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THE NUMBER OF ALTERNATIVE PRODUCTS AND THE INFORMATION ABOUT IT ON THE ONLINE SHOP

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Abstract

As the Internet can aggregate and distribute a great amount of information to users, providing numerous products for consumers has been recognized as a major advantage of electronic commerce. Causing by the problem of information overload, however, consumers facing many alternatives on the online shop may feel hard to decide which one they prefer. Based on the theory of decision style and prospect theory, this study explores if too many products sold on the online shop will reduce consumers' subjective status toward their buying decision. A 3×3 between subjects experiment was conducted and showed that the buyers' decision style, the quantity of alternative products and the information about it will affect consumers' subjective status. These results suggest that we should consider the role of electronic intermediaries more carefully, and further examine the theory of information overload and the need for information literacy to prepare for the future.

Keyword: information overload, Prospect theory, online shopping

1. INTRODUCTIONS

Recent developments in information technology and service infrastructure have brought Internet to be an important retail channel for firms. Comparing with the traditional ones, Internet is advantaged in providing more alternatives and more information to consumers (Brynjolfsson and Smith, 2000; Smith et al., 1999). We usually believe it's good to provide consumers with more products and more product information. Without the limitation in retailing space, online stores can sale more different products than brick-and-block stores. Besides, the concentrated inventory model of online stores reduces the inventory cost, which further increases their ability to prepare more different kinds of products.

This perspective, however, ignores consumers' limitation in processing information. Previous studies show that people will be more satisfied with their decision while they have fewer alternatives (Iyengar and Lepper, 1999). Increasing alternatives may reduce the attractions of the product; consumers may even hope someone can help them to make the decision in this situation (Beattie et al., 1994). People have the problem of information overload while the website provides too many and too complicated information that exceeds the constraint under which they can handle well (Jacoby et al., 1974a; 1974b; Malhotra, 1982).

Based on human decision and prospect theory, this study conducted an experiment to investigate the impact of a lot amount of alternative products provided by a online store on consumer's satisfaction with his/her decision. A complete rational people who continues to look for a better choice to maximize his/her benefits will be more likely to feel dissatisfied with facing too many alternatives; however, a limited rational people may only aim to find a satisfied solution by heuristic rules (Schwartz et al., 2002). Unlike traditional retailers, online shops can manipulate how to present the amount of alternative products they provide. This study also tested the impacts of whether a consumer notices how many information he/she has processed or he/she has not processed on his/her subjective status toward the decision. Results of this study will help us to explain better the impact of information overload on human decision making and to predict the role online retailers should play in the future.

2. THEORETICAL BACKGROUND

2.1 Information overload

The human information processing capacity is limited. Providing people with too many information to be handle in a short time causes the problem of information overload, which brings missing and confusion; the information perceived will be filtrated, people's reaction will be lowered, the performance will be degenerated, and the process of decision-making will be interfered (Schroder et al., 1967). Jacoby et al. (1974a) brought the theory of information overload into consumers' decision making and found that the quality and accuracy of decision would drop as the quantity of information increased and reached a certain amount.

A series of follow-up studies found that different definition of information amount would cause different results (Russo, 1974; Wilkie, 1974), such as the number of attributes or the distributions of attributes' value (Lee and Lee, 2004; Lurie, 2004; Malhotra, 1982; Summer, 1974). Furthermore, the quality of information (Keller and Saelin, 1987), cues help to flit the merchandise (Scammon, 1977), personal cognition style (Buchanan and Kock, 2000), and time pressure (Hahn et al., 1992), are all found to be factors influencing information overload. Since the Internet can provide a massive amount of information and has been a major source of information for consumers, information overload has been a critical issue on the Internet. Lee and Lee (2004) studied the impacts of the number of products, the number of attributes, and the distribution of attributes value on decision accurate for consumers shopping online. They found that the number and distribution of attributes are the major causes that would reduce decision quality and cause consumers confusing and to be less satisfied and confidence.

Studying the impacts on decision accurate, however, implies the consumers know what they want and try to find the product that can fit their preference best. Consumers in the real world may not have such explicit and stable preference and even may not be able to recognize what is the right decision (Fischer et al., 1999). The core of a consumers' decision may not be choosing the most correct merchandise, but whether they could choose among merchandise and will be satisfied with the decision they have made. Jacoby et al. (1974a) found that when the information quantity reached a certain amount, even the quality of decision started dropping, the consumer still satisfied to the decision and feel less confused. But many follow-up studies found that too many information would descend the satisfaction and confidence toward decision (Chen et al., 2009; Keller and Staelin, 1987; Lee and Lee, 2004; Malhotra, 1982).

On the other hand, consumers facing abundant information may use heuristic rules to lower the amount of information need to be handled. Previous studies on information overload assume consumers are completely rational and try to maximize their utility; therefore may feel dissatisfied when they can't find the best solution. Instead of trying to handle all the information and find the best solution, a bounded rationality people adopts a satisfied strategy will keep collecting extra information till he/she finds a satisfied solution (Simon, 1955, 1956; Wright, 1974). Providing these people with abundant information may not negatively affect their subjective status toward decisions because they can be satisfied with processing only a certain part of it.

2.2 prospect theory

The prospect theory provides a framework for understanding human decision making under uncertainty (Kahneman and Tversky, 1979, 1983; Tversky and Kahneman, 1974). It proposes that people hate losses more than they love gains; they will be risk aversion in a gain situation, and be risk seeking in a loss one. Whether the situation will be judged as a loss or a gain is determined by the reference point of the decision maker. Schwartz (2004) suggested that when consumers have more options, their expectation about the result will increase; if they can't handle all the information well, their predicted losses and regret will also be raised. The negative impacts of predicted losses and regret caused by a higher expectation will be larger than the positive impact of a possible better choice (Schwartz, 2000). Massive evidence showed that the expected losses have a great influence on decision making, even stronger than the expected gains (Beattie et al., 1994; Loomes and Sugden, 1982; Ritov, 1996; Simonson, 1992; Zeelenberg, 1999; Zeelenberg and Beattie, 1997; Zeelenberg et al., 1996).

Previous studies also suggested that people may feel better when the number of options is limited. Beattie et al. (1994) found increasing the number of products will reduce the attraction of the products; consumers may even hope somebody can help them to decide. Iyengar and Lepper (1999) also found that increasing options would create serious information processing problem. It's easy to find the best answer from 6 options, but it will be pretty hard to choose from 30 choices. That's why when the selection is less, people are more satisfied with what they choose.

Although bounded rationality would be more suitable to explain human's decision making than the complete rationality model, Schwartz et al. (2002) suggested that people show different tendency toward maximization and satisfaction. Consumers tend to be maximization would keep collecting information before and after shopping, they would feel regret about their decision and reducing their satisfaction if they find something better than what they have chosen. Although the maximizers could find better choice objectively, they may subjectively feel worse than the satisficers.

3. RESEARCH MODEL

The net store can provide massive merchandise, but it may increase the difficulties for consumer to select. Most of the studies on information overload focused on how information amount influences decision quality, but what really affects consumers' buying behavior is the subjective status instead of the objective decision quality. This study explores the effects of abundant alternatives on consumers' subjective psychological status toward buying decision during net shopping. Making a good decision

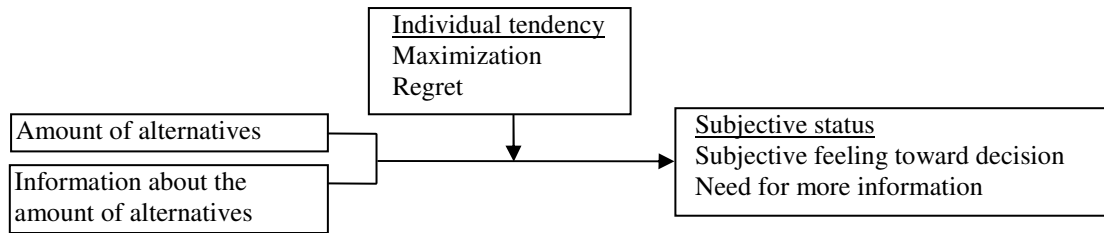


Figure 1: Research model

will lead an individual to a better psychological state; he/she will subjectively feel more satisfied and certain with the decision, less confused and regret, and need no more information. Jacoby et al. (1974) proposed a scale to measure subjective status toward decision that includes the consumer's satisfaction, certainty, confusion, and regret about one's buying decision, and the degree of desire for more product information. This scale was widely used in the follow studies and was usually divided into subjective feeling toward decision and need for additional information (Chen et al., 2009; Keller and Staelin, 1987; Lee and Lee, 2004; Malhotra, 1982).

As the amount of information increased, Jacoby et al. (1974) asserted that consumers would feel better even though they actually made poorer decisions. But many follow-up studies found that subjective status such as satisfaction and certainty would reduce while the amount of options increases (Keller and Staelin, 1987; Lee and Lee, 2004; Malhotra, 1982). Consumers may not think that information should be as more as better. After passing a certain amount of alternative products, it may bring the information overloading problem that increasing prospect losses and consequently reducing subjective status. In addition, consumers facing excessive choices would feel no need for additional information. Therefore, we proposed the two hypotheses below:

H1a: Selling abundant alternative products on the net store will reduce a consumer's subjective feeling toward shopping decision.

H1b: Selling abundant alternative products on the net store will make a consumer feel no need for more information.

Unlike the traditional supermarket, on line stores can present the amount of alternative products in different ways so consumers may perceive differently. It may not be the number of alternatives, but how the number of alternatives is presented, that will affect consumer's subjective status. People may not recognize how many alternatives they are facing if the amount is not shown. Presenting in a positive way, that showing how many alternatives have already been browsed, would remind the consumer of the efforts he/she has spend and induce him/her to search for the satisfied solution; therefore reduces the effect of product amount on subjective status. On the other hand, presenting the amount of alternatives in a negative way, that showing how many alternatives haven't been browsed, could remind consumers of prospect losses and regret, and therefore increases the effect of product amount on subjective status. For these arguments, we addressed hypothesis below:

H2a: How the amount of alternatives is presented on the net store will affect interactively with the amount of alternative products on consumers' subjective feeling; the negative effect of the amount of alternatives will be less when the amount of alternatives is not shown; the effect will increase when the amount is presenting in a positive way, that showing how many alternatives have been browsed; the effect will be the largest when the amount is presenting in a negative way, that showing how many alternatives haven't been browsed.

While the amount of alternatives increases, the decision makers' processing capability wouldn't increase at the same time, making the un-browsed merchandise increases more than the browsed ones. The differences between the amounts of browsed merchandise should be less than the differences between the

amounts of un-browsed merchandise, as the amount of alternatives increases. Presenting in a negative way could remind consumers how many alternatives there are that have not been evaluated, so make them tired about additional information. We could address the hypothesis below:

H2b: How the amount of alternatives is presented on the net store will affect interactively with the amount of alternative products and on whether consumers feel they need additional information; the negative effect of the amount of alternatives will be less when the amount of alternatives is not shown; the effect will increase when the amount is presenting in a positive way and the effect will be the largest when the amount is presenting in a negative way.

Except for the amount of information, individual's tendency about decision could also affect one's subjective status toward decision (Schwartz et al. 2002). Consumers who tend to be maximizers would try to find the best answer. While there are too many options that they can not compare all of them, they would lack confidence about what they chose and would more easily feel regret and doubt if there is a better choice. But satisficers would just seek for a satisfied solution, without worrying about if there is any better choice. So increasing the amount of alternatives may not make them feel bad. While the amount of alternatives amount was presented in a negative way, the hate created by a maximizer would larger then a satisficer. While the amount is presented in a positive way, the amount of browsed products would bring more satisfactions for satisficers than for maximizers. In comparison with satisfaction tendency people, those people who desire to maximization would be more easily affected by the amount of alternatives and how the amount of alternative was presented. Therefore, we proposed the hypothesis below:

H3a: Consumers' tendency toward maximization will positively moderate the impacts of the amount of alternatives and how the amount of alternative products is presented on subjective feeling; the higher the tendency is, the larger the negative impacts will be.

On the other hand, consumers with high maximization tendency would always seek for better merchandise. Although there are already such amount of goods provided on the online store, they might still unsatisfied and seek for more of them. The direction of the moderating effect of maximization tendency on the feel of needing more information differs with the direction of its effect on subjective status:

H3b: Consumers' tendency toward maximization will negatively moderate the impacts of the amount of alternatives and how the amount of alternative products is presented on the feel of needing more information; the higher the tendency is, the less the negative impacts will be.

The prospect theory emphasizes the impact of prospect losses would be larger than prospect benefits. Many follow-up studies found that the effect of hat-to-regret on decisions may even be larger than the effect of hate-to-lose (Beattie et al. 1994; Ritov, 1996; Simenson, 1992; Zeelenberg, 1999). Schwartz et al.(2002) mentioned that regret would have a negative effect on human's feeling and those people with higher tendency toward regret may be unhappier, more dissatisfied about their lives, and more pessimistic and melancholy. People will be more likely to regret when they have many alternatives because they have to abandon more choices. They might feel less prospect regret and better satisfied with decisions while there are fewer options (Iyengar and Lepper, 1999). Furthermore, when the amount of alternatives is presented in a negative way, the dislike brought by the un-processed alternatives may be more for high regret tendency people; high regret tendency people may also satisfy less with the amount of processed alternatives presented. So we proposed the following moderating hypothesis:

H4a: Consumers' tendency toward regret will positively moderate the impacts of the amount of alternatives and how the amount of alternative products is presented on subjective feeling; the higher the tendency is, the larger the negative impacts will be.

Finally, in order to avoid regret, high regret tendency consumers, although facing massive amount of alternatives, would be hard to make decision and still feel they don't have enough information. This

would reduce the negative effect of the amount of alternatives on the need for more information:

H4b: Consumers' tendency toward regret will negatively moderate the impacts of the amount of alternatives and how the amount of alternative products is presented on the feel of needing more information; the higher the tendency is, the less the negative impacts will be.

4. RESEARCH METHOD

A 3x3 experiment was conducted to test our hypotheses. We constructed a web site for packaged tours for the experiment. Travel is the major merchandise sold on the Internet. As the content for oversea tour package is complicated, consumers need to take time to compare and search for information so that the impacts of the information amount will be clearer. Since the effect of information amount isn't linear, we designed three levels of the amount of alternatives in the study: 100 package tours were provided for the high alternatives amount, 50 for the middle amount, and 20 for the low amount. The content of the package tours was captured from four major traveling sites on Taiwan. After entering the simulated travel websites, the subjects would find 20 packages on each page. The destinations, price, days, and flight schedules of each package were shown on the web page. The subjects could click on a package to see its descriptions and the details of activities in each day. They were required to select the package they would like to buy mostly and then click button "buy it now" on the page of that package.

How the amount of alternatives was presented was divided into positive, negative, and no presenting groups. For the positive presenting group, the message "there are X packages totally; you have read Y of them" was shown at the top of the web page; for the negative group, it would show "there are X packages totally, and there are Y of them that you haven't read;" no message was shown in the no presenting group. Besides, after clicking the "buy it now" button, a window would pop up and ask "There are X packages totally; you have read Y of them. Do you really want to buy the Z tour package?" in the positive group, and ask "there are X packages totally, and there are Y of them that you haven't read. Do you really want to buy the Z tour package?" in the negative group. No reminder was shown in the no presenting group.

We asked the subjects to fill out a questionnaire after they bought their tour. A consumer's knowledge about the product would affect how they process product information and how many information they can handle (Johnson and Russo, 1984). Therefore, personal product knowledge was added into the model as a control variable. We asked the subjects to evaluate their oversea travel knowledge by the five items proposed by Brucks(1985). After that, we measured the subjective status toward decision by a scale used widely in previous studies to evaluate the subjective feeling toward decision and whether there is extra need for additional information (Malhotra, 1982; Keller and Staelin, 1987; Lee and Lee, 2004). Maximization tendency and regret tendency were measured by the scales proposed by Schwartz et al. (2002). All the measurements mentioned above used a 7-point Likert scale. Except for products knowledge, gender and the net-shopping experience were also added into the model as control variables (Krugman, 1966; Rosenthal and DePaulo, 1979).

A pretest and interviews with 18 graduated students was conducted to exam the designs of the questionnaire, website, and experimental procedures. Totally 180 students were recruited in campus to participate the experiment. They were randomly assigned to one of the nine treatment groups. We dropped 4 responses from the sample because in these responses, the difference between the transformed score of a reversed item and the score of the other items in the same variable was too large. MANOVA tests were conducted and verified that there were no difference in demographic variables, overseas travel experience, and online shopping experience among the nine groups.

5. RESULTS

A principal components analysis was applied to examine the measurement model. The items of

maximization tendency were divided into three factors in Schwartz et al. (2002), but they turned to be four factors in this study and the reliabilities of two of them were low. Therefore, we measured maximization tendency by two variables. The first one is subjective shopping difficulty, which means the subjective feelings about whether making shopping decision is difficult. The second one is high standard, which represents having high standard both for oneself and for things in general. In addition, we deleted one item in product knowledge and 2 items in regret tendency because they were not loaded in the predicted factors. The Cronbach's α of product knowledge, subjective shopping difficulty, high standard, regret tendency, the subjective feeling toward decision and need for more information are 0.69, 0.64, 0.63, 0.73, 0.70 and 0.68.

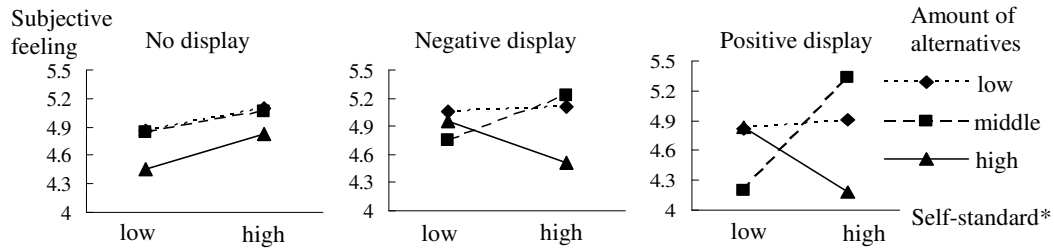
Hierarchical multiple regressions on subjective feeling and on need for more information were conducted to test our hypotheses with moderating effects. We used dummy variables middle alternatives and high alternatives for the groups of high and middle amount of alternatives, dummy variables positive presenting and negative presenting to show how the amount of alternatives was presented, and a dummy variable male to show gender. We tested models with control and independent variables in model 1 and 7, and we added the interactive effects in model 2 and 8. The three moderate variables were added in model 3 and 9 and the moderating effectives were separately tested in model 4 to 6 and 10 to 12. In order to avoid the problem of multicollinearity, we used the centering mean that subtracted the mean from each score prior to transforming into the multiplicative term.

For the hypotheses on the subjective feeling toward decision, the model 5, that adding the moderating effects of high standard, shows the highest explaining power and the moderating effects are significant only in model 5. In model 5, the effect of middle alternatives is insignificant but the effect of high alternatives is significantly negative; H1a is supported that consumers' subjective feeling do decrease while facing numerous amount of alternatives. The interactive term of middle amount of alternatives and positive presenting is significantly negative, but the interactive effect of negative presenting is insignificant, so H2a is only partly supported. High standard, middle alternatives, and positive presenting shows a three-way interactive effect, supporting H3a that about the moderating effect of maximization tendency. H4a is not supported because the interactive terms in model 6 are insignificant. Furthermore, comparing the result in model 5 with the results in the other models, the impacts of high and middle alternatives and positive presenting all increase as the moderating effect of high standard is added, indicating the importance of this moderating effect.

According to the result in model 5, figure 2 illustrates the three-way interactive effect of the amount of alternatives, how the amount is presented, and self-standard. In the no presenting group, people who have higher standard would have better subjective feeling. They probably would try their best to look for the best option so would be satisfied and confident by their decision. Besides, the lines of middle and low alternative amount almost overlap, and the line of high alternatives is significant lower than the other two lines. In the negative presenting group, the slope is steeper when the amount of alternatives increases from low to middle, but the slope substantially changes from positive to negative while high amount take place. Unlike the result in no presenting group, people with high standard would feel worse than low standard people. The results in positive presenting group are similar to the results in negative one, but the effects are further enlarged.

Figure 2 shows several interesting results. First, the effects of increasing the amount of alternatives from low to middle and from middle to high are different, suggesting the non-linear effect of the alternative amount. Second, the impact of the amount of alternatives on subjective feeling differs among people; people with higher self-standard will have a larger effect. Finally, manipulating how the amount of alternatives is presented do alter the effect of the alternative amount, but differs from our hypothesis, the effect in the positive presenting group is larger than the effect in the negative presenting group.

For the hypotheses on need for additional information, from model 10 to model 12, only model 10 shows a significant increase in explaining power, showing that only the subjective shopping difficulty has



*: High and low values are the mean value plus and minus standard deviation.

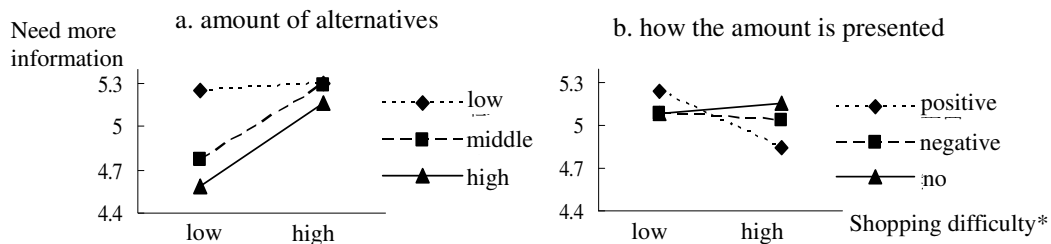
Figure 2. The interactive effects between the amount of alternatives, how the amount is presented, and standard for oneself on subjective feeling.

moderating effect and H4b is not supported. In model 10, subjects in the high amount group feel less that they need more information; H1b is supported. The interactive effects between the amount of alternatives and shopping difficulty and between how the amount is presented and shopping difficulty are both significant. These effects are illustrated in figure 3.

Figure 3a shows that when the amount of alternatives increases, people who feel shopping is easy would feel more that they don't need additional information, but the effect is less for people who feel shopping is difficult, just as the same as H3b. The interactive effects between alternative amount and how the amount is presented are not significant; H2b is not supported. The interactive effect between positive presenting and shopping difficulty on the need for more information is negative. Figure 3b shows in the groups of no presenting or negative presenting, subjective shopping difficulty affects the need for more information slightly. On the other hand, when the amount of alternatives is presented in a positive way, if the consumers feel making shopping decision is easy, they will prefer having more information, but if the consumers feel it's hard to make shopping decision, they will tend to not want additional information.

The results of this study support hypotheses 1 and 3 about the nonlinear effects of alternative amount and the moderating effects of maximization tendency. But the hypothesis 4 that about the moderating effects of regret tendency is not supported. Hypothesis 2 suggested the effects in the negative presenting group would be larger than the effects in the other groups. Results of this study verify the impacts of how the amount of alternatives is presented on subjective status; however, the effects are largest in the positive presenting group.

When the amount of alternatives is displayed in a different way, the decision maker may also react differently. Table 1 lists out the browsed items and browsing time in each group. Regression analyses on the browsed items and browsing time show that they are more for users in the high amount groups than users in the low amount groups. Users in the negative presenting groups spend more time and browsed



*: High and low values are the mean value plus and minus standard deviation.

Figure 3. The interactive effects between amount of alternatives and shopping difficulty, and between how the amount is presented and shopping difficulty, on the need for more information.

Table 1. Browsed items and browsing time

	Low amount	Middle amount	High amount
No presenting	4.30/323.05 ^a	5.37/425.42	7.84/596.32
Positive presenting	8.89/548.26	11.55/588.00	13.45/699.20
Negative presenting	10.90/597.65	13.40/644.75	16.05/690.31

^a. browsed items/browsing time(unit: second)

more items than users in the positive presenting groups, and which in turn is more than users in the no presenting groups. Table 1 suggests showing the amount of alternatives in a negative way that remind users how many alternatives they have not browsed may encourage people to spend more efforts on the task, so will affect their subjective status and reduce the effects of the amount of alternatives.

6. CONCLUSIONS

People usually believe it's good to have more choices. Therefore, firms usually try to offer consumers more alternatives, and provide consumers more information to help them to make decisions. Too many information, however, may cause the problem of information overload. This study investigated the impacts of the amount of alternatives offered by an online store on consumers' subjective status toward their purchasing decision and got some interesting results. First, the amount of alternatives has a non-linear effect on consumers' subjective status; while the amount exceeds the bound of their processing capacity, consumers' subjective status would be worse and they would not need additional information. But the effects are not shown when the quantity is in the middle range.

Since shopping is usually not an urgent problem, traditional arguments of information overloaded may not be easily applied to shopping decisions. Based on the suggestion of Schwartz (2004) and the prospect theory, this study found that personal maximization tendency would moderate the effects of alternative amount. Those consumers with higher maximization tendency would be affected by the amount of alternatives more. This result suggests that personal decision strategy could supplement to the information overload theory and may explain why the results of past studies are inconsistent. On the other hand, although prospect theory emphasizes the importance of regret, its effects are not shown in this study. This would probably due to that we failed to bring the feel of regret in our lab experiment.

Besides, this study found that consumers' subjective feeling is better when the amount of alternatives is low; when the alternative quantity reaches the middle range, maximization tendency and the message about the alternative amount would affect subjective feeling and the need for more information; when the amount is high, consumers' decision style and message presented would affect subjective feeling also, but with different level and direction with in middle quantity. It might suggest that although people show a tendency of maximization or satisfaction, during individual decision, consumers could still choose different coping strategy and target based on the complexity of the problem and the amount of information need to be proceeded. We also found messages about the amount of information presenting in the website can affect consumers' behavior and subjective status at the same time. It's interesting that the impacts of positive presenting differ with the impacts of negative presenting. This phenomenon should be explored in the future to explain the mechanism behind it.

That consumers' subjective status may decrease if they face too many alternatives may bring important implications for electronic commerce. Previous studies proposed that the massive distribution and processing capacity of information technology may benefit the large centralized marketplaces and this centralized marketplace will even replace traditional hierarchical channel (Malone et al., 1987). But even if information technology could carry and transfer a lot amount of information, doesn't mean that the user could process this information effectively. Consumers might lose decision satisfaction or even quit buying in the real world if it's too hard for them to make up their mind.

Of course, online shop could provide tools for searching, filtering, sorting, analyzing, and even interactive or customized functions to help consumers to select what they want (Alba et al., 1997; Evans and Wurster,

1997). But most of these tools would require consumers have some basic knowledge on the product and know their preferences, so these tools could be used effectively for searching the best merchandise. One of the major functions of the intermediaries is helping consumer to filter products and information (Bakes, 1998; Schmitz, 2000). Providing consumers with too many options might be a trouble for them if there aren't effective tools that can help. Building a specialty that consumers can recognize and trust and choose products in a specific field for consumers may still be critical even for online shops.

Finally, personal decision strategy can reduce the problem of information overload. As information explosion has been common on the Internet, people need to develop appropriate strategies to deal with abundance of information. This information literacy should be important for people in the information age.

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