

Full Length Research Paper

The effect of option framing on consumers' decision-making efficiency: Evidence from online service customization

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Based on Loss Aversion theory, this article analyzes and examines the effect of option framing (additive vs. subtractive) on consumers' decision-making efficiency (customization results and customization time) and the boundary conditions for the option framing effects: service importance, service type and individual expectation. Our experiment under the context of online information service customization produces the following findings: (1) Compared with the additive option framing, consumers in the subtractive option framing tend to choose more service options with a higher total option price; (2) Online option framing and service importance (important vs. less important) impose a significant interaction effect—the less important options will be more selected in the subtractive option framing and the important ones are more likely to be chosen in the additive option framing; (3) consumers' expectation plays a regulatory role in the relationship between option framing and decision time: consumers with low expectation tend to take more time when they use subtractive versus additive option framing; while those with high expectation prone to taking more time in the additive versus subtractive option framing. In addition, the interaction effect of online option framing and service type is not significant, but it presents the expected direction. These findings, in turn, offer interesting public policy and future research implications.

Key words: Online service customization, option framing effects, consumers' decision-making efficiency, boundary condition, service importance, individual expectation.

INTRODUCTION

With growing demand for personalization and rapid development of the Internet technology, it is necessary for enterprises to provide a network platform in which customers can design unique product or service they desire (Gilmore and Pine, 1998; Chen and Hao, 2010).

Thus it can be seen online customization is becoming an important channel for enterprises to build competitive advantage and create profits (Cui et al., 2013), which has the effect of increasing the perception of value and consumer satisfaction (Wang and Han, 2012; Lou, 2010;

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Park et al., 2000), in turn leading to improved consumer loyalty and higher purchase intentions (Franke et al., 2010; Kurniawan et al., 2006).

Due to the bargaining advantage of customization, product or service customization has attracted extensive attention from the academia. Park et al. (2000) found consumers made conflicting decisions in two different customization conditions: compared with the additive option framing, consumers in the subtractive option framing will choose more options with a higher total option price, which is known as Option Framing Effects. Previous studies have mostly examined the option framing effects of tangible goods in the offline context, such as automobiles (Park et al., 2000; Biswas and Grau, 2008; Park and Kim, 2012) and pizzas (Levin et al., 2002), which rarely involved the option framing effect of service customization in the online context (Jin et al., 2009; Wang et al., 2009; Jin et al., 2012; Hsu-Kuan and Liwen, 2011). Compared with the offline customization, online customization has stronger experience, autonomy and uncertainty (Cui et al., 2013).

In addition, with the development of information technology, information consumption has become an important approach for country to expand domestic demand and stimulate economic growth. There is a trend to focus on information service online customization for companies to win more customers and advantages over other competitors, which is worthy of study. Then under the online service customization context, is there any difference between consumers' decision in the above two different option framings?

For various information service options, according to the attribute, there are important service options (e.g. the internet flow package) and less important service options (e.g. the animation package); while classified by the service type, the service options can be classified as positive options (e.g. the weather forecast) and negative options (e.g. the flow monitoring). Park et al. (2000, 2012) speculated the importance of the product options had a significant influence on option framing effects. Chitturi et al. (2008) confirmed that the type of product options had remarkable effects on decision. Then does consumers' perception of service importance and the type of service also have an effect on the relationship between option framing and their choice results?

Furthermore, under the guidance of the concept of time, what the consumers concern in the process of decision-making is not only the decision results, but also the decision-making efficiency. Based on the offline customization condition, Park et al. (2000) and Jin et al. (2009) suggest that consumers tend to spend more time in the subtractive than the additive option framing. Will it come to the same conclusion under the online service customization context? In addition, does consumers' expectation on the number and price they ultimately choose have an influence on their decision time?

Based on Loss Aversion theory, the study analyzes and

discusses the effect of option framing on consumers' decision efficiency and the boundary conditions for the option framing effects: service importance, service type and consumers' individual expectation. The study examines the regulatory effect of three variables above on option framing effects by means of online experimental research method, which provide some corresponding methods and theoretical basis to service enterprises majoring in the design of online customization mode.

RELATED RESEARCH AND HYPOTHESES

The effect of option framing on customization results

Prospect theory (Kahneman and Tversky, 1979) posits that people should exhibit different judgments and preferences in mathematically identical decisions contingent on whether the decision is framed negatively (in terms of a loss) or positively (in terms of a gain). Specifically, people tend to be risk-prone when facing losses but risk-averse when facing gains, which is in accordance with framing effects. Framing effects occur when alternative frames for a given decision problem influence both the way information is processed and the nature of the ultimate decision (Zhang et al., 2011; Tversky and Kahneman, 1981). Currently, various studies have found empirical evidences to support the effects of framing in sociology, psychology, behavioral economics and consumer decision-making. Levin et al. (2002) find that consumer's evaluation and purchase intention are affected by whether a product attribute is positively (80% lean) or negatively (20% fat) framed. Zhang et al. (2007) focus on the impacts of percentage and dollar-amount discount presentations on consumers' perceptions of discount amount and purchase intention. Gamliel and Herstein (1967) indicate consumers show more purchase intentions of a product offered in a price deal, and perceive their monetary gain as higher when they are presented with a negative rather than positive framing. Mishra et al. (2012) demonstrate negative frames interacted with situations of high need produce particularly elevated levels of risky choice. Cassotti et al. (2012) put forward that a positive emotional context can reduce the improvement of framing effects on decision-making.

Among all the researchers, Park et al. (2000) are the first to introduce framing effects into the study about the influence of different presentations of product customization on consumer choice; they also define the different presentations as additive (hereafter +OF) and subtractive (hereafter -OF) option framing condition. In the +OF condition, participants are exposed to a base product and asked to add options, more options they add, higher price they should pay; whereas in the -OF condition, participants are exposed to a fully loaded

product and deleted undesired options, more options they delete, lower price they should pay. According to the automobile customization experimental research, they find consumers tend to choose more options with a higher total option price when they use subtractive versus additive option framing, which is called as Option Framing Effects. In addition, many prior researches have confirmed the existence of option framing effects in the customization experiment of automobiles (Park et al., 2000; Biswas and Grau, 2008), pizzas (Levin et al., 2002) and mobile communication service (Jin et al., 2009).

Prior literature has attributed the effects of option framing to some forms of loss aversion (Wicker et al., 1995; Kahneman and Tversky, 1979), which suggests that a loss is perceived as more intense than a gain of the same objective magnitude and consumers should be more sensitive to utility losses than monetary loss. The greatest difference between the +OF and -OF conditions is what consumers lost in the process of decision-making. In the +OF condition, consumers compare gains in utility (i.e. the increase in value incurred by adding an option) against monetary loss in expense. In the -OF condition, consumers compare a loss in utility (i.e. the decrease in value incurred by deleting an option) against an economic gain in price savings. Thus, consumers engaged in subtractive framing may be more reluctant to delete an option (a loss in utility) than consumers engaged in additive framing would be to include that option (a loss in economic income) (Levin et al., 2002). In that case, consumers will keep more options.

In addition, endowment effects, which is built upon the loss aversion theoretical framework, suggests that people are reluctant to part from assets that they currently possess and always give higher evaluation to them. Thus, compared with the +OF condition, in the -OF condition, the full-options model leads consumers to a position of seeming to have once "owned" all the options, thereby inducing them to value the options more highly and making them more reluctant to let them go. Besides, Johnson (1993) posits that consumers tend to make decisions by selecting rather than rejecting, so they usually experience more negative emotions in the -OF condition, in which they customize their desired products or services by deleting certain options. Therefore, consumers tend to keep more options in the -OF condition.

Another difference between addition and subtractive option framing is the different reference points, which therefore influences consumers' perceptions of gains and losses. Consumers engaging in +OF condition regard the basic product as a reference point, those engaging in -OF condition take the fully loaded product as a reference point. Thus they think the economic cost because of adding an option in the +OF condition is bigger than the economic gain on account of deleting the same option in the -OF condition.

In conclusion, option framing effects have been clearly

explained by many different accounts based on the endowment effect or reference points as a result of loss aversion (Biswas, 2009; Biswas and Grau, 2008; Levin et al., 2002; Park et al., 2000). In consequence, compared with the +OF condition, consumers in the -OF condition show a stronger tendency of loss aversion, accordingly they tend to choose more options with a higher total option price.

Meanwhile, previous studies have examined the option framing effects of tangible goods in the offline context, but the study focusing on service customization is seldom dealt among scholars. Online customization have become an important channel of consumer shopping, besides it will turn into a key way for companies to build competitive advantage and create profits. Compared with offline customization situation, online customization possesses much stronger network experience, independence and uncertainty. Thus, whether consumers are equally affected by the option framing effects in the context of online service customization or not, it needs further verification. Based on the above arguments, we propose the following hypothesis:

H1: Under the online service customization context, consumers tend to choose more service options with a higher total option price in the -OF than +OF condition.

The interaction of option framing and service importance

For consumers, various options that have already been attached or are to be added later to defaults can be perceived as relatively more important or less important. For a laptop buyer, for instance, features such as hard disk capacity, RAM capacity and CPU speed may be considered relatively more important than colorful laptop skins. Then for important and less important products or services, whether consumers' selection results have differences between two customization framings? Park et al. (2000) speculate the importance of the product options has a significant influence on framing effects, especially with regard to less important option, this framing effects are more obvious.

According to differential loss aversion theory, individual's loss aversion to different choice situations and product properties tend to be different. In other words, not only decision framing can affect individual's decisions, but also product attributes (Kahneman et al., 1990; Johnson et al., 1993). Especially, the product importance attributes affect consumers' purchase decision mainly through the different influence on consumers' purchase certainty and attention of options. On the one hand, the more important the service is to the decision maker, the higher their purchase certainty is. Compared with less important options, consumers have more certainty to choose the option which is more important. Accordingly,

the influence of the option framing on consumer decision-making is relatively small (Johnson et al., 1993). On the other hand, consumers' attention to the important and less important options is different. Consumers will pay more attention to the important option both in additive and subtractive framing. However, there are some differences between the attentions of consumers paying to less important options in two different option framings. In the -OF condition, which is a negative frame and can bring negative emotion, consumers tend to pay more attention to the less important options (Park et al., 2000), so that they are prone to do more processing of option information and motivate more thinking (Carmon and Ariely, 2000). Thus, they can excavate more potential function and value of less important options, accordingly keep more (Werthenbroch, 1998). In addition, consumers are more willing to seek risks in the subtractive framing, which is a negative frame, so that they tend to choose more less important options (Tversky and Kahneman, 1981). Hence, in line with the above arguments, we propose the following hypothesis:

H2: Under the online service customization context, compared with consumers in the +OF condition, those in the -OF condition are more likely to choose less important options; while consumers more tend to choose important options in the +OF than -OF condition.

The interaction of option framing and service type

Fishbach and Dhar (2005) point out that consumers not only aim at utility maximization in the decision-making process, but also focus on some other multi-objectives, such as product types (Maheswaran et al., 1990; Bertini et al., 2009). Chitturi et al. (2008) confirm for us that the type and attribute of product option have remarkable effects on decision. Furthermore, Gamliel and Herstein (1967) find that negative description frame can promote consumer's buying behavior and perceive value more than positive description frame. Hence, we try taking the description frame into consideration, and then we divide the product into positive and negative options. Positive options can bring direct and positive utility to consumers, such as weather forecast service, by customizing which consumers can get timely weather forecasts directly. While negative options can prevent the damage of consumers' rights and interests and provide indirect value to consumers, such as flow monitoring, through which consumers can monitoring the usage of flow, so that they can avoid flow overrunning. In that way, does the impact of the positive and negative option on consumer choice have differences in two different framings? There is yet no scholar carrying out to explore this theory and practical problems.

We regard the definition of the positive and negative option as the materialization and discretization of the positive and negative option framing. Positive and

negative options affect the option framing effects by inducing consumers' information processing and risk perception. Kahneman et al. (1990) indicate that once the individual process an article, his evaluation of it will greatly increase. That is, deleting an option in the -OF condition tends to be more difficult than add it in the +OF condition. In the -OF condition, consumers are likely to spend more time dealing with the function and value of the product option (Meyers-Levy and Maheswaran, 2004), so that they will excavate and magnify it. Positive option is less affected by the option framing which can directly make consumers perceive utility of the option.

While specific to negative option, consumers only doing more information processing and prefactual thinking (Carmon and Ariely, 2000) can they find what its value is. In consequence, compared with the +OF condition, consumers are easier to find potential utility and value of the negative option in the -OF condition, and thus keep retaining more negative options.

The function of the negative option is always represented in the way in which it can prevent the damage of consumers' rights and interests. For example, only when flow overruns can flow monitoring fully play its role. Otherwise, the money paid for the service customization will not get the corresponding utility. In other words, it is risky to choose this option. In addition, according to prospect theory, individuals tend to be risk aversion faced with positive frame, while they prone to risk seeking faced with negative frame (Kahneman and Tversky, 1979). Hence, compared with the +OF condition, in the -OF condition which is a negative frame, consumers are more willing to seek risks and likely to choose more risky option (Meyers and Maheswaran, 2004).

Furthermore, negative options are more likely to pass more risk awareness onto the consumers, which strengthen the consumers' negative emotions. It also makes consumers behave risk seeking and do more intensive information processing of negative option. Therefore, negative option has more significant effect on framing effect than positive option. Thus, the following hypothesis is proposed:

H3: Under the online service customization context, compared with consumers in the +OF condition, those in the -OF condition are more likely to choose negative options; while consumers more tend to choose positive options in the +OF than -OF condition.

The effect of option framing on decision time: the regulatory role of individual expectation

According to the study of car customization, Park et al. (2000) suggest that consumers tend to spend more time in the -OF than +OF condition. Similarly, Jin et al. (2009) also demonstrate the same viewpoint through an experimental research of mobile communication service customization. But according to our observation, in prior

empirical researches, the proportion of option number which consumers ultimately choose to total number is relatively low whenever in the +OF or -OF condition, which result in the neglect of the time consumers spend adding or deleting options in the process of choosing. As the previous studies show, in the online information service customization process, customization decision time is comprised of two parts: the thinking time (time to consider whether to add or delete options) and the operation time (time to add or delete option) (Neisser, 1963; Ahituv et al., 1998; Haynes, 2009; Edwards, 1954). The thinking time is to measure the time that consumers spend in browsing and weighing whether to choose an option or not. The operation time means the time consumers spend on specific action (add or delete an option), which is closely related to the number of options consumers ultimately choose. In general, individuals' expectation on the number and total price of ultimate customization options will influence their final choice (Godet and Degenhardt, 1994; Ernst et al., 2004). Besides, the number of options consumers ultimately choose has an effect on the thinking time and operation time they spend in the decision-making process. So under the online service customization context, individuals' expectations will have an impact on the relationship between the customization mode and the decision time. This theory and practical problems are worthy of our in-depth study.

As we all know, consumers with low expectation ultimately tend to choose relatively fewer options, which leads to short operation time. So the time they spend in customizing mainly depend on their thinking time. On the other hand, as loss aversion theory mentioned, consumers should be more sensitive to utility losses than monetary loss (Kahneman and Tversky, 1981). In addition, endowment effect shows that consumers always give higher evaluation to assets that they currently possess (Kahneman et al., 1990). Therefore, based on the above theories, we make a prediction that consumers' pain perception caused by deleting the "owed" options in the -OF condition is higher than the entertainment consumers perceive in the +OF condition because of acquiring the option value through adding options (Park and Kim, 2012; Biswas and Grau, 2008; Krishna and Krishna, 2005; Levin et al., 2002; Park et al., 2000). That is to say, consumers engaged in -OF (versus +OF) tend to perceive the task of making option choices as more difficult and mental conflict (Park et al., 2000; Park and Kim, 2012), so that they will spend more thinking time doing more information processing on product options (Luce and Bettman, 1997; Carmon and Ariely, 2000; Park et al., 2000; Jin et al., 2009), which should lengthen the decision time consumers spend in the -OF condition.

As we have mentioned above, individuals' expectation has a positive influence on the number and total price of ultimate customization options. For consumers with high expectation, they are likely to choose more options,

which is usually more than one-half of the total number. In this case, the operating time they spend in the decision-making process cannot be ignored. In the +OF condition, consumers with high expectation not only need to consider the value of options, but they have to inevitably add the selected options in successive, which leads to more operating time. In contrast, consumers with high expectation in the -OF condition tend to spend less operating time, because the number of the options they ultimately choose is larger, they only need to delete a few options. Besides, the thinking time the consumers with high expectation spend in the +OF and -OF condition have no significant difference. This, we predict, is because consumers with high expectation ultimately choose so many options that they have to spend enough time on almost every option whenever in the +OF or -OF condition. In additive, based on bounded rationality theory, consumers tend to be so tired that they spend less time dealing with the option information in the latter part of the decision-making process. Under this circumstance, compared with the operation time, the thinking time is insignificant. According to the above analysis, we put forward the following hypothesis:

H4: Under the online service customization context, consumers' expectation plays a regulatory role in the relationship between the customization mode and the decision time: consumers with low expectation tend to take more time in the -OF than +OF condition; in contrast consumers with high expectation tend to take more time in the +OF than -OF condition.

In conclusion, based on loss aversion theory, the study investigates and discusses the boundary conditions for the option framing's influence on the customization results (the number and total price of options) and customization time under the online service customization context, which reveals the intrinsic mechanism of the effect of option framing on the consumer choice (H1). Specifically, the study mainly tests how the importance and types of service affect the relationship between the option framing and the results of consumers' choice (H2, H3). In addition, the study investigates if consumers' expectation of the number and price they ultimately choose has a moderating effect on the relationship between the option framing and the decision-making time (H4) and provide the companies majoring in information services with some reference recommendation about the design of the online customization context.

EXPERIMENT

Experimental purpose and design

To verify the hypothesis, experimental research method was introduced to study the influence of option framing on consumer choice under the online service customization context and the boundary conditions for the option framing effects (Figure 1). In this

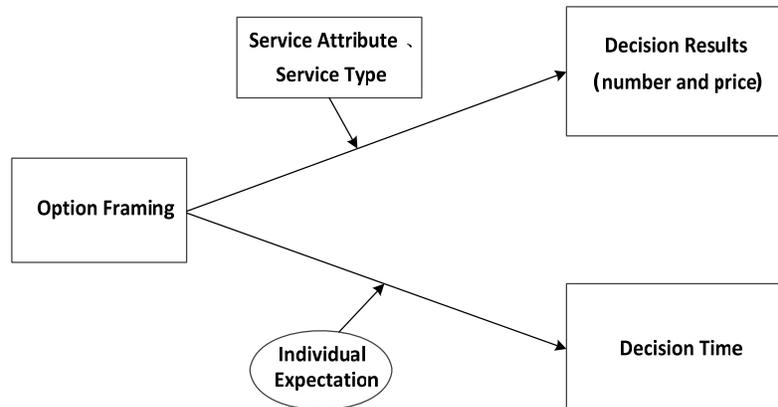


Figure 1. Schematic overview of option framing effects.

study, we used a 2 (variables between groups, addition/subtraction) \times 2 (variables in the group, important/less important, positive/negative) situation-character simulation experiment under online customization context. Subjects were randomized to different condition of option framing. Then, subjects were told that their task was to add (delete) the options they wanted (did not want) from a certain website. We recorded their selection and decision time to analyze whether the results (number and price of selected options) are of significant difference in different option framing context and to examine the influence of framing effects exerted by the importance and type of options.

Mobile communication service was selected as the research object of online customization mainly for the following four aspects. Firstly, for three major telecom operators, apart from phone service, their main sources of income include a multitude of value-added services, which lays a solid foundation for the experimental option settings. Secondly, operators have been established online business hall, which is available for consumers to customize different types of services including positive and negative options. Thirdly, as an indispensable communication tool in daily life, mobile communication service is known well by consumer in terms of consumption and purchasing patterns. In addition, most subjects with college history have experienced e-commerce and customization. At last, for the need of increasing personality, telecom carriers are initiating the discovery of individual customization.

Pretesting and website development

To identify the reasonability of customization experiment on the website, we selected 30 mobile communication services with higher purchasing frequency from the online business hall of three major telecom carriers, China Telecom, China Mobile and China Telecom, and then created a pretest questionnaire. Considering the effectiveness of pretesting, we finally randomly chose 80 undergraduates from a west coast national key university in China to respond to the questionnaire. Except 8 invalid questionnaires, we ended up recycling 72 questionnaires. We employed the seven-point Semantic Differential Scale, which is commonly used and effective for the survey of consumer behavior, to rate the preference (1 = not like at all, 7 = very like) and perceived importance (1 = not like/important at all, 7 = very like/important) of 30 services. In the meanwhile, they were required to fill in their monthly mobile communication consumption. According to the principle of preference above 4.4 and service importance, we finally screened out 20 services (i.e. Internet flow package), whose score

of preference and perceived importance is above 4.4. In order to ensure the accuracy of classification, these 20 services were analyzed by K-means cluster analysis on the basis of perceived importance. The result shows that there are two cluster centers (5.284, 3.976) and there is a significant statistical difference between them ($F(1,18) = 50.009, p = 0.000 < 0.001$). Based on the previous stated category of the service importance, these two types of service are defined as important option and less important option. The ratio of important to less important option is 13:7. In addition, according to the character of the service itself, the ratio of positive to negative service is also 13:7 (Table 1).

For the situation-character simulation experiment of online customization, the requirements of website function and layout were provided to web developers from the beginning of July 2013. With the development of 90 days, our final site could offer the evaluation and customization of mobile communication service to consumer. The simulating situation of this study is subjects are activating their new phone and designing mobile communication package for themselves. Subjects were required to design their packages in the additive and subtractive framing respectively. The additive framing is to ask consumers to add service they want from 20 optional services to the basic service package valued 10 RMB (US\$1.60). Each time subjects add an option, the cost will rise correspondingly. In contrast, the subtractive framing provides 20 integrated options valued 70 RMB (US\$11.21), and then let consumers delete undesired options. Each time subjects delete an option, the cost will reduce correspondingly. In September 2013, 60 postgraduates from a key laboratory of Chongqing were selected for web stress testing and inspection of operational process. To ensure the reliability and credibility of this experiment, the staffs working on experimental demonstration and explanation were trained for one week.

Participants and procedures

Shuptrine (1975) indicates that sample of students, who are suitable for exploratory study, has great homogeneity and can avoid the bias introduced by income, occupation and so on. Besides, extant literature has reported no significant difference between student samples and target samples in framing research. For instance, based on a meta-analysis of 136 studies, Kühberger (1998) found that although student samples dominate framing research, the behavior of student participants does not differ from that of non-student participants (Clawson et al., 1997). In addition, Park and Kim et al. (2012) chose undergraduates as subjects and got satisfactory outcome in the research about product and service

Table 1. Service attributes and type.

Service	Importance	Preference	Attribute	Type	Service	Importance	Preference	Attribute	Type
Internet flow package	5.2	4.98	important	positive	Calls list weekly	4.75	5.03	important	positive
Two cities one home	5.2	5.44	important	positive	Weather forecast	5.08	5	important	positive
Missed call alert	5.44	5.65	important	negative	Ticket network	4.95	4.95	important	positive
Book assistant	5.36	5.09	important	positive	Part-time job seeking	4.06	4.52	less important	positive
Flow monitoring	6.2	6	important	negative	SMS receipt	4.14	4.42	less important	negative
Harassment intercept	6.11	5.98	important	negative	phonological store	4.03	4.47	less important	negative
Call waiting	5.44	5.68	important	negative	I music	4.38	5.44	less important	positive
Mobile navigation	4.93	5	important	positive	7 color tone	3.8	4.59	less important	positive
Call back on busy	5.23	4.95	important	negative	Joke encyclopedia	3.85	4.58	less important	positive
Mobile payment	4.8	4.62	important	positive	Animation package	3.57	4.47	less important	positive

customization. Being consistent with former scholars, 120 undergraduates from four classes of a west coast national key university in China participated in the experiment.

There are four phases in the process of online service customization experiment: the first stage is to let subjects enter the website, register an account and fill in their personal information which includes name, age, gender, class, student ID and phone number, etc.; The second stage is to make subjects be familiar with the background information and rules of the customization task and the function of every option, at the same time they were asked to assess the preference and perceived importance of a variety of service options, as well as the expectation for the number of options they planned to choose on a seven-point scale; The third stage is the formal customization process, the subjects need to add or delete options, and eventually form their own mobile communication package; The fourth stage is to ask for suggestions and express our sincere gratitude to subjects.

One of the major concerns in a lab experiment lies in its unnatural setting; i.e. the participants act as decision makers in a simulated consumer scenario. To ensure decision quality in the current study, we adopted the incentive-aligned mechanism suggested by Ding (2007). The participants were told that they would have the chance to receive rewards both spiritually and materially based on comprehensive evaluation for the consistency of customization outcome and questionnaire results. The material reward is personalized color changing mug in different levels, and the spiritual reward is giving the subjects 3-10

credits rewards.

Measurement of variables

According to the survey of 80 undergraduates, we found the majority of undergraduates' monthly mobile communication consumption is around 50 RMB (US\$6.40). Thus we control the price of communication package in two conditions ranging from 10 to 70 RMB. Park et al. (2000) suggest that the price of products and services has a significant impact on the framing effects, thus in order to avoid the impact of price on the study results, we convert the price of each service 3 RMB (US\$0.48) per month by reference to the pricing standards of three major telecom operators, for example the price of internet flow we actually employ is 5 RMB (US\$0.80) /30M, and in line with it we convert the price into 3 RMB/20M, which is nearly of equal value with what we use. Then we chose a class of 120 undergraduates taught by a professor as our test subjects, including gender ratio of 59:61. Although there is few documents show the effect of gender on the results of this study, we try to randomly assign the 120 undergraduates to two conditions on the principle of equal proportions of men and women. The variables measured during the experiment as follows.

Customization mode. Customization modes are set as "addition mode" and "subtraction mode". "Addition mode" is to add options that they want on the basis of a basic

service package; "Subtraction mode" is to delete undesired options on the basis of a fully loaded package.

Option attribute and type. On the one hand, we classified options into important and less important options. Subjects used a seven-point scale (1 = not important at all, 7 = very important) to rate the degree of perceived importance of service options. On the other hand, it can be categorized into positive and negative options based on the description and nature of options. For instance, the flow monitoring belongs to the negative option since it always reminds consumers the flow usage in order to effectively prevent overuse of flow.

Decision time. Decision time is mainly recording the time of customization process in the third phase, which includes thinking time and operating time. We measured how long each subject took to complete the additive/subtractive customization process. Specifically, when subjects had finished reading the general instructions and background information about the customization task, we asked them to click the begin button. Respondents were then instructed to configure their service package by adding/deleting options. Upon finishing the customization process, respondents were asked to click the end button. In this way, the total decision time for an additive task or a subtractive task can be measured in seconds automatically by computer.

Individual expectation. To test the moderating effect of individual expectation (H4), before the experiment, subjects were asked to use a seven-point scale to do the expectation assessment for the number of options they planned to choose under the online customization context

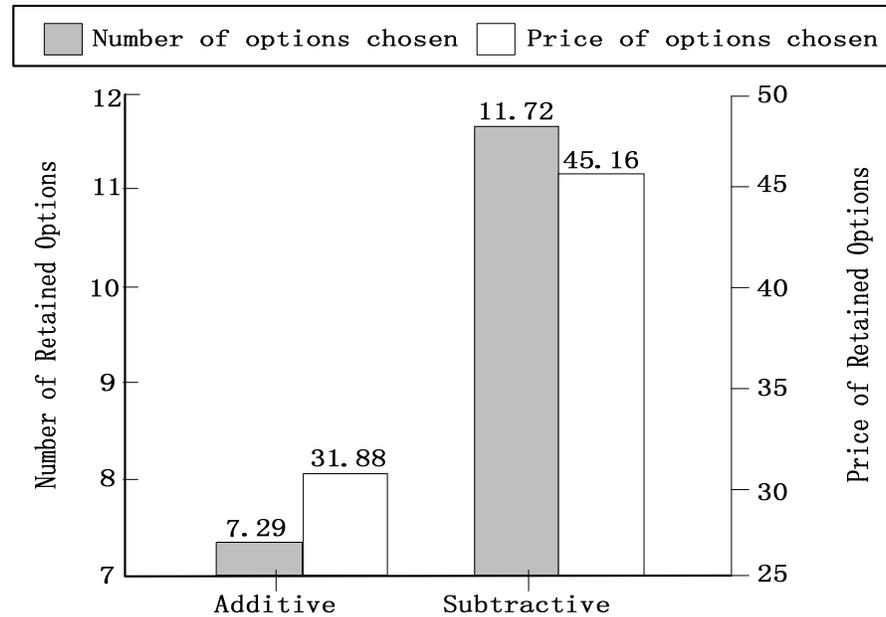


Figure 2. Effects of option framing on customization results.

(1 = very low expectation, 7 = very high expectation).

Customization results. The computer automatically record the total number of options, including the number of different attributes and types of options (important/less important; positive/negative) the subjects chose under different customization mode, and calculate the total price of options and the proportion of different options. The number and total price of options will be used to test the impact of option framing on consumers (H1) as well as the interaction between option framing and types of service (H2, H3).

RESULTS

Five participants failed to follow the instructions or complete the whole questionnaire. We synthetically analyze the data and delete five invalid samples based on the attitude and serious degree of subjects, the regularity of scale, the consistency of consumers' preference, perceived importance of the options and the results of their choices. Thus the final sample for this study was 115, with a +OF/-OF ratio of 58/57.

The effect of option framing on customization results

An analysis of variance (ANOVA) was performed to test H1. First of all, the results of homogeneity of variance test on the number consumers chose revealed that there was no significant statistical difference between the +OF and -OF condition (Levene = 3.129, $p = 0.08$). Then according to the analysis of variance, we found option framing differentially affected the number of options selected as expected. Subjects engaged in -OF condition selected

more options ($M = 11.72$) than those engaged in +OF ($M = 7.29$; $F(1, 113) = 53.056$, $p < 0.001$). Total option price was also higher for subjects engaged in -OF ($M = 45.16$) than those engaged in +OF ($M = 31.88$; $F(1, 113) = 53.056$, $p < 0.001$) (Figure 2). Thus, as expected, we observed that option framing affects the number and the total price of options selected. Hence, H1 received good support.

The interaction of option framing and service importance

Based on the importance of 20 options, we carried out the K-means cluster analysis, the result of which showed there are two clustering centers (5.197, 3.360) and there was a significant statistical difference between them ($F(1, 18) = 32.359$, $p = 0.000 < 0.01$). Through comparative analysis, we found the sort result (important versus less important) was completely consistent with the result which we got in the pretest, which showed the classification criterion and result had high reliability.

An analysis of variance (ANOVA) was performed to test H2. First of all, the results of homogeneity of variance test on the number consumers chose revealed that there was no significant statistical difference between the important and less important options that consumers chose (Levene = 0.249, $p = 0.619$). Then according to the analysis of variance, we found the option proportion (important versus Less important) that consumers ultimately chose in the +OF condition was significantly different from that in the -OF condition ($F(1, 113) = 8.774$,

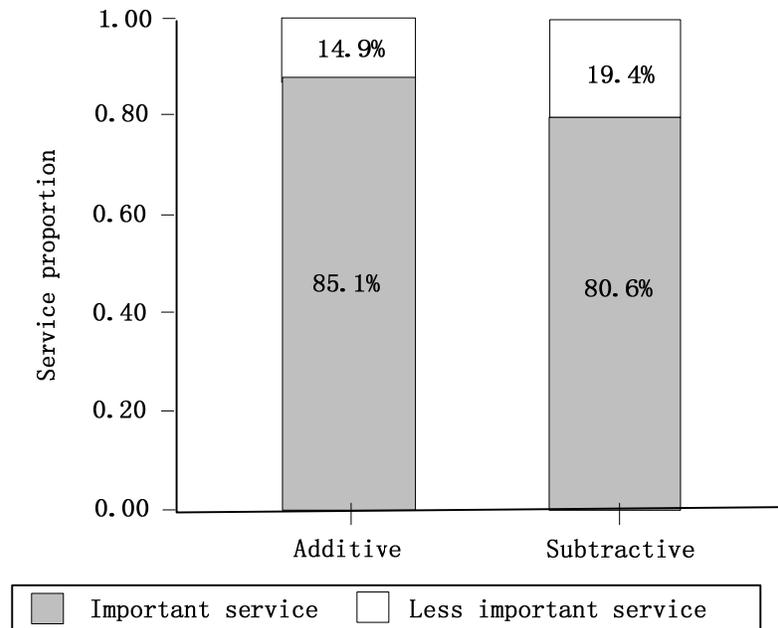


Figure 3. The interaction of option framing and service importance.

$p = 0.004 < 0.01$; Figure 3). As expected, the proportion of important options in the -OF condition ($M = 0.806$) was lower than that in the +OF condition ($M = 0.851$), while with regard to less important options, the proportion in the -OF condition ($M = 0.194$) was higher than that in the +OF condition ($M = 0.149$). That is to say, the effect of option framing on the customization results tended to vary because of the importance of options. In consequence, an interaction between the importance of options and the option framing statistically existed, thus H2 was supported.

The interaction of option framing and service type

An analysis of variance (ANOVA) was performed to test H3. First of all, the results of homogeneity of variance test on the number consumers chose revealed that there was no significant statistical difference between the positive and negative options that consumers chose (Levene = 6.308, $p = 0.013$). Then according to the analysis of variance, we found the effect on option framing had no significant difference between the positive and negative options ($F(1, 113) = 0.445$, $p = 0.506 > 0.01$; Figure 4). The proportion of positive options in the -OF condition ($M=0.627$) was lower than that in the +OF condition ($M = 0.644$), while with regard to negative options, the proportion in the -OF condition ($M = 0.373$) was higher than that in the +OF condition ($M = 0.356$). That is to say, the interaction between option types and the option framing indeed appeared to the expected trend, the effect of option framing on the customization results of

consumers tended to vary because of the type of options. Therefore there was an interaction between the type of options and the option framing, but it was not significant, thus H3 only got partial support.

The effect of option framing on decision time: the regulatory role of individual expectation

Before the test of hypothesis H4, we carried out the K-means cluster analysis based on consumers' expectation, the result of which showed there were two clustering centers (5.438, 2.706) and there was a significant statistical difference between them ($F(1, 113) = 340.235$, $p = 0.000 < 0.01$), which is correspond to classification as stated earlier.

Multivariate analysis of variance (MANOVA) was performed to test H4. First of all, the results of homogeneity of variance test on the number consumers chose revealed that there was no significant statistical difference between consumers' expectation and option framing (Levene = 0.000, $p = 0.989$; Levene = 1.056, $p = 0.306$). Then we separately tested the main effect of option framing and consumers' expectation on decision time, the results did not show significant difference ($F = 0.468$, $p = 0.495$; $F = 0.084$, $p = 0.772$). Finally, we explored the interaction of option framing and consumers' expectation. We conducted a MANOVA analysis using the option framing and consumers' expectation as the dependent variables, we found the interaction effect of option framing and consumers' expectation on decision time is significant ($F(1, 111) = 4.558$, $p = 0.035 < 0.05$;

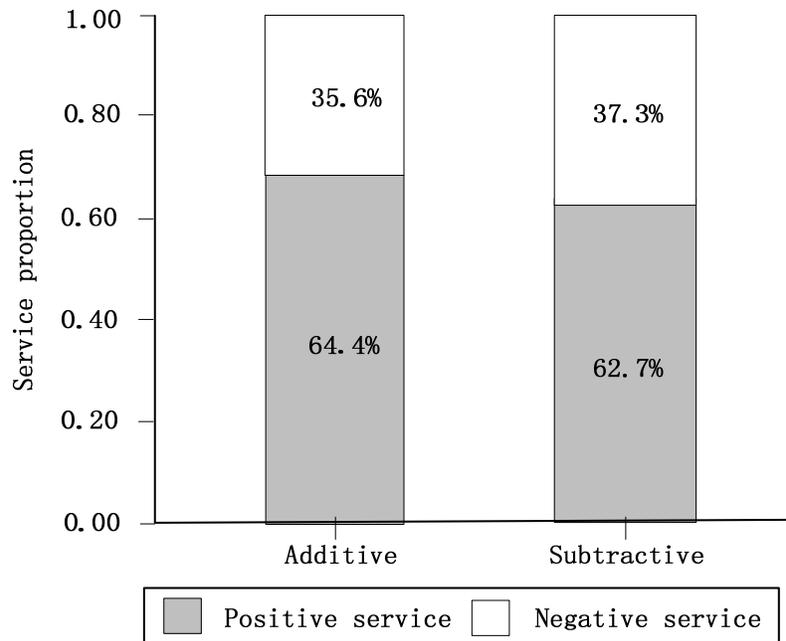


Figure 4. The interaction of option framing and service types.

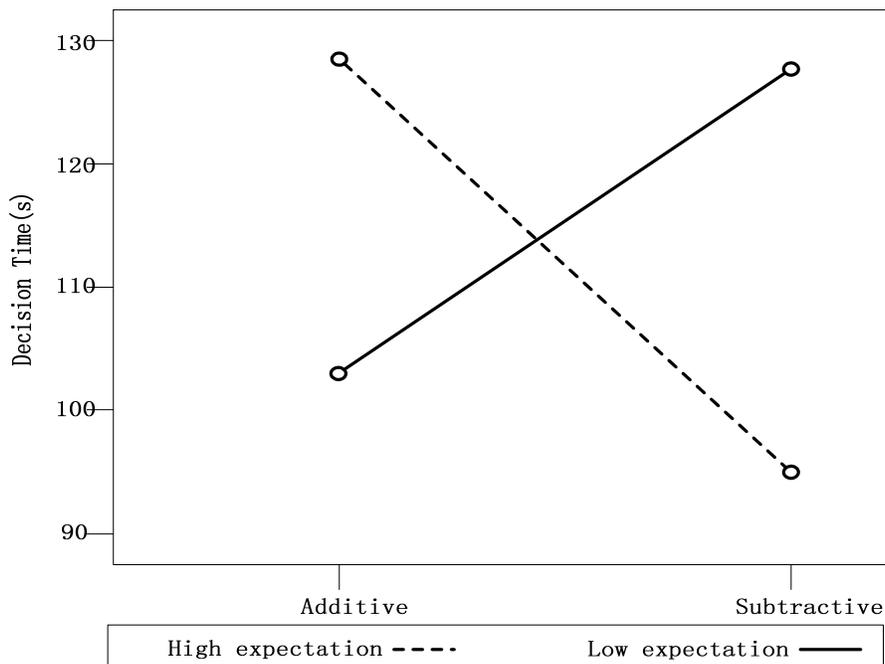


Figure 5. The regulatory role of individual expectation.

Figure 5). As expected, the decision time consumers with low expectation spend in the -OF (M = 127.65) condition was obviously more than that in the +OF (M = 103.29) condition. While consumers with high expectation tended to take more time in the +OF condition (M =

128.42) than -OF condition (M = 95.15). That is to say, the effect of option framing on consumers' decision time tended to vary because of consumers' expectation. Consequently, consumers' expectation had a moderating effect on the relationship between the option framing and

consumers' decision time, thus H4 was supported.

IMPLICATION AND CONCLUSION

Based on Loss Aversion theory, this article examines and verifies the effect of the option framing on consumers' decision efficiency and the boundary conditions for the option framing effects through the situation-character simulation experiment of information services online customization, which produces the following findings: (1) Compared with the additive option framing, consumers in the subtractive option framing tend to choose more service options with a higher total option price (H1); (2) Online option framing and service importance (important versus less important) impose a significant interaction effect—the less important options will be more selected in the subtractive option framing and the important ones are more likely to be chosen in the additive option framing (H2); (3) consumers' expectation plays a regulatory role in the relationship between option framing and decision time: consumers with low expectation tend to take more time when they use subtractive versus additive option framing; while those with high expectation prone to taking more time in the additive versus subtractive option framing (H4).

Theoretical contributions

The findings above expand the existing research conclusions and enlarge the applicable area of option framing effect. According to previous research, the option framing effect is mostly found based on offline product customization, while its mechanism of action in the online service customization has not been studied. The study has examined the effect of option framing on the consumers' customization results in the online service customization context and verified the option framing effect in this context, which enriches and extends the application situation of the option framing effect.

More specifically, according to the identification and discovery of the boundary conditions for the differential effects of option framing on choice, the study empirically demonstrates that the option framing effect differ depending on the characteristics of attributes in the defaults (i.e. the importance of attributes that constitute the defaults). Compared with important options, less important options expand the option framing effect, which provide some theories for reference to the further study of the option framing effect. Meanwhile, it tests and supplies the research carried out by Park et al., in which he proposed there were a significant influence of option framing on framing effect. The study further demonstrates the importance of service options affect consumers' choice results mainly through various degrees of attention and information processing on options in different conditions.

The study has recognized and found that the effect of option framing on consumers' decision time in the online customization context depended on consumers' expectation on the number and price they ultimately chose. Besides the study experimentally verified the consumers' expectation has a moderating effect on the relationship between the option framing and consumers' decision time, which detailed and extended the research conclusions Park et al. (2000) and Jin et al. (2009) drew.

Managerial implications

The findings from the current study have important managerial implications for companies. Firstly, the study brings enterprises majoring in the information service new perspectives to create value. For service enterprises, customization is a critical weapon in differentiating their own service from that of competitors. Besides, we confirm the attractiveness to service enterprises of service customization through subtractive framing. As the above results demonstrate, consumers usually end up paying a higher total price for the service package, thus increasing sales revenue. Therefore, on the condition of not considering the limitation of other factors, we suggest information service providers had better to present the service in subtractive framing, allowing consumers to delete undesired option on the basis of the full-options model, so that they will choose more options with a higher price, which bring more profits to enterprises.

Secondly, the study provides an important reference value about the combinational design of the online customization context and the service importance to information service enterprises. The study suggests that there is a significant effect of service importance on option framing effect. Hence, we propose the information service providers should combine the option framing with the importance of service when they choose the best mode presented to the consumer, so that they will achieve the goal of higher profits. For example, if the enterprise aims to promote the less important service, the enterprise can add more less important options to the package and provide the subtractive framing to the consumers at the same time, which is beneficial to boost sales of less important services.

Thirdly, the study provides the information service enterprises with some practical significance to improve the efficiency of customers' decision. The study finds the effect of option framing on consumers' decision time in the online customization context depends on consumers' expectation on the number and price they ultimately choose. For "time-compressed" (i.e. busy) consumers, if they are with low expectation, we tend to advise them to adopt additive mode, otherwise we tend to suggest the subtractive mode. In consequence, the enterprise should pay attention to consumers' time resource when they design the online customization context, so that they can meet customers' demand at the most.

Limitations and further research

The study also raises several issues relevant to further research on option framing. First, this study's hypotheses were tested in the context of a single service category (i.e. mobile communication service), limiting the generalizability of findings in this research because of the big difference between different service industries. Besides, the study is based on the online customization context, but there are some differences between online and offline customization. Thus, future research is warranted to replicate the results by using other service categories in the online customization context, in order to expand the applicable scope of research conclusions and draw on the universal conclusions.

Second, the study tests the interaction effect of the importance of service options and option framing. In the experiment, the proportion of important options to less important options is 13/7, not 1/1. Though according to logical calculus, if we adjust the proportion to 1/1, the number of less important options consumers choose in the -OF condition will increase, so that proportion of the chosen unimportant options to all the options will increase in the meantime, which provides a more powerful evidence to H2. But in order to obtain a more stable conclusion, the adjustment of proportion to 1/1 is needed for further research.

Third, as stated above, the interaction effect of the type of service and option framing is non-significant ($F(1, 113) = 0.445, p = 0.506 > 0.01$), but the experimental result presents the expected direction. On the one hand, it may be caused by the description of the positive and negative options. If the description of negative options is inappropriate, consumers will not pay enough attention to the options and can't find their potential value, so that they will not choose the options. On the other hand, it is likely to result from the relative proportion of positive and negative options. As mentioned in the experiment, the proportion of positive option to negative option is 13/7, the number of negative option is significantly less than that of positive option. Hence, future research should reconsider and amend the description of options, highlight the differences between different types of options, so that consumers are prone to perceive the risk of positive and negative options. Meanwhile the relative proportion of different types of options should be adjusted to 1/1 so as to increase the accuracy of experimental results. In addition, it would be beneficial to investigate other factors that may moderate the differential effects of option framing on choice.

Fourth, in our exploratory examination, 20 alternative options are randomly displayed in the online customization website, not considering the ranking of options with different attributes and types. According to previous researches, the choice, rating and ranking tend to affect consumer choice (Kühberger and Gradl, 2013). In consequence, our future research can focus on the influence of ranking on the option framing effect, identify-

ing and finding the boundary conditions of option framing effect and then enriching and detailing the application context of option framing effect.

Fifth and finally, in the study the price of every option is converting to 3, through which control the effect of option's price. However, actually what the three operators implement is the differential pricing strategy. Though we make the price conversion to the extent that the price is nearly equivalent with its value, which is not the same as what the consumers perceived, that is to say the price still have a tiny impact on the consumer choice in our experiment. Future research can take price into consideration, studying the option framing effects in different pricing strategy.

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Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

- Ahituv N, Igbaria M, Sella A (1998). The effects of time pressure and completeness of information on decision making. *J. Manage. Inf. Syst.* 15(2):153-172.
- Bertini M, Ofek E, Ariely D (2009). The impact of add-on features on consumer product evaluations. *Soc. Sci. Electr. Publ.* 36(1): 17-28.
- Biswas D (2009). The effects of option framing on consumer choices: Making decisions in rational versus experiential processing modes. *J. Consum. Behav.* 8(5): 284-299.
- Biswas D, Grau S L (2008). Consumer choices under product option framing: Loss aversion principles or sensitivity to price differentials? *Psychol. Market.* 25(5): 399-415.
- Carmon Z, Ariely D (2000). Focusing on the forgone: How value can appear so different to buyers and sellers. *Gen. Inform.* 27(3): 360-70.
- Cassotti M, Habib M, Poirel N, Aïte A, Houdé O, Moutier S (2012). Positive emotional context eliminates the framing effect in decision-making. *Emotion*, 12(5): 926-931.
- Chen J, Hao Y (2010). Mass customization in design of service delivery system: Review and prospects. *Afr. J. Bus. Manage.* 4(6): 842-848.
- Chitturi R, Raghunathan R, Mahajan V (2008). Delight by design: The role of hedonic versus utilitarian benefits. *J. Market.* 72(3): 48-63.
- Clawson RA, Nelson TE, Oxley ZM (1997). Media framing of a civil liberties conflict and its effect on tolerance. *Amer. Polit. Sci. Rev.* 91(3): 567-583.
- Cui N, Cui Q (2013). Effect of contextual factors of online retailing on customer patronage intentions. *J. Manage. Sci. China*, 16(1): 42-58.
- Ding M (2007). An Incentive-Aligned Mechanism for Conjoint Analysis. *J. Market. Res.* 44(2): 214-223.
- Edwards W (1954). The theory of decision making. *Psychol. Bull.* 51(4): 380-417.
- Ernst M, Nelson EE, McClure EB, Monk CS, Munson S, Eshel N, Zarahn E, Leibenluft E, Zametkin A, Towbin K (2004). Choice selection and reward anticipation: An fMRI study. *Neuropsychologia*, 42(12): 1585-1597.

- Fishbach A, Dhar R (2005). Goals as excuses or guides: The liberating effect of perceived goal progress on choice. *J. Consum. Res.*32(3): 370-377.
- Franke N, Schreiber M, Kaiser U (2010). The "I designed it myself" effect in mass customization. *Manage. Sci.*56 (1): 125-140.
- Gamliel E, Herstein R (1967). Effects of message framing and involvement on price deal effectiveness. *Eur. J. Market.* 46(9): 1215-1232.
- Gilmore JH, Pine BJ (1998). Welcome to the experience economy. *Harv. Bus. Rev.*76(4): 97-105.
- Godet M, Degenhardt C (1994). From anticipation to action: A handbook of strategic prospective. *Technol. Forecast. Soc. Change*, 47(2): 263-264.
- Haynes GA (2009). Testing the boundaries of the choice overload phenomenon: The effect of number of options and time pressure on decision difficulty and satisfaction. *Psychol. Market.* 26(3): 204-212.
- Hsu-Kuan JL, Liwen C (2011). The perception of travel agents in Taiwan regarding travel website and training needs for adopting E-commerce. *Afr. J. Bus. Manage.* 5(26): 10811-10820.
- Jin L, He Y, Song H (2012). Service customization: To upgrade or to downgrade? An investigation of how option framing affects tourists' choice of package-tour services. *Tour. Manage.*33 (2): 266-275.
- Jin L, Zou D, Qiu L (2009). The effect of option framing on consumer choice in service customization context. *Nankai Bus. Rev.*12(6): 90-100
- Johnson EJ, Fader PS, Hardie BGS (1993). Modeling loss aversion and reference dependence effects on brand choice. *Gen. Info.* 12(4): 378-394.
- Kahneman D, Knetsch JL, Thaler RH (1990). Experimental tests of the endowment effect and the Coase theorem. *J. Polit. Econ.* 98(6): 1325-1348.
- Kahneman D, Tversky A (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2): 263-291.
- Krishna A, Krishna A (2005). The skeptical shopper: A metacognitive account for the effects of default options on choice. *Soc. Sci. Electron. Publ.* 31(3): 529-539.
- Kühberger A, Gradi P (2013). Choice, rating, and ranking: Framing effects with different response modes. *J. Behav. Decis. Making*, 26(2): 109-117.
- Kühberger A (1998). The influence of framing on risky decisions: A meta-analysis. *Organ. Behav. Hum. Decis. Processes*, 75(1): 23-55.
- Kurniawan SH, So RH, Tseng MM (2006). Consumer decision quality in mass customization. *Int. J. Mass Customisation*, 1(2): 176-194.
- Levin IP, Schreiber J, Lauriola M, Gaeth GJ (2002). A tale of two pizzas: Building up from a basic product versus scaling down from a fully-loaded product. *Market. Lett.* 13(4): 335-344.
- Lou Z (2010). Enjoyment of Participation: A Mediated Moderation Model. *Manage. Sci.* 23(2): 69-76.
- Luce MF, Bettman JR (1997). Choice processing in emotionally difficult decisions. *J. Exp. Psychol.* 23(2): 384-384.
- Maheswaran D, Sternthal B, Research JOC (1990). The effects of knowledge, motivation, and type of message on ad processing and product judgments. *J. Consum. Res.*17(1): 66-73.
- Meyers LJ, Maheswaran D (2004). Exploring message framing outcomes when systematic, heuristic, or both types of processing occur. *J. Consum. Psychol.*14(1): 159-167.
- Mishra S, Gregson M, Lalumière ML (2012). Framing effects and risk-sensitive decision making. *Brit. J. Psychol.* 103(1): 83-97.
- Neisser U (1963). Decision-time without reaction-time: Experiments in visual scanning. *Amer. J. Psychol.*76(3): 376-385.
- Park CW, Jun SY, MacInnis DJ (2000). Choosing what I want versus rejecting what I do not want: An application of decision framing to product option choice decisions. *J. Market. Res.* 37(2): 187-202.
- Park S, Kim MY (2012). The impact of attribute importance in the effects of option framing on choice: Budget range and justification as moderators of loss aversion. *Psychol. Market*, 29(10): 726-737.
- Shuptrine FK (1975). On the validity of using students as subjects in consumer behavior investigations. *J. Bus.* 48(3): 383-390.
- Tversky A, Kahneman D (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481): 453-458.
- Wang Y, Han D (2012). How customers evaluate mass-customization - An empirical study based on customers' self-efficacy, customization options and satisfaction, *Soft Sci.* 26(4): 140-144.
- Wang Y, Kandampully J, Jia H (2009). "Tailoring" customization services: Effects of customization mode and consumer regulatory focus. *J. Serv. Manage.* 24(1): 82-104.
- Wertebroch K (1998). Consumption self-control by rationing purchase quantities of virtue and vice. *Gen. Inform.* 17(4): 317-337.
- Wicker FW, Hamman D, Hagen AS, Reed JL, Wiehe JA (1995). Studies of loss aversion and perceived necessity. *J. Psychol.*, 129(1): 75-89.
- Zhang J, Fang X, Han B (2011). Framing effect of coupon value for products. *J. Manage. Sci.* 24(1): 47-55.
- Zhang L, Fan T, Wang W (2007). Price perception and purchasing intention under different discount resentations. *Nankai Bus. Rev.*10(3): 19-28.