The Impact of Online Shopping Carnival on Consumer Decision-Making: The Moderating Role of Gender

Research-in-Progress

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Abstract

The online shopping carnival has become an annual event for the e-commerce industry in recent years. However, the change of consumers' multi-stage decision-making process during the online shopping carnival remains unknown and has not been investigated before. This study proposes research framework based on stimulus–organism–response (SOR) model, and uses the difference-in-difference (DID) method and regression model to empirically test 50 million shopping log data of more than 420,000 consumers on the Tmall platform. We attempt to identify the impact of online shopping carnival on the relationship between consumers' information processing behavior and purchase decision, and to explore the moderating role of gender. The study expands the research on consumer differences and provides important implications for merchants to formulate targeted marketing strategies based on customer characteristics.

Keywords: Online shopping carnival, consumer decision-making process, purchase log data, gender difference, information processing behavior

Introduction

With the rapid development of e-commerce these years, corporate promotion activities have expanded from offline to online, which emerges online shopping carnivals. According to Alibaba's data, the daily sales and consumers' participation of Tmall's "Double 11" Online Shopping Carnival increased year by year. As a consumer ritual (Bell et al. 2014), online shopping carnival has a much greater impact than ordinary promotions. Affected by this, consumers are stimulated by more information about the goods, more promotional recommendations, and more word-of-mouth information from other consumers than usual. Thus, the processing of information is changed accordingly (Senecal et al. 2005), which in turn changes one's decision-making strategy. Therefore, to better understand consumers' decision-making results, it is quite necessary to open the black box of the consumer decision-making process and analyze the changes in their decision-making behavior during the online shopping carnival.

Consumers' decision-making process is not limited to final purchase decision, but also includes pre-purchase product information collection, alternative evaluation and other information search behaviors. Previous research primarily focused on analyzing motivations and perceived risks in consumers' purchases at the overall level (Kwon et al. 2015), but less considering the multi-stage nature of consumer decision-making based on consumer characteristics. Gender, one of the main characteristics of consumers, has always been an important market segmentation variable in marketing theory. Despite the rich studies about the purchase attitudes and intentions of different-gender consumers, the effect of online shopping carnival on consumers' decision-making behavior based on their characteristics is still unknown and has not been empirically examined.

Based on 50 million shopping log data of more than 420,000 consumers on the Tmall platform in China, this paper explores the impact of the online shopping carnival on consumer information processing behavior and the impact of the information processing behavior on purchase decisions, and examines the moderating effect of gender on this impact under the theoretical framework of SOR. The research contributes to the literature and sheds lights on promotion mechanism and gender difference theory in the following aspects: (1) we first identify the moderating role of gender in the relationship between information processing and purchase decision by establishing regression models, and (2) we assess the effects of online shopping carnival on consumers' information processing behavior by conducting a comparative analysis between the usual and the carnival period using DID method. The findings of this study provide important implications for merchants on how to formulate precise marketing strategies for specific target customers.

Literature Review

Online Shopping Carnival

Promotions have a fundamental impact on consumers' purchase decision process. Online Shopping Carnival is different from ordinary promotions in the following specific aspects: First, the online shopping carnival, as a consumer ritual, its discount intensity, merchants and users' participation and the influence range are far higher than ordinary promotions. Second, it has developed into a cultural exchange or carnival celebration, not just a commodity promotion event. Bell et al. (2014) study the behavioral characteristics of consumers assuming Black Friday as a communication ceremony based on ritual theory. Third, consumers in the online shopping carnival have formed a fixed behavior pattern (Boyd et al. 2011). During the carnival, consumers are affected by not only the promotion, but also the sharing of other consumers' experiences.

At present, there are relatively few studies about online shopping carnivals, which mainly focused on purchase motivation, satisfaction, and purchase intention. Kwon et al. (2015) believe that consumers who shop on "Black Friday" can have fun and have a higher hedonic buying motivation. Compared to "Black Friday," consumers are more interested in buying on Cyber Monday, which means consumers tend to buy goods on the online shopping carnival (Swilley et al. 2013). Besides, issues such as merchandise distribution and price fraud during the online shopping carnival will increase perceived risks of consumers, which will have an influence on consumers' purchasing intentions during the online shopping carnival (Xu et al. 2015). It can be seen that, affected by these issues, consumers' decision-making process will make a change, but it is still not clear how it will change. Therefore, the comparative analysis of the consumer purchasing decision-making process during online shopping carnival and normal times still demands a further analysis.

Consumer Decision-Making Process

The consumer decision-making process has always been the focus of consumer behavior research. Maity et al. (2014) find that consumers tend to make complex purchase decisions under in-store and e-commerce channels but simple purchase decisions under mobile commerce channel. In the face of complex decisions, individuals are prone to making decisions in stages (Moe et al. 2006). Kollat, Engel and Blackwell (1970) have proposed the EKB model, which divides the consumer decision-making process into five stages, including problem recognition, information search, alternative evaluation,

purchase decision and post-purchase evaluation. When shopping online, consumers are used to searching and processing information before making purchase decisions. Lynch et al. (2000) and Ratchford et al. (2003) prove that information search and the following evaluation process are the bases and influencing factors of consumers' purchasing decision. However, most of the existing researches regard the purchase decision stage as the whole decision-making process, ignoring the information search and alternative evaluation stages before the purchase decision. What's more, the relevant research data mostly comes from questionnaires and experimental methods and approximates the measurement of consumer purchase decisions, such as replacing the purchase quantity with the number of comments (Cabral et al. 2010). In addition, the data used is mainly from college students, which has been proved by Darley et al. (2010) in their research review of online consumer behavior and decision-making process. Using consumer's real-world shopping log data to analyze the multi-stage decision-making process and individual differences covering the whole age range is still a theoretical gap to be filled.

Gender Difference

Sociological literature points out that the purchasing decision process is closely related to the diversity of consumers. Different individual characteristics of consumers lead to different cognitions of the same things, and gender, one of the most common characteristics of consumers, is an important reason to explain the differences (Meyers and Brian 1991). Moreover, gender-based classification method is a common classification for marketers, especially advertisers (Otnes et al. 2001). Male consumers and female consumers have considerable differences in many aspects such as information processing, purchasing attitudes, purchasing intentions, etc., specifically as follows: First, the information processing behavior is different. Men tend to have a holistic and consistent approach to information processing, while women often use detailed and complex information processing methods (Meyers and Durairaj 1991). Compared to men, women have lower thresholds for processing information (Meyers and Brian 1991). Second, the shopping attitude is different. Female consumers are less satisfied with online shopping and more skeptical about it, while men consider online shopping to be more practical and convenient (Rodgers et al. 2003). Third, the factors affecting purchase intention are different. In terms of access intentions, the impact of visit frequency on women's perception control and access intentions is significant, but not significant for male consumers (Wang et al. 2010). Therefore, it's reasonable to believe that consumers of different genders will behave differently in information processing and decision making. Unfortunately, the moderating effect of gender on the comparative decision-making behavior of consumers has not received enough attention. So far, experts and scholars at home and abroad have limited exploration of the gender differences in consumer decision-making during online shopping carnivals and we still know little about its impact mechanism behind.

Research Framework

In order to fill the above theoretical gaps, we establish a SOR model to analyze the impact of online shopping carnival on consumer decision-making. The SOR model indicates that external factors stimulate an individual to produce a conscious or unconscious psychological response (including emotional response or cognitive response), thus resulting in his behavioral response to the stimulus (Parboteeah et al. 2009; Animesh et al. 2011).In the model, S is the stimulus that causes individual's response, O is the internal state of the organism, and R is the final reaction caused by the stimulus.

According to previous studies, the five-stage behavior of consumer decision-making can be used to explain the psychological process and final response of the organism in the SOR model (Zhang et al. 2016). Teo et al. (2003) confirm that information search, alternative evaluation and purchase decisions are the three core stages of consumer decision-making process and we adopt their arguments in this paper. Therefore, in this study, S is the online shopping carnival, O is the consumer's behavior of information search and alternative evaluation, and R is the purchase decision. Using the SOR model as the overall theoretical framework of this paper sheds a brilliant light on understanding the influence mechanism of online shopping carnival on consumers' decision-making process.

The behaviors of consumers in these three stages can be measured by different variables. During the information search stage, consumers typically browse multiple product pages and access the website

multiple times (Park et al. 2016). Studies have shown that the number of pages viewed per visit is positively related to the final purchase decisions and sales volume (Mallapragada et al. 2016). Meanwhile, the number of visits reflects the browsing frequency and activity degree of consumers and positively affects the access intention (Wang et al. 2010). During the alternative evaluation stage, some consumers are more cautious to select multiple products for comparison when making a purchase decision, while the other consumers will compare a small amount of product information. Therefore, browsing variety can reflect the behavioral characteristics of the consumer during the alternative evaluation stage (Moe et al. 2003). In the purchase decision stage, we use the number of purchased items to measure the consumers' purchase needs based on previous studies (Bucklin et al. 2009). The variables in the three core stages of consumer decision-making process are described in Table 1.

Table 1. Summary of Variables

Decision Stage	Variable Name	Variable Description	References
Information Search	Number of Pages Viewed	Average number of pages viewed per visit	Huang et al. (2009), Mallapragada et al. (2016)
	Browsing Frequency	Number of visits to the site during a specific time	Bhatnagar et al. (2016), Wang et al. (2010)
Alternative Evaluation	Browsing Variety	Number of different products browsed/total number of browsing pages	Moe et al. (2003)
Purchase Decision	Purchase Quantity	Number of items purchased by consumers during a specific time	Bucklin et al. (2009)

In summary, based on the log data generated by consumers when they visit the websites, this paper combines the SOR model and the five-stage model of consumer purchasing decision, aiming at measuring the impact of online shopping carnival on consumers' information search behavior (the number of pages viewed, the browsing frequency) and alternative evaluation behavior (browsing variety). What's more, it further explores the impact of consumers' information processing behavior (information search, alternative evaluation) on purchasing decisions (purchase quantity), and examines the moderating role of gender in this relationship. The research framework of this paper is shown in Figure 1.

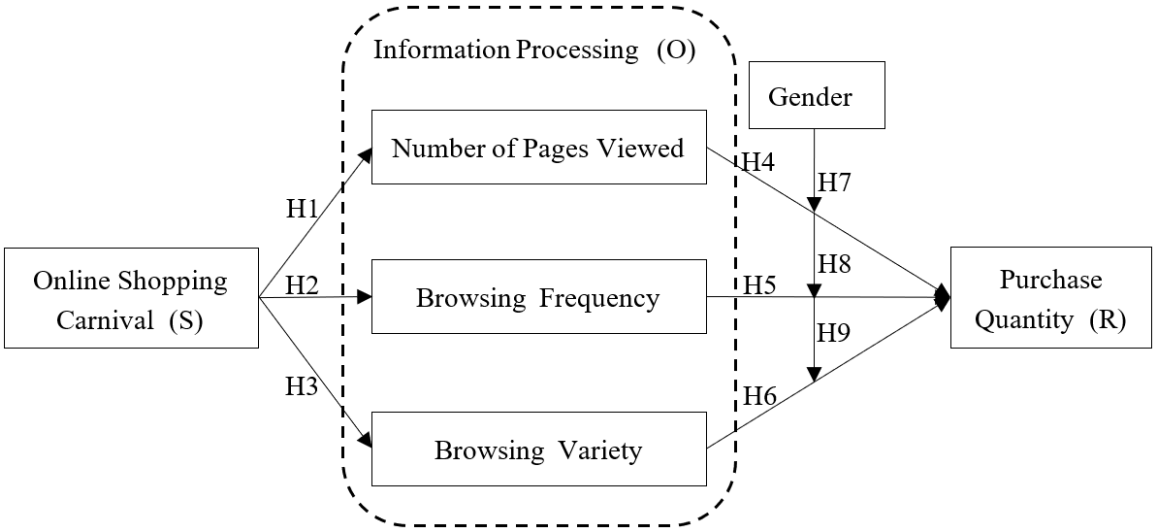

Figure 1. Research Model

Hypotheses

The main research question we try to answer is whether online shopping carnival has a positive effect on consumer information processing behavior, the influence mechanism of information processing behavior on purchase decision and the moderating role of gender. Therefore, we propose the following nine hypotheses for empirical testing.

(1) The Effect of Online Shopping Carnival on Consumer Information Processing Behavior

We argue that online shopping carnival would potentially make consumers search for goods information more frequently. Consumers often have dumping or impulse buying behaviors because of price concessions during the carnival. Therefore, there is no need to conduct comparative evaluation of commodities before making purchasing decisions, which means low browsing variety. To examine and quantify the specific effects of online shopping carnival, three variables have been introduced to measure consumers information processing behavior as follows:

H1: Influenced by online shopping carnival, consumers access more pages for information search.

H2: Influenced by online shopping carnival, consumers visit the website more times for information search.

H3: Influenced by online shopping carnival, consumers evaluate fewer products before making the purchase decision.

(2) The Effect of Consumer Information Processing Behavior on Purchase Decision

We argue that information processing behavior has an influence on purchase decisions in three dimensions. The higher browsing variety means less clear purchase demand and lower purchase possibility. Therefore, browsing variety negatively affects purchase quantity. Similar as H1 to H3, these three hypotheses will also be tested as follows:

H4: The number of pages viewed by consumers has a positive effect on purchase quantity.

H5: The browsing frequency of consumers has a positive effect on purchase quantity.

H6: Consumers' browsing variety has a negative effect on purchase quantity.

(3) The Moderating Role of Gender in the Relationship Between Information Search and Purchase Quantity

Due to the differences between men and women in information processing and purchasing decisions, it is necessary to study the moderating role of gender in the relationship between information processing and purchase decisions. H7 to H9 have been established as follows to examine the effect.

H7: Gender plays a moderating role in the relationship between number of pages and purchase quantity.

H8: Gender plays a moderating role in the relationship between browsing frequency and purchase quantity.

H9: Gender plays a moderating role in the relationship between browsing variety and purchase quantity.

Methodology

Our dataset mainly comes from Tianchi platform, which provides the collection of real-world user data published by Alibaba Group for academic research and business model innovation. The dataset records the shopping log data generated by consumers on the Tmall website during "Double 11" Shopping Carnival and six months before the carnival. The user information table records user id, gender, and age information. The product information table records product id, category, merchant, and brand information. The user browsing log data includes users' behavior type which includes clicking, joining

shopping cart, purchasing and collecting. The total number of the log records exceeds 50 million, and the total number of users exceeds 420,000.

In this paper, we use the difference-in-difference (DID) method to evaluate the impact of online shopping carnival on consumers' information processing behavior. Then we construct the regression model to examine the relationship between information processing behavior and purchase decision and make dummy variable interaction item test to verify the moderating effect of gender. The models established are as follows:

Difference-in-Difference Estimation

For hypothesis 1 to 3, we estimate DID model, which has been widely used in the evaluation of policy effects, to evaluate the impact of online shopping carnival on consumer information processing behavior. The basic idea of DID method is to evaluate the effectiveness of the policy by comparing the changes of participants (treatment group) and non-participants (control group) before and after the policy implementation. By constructing the DID estimator, it is possible to eliminate the changes caused by self-change or other possible factors before and after processing, and thus effectively separate the effects of the policy. The basic DID model is shown as follows:

$$Y_{\mathrm{it}} = \alpha_0 + \alpha_1 d_{it} + \alpha_2 T_{it} + \beta d_{it} T_{it} + \varepsilon_0 \tag{1}$$

- i represents the consumer individuals. t represents time. Y is a series of variables representing the consumers' purchase decision-making behavior affected by online shopping festival at each stage.
- d is a grouping variable. If the group to which the consumer i belongs is a processing group, the value of d is 1, and hence, the value is 0 indicates that it is a control group.
- T is a time variable. If the consumer i is in process after time t, the value of T is 0. If not, the value is 1.
- α_1 represents the difference in unobservable fixed features between groups.
- α_2 represents the effect of overall unobservable factors that change over time.
- β, the parameters of the cross terms of d and T, is the parameter indicating the effect of the policy.

Model (1), as the basic model of DID, is built to analyze the impact of online shopping carnival on consumer information processing. When comparing the effect of online shopping carnival on consumers with different characteristics, a cross term is added to the basic model, which is Model (2).

$$Y_{\mathrm{it}} = \alpha_0 + \alpha_1 d_{it} + \alpha_2 T_{it} + \beta_{DID} d_{it} T_{it} + X + \alpha_1{}^X d_{it} X + \alpha_2{}^X T_{it} X + \beta_{DID}{}^X d_{it} T_{it} X + \varepsilon_0 \tag{2}$$

- X represents the fixed features of individual consumers, (i.e., gender and age).
- $\alpha_1{}^X$ indicates the influence of inherent difference between treatment group and control group on the consumer having the feature (male) with respect to the consumer who does not have the feature (female).
- Similarly, $\alpha_2{}^X$ indicates the overall impact of unobservable factors over time on consumers with the feature (male) relative to consumers who do not have this feature (female).
- $\beta_{DID}{}^X$ is the difference in behavioral changes of consumers with different features affected by online shopping festival.

Regression Analysis

For hypothesis 4 to 9, we estimate the following regression model to analyze the impact of consumers' information processing behavior on purchase quantity. With age (X_{age}) as the control variable, the dependent variable is purchase quantity ($Y_{purchase}$), and the independent variable includes number of

pages viewed (X_{pages}), browsing frequency (X_{visit}), and browsing variety ($X_{diffitem}$). The model is shown in Model (3).

$$Y_{purchase} = \alpha_0 + \beta_1 X_{pages} + \beta_2 X_{visit} + \beta_3 X_{diffitem} + \delta_1 X_{age} + \varepsilon_0 \quad (3)$$

Next, the dummy variable interaction test is used to test the moderating effect of gender. Gender is set as a dummy variable (X_{gender} equals 0 for female, and 1 for male), and the interaction item between gender and independent variable is introduced into the regression model. Through the parameter of interaction items, it can be seen whether the moderating effect of gender is significant. The following three formulas respectively examine the moderating effect of gender on the relationship between number of pages viewed and purchase quantity, browsing frequency and purchase quantity and browsing variety and purchase quantity as in Model (4) ~ (6).

$$Y_{purchase} = \alpha_0 + \alpha_1 X_{pages} + \alpha_2 X_{visit} + \alpha_3 X_{diffitem} + \beta_1 X_{gender} X_{pages} + \delta_1 X_{age} + \varepsilon_0 \quad (4)$$

$$Y_{purchase} = \alpha_0 + \alpha_1 X_{pages} + \alpha_2 X_{visit} + \alpha_3 X_{diffitem} + \beta_1 X_{gender} X_{visit} + \delta_1 X_{age} + \varepsilon_0 \quad (5)$$

$$Y_{purchase} = \alpha_0 + \alpha_1 X_{pages} + \alpha_2 X_{visit} + \alpha_3 X_{diffitem} + \beta_1 X_{gender} X_{diffitem} + \delta_1 X_{age} + \varepsilon_0 \quad (6)$$

Expected Results

For the hypothesis H1~H3, the online shopping carnival is expected to have a significant impact on consumers' information search and alternative evaluation behavior. If the impact is positive, the results indicate that under the influence of online shopping carnival, the number of pages viewed by consumers and browsing frequency increase, and consumers have higher demand for information than usual. If it is negative, it suggests that consumers are more cautious and rational during the shopping carnival. Otherwise, it implies the stimulating effect of online shopping carnival on consumption is not so obvious and effective as we think.

Similarly, it can be concluded for the impact of consumer information processing behavior on purchase decision for the hypothesis H4~H6. If the result is significantly positive, it suggests that information processing behavior has a positive effect on purchase decision. If it is significantly negative, it suggests that information processing behavior has a negative effect on purchase decision. Otherwise, it suggests they are not correlated. Furthermore, the three dimensions of information processing behavior may have a different magnitude and direction of effect on the purchase decision.

For the hypothesis H7~H9, the moderating effect of gender is expected to exist during usual and online shopping carnival, but the effect may not necessarily be in the same level. From our future empirical results, we can identify if the moderating effect during online shopping carnival is stronger, it confirms that the gender difference during online shopping carnival is more pronounced and therefore will provide important guidance for merchants about how to promote precision marketing strategies based on consumer characteristics during different promotion periods.

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