectives to explain quality. In operational management, quality is viewed as compliance to requirements and is described as a technical specification[26]. In economics, quality is used as one of the competitive strategies for a firm to differentiate in the market[25] and is used to explain the rational customers' collective behaviors[3]. In marketing and organisational studies, individual biases during quality perception processes are highlighted[41, 68].

Not only the views have been diverse but the elements related to quality have been identified with variety. For example, the determinants of quality such as poor style, incompleteness, and error in Web site context[24] and product information

and price[9] are identified, while quality is perceived as a determinant of channel satisfaction[20, 36]. Moreover, various dimensions of quality such as reliability and assurance have been studied[48, 51, 65].

All these studies, however, bear one common fundamental assumption : high quality means superiority in terms of having innate excellence and is unarguably desirable, thus always non-arguably being pursued by all customers[5, 48, 50]. This collective customer pursuit of quality represents the objectivity of the quality. If the quality is the subjective conception, there would have been this consensus on having a high quality. The objectivity of quality can be explained in another way. According to Parasuraman et al.[48], quality is 'assessing the superiority.' To be superior, the customer primarily needs to assess the superiority of a product, and any measurement satisfies objectivity. In other words, the word 'assessing' implies the objectivity of quality in itself.

In management, studies assuming the objectivity of quality are normally coupled with 'perceived quality'[41, 68]. Possible biases during the quality perception process are examined in these research endeavors. Prior studies admit that quality is originally an objective concept, but the objectivity of quality is used only to be compared with the perceived quality. These studies, therefore, are more focused on the systematic biases hindering the objectivity.

Studies about the objectivity of quality are often found in the field of economics. Economists use the quality to develop a concept of vertical differentiation that is differentiated by quality and define quality as a measure for objective rankings among products. Quality satisfies the consensus from customers about the rankings among products[19], and economists have studied about the firm's strategy, customer behaviours, and market structures[17, 55, 61]. These studies explicitly assumed the objectivity of quality and investigated the role of quality by analysing what happens in the market as a result of quality competition.

In the study, we depict the commonly pursued objectivity as a fundamental assumption in assessing superiority, which all disciplines and perspectives have agreed upon as quality. From this, we define quality as *an objectively measurable ranking-based attribute inherent in the product.* The customer's agreement on the product's high quality has been the firm's most important management concern[18, 52, 60] because high quality results in high product evaluation and ultimately, high purchase intentions.

2.1.2 Preference

Products have many attributes that cannot be objectively measured. For example, one cannot measure the product's style, design, and colour because there is no established consensus about the superiorities of the elements in these categories. One cannot convincingly argue that the red color is objectively better than yellow. However, some customers prefer red shoes over yellow ones based on their individual preferences. The concept of preference is based on these different standards of evaluating the different colours in shoes.

Individual preferences are usually revealed in action. Prior research on preference in management has shifted from the behaviour perspective to action of choice[2, 7] resulting from exogenous stimulus[20, 34, 57]. Since these scholars treat preference as the precursor of choice, they do not consider the psychological aspect of these actions. They are concerned with preference because it directly

determines the buying decision[16], and they use the preference concept in management to explain and predict individually different actions resulting from the same situation, but do not focus on explanations.

While managerial perspectives focus on the actions of customers, economic perspectives emphasise the underlying assumptions in preferences. To explain the personalities or individually different actions, Hotelling[30] introduces the concept of horizontal differentiation. In his work, he assumes that no two people have the same taste, and therefore, preferences representing taste and individual actions are different. As a result, consumers in horizontally differentiated markets have no consensus of rankings among products based on their willingness-to-pay[19]; thus, they have different preferences even when there is no quality difference[61]. In a market level, any two horizontally differentiated products both have a positive demand whenever they are offered at the same price[25]. With these in view, economists investigate various market structures and consumer choices[17, 27, 67].

Quality and preference are conceptually exclusive but empirically related. A product's quality is determined when it is produced and not easily changed unless it is critically damaged. In contrast, the individual's preference for a product or service changes at times[7, 29] and is continuously influenced by outside stimuli such as satisfaction, quality, and cost[20], physical and psychological features of the product[16], and attribute-task compatibility[47]. In this study, the quality of the product is perceived as an exogenously given attribute to the customer, which affects the customer's individual preference for the product. Therefore, we propose that when the customer perceives the high quality for the product, his/her preference for the product accordingly increases. In this study, preference is defined as *the subjective judgment about the product quality based on his/her individual taste, which results in the intentions of actions to purchase the product.* Ultimately, preference is about the customer's decision to patronise or reject a product. The customer's preference for the product, therefore, is directly related to his/her purchase intentions.

2.2 The Marginal Impact of Product Information and Product Types

If the non-price positive product related information such as high scoring online rating, brand popularity, and better store image are added, the customer's purchase intention generally increases[9, 11, 32, 49, 62]. Therefore, we argue that product information changes the customers' purchase intention and its relationship with quality and preference. Prior to the discussion of these matters, the types of product and information are discussed to explain their different impacts on quality, preference, and purchase intention. Subsequently, we discuss the impact of product information with two different situations respectively, buying quality goods and preference goods.

Product types differentiate the impact of product information on purchase intention. Products are categorised based on their quality or established consumer preferences (e.g., red stiletto shoes). If the product is evaluated more importantly based on quality, it is considered a *quality good.* If the product is evaluated more importantly based on preference, it is considered a *preference or preferred good.* In buying a book, for instance, preference is more important than the quality of the book.

One carefully examines the style, storylines, and authors of the book, which are not objectively measurable, as criteria for purchase. In contrast, when one decides to purchase a copy machine, objectively measurable attributes such as copy speed, durability, and warranty are considered important evaluation criteria over attributes such as design and colour. In this case, we can consider a book as a preference good and a copy machine as a quality good. In reality, however, many products are evaluated by both quality and preference concurrently. For example, a 19-inch Samsung TV is evaluated based on quality when it is compared with a 17-inch Samsung TV. However, it may likewise be preference goods when it is compared with a 19-inch Sony TV. Width is objectively measurable whereas brand is not. In this case, it is not easy to decide which attribute is more important and accordingly, distinguish the product types.

Firms provide various types of online product information such as size of clothes, nationality of the book author, among others. Based on the objectivity of the information, there are two common categories : quality information and preference information. If the information explains objectively the measurable attributes of the product, it is called *quality information*. If the information explains subjectively the describable attributes of a particular product, it is called *preference information*. Examples of quality information are size, quantity, capacity, and ranking, while color, style, and design are the examples of preference information. One unit of information may carry both quality and preference information. For example, brands can be both quality and preference information because Nike may be superior to the unknown brands, but it is difficult to be objectively superior to Adidas.

With these conceptualisations of product types and information types, we hypothesise the impact of product information on purchase intention in case of buying quality goods and preference goods in the following two sections, respectively.

2.2.1 Buying Quality Goods

When buying quality goods with utilitarian function such as copying machines, consumers are concerned more on product quality than preference and looking more for quality information than preference information. The customer response to the product information found on the web depends on the reliability of the information. In this case, since he/she looks for quality information which has high reliability, he now is more relieved about the quality of the product.

The reliability of quality information is supported by the inherent objectivity of the information. Quality information such as length and size causes little possibility of misunderstanding or suspicion between the parties. For example, a seller cannot lie or exaggerate about the width of a TV set because width is an objective standard for this type of electronic goods. From the available quality information, a customer knows exactly what he/she will be getting if he/she purchases it. In this case, product uncertainty inherent in online business[4,8] would be relatively low. On the contrary, the seller can exaggerate about the style of a TV set because it is a subjective concept. Even though the seller advertises that his/her TV has fantastic design, not all the customers would believe it.

Once the customer was assured about the quality of the products, the impact of quality on purchase intentions decreases because he now considers other factors like preferences more importantly. At this point, it is necessary to distinguish the impact

of quality on purchase intention from the evaluation on quality. The higher the customer evaluates the quality of the product, the lesser the product quality affects his/her purchase decision due to the increased relief about the quality. Dependency or the impact of the variable is decided by its importance, and the increased relief makes the customer concerned with other factors apart from quality. From this explanation, we have the following hypothesis :

H1 : In quality goods, as positive product information increases, the impact of quality on (a) customer purchase intention and (b) preference decreases.

When buying quality goods, however, a customer is not much concerned with preference for the product and he does not intensively look for preference information. Accordingly, preference information does not impact much the customer's purchase intention in this case. When a customer buys quality goods like a copy machine, for instance, his/her response to the preference information like the upgraded design would not be so influential compared with other quality information like the duration of the warranty. Thus, his/her evaluation on the preference of the product does not change much compared to its impact on purchase intentions. From this explanation, we hypothesise the following :

H2 : In quality goods, as positive product information increases, the impact of preference on customer purchase intentions does not change.

2.2.2 Buying Preference Goods

The same rationale from the purchase of quality goods can be applied when buying preference goods. Since the customer is more concerned with preference of the product and not about its quality, the consumer is less sensitive to its functional attributes. When a customer is buying a book, for example, the storylines, authors, and the genre of the book were given more considerations compared to the weight and size of the book. When buying preference goods, therefore, the customer's evaluation on the quality of the product has minimal impact on his/her purchase intentions. This leads to the following hypothesis :

H3 : In preference goods, as positive product information increases, the impact of quality on (a) customer purchase intentions and (b) preference does not change.

When buying preference goods like a book, customers sensitively respond to preference information such as customer reviews, reputations of the author, and genre specifications. After he/she recognises the increased preference information, however, his/her evaluation on preference for the book does not directly increase because of the preference information's low reliability.

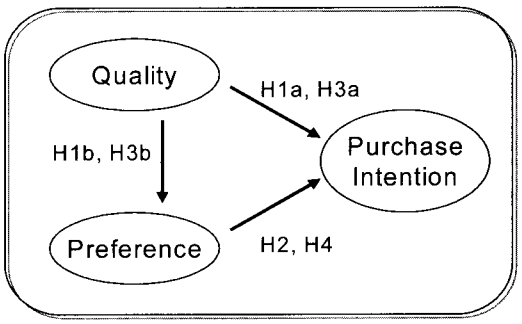
The low reliability of preference information originated from the assumption that everybody has different preferences. Since individual preferences are diversified, one customer's opinion about his/her individual preference for a product does not always match to the other customer's preference for the product. There is a high possibility of non-matching of preferences between people. In other words, even though many other customers may think that a particular book is interesting, it is not unusual that one customer may feel differently. Therefore, the increased preference information

like positive customer reviews does not guarantee that the book will have increased reader preference based on customer reviews alone. After recognising the increased preference information about a book, a customer who is aware of the subjectivity assumption becomes more defensive about the information. This is because he/she should find the preference information which would best fit his/her preference among those increased information as well as be more careful in their examination in order to evaluate the preference of the product. For example, when there is only a couple of customer reviews about a book, he/she plainly reads the reviews and decides to buy it or not. When there are more than 50 reviews for a book with various opinions, he/she becomes more serious and careful to find the information that fits his preference.

As a result, the dependency on preference evaluation for purchase decisions increases because more attention is given to evaluate preferences regarding the product. The increase in the amount of preference information increases the concerns on the preference and eventually increases the impact of preference in making purchase decisions. This leads to the following hypothesis :

H4 : In preferences goods, as positive product information increases, the impact of preference on customer purchase intentions increases.

The discussions about the four hypotheses are summarised in [Figure 1] and <Table 1>.



[Figure 1] A conceptual research model

3. Survey Design

A paper-based survey was conducted to validate the proposed hypotheses. First, we developed measures for quality, preference, and purchase intention. We then selected one quality goods and one preference goods in the context of online shopping,

〈Table 1〉 Consumer response mechanism to product information

Type	Information firms provide	Information customers seek	Information reliability	Customer Response to positive information	Hypotheses
When buying quality goods					
Quality Information	O	O	O	Customers are more "relieved" about quality	H1a, H1b
Preference Information	O	X	-	No response	H2
When buying preference goods					
Quality Information	O	X	-	No response	H3a, H3b
Preference Information	O	O	X	Customers are more "concerned" about preference	H4

and presented them to the respondents with different product information levels. After showing the products, we asked the respondents regarding their perceptions on quality, preference, and purchase intention. The details of the survey process are presented in the following sections.

3.1 Item Development

The lack of items developed in prior literature regarding quality and preference prompted us to develop an original measure for items using the simplified card sorting method[45]. For content-validity exercise, the study referred to management and economics literature, where eight and nine candidates in the form of nouns and verbs were derived, as shown in <Table 2>.

For pilot test 1, we prepared 3 by 5-inch cards, each containing one word from the table, and asked 10 graduate students majoring in information systems in one major university in Korea to sort the cards in the order of the meaning closest to quality and preference, respectively. For construct validity, we fully explained to the subjects about the original concepts of both quality and preference used in the research but did not directly mention the words quality and preference to avoid construct biases from the respondents.

For pilot test 2, the top five and six words from pilot test 1 were selected and converted to full sen-

〈Table 2〉 Results of pilot tests 1 and 2 for quality and preference

Underlined : selected for main survey	Pilot Test1 Average Ranking(/8, /9)	Pilot Test2 Selected if has isolated meaning (/15)	Key Studies
QUALITY			
Perform well	4	2	[5, 26, 41, 48 etc]
Reliable to use	4.4	2	
Durable	5.4	7	
High quality	5.4	3	
Work well	5.9	1	
Recommendable	6.6	-	
No worry to use	6.8	-	
No error	6.9	-	
PREFERENCE			
Like	3.2	1	[2, 16, 19, 20, 61 etc]
Prefer	4.8	0	
Fit my Taste	4.9	2	
Interest	5.1	6	
Important	5.1	9	
Meaningful	5.4	2	
Enjoy	6.3	-	
Choose	6.8	-	
Happy	8.3	-	

tences such as "I would prefer this product," and "this product would work well." Then we asked 15 graduate students at the same school to select one, two, or three sentences with isolated meanings from the others. After the pilot tests, four items for each quality and preference were finalised for the main survey. For purchase intentions, three question items were selected from the literature (See Appendix for a full version of questionnaires).

3.2 Experiment Design

For the main experimental survey, we selected *Windows Vista* for quality goods and *New Movie* for preference goods. *Windows Vista* is differentiated by quality in the MS *Windows* series and purchased by the customer because of perceived superiority over *Windows XP* and other older *Windows* versions. *New Movie* (before the release) is differentiated by preference from other movies, and the ticket is normally sold because the customer personally likes it based on storylines, plot, and actors.

We prepared two types of product information for one product : a product with non-positive information and with positive information. Non-positive information includes the small picture of the product, price, name, and low customer rating (3.0/10.0). On the other hand, positive information includes the large picture of the product with high resolution, high customer rating (8.0/10.0), and lengthy product explanation with high-technology function description, specification, warrantee, attractive storyline, director information, and awards in movie festivals. As a result, this study designed four different cases :

Case 1 : *Windows Vista* with non-positive product information;

Case 2 : *Windows Vista* with positive product information;

Case 3 : *New Movie* with non-positive product information;

Case 4 : *New Movie* with positive product information.

Each case has 11 questions (four each for quality and preference and three for purchase intention) and 10 demographic questions so one set of survey has 54 question items in total.

4. Hypotheses Testing

4.1 Descriptive Analysis

To validate the proposed hypotheses, this study collected data from university students. The sample of students is considered as the representative of online customers because online consumers are generally younger and more educated than conventional consumers[37]. In addition, students themselves are important and genuine online shoppers[59].

A total of 57 undergraduate students in the same university participated in the survey in June 22, 2007. We explained the contents of the survey so that the respondents would fully understand the purpose of the survey. We eliminated those respondents who already use *Windows VISTA* to

〈Table 3〉 Respondents' demographics

Gender	No. Res.	%	Age	Year
Male	21	37	average	23.2
Female	36	63	Min	20
Total	57	100	Max	35

〈Table 4〉 Respondents' shopping behaviours

Do you have online shopping experience?		Yes	No
		57	0
If yes, average shopping experience		3.7 years	
If yes, average shopping frequency		1.7/month	
The last time shopped	No. of Responses	Items purchased	No. of Responses
Within a month ago	40	Apparel	51
1-6 month ago	13	Electronics	34
7-12 month ago	1	Tickets	24
More than a year ago	3	Cosmetic	30
Total	57	Book, CD, DVD	19
		(Etc : Digital contents, Medical device, furniture etc)	

avoid pre-conception, and confirmed that all the respondents surveyed have never seen the movie included in the questionnaire.

For a total of 54 questions, 7 minutes were allotted for explanation and 25 minutes were given for the respondents to answer the questionnaire. To control the general attitude problem on online shopping, we examined whether all the respondents have experienced online shopping. Their average shopping experience period is 3.7 years and 1.7 times per month. Regarding online items they normally purchase, responses varied from apparel to books. Since majority of the respondents were young female college students, apparel and cosmetics ranked relatively high among items purchased. All descriptive analyses are presented in <Table 3> and <Table 4>.

4.2 PLS Path Comparison Analysis

For the hypotheses testing, PLS path comparison analysis was conducted as suggested by Chin[13]. The PLS method is known for its high statistical validity with relatively small sample size. It usually requires a sample size of 10 times the most complex relation in the model[1, 12], and prior research empirically showed its statistical significance for even less than 50 samples[33, 66]. This technique is also valid when the paths in multiple models are compared. T-value of the path coefficients difference is computed and checked whether it exceeds the critical value (2.0) or not. The study's model has four items for one construct; thus, the PLS method was deemed appropriate with a sample of 57 respondents for hypotheses testing. The results of factor analyses and reliability tests showed adequate level of significance, as shown in <Table 5>.

Based upon the previous discussions regarding the hypotheses development, H1 and H4 came in the form of typical alternative hypotheses, H_1, while H2 and H3 came in the form of null hypotheses, H_0. To validate H_1, we used the PLS path comparison method and estimated the t-value to determine the significance level. If the value is over 2.0, hypotheses can not be rejected. Statistical interpretation of this process evaluates whether we could or could not reject H_0. To validate H_0, its t-value was estimated to determine whether we could or could not reject H_0. In this case, we in-

〈Table 5〉 Results of factor analysis and reliability test

(a) Factor Analysis

Items	Case 1			Case 2			Case 3			Case 4		
	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
Q1	0.16	0.86	0.22	0.18	0.79	0.35	0.88	0.28	0.27	0.83	0.21	0.38
Q2	0.38	0.79	0.29	0.27	0.88	0.15	0.81	0.29	0.40	0.78	0.43	0.21
Q3	0.29	0.84	0.25	0.28	0.86	0.15	0.82	0.36	0.31	0.80	0.35	0.30
Q4	0.45	0.71	0.30	0.15	0.85	0.37	0.78	0.45	0.31	0.77	0.40	0.30
PR1	0.76	0.39	0.37	0.88	0.27	0.25	0.40	0.77	0.38	0.35	0.79	0.42
PR2	0.80	0.37	0.40	0.86	0.30	0.24	0.38	0.81	0.31	0.39	0.82	0.34
PR3	0.75	0.29	0.42	0.90	0.20	0.27	0.27	0.82	0.38	0.42	0.70	0.29
PR4	0.84	0.27	0.33	0.89	0.17	0.34	0.36	0.80	0.34	0.34	0.71	0.52
CPI1	0.41	0.38	0.75	0.50	0.30	0.76	0.37	0.43	0.76	0.33	0.42	0.81
CPI2	0.38	0.34	0.80	0.28	0.46	0.79	0.39	0.41	0.78	0.37	0.32	0.82
CPI3	0.40	0.24	0.83	0.45	0.27	0.82	0.41	0.45	0.75	0.36	0.57	0.68

Note : Q : Quality; PR : Preference; CPI : Customer's Purchase Intention;
Extraction Method : Principal Component Analysis; Rotation Method : Varimax with Kaiser Normalization.

(b) Reliability test

Variables	Cronbach's Alpha				Intra-Class Correlation Coefficient			
	Case 1	Case 2	Case 3	Case 4	Case 1	Case 2	Case 3	Case 4
Quality	0.92	0.93	0.96	0.93	0.75	0.77	0.87	0.79
Preference	0.95	0.96	0.96	0.95	0.84	0.87	0.85	0.82
Customer's Purchase Intention	0.93	0.95	0.95	0.95	0.83	0.86	0.88	0.87

〈Table 6〉 Hypotheses test results

	If positive product information is added,	Testing Hypotheses	t-value	Result	Interpret
In quality goods,					
H1a	Impact of quality on purchase intention will decrease	H1	-0.26	Can not reject H0	Not Supported
H1b	Impact of quality on preference will decrease	H1	2.03	Can reject H0	Supported
H2	Impact of preference on purchase intention will not change	H0	-0.76	Can not reject H0	Supported
In preference goods,					
H3a	Impact of quality on purchase intention will not change	H0	0.81	Can not reject H0	Supported
H3b	Impact of quality on preference will not change	H0	-0.39	Can not reject H0	Supported
H4	Impact of preference on purchase intention will increase	H1	-0.76	Can not reject H0	Not Supported

directly estimated the statistical significance level. As shown in <Table 6> and [Figure 2], the results showed that H1 was partially supported, H2 and H3 were supported, and H4 was not supported.

4.3 *Post-hoc* Analysis of Information Sensitivities on Quality, Preference, and Purchase Intention

In estimating the PLS path coefficient changes, we examined whether the information weakens or strengthens the relationship between variables selected in this study. We further examined 'how much' information has an impact on customer's purchase intention by estimating the variables' sensitivity to information. This additional process allows us to have an in-depth look regarding information impacts, that is, not only the direction of changes but also the amount of changes. "If there are some changes in the quality, preference, and purchase intention, how much are they changed? How are those changes related to each other?" These would be the questions for analysis in this section.

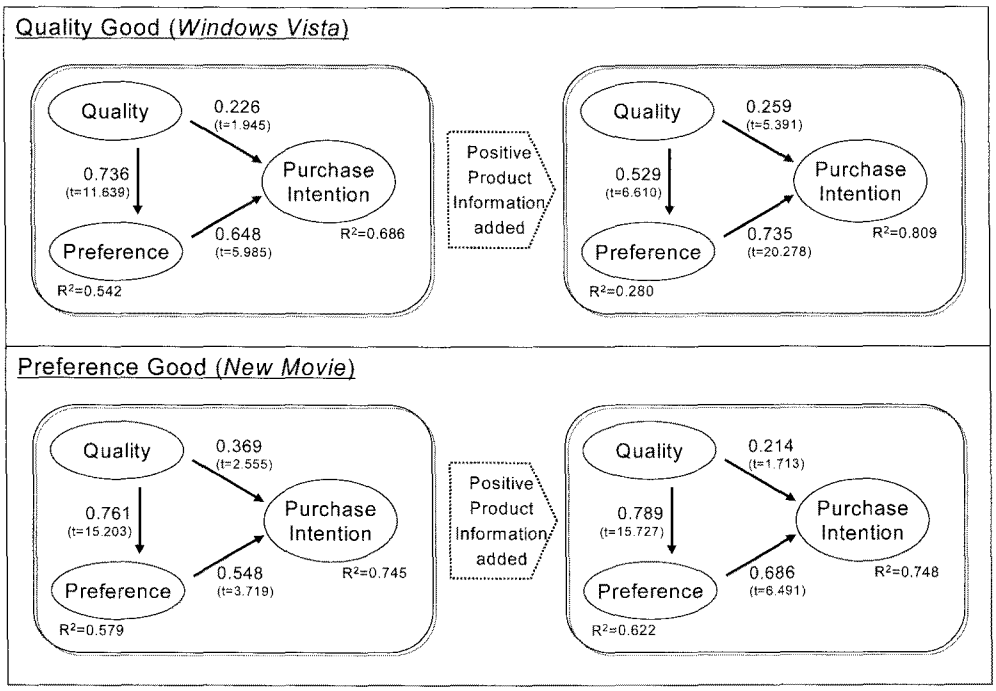
We estimated the sensitivities of the variables to information using the following mathematical form of the sensitivity of variable Q in product A :

$$\Delta Q_A = \frac{Q_A'' - Q_A'}{Q_A'}$$

ΔQ_A : Information sensitivity of variable Q of product A

Q_A' : Average rating on variable Q of product A with non-positive product information

Q_A'' : Average rating on variable Q of product A with positive product information



[Figure 2] PLS analyses result

In this study, six different types of sensitivity were identified as follows :

$\triangle Q_{QG}$, $\triangle PR_{QG}$, $\triangle PI_{QG}$: sensitivites of quality, preference and purchase intention of the quality good

$\triangle Q_{PRG}$, $\triangle PR_{PRG}$, $\triangle PI_{PRG}$: sensitivites of quality, preference and purchase intention of the preference good

With these, we conducted a series of *post-hoc* analyses to identify the relationship between the sensitivities of the variables and had the result supported by two different analyses such as Wilcoxon sign test and regression test, as displayed in <Table 7> and <Table 8>.

〈Table 7〉 Wilcoxon Sign test(non-parametric mean-comparison analysis)

Hypotheses	Asymt. Sig
$\triangle Q_{QG} < \triangle PI_{QG}$	0.035
$\triangle PR_{QG} < \triangle PI_{QG}$	0.115
$\triangle Q_{PRG} < \triangle PI_{PRG}$	0.006
$\triangle PR_{PRG} < \triangle PI_{PRG}$	0.022

〈Table 8〉 Regression test(seeing linear relations among the sensitivities)

Hypotheses Equations	$\beta 1$		R square
	Coeffi.	Sig.	
$\triangle PI_{QG} = \beta 1 \triangle Q_{QG}$	0.823	0.000	0.678
$\triangle PI_{QG} = \beta 1 \triangle PR_{QG}$	0.883	0.000	0.779
$\triangle PI_{PRG} = \beta 1 \triangle Q_{PRG}$	0.894	0.000	0.799
$\triangle PI_{PRG} = \beta 1 \triangle PR_{PRG}$	0.934	0.000	0.872

The result of the Wilcoxon sign test implies that purchase intention increases faster than quality or preference ($\because \Delta PI > \Delta Q, \Delta PR$). On the other hand, the result of regression test showed that purchase intention increases slower than quality or preference ($\because \beta_1 < 1$). The assumption used in PLS analysis implies that purchase intention increases in the same speed with quality and preference (i.e., $PI = k \cdot Q \leftrightarrow \Delta PI = \Delta Q$). All these different and seemingly contradictory results came from one data set collected in this study.

Different results from the one data set were rooted in the different constraints on error terms used in each analysis. All the statistical inference methods inevitably assumed a certain level of residuals (i.e., error terms), and we made the statistical inference to minimise errors. The maximum level of error we tolerated during the inference is called confidence interval or significance level. Based on the forms and the conditions of the residuals, we have various types of statistical estimating methods such as OLS, GLS, and so on[43].

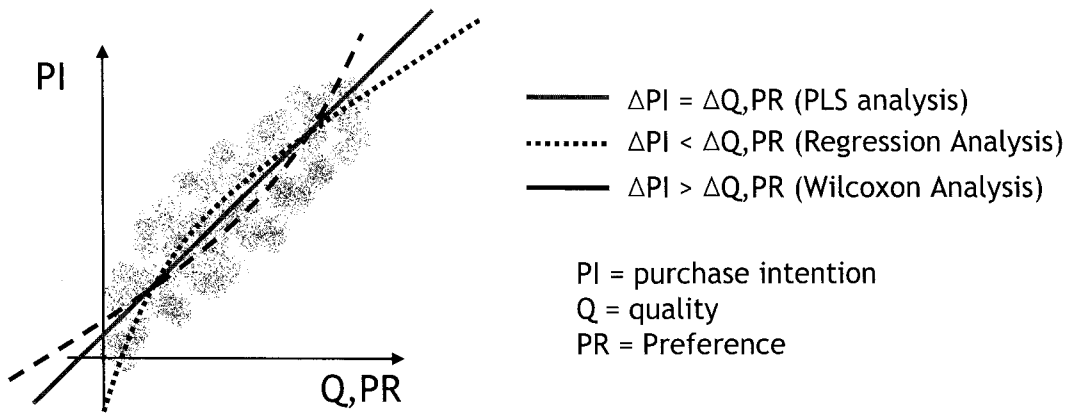
Hypotheses test results were the examples of various types of estimations. In PLS, we assumed the linearity of variables for easy handling and simple understanding. To understand the changes of angle the slopes made, we drew straight lines between purchase intention and quality preference. In Wilcoxon analysis, we compared the sensitivities of variables and obtained the result that purchase intention increases faster than quality and preference, which indicates that there could exist a convex line between the variables. In the regression test, we assumed and tested the linearity between the sensitivities so that we could approximately conclude that purchase intention increases slower than quality or preference resulting concave line between them. All these are of course statistically significant. These results are summarised in [Figure 3].

In PLS analysis, we assumed linearity for convenient estimation of the average slope angles between quality, preference, and purchase intention. In reality, however, not many relations were found to be linear. On the Web, for example, adding information is easy and almost free. Even though it is logically possible, firms usually do not provide 'all' the information they have because they are aware of the marginally decreasing impact of product information on customer's purchase intention. When there is not much information, adding one unit of positive information would effectively work on purchase intention. When there exists 'enough' amount of existing information, however, adding one more unit of information could not work as effectively. For example, when there is only one review about a book, the second review will have a large impact on the customer's final product evaluation. In contract, when there are already one hundred book reviews, one more newly added customer review will not have much impact on the customer product evaluation.

From these *post-hoc* analyses, to support the intuitive non linear impact of product information, we empirically examined the non-linearity between quality, preference, and purchase intention.

5. Discussion and Conclusion

This paper showed how online product information changes the customer's purchase intention with epistemological and methodological specifications. In theory, the proposed quality and preference as product evaluation criteria, which determined the customers' purchase intention, cover the subjectively and objectively evaluated attributes of the product. From the subjectivity-objectivity dichotomy perspective, quality is the objectively measurable and ranking-based attribute inherent in the product, while preference is the subjective judgment about the product quality based on individual taste. Quality is positively associated with preference, and both quality and preference are positively related to customers' online purchase intention. In validation, we differentiated the level of product information to estimate its marginal impact on product information. Since the impact of product information on quality, preference, and purchase intention was different with product types, we respectively hypothesised that



[Figure 3] Relations between quality, preference and purchase intention

positive product information in quality goods decreases the impact of quality on purchase intention and preference (H1), while the information does not change the impact of preference on purchase intention (H2). And in preference goods, the positive product information does not change the impact of quality on purchase intention and preference (H3), while it increases the impact of preference on purchase intention (H4). Measurement items for quality and preference were newly developed, and Windows Vista and new movie were selected as target products for the experimental survey. Positive product information about the products includes higher customer rating, longer product description, and larger picture of the product. The survey was answered by 57 undergraduate students, and as a result, hypotheses were partially supported through the PLS path comparison method. For an in-depth investigation on the information impact, we performed a couple of *post-hoc* analyses and found statistically significant non-linear relations between quality, preference, and customer's purchase intention, which implied the different impact of product information with its adding timing.

Most of hypotheses proposed in this study were accepted, but H1a and H4 were not supported. It is partially because, for H1a, the association intensities between quality and purchase intention inferred from t-values[43] are smaller than those between quality and preference ($t\text{-}value(Q \rightarrow PI) < t\text{-}value(Q \rightarrow PR) \Leftrightarrow 1.945 < 11.639$, $5.391 < 6.610$). Theoretically, it implies that when a customer perceives the high quality of a product, his/her purchase intention increases not directly influenced by the quality itself but indirectly mediated by the increased preference for the product. It can be explained as, even though we divide the customer perception area into subjective and objective, they are not in equally parallel positions but subjective favour to the product more critically impacts on the purchase intention than objective superiority does. And it eventually explains why the association between quality and purchase intention does not significantly change while the association between quality and preference significantly changes.

Another interesting point was drawn from H4 test result. Inherently diverse opinions about preference goods may result in the relatively weak patterns for path changes. When people buy a preference good like movie, their favours to the product more widely vary and include more hidden factors[44], thus the customers' favours to preference goods are harder to be patternized than those to quality goods. Compared to quality goods, preference goods may have higher probability of having other hidden factors in addition to preference and quality[44]. As a result, even if the beta coefficient increased ($0.548 \rightarrow 0.686$), the change was not proved to be statistically significant.

The results further suggest several implications of both academic and practical importance. This study addresses two academic contributions. First, it provides an effective and efficient framework for product information perception processing by adopting the subjectivity-objectivity dichotomy. The framework is simple : it has only two criteria for product evaluation and includes an exhaustive list to cover most product information types on the Web. From the firm's perspective, this is especially effective because of high information controllability online. Second, it technically separates the impact of product information from other confounding factors by adopting the marginal analysis method. This method compensates the generic lim-

itation in cross-sectional analysis by segregating the impact, and it is also more efficient than longitudinal study in terms of time and cost.

We also suggest two managerial implications from the findings. First is effective product information management. The right information should be given for the right product. From the hypotheses, the study showed that product information has an impact on purchase intention differently based on the types of product and information available. Quality information effectively impacts on quality goods, while preference information does not effectively impact on preference goods. For sellers, knowing and positioning the type of the product should be the most important strategic concern when selling products online. The Web is high with potential in information control and low with time-and-space constraints. High manipulability as well as the low constraint of the Web, however, would be wasted without an effective and efficient strategy. In this regard, this research provides the guidelines for a firm to effectively manage its product information on the Web with theoretical foundation.

Second is efficient product information management. The amount of information is as important as its correctness. From *post-hoc* analyses, we understand that the impact of one unit of information on purchase intention might be different with its time of being added. Considering the cost of information added and its corresponding quality and preference, the marginal impact of product information became directly related to information efficiency. If the marginal impact of product information (i.e., the impact of the addition of one unit of information) is large, information efficiency is high so the firm has an incentive to invest in the product and *vice versa*. Therefore, information efficiency is an important parameter for a firm to decide whether to invest on a particular product more or not. With the awareness of information efficiency, the firm now can make a better business decision.

While the findings provide some implications, this study has several limitations. First, this research adopts a paper-based survey method to test online purchase intentions. Even though we have sufficiently explained the research objective to the respondents, contextual limitation may exist such as paper size and legibility. Second, the relatively small sample size may result in low t-test values in path comparison processes. In similar studies on path comparison, over 500[35] and 150[28] respondents were used. Compared to these published papers, the sample size of the study may not be sufficient for path comparison. Lastly, the relatively high R square value may be caused by the high-controls of the survey. To avoid attitude biases on product types and its price, the respondents were asked to be generally positive to buy the product and not to consider price. These explanations may lead them to focus on the purchasing process and eventually generate a high R square value.

To supplement these limitations, this study suggests the following future research directions. First is to conduct econometric analysis using real sales to assess the distinction between quality and preferences goods data from online shopping malls. A large-scale econometric analysis about the relations among sales records, product category, and information will strengthen the actualities of the theory and the results proposed in this research. Second is to look at other important factors that influence the customers' purchase intention in online shopping. The identification of key antecedents

that generate positive or negative product information is further proposed for future research.

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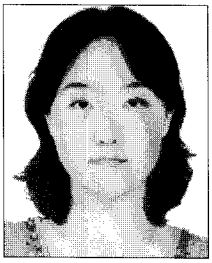
〈Appendix〉 Measurement instruments

Construct	Item	Question
Quality	Q1	This product would work well.
	Q2	This product would perform well.
	Q3	This product would be reliable to use.
	Q4	This product would have a high quality.
Preference	PR1	I would prefer this product.
	PR2	I would like this product.
	PR3	This product would fit my taste.
	PR4	This product would be meaningful to me.
Customer's Purchase Intention	CPI1	I am positive towards buying this product.
	CPI2	I have the intention of buying this product.
	CPI3	I think it is a good idea to buy this product.

◈ 저 자 소 개 ◈



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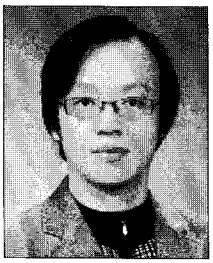

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