

## **Kansei-Engineering-Based Method for Improvement of Cross-border E-commerce Service: From the Perspective of Customers' Emotional Perceptions**

*(Work in Progress)*

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### **ABSTRACT**

With the rapid development of the Internet, cross-border e-commerce has become an important channel for promoting international trade. Simultaneously, more and more customers express their views and comments on cross-border e-commerce services on the Internet. To understand and satisfy customers' requirements, it is required to find out helpful information from consumer feedback and make an improvement as soon as possible. The relevant firms will provide a more friendly and satisfactory service for customers by this way. Cross-border e-commerce will also achieve a better development. Therefore, this study proposes a method which combines text mining and Kansei engineering to analyze cross-border e-commerce service. Kansei engineering (KE) is a kind of approach to design the elements which transforms customers' affective and emotional perceptions into products and services. Therefore, this study applies a KE-based approach to analyze the associations between service elements (property space) of cross-border e-commerce and customers' emotional perceptions (semantic space), and provides a new idea for further improvement of cross-border e-commerce service.

**Keywords:** Cross-border e-commerce service, consumer feedback, Kansei engineering.

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### **INTRODUCTION**

With the progress of the Internet technology, e-commerce has become an important driving force to world economy in the 21<sup>st</sup> century, especially cross-border e-commerce. Consumers are able to purchase products and services directly which may be unavailable or expensive in their home countries from online marketplace, despite of the difference in languages and currencies between consumers and merchants (Hsiao, Chen, & Liao, 2017). This business activity is called cross-border e-commerce and has been growing in recent years because of the advances in international payment security, payment methods and logistics, language barriers, and so on. Nowadays, cross-border e-commerce has become an important channel for promoting international trade. Therefore, it is an important issue to understand how cross-border e-commerce customer feedback and satisfaction are jointly influenced by customers' emotional perceptions and cross-border e-commerce service elements. Because the success of cross-border e-commerce depends on the degree of consumers' satisfaction and the number of potential buyers, thus a better service is required for meeting consumers' high requirements and expectations for cross-border e-commerce service such as good service quality and attitude, fast logistics and more choice, etc. (Mou, Shin, & Cohen, 2016).

For better service improvement, some researchers collected data from a leading cross-border e-commerce firm in China to explore the topics of feedback posted directly by their customers. Then, the Latent Dirichlet Allocation (LDA) model was employed to explore the potential topics focused on most by consumers (Mou, Ren, Qin, & Kurcz, 2018). This paper plans to collect consumer feedback from cross-border e-commerce platform. Through collecting, reading and analyzing consumer feedback, consumers can make a better purchase decision, and cross-border e-commerce firms may have a good understanding of consumer' needs. Therefore, service quality of cross-border e-commerce will be improved. Kansei engineering (KE) is an approach to transform the elements which satisfy customers' affective and emotional perceptions into products and services (Schütte\*, Eklund, Axelsson, & Nagamachi, 2004). Therefore, the main purpose of this study is to use KE approach to analyze consumer feedback and the associations between service design elements of cross-border e-commerce and customers' emotional perceptions. It will provide a new idea of transforming the elements of customers' affective and emotional perceptions into cross-border e-commerce service. Meanwhile, this study provides reference for firms to develop cross-border e-commerce service strategies and designs, and it can also help them understand the key factors which facilitate such commerce.

The rest of this paper is constructed as follows. In Section 2, we review the cross-border e-commerce, consumer feedback and Kansei engineering. Section 3 illustrates the study framework and methodology. In Section 4, conclusions are made, and the limitations and suggestions for future research are described.

## LITERATURE REVIEW

### Cross-border e-commerce and related work

In recent years, as a hot field of Chinese e-commerce, cross-border e-commerce has become the fastest growing sector of the whole Chinese e-commerce (Xue, Li, & Pei, 2016). Cross-border e-commerce is a new mode of international trade utilizing the Internet and the e-commerce platform as its medium (Jiao, 2016). It can shorten the distance between products and markets in time and space, through information and capital flow and logistics efficient integration. Therefore, cross-border e-commerce will become the main method of promoting trade facilitation and upgrade trade development mode (Xue, et al., 2016). In general, cross-border e-commerce occurs when multiple parties in different consumers' areas conclude a transaction involving cross-border logistics via cross-border e-commerce platforms. Typical parties involved include two subjects (buyer and seller), e-commerce platform (cross-border online platform), and other third-party service firms (cross-border logistics provider and payment provider). The seller utilizes the online e-commerce platform to sell products; the international buyer utilizes the online e-commerce platform to order the products; and the third parties (e.g. logistics firms or payment firms) conclude the cross-border transactions (Mou, Cohen, Dou, & Zhang, 2017). The characteristics of cross-border e-commerce are multilateral, direct, small-amount and high-frequency (Wang, Chai, Liu, & Xu, 2015). Currently, China's e-commerce is in a period of great development. As the main body of e-commerce in China, cross-border e-commerce platform is developing well with its strong vitality (Xue, et al., 2016).

Extant researches on cross-border e-commerce are mainly focusing on the different determinants of successful transaction between buyers and sellers, such as reputation, word of mouth and so forth which lack the reasons in depth for the success of cross-border e-commerce from seller's perspective (Cui, Mou, Cohen, & Liu, 2018). Some researchers suggest that the main motivation for cross-border e-commerce is economic advantages of product price, product quality, service provided by sales person, store facilities and variety of product selections in cross-border region (Wang, 2004). However, from views of sellers and consumers, it is generally recognized that cross-border commerce has more complexities and risks compared with domestic e-commerce (Lesma & Okada, 2012; Guo, Bao, Stuart, & Le-Nguyen, 2017). In cross-border e-commerce, buyers, sellers, the platform and third parties show more complicated interaction processes and there may be greater uncertainties for consumers (Mou, et al., 2017). Consumers will face uncertainties such as increasing information asymmetry, private information misuse, and trust on sellers. Thus, this has been emphasized as an important factor to the success of cross-border e-commerce (Guo, Le-Nguyen, Jia, & Li, 2015). Anyway, whether to provide a satisfactory service and product or not is the most important question that consumers concern about. It is also a vital factor for cross-border e-commerce to grow rapidly (Lesma & Okada, 2012).

To summary, consumers' satisfaction is closely related to the success of the cross-border e-commerce. Although cross-border e-commerce brings numerous benefits, consumers may still have worries and concerns about it such as uncertainties, private information misuse and trust on sellers. Previous studies have showed that cross-border e-commerce satisfies consumers' needs and provides them with benefits sought, including value, relaxation, pleasure, variety seeking, sensation seeking or a learned experience (Sullivan, Bonn, Bhardwaj, & DuPont, 2012). However, consumers still have a variety of dissatisfaction (e.g. terrible service attitude, poor product quality, slow logistics, etc.) with cross-border e-commerce service. At present, there are few researches on how to improve cross-border e-commerce service from the perspective of customers' emotional perceptions and satisfaction. So this topic should get more attention.

### Consumer feedback and related work

With the surge of information and communication technologies, consumers are able to express their feedback even complains more easily and quickly through the Internet than traditional media. Its effect is becoming enormous in consumers' daily lives (Wu & Huang, 2015).

Consumer feedback includes positive feedback and negative feedback. Positive feedback can provide various positive implications behavior, including guidance to develop innovative products or services and opportunities to redress consumers' problems (Wu & Huang, 2015). However, when consumers encounter service failures or product dissatisfaction, they are more likely to engage in complaining behaviors to resolve the problems (Bach & Kim, 2012). Therefore, negative feedback could be more attention grabbing in general and be more useful, which ultimately has a stronger effect on consumers' evaluations than positive feedback (Homer & Yoon, 1992; Park & Nicolau, 2015).

Consumer feedback is the critical sources of product/service feedback. Firms cannot acquire the crucial information regarding the sales losses if consumers do not provide feedback. By collecting and analyzing the consumer feedback, firms can have a good understanding of consumers' needs and make some improvements according to consumers' needs. Therefore, consumer feedback is essential for the development of cross-border e-commerce (Sparks & Browning, 2010).

Consumer feedback can offer indirect experiences about products and their dominant attributes. It plays an important role as an informant and a recommender of products (Bae & Lee, 2011). Consumer feedback enables people to obtain detailed information with high trustworthiness and credibility compared with the information provided by marketers (Park & Nicolau, 2015). According to prior research, it is found that consumers are more likely to be influenced by other consumers' opinions. People often refer to others' opinions or experiences before spending on some products about which the quality they are uncertain. The feedback from other users can serve as a quality index for a product of interest. Thus it can potentially reduce the quality uncertainty faced by a potential customer and confer a higher degree of confidence to the consumer's purchasing decision (Schubert & Ginsburg, 2000). As a result, there are some reasons to believe that positive consumer feedback may reduce quality uncertainty and increase product sales, and thus promote the development of cross-border e-commerce (Chen, Wu, & Yoon, 2004).

In summary, for cross-border e-commerce, service quality gradually becomes a critical factor determining customers' satisfaction and emotional perception. Previous studies showed that consumer feedback can reflect customers' satisfaction and emotional perceptions with cross-border e-commerce services (Wu & Huang, 2015). For example, consumers will give negative feedback if they are dissatisfied with the products or logistics. However, these studies mentioned above are mostly focused on the relationship of consumer feedback and satisfaction. This study will, from the perspective of customers' emotional perceptions feedback, analyze the relationship between consumer satisfaction and cross-border e-commerce service using KE method, in order to promote the improvement of cross-border e-commerce service.

### **Kansei engineering**

Kansei is a Japanese word. When translated into English it might mean 'consumer's psychological feeling and image' (Hsiao, et al., 2017). Kansei engineering is a proactive product development methodology which translates customers' impressions, feelings and demands on existing products or concepts into design solutions and concrete design parameters. This approach was developed in the early 70s at the University of Hiroshima, through the work of Mitsuo Nagamachi. Since then many companies and universities in Japan have adopted the methodology (Schütte\*, et al., 2004). It is a customer-oriented product development method, and it does not focus on the manufacturer's intention of the product, but rather on the customer's feeling and needs.

Kansei engineering is mainly a catalyst for a systematical development of new and innovative solutions, but can also be used as an improvement tool for existing products and concepts (Schütte\*, et al., 2004). Kansei engineering can provide some help for product designers by establishing and analyzing relationships between customers' feelings and corresponding designs. It also supports the consumer in choosing a product that fits his/her feeling among various products (Chen, Hsu, Chang, & Chou, 2015). Kansei engineering is based on subjective estimations of product and concept properties. It gives expression to the demands on the products which customers are not aware of, by using semantic tools developed by Osgood (Hsiao, et al., 2017).

## **METHODOLOGY**

This study proposes a KE-based approach to analyze the associations between service design elements of cross-border e-commerce service and customers' emotional perceptions, then to provide a new idea of designing the elements of consumers' affective and emotional perceptions into cross-border e-commerce service, shown in Fig. 1. According to the KE method, this approach consists of four phases: Phase 1 is to choose the product domain. Phase 2 is to span the semantic space and property space of the cross-border e-commerce service. Phase 3 aims to build the relationship between semantic space and property space, and test the validity of semantic space and property space. Phase 4 is model building. The factors that influence consumers' emotional perception can be found out by analyzing the model.

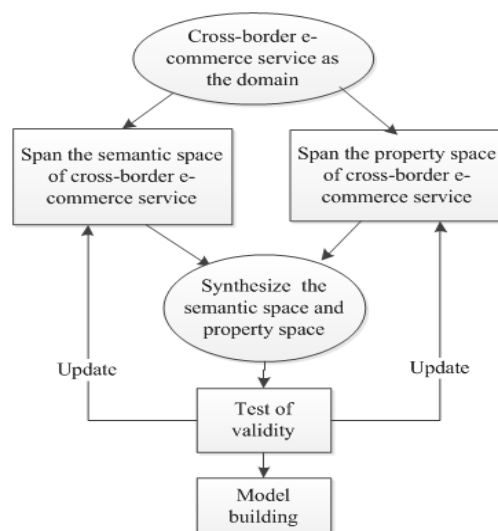
The four phases of the proposed KE-based approach are detailed as follows.

### **Choose the product domain**

Selecting the domain includes the selection of a target group and the specifications of the new product. Based on this information, product samples which represent the domain will be collected. The Kansei domain can be understood as the perfect idea behind a certain product (Schütte\*, et al., 2004). Kansei engineering method in this work will be used to study the whole service of the cross-border e-commerce, including platform, products, logistics, customer service, etc.

### **Span the semantic space and property space**

The purpose of this stage is to span the emotional semantic space and the space of the cross-border e-commerce service elements. Text-mining-based analysis will be employed as the first screening methods, which are followed by secondary screening based on expert knowledge.



Source: This study.

Figure 1: Kansei engineering method.

### ***Span the semantic space***

A Kansei word is a word used to describe the selected domain. In this step, the Kansei words which are generally used to express the emotional perceptions of cross-border e-commerce service are extracted to establish the semantic space (Schütte\*, et al., 2004).

#### **(1) Text-mining-based analysis**

The part of text-mining-based analysis includes two steps:

The first step is: Filter by the Part Of Speech (POS). The POS is the first filtering consideration, because Kansei words are always adjectives. For example, adjectives will be used like quick and slow when describing the logistics of cross-border e-commerce service. The POS will be conducted on all text feedback, and the tagging adjectives will be screened out.

The second step is: Frequency statistics of words. The frequency of the marked adjectives will be counted, and the higher-frequency words (the top 200) will be extracted (i.e. 'good', 'different', 'expensive', 'multiple', etc.). The higher the frequency is, the more frequently words are used.

#### **(2) Secondary screening**

In secondary screening, expert knowledge will be employed in a supporting role to optimize the set of Kansei words. There are six experts to do the secondary screening, three experts with the background of Kansei engineering and three experts with the background of cross-border e-commerce. The steps of the secondary screening are as follows:

Step 1: The words and terms that are close in meaning or less important or incorrect will be eliminated (e.g. these words, like 'good', 'nice', 'great' and 'fine' are close in meaning, and 'such', 'able' and so on are considered less important or incorrect.). Then the Kansei words that are not extracted by the text mining method will be added.

Step 2: An affinity diagram technique, also known as the KJ method, will be used to group the semantically-identical words and terms (e.g. 'horrible', 'terrible', 'frustrating' and 'disappointed'). According to their affinity, one relevant word or term is chose to represent the others in the group.

Step 3: The final identified Kansei words which form the semantic space will be discussed with and confirmed by professional senior managers and experts in the cross-border e-commerce domain (Hsiao, et al., 2017).

### ***Span the property space***

Span the property space has the same procedure as spanning the semantic space. The service elements (e.g. website design, product quality, logistics speed, payment method, and so on) presented in online feedback texts are mostly nouns. Filtering by POS and frequency statistics of service elements will be also used to extract the top 200 nouns. Then experts' knowledge will be employed to revise and optimize service elements. The similar, incorrect and less important service elements will be eliminated (e.g.

'account' and 'number' are similar, 'i', 'm', '/', and so on are incorrect, 'work', 'anything', 'example', and so on are less important words. ). Finally, professional senior managers and experts will discuss and confirm the final service elements.

### **Build the relationship of semantic space and property space**

By questionnaire and the statistical method of Partial Least Squares (PLS), the relationship between Kansei words (semantic space) and cross-border e-commerce service elements (the space of properties) will be established. Then, testing the validity of the relationship and building model will be conducted.

### **Synthesize the semantic space and property space**

In the synthesis step, the semantic space and property space will be linked to understand the relationship between service elements and Kansei words. For this purpose, it is required to collect customers' Kansei evaluations of the stimuli by questionnaire survey (A stimulus is a service sample presented by the combination of one selected attribute in each service element of the property space, which is a possible outcome of service design (Hsiao, et al., 2017)). Then the relationship between the semantic and property space may be clear by analyzing collected data.

#### **(1) Questionnaire design**

This study will employ a web-based questionnaire survey to protect respondents' anonymity and overcome time and place constraints. A web-based survey helps to reach respondents more easily than with other survey methods such as interviews and other self-administered survey techniques. The questionnaire survey will be conducted by asking respondents to evaluate the predefined cross-border e-commerce service system samples (stimuli). It will use each of the Kansei words in the semantic space to obtain consumers' kansei responses. The respondents in this questionnaire survey are the sellers of cross-border e-commerce service. Each respondent will spend about ten minutes completing the questionnaire, and the incomplete questionnaire responses will be eliminated. The questionnaire consists of three parts. The part 1 is relevant information of respondents including gender, age, education level, annual sales, experiences of selling online, etc. As suggested by Nagamachi, it is appropriate to have 10-20 stimuli including the one for benchmarking to implement questionnaire survey (The only one attribute adopted in each service element is randomly determined except the stimulus S1 which is designed as a benchmark service.) (Schütte\*, et al., 2004). Thus this study will use 12 stimuli to serve as the service sample and pick out 2 randomly. The first one of the selected two stimuli will represent the first cross-border e-commerce service example. It will be assigned to the part 2 of the survey questionnaire in text description for respondents to evaluate their emotions and Kansei perceptions regarding Kansei words in five-point Likert scale, anchored by 1 = strongly disagree and 5 = strongly agree. The second one of the selected two stimuli will be assigned to the part 3 of the survey questionnaire for the same purpose.

#### **(2) Data collection and analysis**

In this part, descriptive analysis will be conducted on the data collected from the part 1 of the questionnaire, which can be summarized as tables for statistics. The data collected from the part 2 and part 3 will be statistically analyzed by SPSS software. Then, the relationship of the service elements and Kansei words can be obtained by data analysis above. For every Kansei word, a number of service elements in cross-border e-commerce will be found, affecting the Kansei word. For example, the Kansei word 'friendly' may arise because of good service attitude.

### **Test of validity**

This validity test will be done to check if the synthesis is reliable. It is necessary to update the property space and the semantic space if the validity fails. A factor analysis will be conducted from the gathered customers' evaluation data to spot the words which have no effect on the Kansei. Conventionally, variables that have a factor loading of 0.4 or greater within a particular factor are considered to be its major components. This will be then fed back to the semantic space and property space if validation fails. Additionally, Cronbach's  $\alpha$  will be used to perform the reliability analysis. It is greater than 0.70, which indicates a high reliability for the synthesis above (Chen, et al., 2015; Hsiao, et al., 2017).

### **Model of building**

The model is a function depending on the service elements and the Kansei score for a certain word:

$$y_{\text{kansei}} = f(\text{service elements}) \quad (\text{Schütte}^*, \text{et al.}, 2004) \quad (1)$$

For example, one of the results in this study shows that the score of the Kansei word 'satisfied' is affected by five service elements, of which the product quality, the speed of logistics and service attitude are the most significant. Once the validity tests give a sufficient result, the data gathered from the synthesis step will be presented as models to investigate the relationship between Kansei words and service elements. By analyzing the models, new idea for the design and improvement of cross-border e-commerce service will be obtained.

## **CONCLUSION**

The service quality of cross-border e-commerce is likely to be a critical factor in determining consumers' emotional perceptions and satisfaction. For a cross-border e-commerce service provider, how to improve the level of cross-border e-commerce service

and attract further new consumers is an urgent issue. This study explores the implementation of Kansei engineering to analyze the associations between service design elements of cross-border e-commerce and consumers' emotional perceptions. It integrates text-mining-based online content analysis into the conventional expert-knowledge-based approach to improve overly subjective expert opinions. The findings of this study will provide significant implications for the design of cross-border e-commerce service.

The future work will be conducted as follows. First of all, text mining method will be used to analyze consumer feedback and extract Kansei words and service elements related to cross-border e-commerce service. Furthermore, we will eliminate Kansei words and service elements that are similar in meaning or considered incorrect and add the words that are not covered in text mining method. Then, the questionnaire survey will be carried out. Finally, we will analyze the results based on the collected results and build model of the relationship of Kansei words and service elements.

However, some limitations still need to be addressed in the future. Firstly, the materials of this study have a limited application scope such as experts, online contents, test subjects, etc. Therefore, the results may not be fully applicable to all cross-border e-commerce services in the world. Secondly, the Kansei words and service elements (attributes) might not be completely identified in this study. Further improvement is still required. Thirdly, consumers' feedback on cross-border e-commerce service may not fully represent all consumers. Future study should be conducted in a more comprehensive way.

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