Exploring the Effects of Combinations of Product Quality Cues in Contented-based Recommendation System on E-commerce Platform

Yankai Cai
School of Economics and Management, China University of Geosciences, China

Yi Jiang
School of Economics and Management, China University of Geosciences, China, wuhanjoey@163.com

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Exploring the Effects of Combinations of Product Quality Cues

in Contented-based Recommendation System on E-commerce Platform

Yankai Cai [1], *Yi Jiang*[1*]

[1]School of Economics and Management, China University of Geosciences, China

Abstract: On e-commerce platforms, to cope with the problem of information overload, the recommendation system is widely used by online sellers. Product characteristics are often used as basic features for algorithms to generate recommendations. However, how the interaction between product characteristics and recommendation sources, both product signal cues transmitting information of product quality, affect consumers decisions remains to be explored. By conducting an online experiment, we tried to compare the recommendation effects between different combinations of product characteristics and recommendation sources empirically. Our results make theoretical contributions to the research on signaling theory in e-commerce context and the research of content-based recommendation. Moreover, both e-commerce designers and sellers could benefit from the practical implications of our study.

Keywords: recommendation system, product quality cue, signaling theory, e-commerce

1. INTRODUCTION

While the online market provides consumers with abundant product information, with information overload, consumers can't easily inspect a product to assess its quality compared to those in the traditional market. Thus, more and more e-commerce companies are using recommendation systems to assist online shoppers in locating the products which they are likely to purchase. For the content-based recommendation system, one of the most widely used recommendation systems, features are needed to construct item profiles and user profiles in order to calculate similarity so as to generate final recommendations. In the e-commerce context, product characteristics typically serve as basic features. And for e-commerce platforms, an efficient recommendation system is crucial to enhance sales. Our first research target is **comparing the effects of systems where different product characteristics serve as the main basis to generate recommendation**. Based on signaling theory, we note that the other type of product quality que's interaction with product characteristic could affect the effects of recommendations and raise the second research target: **understanding how different matching modes affect user's adoption of information.** Besides, previous studies generally divided users' behavior of online shopping into two stages [1]. Adding a cognitive stage, we expanded it to three stages and propose our third research aim: **exploring the transformation process from adopting information to forming a consideration set**.

2. THEORETICAL FOUNDATION AND HYPOTHESES

Signaling theory illustrates that some behaviors can be transmitted as signals to buyers with relative information deficiency and has been used as a theoretical framework in the field of e-commerce to understand how consumers evaluate product quality before purchasing. Based on signaling theory, product signal cues can be sorted into the cue of predictive value and the cue of confidence value [2]. Product characteristics are typical cues of predictive value, while recommendation sources are often considered as cues of confidence [3]. To the extent of our knowledge, the combination of two types of product quality cues may affect consumers' choice significantly, however, previous research has not combined them to study their interaction. Besides, adding a

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[*] Corresponding author. Email: wuhanjoey@163.com (Yi Jiang)

cognitive stage, we expanded the stages of users' behavior of online shopping to: 1) preliminarily screening the products and judging whether they are satisfied with the recommendation, 2) forming consideration sets of products for possible purchase, 3) comparing the items in the sets thoroughly before making the final purchase decision. Previous studies focused on how recommender systems impact the process from the second to the third stage. The relationship between user's information adoption and their consideration set remains to be explored.

3. RESEARCH METHODOLOGY AND RESULTS

To bridge the research gaps, we designed a 3x3 factorial experiment, to conduct which 9 online shopping websites were built. The first influential factor was the product-related attributes including category, brand and price. These product characteristics are synthesized to serve as the basic features for establishing user profiles and product profiles to generate recommendations. But the weight of 3 product characteristics to form profiles was manipulated accordingly. And the second factor was recommendation sources containing other consumers, human experts and recommender system. 300 subjects recruited randomly were invited to surf our websites, after which they would be asked to fill in questionnaires designed to measure their degree of information adoption. The number of products in the shopping cart will be measured as the size of the consideration set.

Statistical analysis suggested that our subjects are the main audiences of e-commerce recommendation systems and the reliability of the experimental data was examined. After that, analysis of variance was used and its results suggested that the recommendation effect of the recommendations based on product category is better than those based on product brand or product price in general. Meanwhile the information adoption of 9 experimental groups was compared whose results are summarized in Table 1. Additionally, the results of linear regression suggested that information adoption has a significant and positive impact on the consideration set.

Table 1. results of ANOVA on combinations of product quality cues

The feature which system mainly based on to generate recommendation	The types of recommendation source produce better effects of information adoption significantly
Category	Consumer
Brand	Consumer, Expert
Price	System, Consumer

4. CONCLUSION AND DISCUSSIONS

Our findings provide both theoretical and practical implications. By providing empirical evidence of the relationship between product quality cues and recommendation effects, we extend the scope of the signaling theory to the field of recommendation system. Meanwhile, our study explored the transformation process from adopting information to forming a consideration set, which supplements the research on consumers' behavior of online shopping. For every certain product characteristic, we managed to find recommendation sources matching with which bringing better recommendation effect. Our study has practical value for e-commerce designers to create efficient recommendation algorithms according to sales scenarios. And understanding how recommendation sources function in different scenes can also help e-commerce sellers choose applicable promotion access. In the future, we will consider cooperating with e-commerce platforms to reproduce our experiment so as to improve certain deficiencies of our study.

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