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Applying Kansei engineering to design logistics services – A case of home delivery service

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ABSTRACT

Home delivery service (HDS) has grown fast in recent years because more and more customers engage in Internet and television shopping. Moreover, due to the rising competition in the HDS sector, service providers need to put more concentration on the continual improvement and differentiation of service to maintain the competitive advantage. After experiencing the current services, customers are always expecting the new ones. Thus, the idea of new service design never ends. Designers always have to insight into the real feelings of customers so that they could design the new service, which is able to meet customers' expectation. Kansei engineering is a means to transform real voices of customers into the product and service design. This method is able to quantify the relationship between feelings represented by simple words and design elements. In this study, the Partial Least Square (PLS) is used to analyze the relationships between the real feelings of customers and characteristics of HDS. Finally, this study combines those characteristics, which are strongly related to important feelings, to obtain the original idea of new design of HDS.

Relevance to industry: As stated in this abstract, our study offers an exemplification on applying Kansei engineering to design service in service industries. Specifically, along with the application of Kansei engineering, the research findings offer a technique for service design of service industries.

1. Introduction

Given that the emergence of Internet and television shopping, customers are able to order goods from the Internet and by telephone or fax. The need for home delivery service (HDS) is increasing, and it can add a great value to consumers as well as enterprises. Customers can receive the ordered goods through HDS from sellers' warehouses or cooperative third-party logistics (3 PL) service providers to homes or assigned locations (Chen et al., 2011). A popular HDS provided by a Taiwan's logistics company is taken as an example to describe the HDS process as follows. This HDS is derived from the technical cooperation contract signed with a Japan's logistics company. Its service process mainly includes three stages, namely, package pick-up service, package tracking service, and package delivery service. In terms of the package pick-up service stage, senders can deliver their packages to the HDS company's service stations and partner convenient stores, or request the HDS company to pick up the package from their designated sites (e.g., home or office). As to the tracking service stage, senders can track the status of the delivered package via telephone, mobile phone or Internet. Finally, regarding the package delivery service stage, HDS company has to deliver the package to recipients at the location during the time slot designated by senders. Meanwhile, senders can again change the time slot or location when recipients cannot receive the package at that time or at that place. Thus, HDS plays a crucial role in improving the convenience of the physical distribution of goods and on-line transactions (Hsu et al., 2011). The idea of better delivery process toward customers can serve as a way to create a competitive advantage in dynamic markets has widely discussed (e.g., Cairns, 1996; Chen et al., 2011; Punakivi and Saranen, 2001). Samson and Terziovski (1999) proposed that

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effective management on service delivery will be helpful to improve organizational performance. To enable the efficient and convenient transaction, HD companies require providing services that satisfy the actual needs of customers.

Goebel et al. (2012) proposed that companies have made efforts to develop services that acclimatize to main trends in consumer behavior, an increasing number of products and services are being integrated with human factors, and users are becoming very influential in the design process (Abras et al., 2004). Human factors (also known as ergonomics) is the study of how humans behave physically and psychologically concerning particular environments, products, or services (Rouse, 2005). Hendrick (2001) depicted *good ergonomics is good economics* derived from some examples of positive effects of human factors (ergonomics). Eikhout et al. (2005) indicated that these positive effects such as productivity and comfort. As defined by Cambridge Advanced Learner's Dictionary (2005), productivity means "*It is the rate at which a company or country makes goods, judged in connection with the number of people and the amount of materials necessary to produce the goods*". Vink (2005) defined comfort as "*The convenience experienced by the end user during or just after working with the product*". Thus, taking human factors (ergonomics) into consideration is possible to increase sales or productivity in combination with better well-being or comfort (Eikhout et al., 2005; Vink, 2005). Additionally, human factors (ergonomics) are concerned with the match between the user, equipment and their environments, and to achieve the match between an individual and the engaged in activity, human factors specialists or ergonomists can consider the activity being done and the user's needs (Wiki, 2014). As indicated by Rubin (1994), this consideration of human factors (ergonomics) enables designers to create products and services that satisfy the needs of the users. Specifically, the concept of human factors (ergonomics) has extended from product design to service design. In the design of service delivery, companies have to understand the reasons and methods by which perceptions are formed, and further enable designers to manage service encounters with customers (Cook et al., 2002). Hence, this study brings the concept of human factors (ergonomics) to the logistics field, particularly focusing on the HD sector. When companies are including the perceptions and preferences of consumers into service design, they can hold the hopes of creating services with individual characteristics and market competitiveness. Once service design enables to fit with customer's viewpoint, customer satisfaction will be improved (Kimita et al., 2009). Therefore, service design is the application of established design process and skills to develop new services. Kansei engineering helps the design of products from a psychological perspective (Tsuchiya et al., 1996). Dahlgaard et al. (2008) indicated that Kansei engineering could be used to design and create new attractive products and services with a profound affection on the users. Specifically, the purpose of the Kansei engineering methodology is to design and develop products/services that match customers' emotional, psychological feelings and needs. Huang et al. (2012) proposed that the customers' emotional requirements which are called as Kansei needs, have become one of the crucial concerns in developing a product/service. Agost and Vergara (2014) suggested that emotions have to be considered into the generation of product preferences. Thus, for service design purpose, Kansei engineering will be used to recognize the associated relationships between service design elements and customer emotional perceptions to help operators and designers create a systematic procedure for the design of services such as HDS.

Previous studies employing Kansei engineering have focused on the design of physical products, such as automotive interiors (Nagamachi, 1995), architectural exteriors (Nagasawa, 1997), telephones (Yang et al., 1999), fabric (Lin et al., 2007), cameras (Yang, 2011), housing (Llinares and Page, 2011), beverage bottle (Luo et al., 2012), mobile phone (Yang and Chang, 2012), sport shoes (Shieh and Yeh, 2013), and notebooks (Huang et al., 2014). For the most part, the design elements of these physical products can be transformed into texts or images, enabling researchers to present texts or images to stimulate test subjects prior to filling out the questionnaire. The application of Kansei engineering in service design is less common; For example, Rostlinger and Goldkuhl (1999) used Kansei engineering to examine the services of delivery and installation of a washing machine. Nishino et al. (1999) applied Kansei engineering to explore the Internet services, and found has a much extensive applicability. Hartono (2012) proposed an integrative framework of Kansei engineering including the Kano model and QFD applied to luxury hotel services. Therefore, we expect that such an application in the development of HDSs could be considered as an application of Kansei engineering methodology in a new area. This is one of the main contributions of this study.

In this study, two primary reasons of applying Kansei engineering to serve as the service design method are as follows (Nagamachi, 1989, 1995; Demirtas et al., 2009). One is that Kansei engineering uses the presented vocabulary of individuals to express user perceptions in the construction of a suitable framework. Osgood et al. (1957) proposed that semantic differential (SD) method is most commonly used to assess user perception of a product/service in Kansei Engineering studies. In contrast, other methods generally adopt terminology defined by product/service development experts; For example, Chen et al. (2011) applied Kano model to explore the categorization of home delivery quality elements derived from service convenience model and their impact on customer satisfaction. Hsu et al. (2010) used SERVQUAL scale to serve as the measurement instrument of the respondents' expectations and perceptions of service offered by HDS providers. Chen et al. (2014) analyzed a Taiwan's HD company and uses an NSD model and quality function deployment (QFD) to develop a home delivery service model. Therefore, compared to the methods used in other works, Kansei engineering is able to better express the true feelings of users. The other is that Kansei engineering can use the interactive relationship between affective responses and design features to establish a quantitative framework.

In summary, this study develops a Kansei Engineering based procedure for logistics service design, which analyzes the associations between service design elements (property space) and customers' Kansei perceptions (semantic space) to create a systematic procedure for service design. Moreover, HDS is taken as the case of logistics service design by using the Kansei Engineering based procedure. Specifically, the Kansei Engineering based procedure is developed to realize the characteristics of HDS that best meet customers' needs and the important Kansei perceptions according to customers' viewpoints. This procedure enables HDS providers' managers and frontline personnel to become closer to customers and provide services able to satisfy their needs. Additionally, the knowledge of associations between logistics service design elements and customers' Kansei perceptions can help service enterprises formulate marketing activities and inspire new service design concepts. With this knowledge, consumers' acceptance of innovative services can be predicted before they are introduced to the market to reduce the risk and the waste of resources. As well, the marketing department can hold marketing activities based on the Kansei perceptions to which customers attach the most importance to maintain the existing customers and even to develop a new customer base.

The rest of this paper is constructed as follows. In Section 2, we describe the HDS and service design, as well as Kansei engineering. Section 3 presents the research framework, questionnaire development of Kansei, pilot test, sampling and data collection. Section 4