

## A NEW THEORY TO SELECT PRODUCTS SELLING ON INTERNET – THE PRODUCT E-COMMERCE VALUE THEORY

HUIPO WANG<sup>1</sup>, YUNFU HUO<sup>2,\*</sup> AND ZUOLIANG LV<sup>1</sup>

<sup>1</sup>College of Economics and Management

<sup>2</sup>Research Center for E-commerce and Logistics Development  
Dalian University

No. 10, Xuefu Avenue, Jinzhou New District, Dalian 116622, P. R. China  
wanghuipo@aliyun.com; \*Corresponding author: josephhuo@sina.com

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**ABSTRACT.** *From the practice of E-commerce, the product type is very important to the success of the implementation of E-commerce. Many scholars have carried out the empirical research to this problem. However, there is no theory research to explain why and how product types affect E-commerce. In this article, the authors proposed product E-commerce value theory. This theory consists of five elements: supply and demand difference, perception difference of quality, willingness to pay for E-commerce, logistics satisfaction degree to goods and post-purchase evaluation. In the end, this article proposed an analysis framework of product selection in E-commerce based on the foregoing theory.*

**Keywords:** E-commerce, Product, Value, Selection

1. **Introduction.** With the development of network technology and consumer's attitudes, E-commerce has permeated and transformed the traditional business everywhere, and almost everything, from pencil to car, can be traded on Internet. CNNCI announced in the "2013 China's online shopping market research report" that clothing and shoes are the most popular product category in online market, 75.6% of the online shopping crowd report their purchase of them, that means for every 100 participators in online shopping market, about 76 individuals have bought garments commodities. The following are general merchandise and computers, digital communication products and accessories, whose proportions are 45.1% and 43.3% [1]. Zhao quoted the data from Alibaba Research Center and it shows that the first round of E-commerce belongs to music, books, etc., the second round belongs to household appliances, digital products, clothing, etc., and the third round belongs to agricultural products, individual customized products and services [2]. It is clear that in correct time selecting a correct product has a significant impact on the successful implementation of E-commerce. To choose E-commerce products must base on the study of consumer behavior. Wang had analyzed the five western popular consumer buying behavior theories [3]. From those theories, there are four coherent processes in the general consumer buying behavior: identifying needs, perception of commodity, money and goods exchange, and post-purchase evaluation. Different from the traditional business, in E-commerce, money and goods exchange is separated into payment and logistics. Therefore, in this article we divide the consumer purchase behavior into five processes: identifying needs, perception of goods, payment, logistics, and post-purchase evaluation. Many factors have significant impacts on the above processes, but the product itself is the most important. Many scholars added the product types into their model when they studied E-commerce. Phau and Poon deemed that buying from retail store or online is affected greatly by what product people are buying [4]. Hassanein and Head studied how the product type affects the trust in online trade [5]. Xiao and Benbasat introduced the product type and product complexity as a variable into the model to analyze E-commerce

recommendation system [6]. Hemamalini found that consumers' attitudes and reasons to buy are varied according to different commodities [7]. However, those studies are empirical research, and there is no theory research to explain how product types affect E-commerce.

Actually, with the development of E-commerce, the value of product should be redefined. Its necessity can be discussed from two aspects: first, E-commerce revolution improves the social productivity and then changes the value of product; second, E-commerce environment is essentially different from the traditional business environment and then changes the value of product.

First, the E-commerce revolution improves the productivity level and then changes the value of the goods.

Toffler predicted in the "third wave" that the information technology revolution will be the third revolution that changes human destiny following the agricultural revolution and the industrial revolution [8]. The former two revolutions had greatly improved the level of productivity; if IT is the third industrial revolution, then it should be able to raise the level of social productivity. However, Roach had reported a departure from the IT investment and production efficiency [9]. This caused many economists' concern. Since then many economists carried out deep study on this issue from macroeconomic level, industry level and enterprise level (Brynjolfsson and Yang) [10]. After then more and more literature had reported a positive relationship between IT investment and productivity, so the study goes into a new era, namely how IT technology creates value, and how to use IT resources more efficiently [11]. In this period many studies focus on IT value for enterprises. E-commerce revolution has also been recognized by some scholars [12-14]. The study of the enterprises E-commerce value becomes popular in this context. The majority of those studies are empirical research. The default assumption of those studies is that E-commerce can create value for the enterprise. In those studies, productivity or performance is considered as value, and then they study what elements are involved in value creation [15,16]. In summary, we can see that E-commerce is changing human behavior and society profoundly, improves the level of productivity, will change the value of the goods, but there is little research on the value of product under the environment of E-commerce.

Secondly, E-commerce environment and traditional business environment are fundamentally different and then change the value of the product.

The essential difference between E-commerce and traditional business is the difference in access, storage and processing of information, which leads to different business conducts. This difference has penetrated into all aspects of business activities, and changes people's behavior profoundly. On one hand, the traditional business activities have changed because of E-commerce; on the other hand, E-commerce has led to the emergence of new problems. The former, for example, in E-commerce environment the consumer buying behavior and the distribution of goods are different from the traditional business; the latter, for example, E-commerce environment leads to new problems due to the transmission of information, such as trust, security, and privacy. In short, the buying environment has changed fundamentally, so it will definitely affect the value of goods.

In a word, a new concept of value should be proposed in order to study the commodity exchange in E-commerce environment. So, this article proposed product E-commerce value; considering the impact of product type to the processes of the consumer buying behavior, the value is influenced by five factors: identifying needs, perception of goods, payment, logistics, and post-purchase evaluation. When the enterprises and consumers' recognition of the product E-commerce value is consistent, the transactions may happen; when the recognition is inconsistent, the transactions hardly happen. Also the implementation of E-commerce cannot succeed. This article based on product E-commerce value builds a theoretical framework to select E-commerce commodities.

This article is organized as follows: Section 1 is introduction; Section 2 illustrates the theory of product E-commerce value; Section 3 presents theoretical constitution of product E-commerce value; Section 4 is the analysis framework of product selection in E-commerce based on the product E-commerce value theory; Section 5 gives the conclusion.

**2. The Basis of Product E-Commerce Value.** Theoretical base of product E-commerce value is “value theory”. “Value” is a multi-faceted and complex concept. Nietzsche said that “Value is generated by evaluation” [17]. In philosophy, “value theory” experiences the evolution from “value of substance” to “value of relationship” [18]. The relationship means that the object attributes satisfy the needs of the subject. “Subject” is often people, but some scholars believe that the “subject” can be animals, plants, and even inanimate objects [19]. In economics, “labor value theory” and “marginal utility theory” coexist for a very long time. The labor value theory is very powerful in explaining the relations of production; the marginal utility value theory is very powerful in explaining the relations of exchange. However, the value of product is non-constant whether according to labor value theory or marginal utility value theory. The labor value theory deems that the value of individual commodities will vary with changes in productivity [20]. The marginal utility value theory believes that the value is subjective, and there is no objective metrics, varying with the changes of time and place. In marketing theory, value has the following characteristics: the value is a concept of multi-dimension; the value is an interaction between the customers and the products; the value is comparative, personalization, and subject to availability features [21]. Accordingly, for the concept of value we can make the following set of guidelines: (1) value reveals the relationship between the “producer”, “customer” and “product”, and the relationship is evaluation; (2) value varies with the changes in productivity; (3) value varies with the changes of exchange environment. The above settings are the theoretical basis of the product E-commerce value.

**3. Theoretical Constitution of Product E-Commerce Value.** From the perspective of commodity exchange in E-commerce environment, this article argues the product E-commerce value consists of five elements: supply and demand difference, perception difference of quality, willingness to pay for E-commerce, logistics satisfaction degree to goods and post-purchase evaluation.

**3.1. Supply and demand difference  $\phi_1$ .** In a certain period, the supply of goods of the enterprise in E-commerce environment is given as (1):

$$Q^s = \sum_{n=1}^{+\infty} n_e \times P_1(n_e) \quad (1)$$

where:  $n_e$  – the expected demand during this period;  $P_1(n_e)$  – during this time the expected probability of  $n_e$  goods being sold.

During this time the actual need of consumers is given by (2):

$$Q^d = \sum_{n=1}^{+\infty} n_a \times P_2(n_a) \quad (2)$$

where:  $n_a$  – the actual demand during this period;  $P_2(n_a)$  – during this time the actual probability of  $n_a$  goods being sold.

So,  $\phi_1 = Q^d - Q^s$ .

**3.2. Consumer's perception difference of product quality  $\phi_2$ .** Consumer's perception difference of product quality comes from the difference between the expected quality and the actual quality. Consumer's expectation for the quality of goods is given by (3):

$$Qu^e = \int_{q=0}^{+\infty} q \times f_1(q) dq \quad (3)$$

where:  $q$  – quality of the product;  $f_1(q)$  – the expect distribution of the quality.

The actual quality of the product is given by (4):

$$Qu^r = \int_{q=0}^{+\infty} q \times f_2(q) dq \quad (4)$$

where:  $q$  – quality of the product;  $f_2(q)$  – the actual distribution of the quality.

So,  $\phi_2 = Qu^r - Qu^e$ .

**3.3. Consumer's willingness to pay for E-commerce product  $\phi_3$ .** E-commerce transactions cannot do without online payment (including: online banking, E-payment, mobile payment and other forms). Consumer's willingness to use online payment directly affects the product E-commerce value. If consumer likes to pay online, this may improve the product E-commerce value, that is  $\phi_3 > 0$ ; if consumer does not like to pay online, this may devalue the product E-commerce value, that is  $\phi_3 < 0$ ; if cash on delivery is available, the consumer's willingness to pay has no difference with that of traditional business, which has no influence on the product E-commerce value, that is  $\phi_3 = 0$ . So,  $\phi_3 \in [a, b]$ , where  $a < 0$ ,  $b > 0$ .

**3.4. Current logistics level meeting the requirements of the product  $\phi_4$ .** Modern logistics is an important support to E-commerce. In fact, products can succeed in E-commerce market, largely depending on their characteristics of logistics or that current logistics technology can meet the demand of those goods. For example, the development of E-commerce of fresh product must accompany with the development of the cold chain logistics. When the match degree of logistics technology and need of the distribution of product is high, this may add the product E-commerce value,  $\phi_4 > 0$ . When the logistics cannot meet the needs of distribution of product, this may reduce the product E-commerce value,  $\phi_4 < 0$ . So,  $\phi_4 \in [c, d]$ , where  $c < 0$ ,  $d > 0$ .

**3.5. Consumers' post-purchase evaluation  $\phi_5$ .** Consumers' post-purchase behavior is still a part of the consumer behavior [22]. The consuming experience will be demonstrated by post-purchase behavior. In traditional business there are four ways for consumers to share their experience: share with themselves, share with friends and family, share with vendor, and share with a just third-party. In E-commerce the above ways still exist, and are given a new meaning; besides, consumers can share through E-commerce platform with strangers. So in E-commerce consumers' post-purchase evaluation becomes more and more important. Positive comments tend to increase the product E-commerce value, that is  $\phi_5 > 0$ . Negative comments tend to reduce the product E-commerce value. That is  $\phi_5 < 0$ . Neutral comments have no effect on the product E-commerce value. That is  $\phi_5 = 0$ .

Therefore, the function of the product E-commerce value is:  $V = f(\phi_1, \phi_2, \phi_3, \phi_4, \phi_5)$ .

**4. The Analysis Framework of Product Selection in E-Commerce Based on the Product E-Commerce Value Theory.** Through the above analysis we can conclude that in E-commerce environment the product E-commerce value is the equilibrium price. So the analysis framework can be shown below:

(1) For commodities  $V > C$ , the seller can implement E-commerce;

- (2) For commodities  $V < C$ , the seller cannot implement E-commerce;
- (3)  $V = C$  is a critical value. According to it, the seller decides whether to implement E-commerce or not; where:  $V$  – product E-commerce value;  $C$  – the opportunity cost of goods.

**5. Conclusion.** In this article we proposed a theoretical framework to select products which are sold on Internet. In order to prove the effectiveness of this framework, we will establish a multi-agent simulation model which is based on the product E-commerce value theory to discuss how to use this framework to select a product. According to the simulation result we will put forward the price strategy, supply strategy and quality strategy of the selection of E-commerce product. This part is included in another article [23].

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