

# How Item-based Recommendation Affects E-commerce Platform Satisfaction

## —Measurement of Mediating Effect of SPSS Analysis Method

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**Abstract**—In the era of the digital economy, each e-commerce platform has adopted a personalized recommendation service strategy to cope with the fierce competition. From the perspective of customer perceived information value, this paper explores the influence mechanism of personalized recommendation service on e-commerce platform satisfaction. The questionnaire data were collected online and offline, and SPSS was used for reliability and validity analysis. The structural model analysis path and hierarchical regression analysis were used to analyze the mediating effect. Finally, it is concluded that to win customer satisfaction. The platform needs to present personalized suggestions with high information value to specific users through an intelligent recommendation algorithm to meet the personalized needs of users.

**Keywords**—item-based recommendation; Perceived information value; platform satisfaction

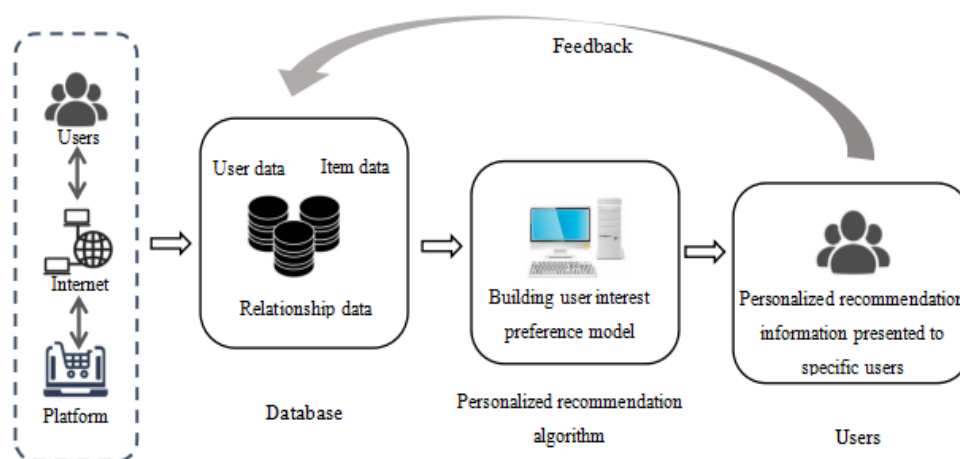
## 1 INTRODUCTION

Driven by the Internet, big data, 5G and other technologies, e-commerce has developed rapidly. With the increase of product types, consumers face difficult selection due to information overload. At the same time, users leave vast amounts of behaviour data when browsing the Internet, and enterprises are also in the dilemma of using them effectively. Therefore, all major e-commerce platforms have launched personalized recommendations, among which collaborative filtering is the most common application. Research on extracting user interest preferences from browsing behaviour data generated by the interaction between users and items runs through the whole process of collaborative filtering algorithm development [1]. At present, the research on personalized recommendation is roughly divided into two aspects: one is to study how to improve the accuracy of advice from a technical perspective; the second is to check the click or adoption of recommendation information from consumers' perspective. Most of the existing research focuses on the technical level, and it is not known whether consumers' satisfaction with e-commerce platforms is affected by the personalized recommendation effect. Therefore, our study mainly focuses on how the personalized project-based recommendation of the e-commerce platform affects platform satisfaction.

## 2 LITERATURE REVIEW

### 2.1 Personalized recommendation

For the first time, Resnick put forward the concept of personalized recommendation, which collects consumer feedback on products or services. The system responds to improve the efficiency of users' purchase decisions [2]. Arabi et al. believe that personalized recommendation technologies establish user information through user behaviour and other content and automatically recommend projects that best meet user preferences [3]. The first step of personalized recommendation requires data input, mining and collecting user data, project data, relational data, and then analyzing the data to build a user preference model. Next, collaborative filtering and other recommendation algorithms are used to form recommendation recommendations, and the results are presented to specific users. Finally, the user behaviour response data is fed back to the dataset [1]. The particular flow is shown in Figure 1. There are many existing recommendation systems, but the collaborative filtering algorithm is the most widely used, usually divided into user-based and item-based recommendations. The User-based recommendation is to find other users with the same preferences as the target user in the database and recommend items that match the customer's preference to the user, such as "the user who viewed this also saw...". The item-based recommendation is to build a recommendation algorithm model according to the relevant information of the product or service. The user's relevant information and the user's operation behaviour of the product or service to provide users with recommendation services, such as "similar product recommendation".



**Figure 1.** Personalized recommendation process

### 2.2 Perceived information value

At present, the theory of perceived value is relatively mature in the academic circle. It refers to users' perception and evaluation of enterprises and their products to meet their needs. Enhancing users' perceived value is also regarded as the essential task of enterprises [4]. Previous researchers have carried out many studies on the division of the dimension of

perceived value. Chandon et al. believed that perceived value has two sizes: functional significance and emotional value. Some researchers divided it into three dimensions. Rintamaki et al. split it into emotional value, practical value and social value. Dong Dahai et al. divided consumers' perceived value into affective value, procedural value and resultful value in the network environment. Drawing on the theory of perceived value and existing studies, this paper focuses on the perceived information value of users' personalized recommendation on e-commerce platforms. Information value refers to the perception that users can obtain the information they want to know or use to themselves through the personalized recommendation of e-commerce platforms.

### **2.3 Platform satisfaction**

E-commerce platforms carry out personalized recommendation services, recommending products that meet customers' needs and preferences and encourage customers to browse and buy more products. The platform can also gain profits from them. Chen, Yang and other scholars studied the causal relationship between the subjective experience of personalized recommendation, satisfaction and purchase intention and proved that perceived novelty, relevance, timeliness and contingency significantly impact consumer satisfaction [5]. In online shopping, it is essential to maintain and even improve customer satisfaction of e-commerce platforms because the improvement of customer satisfaction can enhance the willingness to reuse the system, the loyalty of the forum and the favourable rating of the medium [6].

## **3 HYPOTHESIS**

### **3.1 Item-based personalized recommendation and perceived information value**

In the network environment, the factors influencing the purchasing decisions of platform users include not only product quality and price but also the services provided by shopping websites. Online shopping is in a virtual environment, and consumers are faced with "explosive" information, which increases the psychological distance between sellers and buyers, thus affecting users' perceived value [7]. By using personalized recommendations, the platform can guide consumers to selectively pay attention to information related to themselves, shorten the psychological distance between them, and improve value perception. In general, experienced customers may interact more rationally with the recommendation system and deliberately choose to click or not click on the recommendation information to improve the quality of future recommendations [8]. Therefore, hypothesis 1 is proposed:

H1: Item-based personalized recommendations are positively associated with perceived information value.

### **3.2 Perceived information value and platform satisfaction**

According to the S-O-R theory, when consumers are stimulated by commodity recommendation information provided by e-commerce platforms, they will form individual cognition in their hearts. If the recommendation information meets their needs, they will be happy mood and have a more positive attitude towards online shopping. In the interactive use of the network system, the flow experience can change customers' perspectives, prolong the browsing time of the website, and then improve the positive perception of the website and

generate satisfaction [9]. It can be inferred that the more high-quality and convenient the personalized recommendation services provided by e-commerce platforms are, the more satisfied users will be with the platform when they gain higher perceived information value. Therefore, hypothesis 2 is proposed:

H2: Perceived information value is positively related to platform satisfaction.

### 3.3 The mediating role of perceived information value

Wang et al. pointed out that personalized recommendations provided by shopping platforms rely on accurate algorithms, and their contents are systematically analyzed. Compared with consumer comment information, the recommended ranges of the media are more objective and confirm that the effectiveness of the recommendation of the perception system negatively regulates the relationship between consumer satisfaction and trust [10]. User perceived value will affect user satisfaction. Item-based personalized recommendation services recommend users according to their needs and preferences, which is conducive to reducing user costs, improving the value of perceived information, and thus promoting the satisfaction of the platform. Therefore, hypothesis 3 is proposed:

H3: Perceived information value plays a mediating role between content-based personalized recommendation and platform satisfaction.

In conclusion, the conceptual model of this paper is shown in Figure 2:

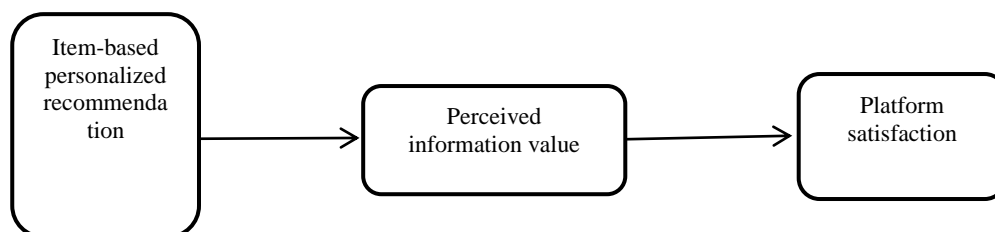


Figure 2. The Conceptual Model

## 4 METHOD AND DATA ANALYSIS

### 4.1 Variable measurements

The scales in this study are from the mature scale and combined with the research background to modify the items slightly so that the items can be closer to the user's situation of the e-commerce platform, as shown in table 1. The measurement items of all scale variables are measured by the Likert 5 - point scoring method. The degree from 1 to 5 is getting deeper and deeper, from significantly disagree to very agree. The respondents choose the items from 1 to 5 according to their actual situation.

### 4.2 Reliability and validity

As shown in Table 1, the reliability and validity analysis using SPSS shows that the Cronbach's alpha of item-based personalized recommendation and perceived information value is above 0.8, and the combined reliability (CR) is above 0.8, indicating the scale's reliability is good. The

Cronbach's alpha of platform satisfaction is above 0.6, and the combined reliability (CR) is above 0.7, indicating that the scale's reliability is acceptable. In terms of validity test, the factor load of each item is more significant 0.6, meaning that the scale has good convergence validity. As shown in Table 2, the square root of the average variance extraction (AVE) is greater than the absolute value of the correlation coefficient, indicating that the discriminant validity of each variable is good.

**Table 1** Variable Measurement Items

Variable	Measurement Items	Factor Loading
Item-based recommendation Cronbach's alpha=0.841 C.R=0.867 AVE=0.766	IR1. Similar product recommendations are related to the product information description of my collection	0.892
	IR2. Similar product recommendations are related to the product features of my collection	0.858
Perceived information value Cronbach's Alpha=0.835 C.R=0.852 AVE=0.591	PIV1. Browse the shopping platform recommendation information to get the information you need	0.772
	PIV2. Browse shopping platform to recommend informatics to much knowledge	0.834
	PIV3. Browse shopping platform recommendation information for more product information	0.791
	PIV4. Browse shopping platform recommendation information to help make purchase decisions	0.668
Platform satisfaction Cronbach's Alpha=0.689 C.R=0.784 AVE=0.549	PS1. Shopping on this e-commerce platform is very convenient	0.668
	PS2. Using this e-commerce platform can kill spare time	0.749
	PS3. I am satisfied with the e-commerce platform as a whole	0.799

**Table 2** Correlation Coefficients Among Variables

Variables	Mean	S. D	IR	PIV	PS
IR	4.006	0.576	0.875		
PIV	3.672	0.699	0.339**	0.769	
PS	3.742	0.549	0.324**	0.415**	0.741

### 4.3 Path verification

In order to verify the research hypothesis, the structural equation path model (SEM) was used to fit the data. The fitting parameters of the model were CMIN/DF=1.871<3, RMSEA=0.093<0.01, GFI=0.934, CFI=0.951, NFI=0.908, IFI=0.955. All indicators are within the standard range, indicating that the model fits well and the path is significant in the 95 % confidence interval. As shown in table 3, the item-based personalized recommendation positively impacts perceived information value ( $\beta= 0.528$ ,  $p = 0.000$ ) and supports H1. Perceived information value positively affects platform satisfaction ( $\beta= 0.411$ ,  $p = 0.000$ ), supporting H2.

#### 4.4 Intermediary test

In this study, the bootstrap was used the confidence interval method to verify the mediating effect. The process mediation analysis plug-in of SPSS was used for analysis: bootstrap ML was set for the mediation hypothesis, 5000 repeated samplings (> 1000) were conducted, and the 95 % confidence interval level with deviation correction (the confidence interval of mediation effect should not include zero value) was adopted. The analysis results are shown in Table 4, and the mediation effect was verified (the confidence interval does not have zero value and is significant), which supports H3.

**Table 3** Model Regression Coefficient

X	—	Y	Non-standardized path coefficient	SE	z (CR value)	P-value	Standardized path coefficients
IR	—	PIV	0.64	0.115	5.556	***	0.528
PIV	—	PS	0.323	0.087	3.713	***	0.411

**Table 4** Mediation Test Edition Test of Perceived Information Value

Effect	Gross effect	Mesomeric effect	Direct effect	95% confidence interval for deviation correction		P-value	Result
				Upper limit	lower limit		
IR → PIV → PS	0.392	0.206	0.186	0.076	0.385	***	Full mediation

## 5 CONCLUSION

First, this paper establishes the influence model of the relationship between item-based personalized recommendation, perceived information value and platform satisfaction. It collects data through a questionnaire survey to confirm the formation path of platform satisfaction in the context of personalized recommendation service.

Secondly, from marketing, personalized recommendation helps customers make purchase decisions by proposing product or service recommendations. From the perspective of artificial intelligence, it can be regarded as a learning problem for using users' existing knowledge. In the era of the digital economy, almost all platforms are implementing personalized recommendations. Still, the most important thing is to improve the perceived value of recommendation information to attract and retain customers, win customer satisfaction with the platform, and increase continuous use.

Finally, this article only focuses on project-based recommendation sets. When consumers are faced with multiple recommendation lists, they will have different attitudes towards the platform and show different behavioural responses.

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