

Improving service quality using quality function deployment: The air cargo sector of China airlines

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Abstract

Recent-rising crude oil prices have impacted on the development of the air-freight industry making improved service quality and competitiveness—pressing issues for management. To examine the performance of China Airlines this paper employs quality function deployment to integrate inside quality technology and the voice of outside consumers, and using “House of Quality” charts, illustrates the company’s performance in terms of service and offer suggestions for improvement. The conclusion shows, in terms of outside consumer voice, the three main factors demanding improvement and the three in greatest need of improvement regarding quality technology.

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1. Introduction

With the division of production and marketing in global logistics and the prevalence of the just-in-time concept, large-scale enterprises are moving toward multinational production to best allocate resources. To improve competitiveness low-volume, light-weight, time-sensitive, and high-value goods are generally shipped to their destinations by air. Despite the effects of the September 11 terrorist attacks in the US, the SARS outbreak, the Iraq War, and the “War on Terrorism”, the air-freight market has continued to expand. In 2004, Boeing asserted that the air-freight market is set to maintain an average growth of 6% per annum over the next 20 years. However, the crude oil price instability has led to higher costs for airlines, not only impacting their bottom lines, but also negatively affecting their growth and sustainability. Airlines are this undergoing major reforms, including overhauling personnel management and refining operating procedures, as well as implementing a complete digitization of their systems, to improve operations and lower costs. Additionally, some airlines have taken this opportunity to expand their market

share. In this environment, lowering costs while increasing service quality and competitiveness are pressing issues.

This paper provides information on the freight service quality of China Airlines, building on the service quality model proposed by Parasuraman et al. (1985), and making use of a survey that looked at the disparity between expected service and perceived service received by air cargo forwarders (Fig. 1). Then, using of data in quality function deployment (QFD), we systematically determine the service demands of air cargo forwarders on airline cargo shipping and the corresponding organizational aspects of cargo-shipping departments. Finally, through quality attribute ranking (QAR), methods to assist management in understanding the voice of outside consumer and better prioritize internal operations are developed.

2. Air cargo operation

International air shipping can be divided into three categories (Wells, 1999):

- *Airmail.* The majority of airmail consists of important documents, small packages, and letters or documents,

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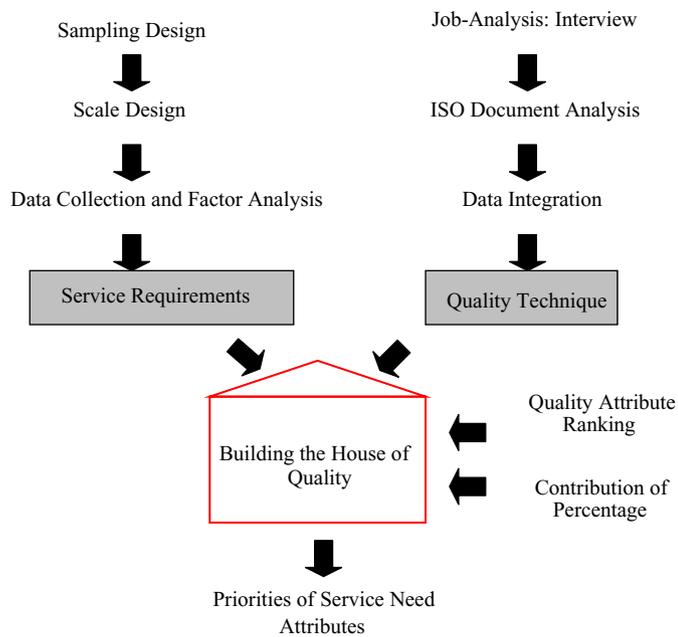


Fig. 1. Framework of analysis.

such as passports and gifts. In Taiwan, most of this category does not pass through the airport freight station but is sent through a specialized air mail-handling center.

- *Air express.* Most goods in this category are standardized packages, high-value documents such as bonds and certain mail, and other goods that can be shipped simply using a convenient, comprehensive express service with clear standardized operations.
- *Air freight.* This consists of items that do not qualify under the other categories and includes ordinary items that need to be transported by air, such as live animals, dangerous goods, and sensitive machinery, as well as other goods that cannot be shipped easily or in a standardized form.

When an airline is used for importing or exporting goods, the first step in the process is to send the cargo to a storage area and apply for a customs inspection. Goods being transported are for import, export, or transit. Express mail operations are divided between express handling units (EHU) and on-board couriers (OBC) with the former further sub-divided into export and import operations. Air cargo operations similarly are comprised of import and export operations. Here airline cargo handling operations are divided into document handling and goods handling, and include customs inspections, trade information handling and warehousing (Fig. 2).

3. Quality function deployment

Building on the service quality model provided by Parasuraman, et al. (1985), we use questionnaires to gather

data on the disparity between expected service and perceived air service attributes from perspective of air cargo forwarders. Customer service quality is evaluated from an overall perspective and is determined by the gap between pre-provision expectations and post-provision perceptions.

QFD is a planning methodology for product development developed in 1972 at Mitsubishi's Kobe shipyard (Bergman and Klevsjo, 1994) and is a systematic method based on the idea of adapting technology to people (Anderson, 1991). It can be used to help businesses understand customers' needs and meet these within their abilities and resources (Liang, et al., 2006). QFD is customer driven and translates customer needs into appropriate technical requirements in products and services. Sometimes, this process of translation is referred to as the "voice of the customer" (VOC). Designers need a means for incorporating customer requirements into designs (Li and Hsu, 1996). The "House of Quality" chart shown in Fig. 3 illustrates how QFD can be used to accomplish this (Chang, 2006). The left wall of the house contains a listing of customer requirements, while the roof lists technical requirements or the voice of engineering (VOE).

Here, a two-part approach is used to develop the House of Quality: factor analysis and quality attribute ranking (QAR). Factor analysis is used to examine the underlying relationships for a large number of variables and to determine whether the information can be summarized into a smaller set of factors (Hair et al., 1998). It is used to classify the different requirements of the customers so as to decrease the number of variables in the House of Quality.

QAR provides an evaluation of the priority levels of consumer requirement attributes. Prior to undertaking a QAR, changes are necessary to the factors involved to reflect situation on the ground (Wasserman, 1993). The changes first involve reducing importance and satisfaction degree scale by three, creating a new measurement standard for the two. The new rankings using this new standard means the range of variation between degrees of importance and of satisfaction altered from a pre-change range of 1–5 to a post-change range of –2 to 2. The satisfaction attitude and difference index for each quality characteristic are then evaluated. The former is obtained by multiplying the post-change customer importance by customer satisfaction, and the difference index is the difference between the rankings of customer importance and satisfaction.

Satisfaction attitude is the product of the satisfaction degree with regard to quality of service and degree of importance, creating a weighting value. The difference index is the gap between the actual quality of service offered and the standard of quality demanded by the customer. These indices can be used to determine the order of priorities of customer demand with regard to service. The priority order regarding passenger demands is based on two criteria: the smaller the difference index

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