An advanced analytical framework for improving customer satisfaction: A case of air passengers

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A B S T R A C T

Having an appropriate and advanced analytical framework is essential for transport service managers to optimize resource allocation to improve customer satisfaction. This study proposes a novel analytical framework, the "*Importance-Performance-Impact Analysis*" (IPIA), which aims to overcome several conceptual and methodological shortcomings associated with Importance–Performance Analysis (IPA). The IPIA framework integrates advanced analytical techniques, such as Back Propagation Neural Network and Decision-Making Trial and Evaluation Laboratory (DEMATEL/ANP). We illustrate IPIA in one of the 'Big Four' airlines in China. IPIA Table and IPIA Matrix help transportation managers to allocate resources better than IPA to improve customer satisfaction.

1. Introduction

Transport service operations managers need to constantly prioritize resource allocation in order to improve service quality and customer satisfaction (Celik et al., 2013; Gonçalves and Caetano, 2017; Kuo, 2011; Stelzer et al., 2016; Steven et al., 2012). One of the widely used analytical frameworks by managers to make such decision is importance-performance analysis (IPA, Azzopardi and Nash, 2013; Caber et al., 2013; Pan, 2015). First introduced by Martilla and James (1977), IPA is a simple and useful analytical tool based on a two-dimension matrix, which displays the results of customer evaluation of the importance and performance for the attributes of a product or service. In spite of its popularity, IPA suffers from a number of shortcomings that reduce its reliability and usefulness of resource allocation decisions (Bacon, 2012; Oh, 2001). These shortcomings include conceptual ones, such as construct validity of 'Importance' dimension and reliability of 'Performance' dimension, and methodological ones, such as discriminating thresholds of IPA quadrants, measurement errors, lack of control, and the relationships between attributes Performance and Importance. Critics of IPA have highlighted: (a) erroneous assumptions of linear relationships between attribute performance and customer satisfaction (Geng and Chu, 2012; Oh, 2001); (b) inadequate measures of attribute importance (Matzler et al., 2004); and (c) assuming in-dependence individual attributes whereas there is strong correlation among them (Geng and Chu, 2012; Matzler et al., 2004; Oh, 2001). Different modifications of IPA have been proposed in the literature, such as IPA with Kano's Model or Three-Factor Theory (e.g. Arbore and Busacca, 2011; Kuo et al., 2012), neural network based IPA (Mikulić and Prebežac, 2012) among others. In the context of customer satisfaction with transport service, Celik et al. (2013) integrate fuzzy-MCDM (Multi-Criteria Decision Making) model to the IPA and Li et al. (2017) applied fuzzy analytic hierarchy process (AHP) for evaluation in-flight service quality.

These modifications have enhanced the usefulness of IPA for management practice. Nevertheless, there are at least three issues yet to be solved. First, there are still a number of conceptual and methodological shortcomings that need to be tackled. Second, there

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have been very few studies that have integrated advanced decision-making techniques such as Back Propagation Neural Network (BPNN), Decision Making Trial and Evaluation Laboratory (DEMATEL) and Analytic Network Process (ANP) into IPA (Hu et al., 2009). Third, prioritizing scarce resources in improving service delivery and enhancing customer satisfaction is a Multi-Criteria Decision Making (MCDM) task for managers (Aydin, 2017; Celik et al., 2013; Geng and Chu, 2012; Hu et al., 2009; Kuo, 2011).

This paper aims to provide an advanced analytical framework for improving customer satisfaction with transport service by addressing the above issues of IPA and introducing 'Importance- Performance-Impact Analysis' (IPIA), which is based on several advanced decision making techniques. The novel contribution of IPIA method is that it overcomes a number of conceptual and methodological shortcomings by adding a new dimension (impact) to the existing two IPA attributes (performance, importance), thus increasing the reliability and validity of the proposed resource allocation. Moreover, IPIA uses systematically advanced and powerful analytical tools that have been tested conventional IPA analysis (Hu et al., 2009) but have not adopted widely. In so doing, IPIA arrives at reliable propositions overcoming data limitations. Further, the addition of impact dimension provides more insights to managers that help them in deciding how to allocate resources to achieve the desired level of customer satisfaction.

We selected one of the major airline companies in China for the empirical illustration of our framework, because of the growing importance of the Chinese market for the global airlines industry (IATA, 2017b). The Chinese airline market has experienced tremendous growth in the last 30 years, and it is now the world's second largest aviation market, only behind the United States, but soon it will surpass United States as the world's largest, as reported in a recent forecast by IATA (2017a). The market continues to grow at a very fast pace, thanks to a growing affluent middle class in the country, and it is expected that the number of civil airports will reach 244 in 2020 (Fu et al., 2012). Competition among industry rivals is particularly fierce due to the recent relaxation of market entry for private firms, and global airlines entering to the Chinese market through either direct flights or global alliance networks, such as Oneworld, SkyTeam and Star Alliance. Intense competition also come from the aggressive development of the country's high-speed rail service, which has the world's largest high-speed rail network linking virtually all major cities in the country (Fu et al., 2012). This provides an especially appropriate field context for the research (Lin and Filieri, 2015; Vlachos and Lin, 2014).

The next section reviews the conventional IPA in the context of airline service literature and discusses the development of IPIA, providing solutions to the existing weaknesses of IPA in more detail. The subsequent section presents the four steps of IPIA method, the selection of airline service in China, and the application of IPIA in this airline. It follows findings section presenting the IPIA results, the IPIA table and IPIA bubble matrix. The paper concludes with a discussion of findings, research limitations and further research.

2. Importance-Performance Analysis

Importance-Performance Analysis (IPA) has been widely adopted in a variety of business sectors for understanding customer satisfaction, identifying areas for improvement, and prioritizing resource allocation (Arbore and Busacca, 2011; Geng and Chu, 2012; Kuo et al., 2012). In a conventional IPA (Martilla and James, 1977), data are collected from customer surveys that measure customer perceptions of the importance of a list of several product and/or service attributes, and their satisfaction with respect to each of the attributes. The data are then presented in a matrix, with the x-axis depicts attribute importance and the y-axis attribute satisfaction, i.e. performance, with four quadrants based on their rankings (see Fig. 1). Attributes located in Quadrant 1 are "high importance and
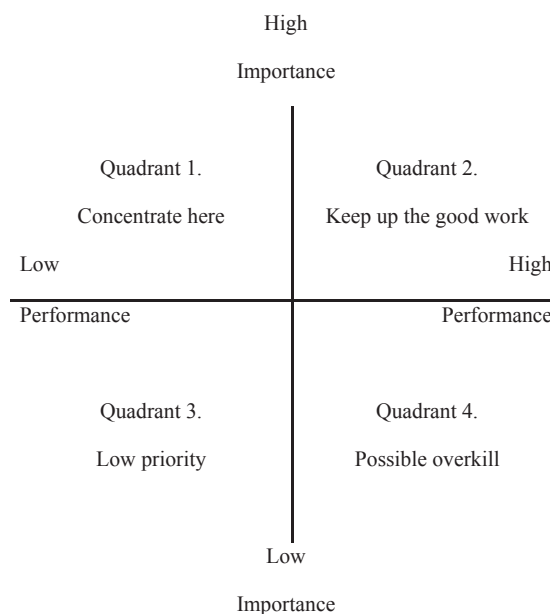
High

Importance

Quadrant 1.	Quadrant 2.
Concentrate here	Keep up the good work
Low	High
Performance	Performance
Quadrant 3.	Quadrant 4.
Low priority	Possible overkill

Low

Importance

Fig. 1. The Importance-Performance Analysis (IPA) matrix (adapted from Martilla and James, 1977).