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Estimating attributes importance for container shipping industry by closing the listening gap with maximum convergent validity

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ABSTRACT

This paper estimates the relationship of attributes importance (AI) to prospect purchase intention by closing the listening gap between customers and managers of container shipping companies. A proposition of minimum cross entropy is proposed to find a solution to the problem with maximum convergent validity, and this proposition is used to estimate AI, in which both opinions about AI of customers and managers of container shipping companies are included. Results indicate that price, discount, personal selling, and word of mouth, are the most important attributes to prospect purchase intention, within the industry. In addition, managerial implications are also discussed.

1. Introduction

The container shipping industry plays an increasingly crucial element in the efficiency and effectiveness of global supply chains. Increased global competition has elevated the role of logistic functions performed by firms in this industry. However, currently, industry capacity is over supplied due to the number of new shipments delivered from worldwide shipyards. In such service environments, a firm must use a proper offensive marketing strategy to attract prospects and get more customers. In this paper, prospects to a specific container shipping company refer to all firms who have not purchased a shipping service from this company, and require a global container shipping service. A container shipping company usually has two kinds of business customers, shippers and freight forwarders. Shippers are companies with cargo to transport from one place to another via trucks, rail, or transportation by sea in which container shipping companies are involved. Freight forwarders serve as intermediaries between the shippers and container shipping liners. The relationships between shippers, freight forwarders and container shipping companies have been described in Chen et al. (2009). The paper will focus on the purchase intention of prospects direct to container shipping companies.

The firm must understand what level of service attributes quality should be expected from new container shipping companies that will induce them to switch from their current container shipping company to a new one, or the firm's profits will suffer.

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Taking Yang-Ming container shipping company as an example, twenty-nine container ships with an incremental capacity of 175,362 TEUs failed to be delivered from shipbuilding corporates during the 2008 financial crisis (http://www.yangming.com.tw/english/ASP/index.asp). The crisis played a significant role in the failure of key businesses, decline in consumer wealth estimated in trillions of U.S. dollars, and a downturn in economic activity leading to the 2008–2012 global recession and contributing to the European sovereign-debt crisis. Yang-Ming's excess capacity would be severe if Yang-Ming could not acquire prospects when the ordered ships were delivered subsequently.

Although predicting prospect purchase intention (**PPI**) continues to be an important concept in marketing, data limitation is a factor motivating firms and researchers to emphasize customer retention disproportionately, as opposed to prospect acquisition (Thomas, 2001). This paper attempts to predict PPI under the condition of lack of prospects databases in the container shipping industry.

The primary purpose of this article is to estimate the attribute importance (**AI**) of PPI for the Taiwanese container shipping industry. Theoretically, we ought to survey true AIs perceived by prospects. However, prospects data is absent from the databases of container shipping companies. To overcome the problem, this paper replaces prospect opinions with the AIs, which would affect the likelihood of not switching to new service providers (**NSP**), stated by current customer preferences of container shipping companies. Customer stated preferences (**SP**) data refers to the behavioral intentions and responses to hypothetical choice situations, in the literature (e.g., Danielis et al., 2005). However, many previous studies have identified substantial measurement problems when only SP data is used to estimate AI for forecasting behavior intention (e.g., Bemmaor, 1995; Ben-Akiva et al., 1994; Mittal and Kamakura, 2001; Verhoef and Franses, 2003).

Recently, a number of studies have combined different sets of data to jointly estimate the parameters of customer preferences for improving the efficiency of AI estimations (e.g. Azevedo et al., 2003; Ben-Akiva et al. 1994), particularly the method of combining SP data and revealed preferences (**RP**) data, which refers to data describing actual behavior. Although the combination methodology seems to hold considerable promise for improving the efficiency of parameter estimation, however, consistency or convergent between the RP and SP data is still unconfirmed (Azevedo et al., 2003; Axsen et al., 2009; Döbeli and Vanini, 2010; Urama and Hodge, 2006; Van Ittersum et al., 2007).

To remedy the possible measurement problems in SP, the container shipping company managers' opinions on the importance of service attributes, which the prospects may expect from container shipping companies, are also surveyed in this paper since employee prediction might be more accurate than official company forecasts. For example, HP's employee prediction markets were generally more accurate than official company forecasts, and Intel's market for predicting product demand has been as much as 20% more accurate than official forecasts (Schlack, 2015).

However, a listening gap, which is defined as the difference between customer expectations of service and those expectations understood by companies' managers (Zeithaml et al., 1990), may exist between opinions of customers and managers of container shipping companies. For example, Allen et al. (2005) surveyed 362 firms and found 80% believed they delivered a "superior experience" to their customers. Nevertheless, when they asked customers about their own perceptions, Allen et al. (2005), found that only 8% of customers believed the company was really delivering.

To reduce the listening gap as much as possible, a proposition of minimum cross entropy is proposed which can find a solution to the problem with maximum convergent validity. A proposition is also used to estimate the AIs, in which the data surveyed from customers and the managers of container shipping companies are integrated in a proposed NSP model.

The proposed NSP model is based on the following premise: the AIs of container handling service expected by prospects should be close to the AI perceived by the managers of container shipping companies, and should also be close to the AI perceived by their current customers. However, the difference between both data sets is limited to the data generating processes (Ben-Akiva et al., 1994), which will be reflected in the model error structures. This paper aims to provide a mathematical method to find the final AI for the solution set composed of customer SP data and its closest match with the AI judged by the managers.

The contributions of the paper are providing information to container shipping companies, to improve their marketing offensive tactics to attract prospects, and to prevent current customers switching to new service providers.

We also estimate AI for predicting PPI by closing the listening gap between customer SP and viewpoints from managers of container shipping companies in search for maximum convergent validity, which refers to the case when parameters estimated by two different data sets, if not completely identical then very similar and close together statistically.

Maximum convergent validity means closing the listening gap as closely as possible. In the transportation literature, a typical application is the choice of transportation modes. The RP data involves the current choice and the SP data involves a future choice among current and new (e.g., new train lines, electric cars, etc.), transportation alternatives. Although some studies using various choice models to combine SP and RP appear in the field of transportation and logistics (e.g. Ben-Akiva and Morikawa, 1990a; Börjesson, 2007; Gudmundsson, 1999; Hensher, 2008; Hensher et al., 2008), none of these studies have considered the problem of maximum convergent validity. To the best knowledge of the authors, previous studies only rely on a positive correlation coefficient of two estimates found by two different data sets (i.e. SP and RP), for testing convergent validity. This paper may be the first to propose a mathematical method to guarantee maximum convergent validity.

The paper is divided into the following sections: in Section 2, the problems of using SP and RP data to measuring AIs are reviewed; in Section 3, the minimum cross entropy model is described and a proposition is proposed for improving convergent validity, and the multicollinearity mitigation property of this principle is also demonstrated in this section. In Section 4, the empirical research design for measuring PPI AIs for the container shipping companies in Taiwan is illustrated; in