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Investigating the different approaches to importance-performance analysis

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Importance-performance analysis is an analytic technique that generates a two-dimensional importance-performance grid, where the values of importance and performance across attributes are plotted against each other. This technique is used to assist service and other firms in prioritizing areas for service improvement when resources are limited. This study contributes to service theory by firstly performing a comprehensive literature review of four different and commonly used approaches to importance-performance analysis. Survey data from the ports sector are then used to elucidate the value and the distinctiveness of these four different approaches, and it is also shown how the underlying theoretical assumptions led to somewhat varying, and contradictory interpretations. Subsequently, novel guidelines for integrating results from these four different approaches are proposed. The study advances service theory by detailing the integration of the different approaches to make sense of the importance and performance of diverse service attributes. The integrative approach developed in this paper also provides practitioners with clearer guidance for the application of

importance-performance analysis.

Keywords : importance-performance analysis; gap analysis; three-factor theory; ports

INTRODUCTION

Importance-performance analysis (IPA) is, in general, a method which provides a two-dimensional importance-performance grid, where the values of importance and performance across diversified attributes are plotted against each other and the resulting importance-performance space is generally divided into four quadrants. For service firms, service attributes displayed in these quadrants help managers to identify areas with effective performance and prioritize areas needing improvement (Shieh & Wu, 2009). IPA is widely used because it is an effective technique for practitioners to evaluate an existing strategy, identify improvement priorities for service attributes, and develop new effective marketing strategies (Hansen & Bush, 1999). IPA allows companies to identify areas consuming too many resources and to gain important insights into which aspects they should devote more attention to achieve customer satisfaction (Matzler, Sauerwein, & Heischmidt, 2003). IPA is a popular tool for formulating a management strategy as it is simple, intuitive and does not require much knowledge of statistical techniques (Taplin, 2012).

With its popularity, IPA has attracted the interest of various academics and practitioners from different fields. IPA has been applied in profile marketing (Crompton & Duray, 1985), manufacturing (Platts & Gregory, 1992), operations and engineering services (Slack, 1994), retail (Shieh & Wu, 2009), education services (Ford, Joseph, & Joseph, 1999), hospitals (Yavas & Shemwell, 2001), professional associations (Johns, 2001), financial services (Matzler, Sauerwein, & Heischmidt, 2003), transportation (Huang, Wu, & Hsu, 2006; Mangan, Lalwani, & Gardner, 2002), ports (Brooks, Schellinck, & Pallis, 2010), airport services (Tsai, Hsu, & Chou, 2011), human resources (Eskildsen & Kristensen, 2006; Siniscalchi, Beale, & Fortuna, 2008), hotels (Deng, 2008; Deng, Kuo, & Chen, 2008), tourism (Lai & To, 2010; Taplin, 2012), restaurants (Liu & Jang, 2009; Ma, Qu, & Njite, 2011), other service sectors (Bacon, 2003), and supply chain management (Teller, Kotzab, & Grant, 2012).

IPA has in fact been around for forty years. It is actually largely grounded in service

theories which focus on methods for measuring and interpreting service quality/performance and gaps therein (Parasuraman, Zeithaml, & Berry, 1985 & 1998). So far, different approaches to IPA have been developed (Martilla & James, 1977), modified (Yavas & Shemwell, 2001) and enhanced (Eskildsen & Kristensen, 2006; Taplin, 2012). These approaches vary due to the different theories suggesting how service performance and gap should be measured (Parasuraman, Zeithaml, & Berry, 1988; Cronin & Taylor, 1992; Urban, 2013) and how the importance of services should be interpreted (Gilbert & Morris, 1995; Rosen, Karwan & Scribner, 2003). For instance, the "traditional IPA" approach developed by Martilla and James (1977) employs self-stated importance and performance measures without considering the gap between customer expectations and performance. Lin et al. (2009) and Tsai et al. (2011) integrate the traditional IPA approach with Gap 1 analysis (gaps between customers' expectations and satisfaction). Yavas and Shemwell (2001) and Mangan et al. (2002) extend this approach by integrating competitor performance (called Gap 2 analysis). Yavas and Shemwell (2001) incorporate relative performance to competitors' as a weighted index to better understand customer perceptions in light of competition. Matzler et al. (2003), Deng et al. (2008), and Lin et al. (2009) revise the IPA approach by employing the three-factor theory which divides service attributes into basic factors, performance factors and excitement factors. This is grounded in Kano's (1984) theory on the need to differentiate the importance of different service attributes.

Since different theories are embedded in the different IPA approaches, researchers are not often aware of the differences between them, and how and when to use the different approaches. More critically, the misinterpretation of the results could lead to recommendation to improve service attributes not valued by customers. Thus, attempts to compare the different IPA approaches become necessary. However, existing comparative studies have focused on comparing methods for obtaining different values of importance and performance (Bacon, 2003; Crompton & Duray, 1985), and methods for positioning the values of importance and

performance in the grid lines (Bacon, 2003). There is a lack of studies which compare and interpret the results from the different methods using the same dataset. This study is the first to address this important issue.

The study performs a comprehensive review of the existing literature and compares four approaches to IPA: (1) traditional IPA; (2) IPA with Gap 1 analysis (difference between explicit importance and explicit performance); (3) IPA with Gap 2 analysis (explicit importance against explicit performance difference between focal firm performance and competitors' performance); and (4) IPA with three-factor theory (explicit importance against implicit importance). In addition, the four approaches are applied to analyze survey data concerning the ports sector, and the results are compared. Such a comparison helps to illustrate the values of each approach and the problems of interpreting results from only a single approach without understanding the underlying theories. We further advance service theories by proposing general rules for integrating the different approaches and demonstrate how such rules can be applied to enhance the analysis of the dataset. To do that we selectively apply different service theories and demonstrate how they can be combined for making the most of the different IPA approaches. Detailed discussion of the contributions and limitations of this study is finally presented.

DIFFERENT APPROACHES TO IPA

To compare the different approaches to IPA, we conducted a review of existing literature. We used "importance, performance and analysis" as the keywords to search the related literature from the ABI/INFORM/EBSCO database. The results of the initial search in January 2013 showed 146,617 peer-reviewed papers which contained "Importance" AND "Performance" AND "Analysis" in the abstract/full text, 1,618 peer-reviewed papers with "Importance" AND "Performance" AND "Analysis" in the abstract, 123 peer-reviewed papers

having “Importance” AND “Performance” in the title, AND “Analysis” in the abstract/full text, and 53 peer-reviewed papers consisting of “Importance” AND “Performance” AND “Analysis” in the title. We did not use the first two results but focused on the last two results. Based on reading the title and abstract, we identified sixty-four papers that used, discussed and studied IPA. Our aim here is to analyze and investigate research which applied IPA to investigate service attributes, with a focus on the number of attributes, the methodology employed, the response rate of empirical survey data and different IPA approaches.

We distilled the portfolio of identified papers to a listing of thirty-one key papers that used and developed IPA; and they are included in Table 1 in a chronological sequence for further content analysis. Here we focus on identifying the modifications, extensions and transformations of the traditional IPA proposed such as Ford et al. (1999), Yavas & Shamwell (2001), Deng et al. (2008). We also concentrate on theories applied (Sampson & Showalter, 1999; Matzler, Sauerwein, & Heischmidt, 2003; Deng, 2008; Mikulic, Paunovic, & Prebezac, 2012). Moreover, we highlight empirical evidence of the effectiveness of IPA and all papers listed in Table 1 are supported by empirical data and implications. Table 1 shows that among these papers, the majority (90%) employed traditional IPA and only 43% of them exclusively employed traditional IPA while the remaining employed it together with one or another approach. 16% of the papers employed Gap 1 analysis and 80% of them compared Gap 1 analysis with traditional IPA. 23% of the papers employed Gap 2 analysis and 57% compared Gap 2 analysis with traditional IPA, Gap 1 analysis or IPA with three-factor analysis. 19% of the papers employed three-factor analysis and all of them compared three-factor analysis with other approaches.

[Insert Table 1 here]

This study focuses on comparing the theoretical underpinnings of the four major

approaches to IPA; other approaches, listed in the table, which combine IPA with different techniques, such as Profile Accumulation Technique (Johns, 2001), Analytical Hierarchy Process (Tsai, Hsu, & Chou, 2011), and structural equation modeling (Teller, Kotzab, & Grant, 2012) are excluded from this study. In the following sections each of the four approaches is briefly described and then compared and contrasted to the other approaches.

Traditional IPA

Martilla and James (1977) originally introduced the IPA technique to identify key factors for developing an automobile marketing program. They employed self-stated importance and performance measures to form an IPA matrix. This approach is known as traditional IPA (see Figure 1). The horizontal axis measures the importance of attributes, including service attributes. The vertical axis measures the performance of the attributes, for example, customers' perceptions of services. Attributes with high importance and high performance are located in quadrant I, the emphasis for these attributes is "keep up the good work". Attributes with low importance but high performance are located in quadrant II; the emphasis here is "possible overkill". Attributes with low importance and low performance are located in quadrant III, with a "low priority" emphasis. Attributes with high importance but low performance are located in quadrant IV, with a "concentrate here" emphasis.

[Insert Figure 1 here]

IPA with gap between customers' expectations and satisfaction

Despite the popularity of the traditional IPA approach, a number of other more comprehensive evaluation methods have been developed. Some scholars integrate traditional IPA with gap analysis. A review of the literature identifies two types of gap analysis: (1) gaps between importance and performance (which is also known as gaps between customers' expectations

and the perceptions of the service or customers' satisfaction), referred to as Gap 1; and, (2) gaps between focal performance and competitor/bench-marker's performance, referred to as Gap 2. Gap 1 analysis has its origins inthe SERVQUAL model of Parasuraman, Zeithaml, and Berry (1988) which argues for the importance of identifying the gap between the expected and perceived service quality. Chu and Choi (2000) claim that understanding this gap is critical to a company's success and it is a theoretically sound measure of service quality. Service gap was also found to profoundly influence overall service satisfaction (Abalo, Varela, & Manzano, 2007). Subsequently, Lin et al. (2009) integrated Gap 1 analysis to strengthen the analytical power of traditional IPA. Tsai et al. (2011) further integrate IPA, Analytical Hierarchy Process and Multi-criteria Optimization and Compromise Solution to construct an importance-unimproved distance model for illustrating managerial strategies for airport passenger services.

IPA with gap between focal performance and competitors' performance

For Gap 2 analysis (gaps between performance of a focal firm and its competitors), Yavas and Shemwell (2001) and Taplin (2012) extend the traditional IPA approach by integrating competitors' performance. They note that Gap 1 is biased and then they take competitive performance into consideration. This is different from the traditional IPA approach which only considers the performance of the focal firm. The performance gap is measured by focal performance minus the competitor's or bench marker's performance. This helps to identify competitive attributes needing improvement. The attributes with high importance and high performance gap are called "salient factors" by Brooks et al. (2010). Mangan et al. (2002) identify the "salient factors" for port/ferry choice in roll-on-roll-off freight transportation, and position these factors into the importance-performance difference model illustrated in Figure 2.

[Insert Figure 2 here]

In the importance-performance difference model, each quadrant requires different service management and improvement strategies. Attributes in Quadrant I (high importance and high performance gap) are identified as "salient" factors. They represent competitive attributes. Their services should be maintained, leveraged, and heavily promoted (Lambert & Sharma, 1990), or "keep up the good work". Quadrant II represents low importance but high performance gap, i.e., much better performance than competitors, which means resources are allocated over and beyond what is required. The organization can allocate a portion of such resources to those attributes with high importance, for example, Quadrant IV variables ("concentrate here") to achieve a more efficient utilization of resources. Quadrant III represents low importance and low performance gap. The organization should consider stopping or decreasing the resources to these factors. Quadrant IV represents high importance but low performance gap. Attributes here are major weaknesses and should be top priority and targeted for immediate improvement efforts.

Revised IPA employing the three-factor theory

While IPA is used for assisting managerial decision-making, scholars have gradually become aware of the limitations in its basic assumptions. Deng et al. (2008) argue that the traditional IPA approach has two implicit assumptions: (1) Attribute importance and performance are two independent variables; and (2) the relationship between attribute performance and overall performance is linear and symmetrical. Eskildsen and Kristensen (2006) enhance IPA by employing structural equation modeling to obtain optimal performance and configure an IPA matrix by actual performance against optimal performance, finding that the assumption of independence between importance and performance was invalid in certain situations. Sampson and Showalter (1999) showed a relationship between importance and performance

that is V-shaped and importance is a function of performance. Slack (1994) hints the relationship is causal, while Magal et al. (2009) identify an N-shaped relationship between importance and performance.

The three-factor theory is based on the argument that not all attributes are equally important. Kano (1984) distinguishes five categories of service quality attributes (attractive, one-dimensional, must-be, indifference, and reverse) and explains that each of these categories influence customer satisfaction differently. Later research into customer satisfaction suggests that service attributes fall into three categories with a different impact on customer satisfaction, which is known as the three-factor theory (Deng, Kuo, & Chen, 2008; Matzler, Sauerwein, & Heischmidt, 2003). The three factors refer to basic factors, performance factors and excitement factors. Basic factors are minimum requirements that cause dissatisfaction if not fulfilled but do not lead to customer satisfaction if fulfilled or exceeded. Performance factors cause satisfaction or dissatisfaction, depending on their performance level. They lead to satisfaction if fulfilled and dissatisfaction otherwise. Excitement factors can increase customer satisfaction if delivered but do not cause dissatisfaction if not delivered.

The three-factor theory implies an importance hierarchy. Basic factors are basic requirements and they are of the utmost importance if not delivered; performance factors are the second most important as they are explicit expectations and they influence satisfaction depending on their performance level; excitement factors are the least important as they comprise augmented or enhanced services and they do not matter even if not being delivered. This means a basic or performance factor becomes important when it is under-performing. Matzler et al. (2004) and Deng et al. (2008) argue that the relationship between importance and performance for “basic factors”, “excitement factors”, and “performance factors” are negative, positive and no relationship respectively. Thus the different factors should be treated differently in term of their different importance rankings. Based on the three-factor theory and

the work of Matzler et al. (2003), Deng et al. (2008) and Lin et al. (2009), a revised IPA model is adapted as shown in Figure 3. The horizontal axis represents explicit importance while the vertical axis represents implicit importance.

[Insert Figure 3 here]

Comparisons of the four approaches

Table 2 compares the four different IPA approaches based on customer expectation and satisfaction of service attributes. The traditional IPA approach uses self-stated (explicit) importance and performance mean values, and categorizes service attributes into four quadrants to prioritize improvements. As mentioned earlier it has limitations in its assumptions. However, Table 1 shows that it is still most popularly used, mainly because it is the simplest and most pragmatic method among the four approaches. To complement the traditional IPA approach, IPA with Gap 1 analysis can be used to compare gaps between importance and performance. However, it does not compare the performance with competitors. IPA with Gap 2 analysis is used to illustrate the gaps of performance between focal firm and competitors. However, it does not include gaps between importance and performance indicated by IPA with Gap 1 analysis. The above two approaches can be misleading when users focus only on the gaps. Users of traditional IPA must check if the service environment fits with the two assumptions mentioned earlier. Obviously, these three approaches become more valuable when they are used in combination.

[Insert Table 2 here]

Finally the IPA with three-factor theory is different from the above three approaches mainly due to its conceptualization of the importance of service attributes. The three-factor

theory argues that the relationship between customer expectation and overall customer satisfaction is nonlinear and asymmetrical for the basic and excitement attributes, while such a relationship for performance attributes is linear and symmetrical. According to Arbore and Busacca (2011), scholars during the 1970s demonstrated that customers judge services based on a limited set of attributes, some of which are relatively important in determining customer satisfaction, others are not so significant.

As discussed, the approach based on three-factor theory categorizes service attributes into three hierarchical levels of importance, meaning we cannot solely rely on the explicit self-stated importance or direct-rating which can be biased (Brooks, Schellinck, & Pallis, 2010). Instead, implicit importance derived from performance perceptions can be a more accurate representation of the three hierarchical levels of importance (Deng, Kuo, & Chen, 2008). In addition, both the available evidence and theory indicate that changes to attribute performance (satisfaction) are associated with changes to attribute importance (Matzler, Sauerwein, & Heischmidt, 2003). This implies that the self-stated importance that is explicitly stated by customers is not practically feasible for the three-factor theory. Hence, the traditional IPA approach using explicit importance can be misleading (Bacon, 2003; Matzler, Sauerwein, & Heischmidt, 2003; Deng, Kuo, & Chen, 2008) and requires modification. For this reason, the concept of "implicit importance" was introduced by researchers such as Matzler et al. (2003), Gregg et al. (2007) and Deng et al. (2008) to incorporate the service attribute's performance into the interpretation of importance.

Since implicit importance is derived from performance perceptions and already includes attribute performance, it reflects much more variation in overall satisfaction and is superior to explicit importance (Gregg, Ryzin, & Immerwahr, 2007). However, the literature has yet to identify the right way of making such an incorporation. The literature has, for example, proposed use of Pearson's correlation coefficient and correlated median values using Spearman's rank order correlation (Crompton and Duray, 1985), and simple correlations and

multiple regression coefficients (Bacon, 2003) to measure implicit importance. The most appropriate method to obtain implicit importance is still subject to continuous debate.

COMPARISON USING EMPIRICAL DATA

Data collection

The focus of this paper is to elucidate insights into the four different approaches to IPA and then propose how they may be integrated based on appropriate use of service theories. To further demonstrates the differences among the four approaches, data from the ports sector in the UK and China were collected and analyzed using the four approaches. The ports sector was selected for a number of reasons: (1) it is a service sector where various attributes can be delineated; (2) some previous IPA studies have been performed in the ports sector, in particular, as well as in the wider transport sector; and (3) the issue of port performance has been widely studied, although using different approaches.

To collect the data, a questionnaire survey was designed and the data thus generated was used to demonstrate the application and comparison of the four different approaches. Interviews were conducted with various port stakeholders in both the UK and China in order to develop and pilot test the questionnaire. A large-scale self-completed questionnaire survey was then employed to measure (1) attribute importance, and (2) attribute performance for both focal port services and that of the best competitor using closed-response questions, on a five-point Likert scale. A key informant approach was adopted for questionnaire respondents (port managers) who were purposively selected based on in-depth knowledge and expertise of port services. Five hundred questionnaire surveys were then distributed to key port stakeholders including shipping line executives, shippers, freight forwarders, port service providers, port authorities and other port stakeholders in the UK and China. A total of 254 valid responses were received (a valid response rate of 50.8%).

The attributes were carefully selected because an improvement strategy can only be

effective and efficient if it is based on an appropriate selection of service attributes in need of improvement (Lin, Chan, & Tsai, 2009). Relevant literature was examined and port-related attributes were selected based on an extensive review of port performance and competitiveness (Cullinane, Teng, & Wang, 2005; De Langen, 2003; Lam & Yap, 2008; Lirn, Thanopoulou, & Beresford, 2003; Notteboom, Ducruet, & Langen, 2009; Song & Yeo, 2004; Tongzon, 1995; Wiegmans et al., 2008; Yeo, Song, Dinwoodie, & Roe, 2010). Interviews with the port stakeholders confirmed the following 15 attributes: (1) shipping services; (2) shipping prices; (3) port charges; (4) feeder services; (5) cheapest overall route; (6) speed of cargo handling; (7) risks; (8) safety; (9) technical infrastructure; (10) proximity to customers/suppliers; (11) skilled employees; (12) landside links; (13) logistics services (warehousing, freight forwarding, etc.); (14) government support; and (15) depth of navigation channel.

Measurement of attribute importance

As discussed earlier, there are two types of importance assessing attribute: explicit self-stated importance and implicitly derived importance. Explicit importance is often obtained directly from respondents using Likert-type scales (Martilla & James, 1977) and ranking (Aigbedo & Parameswaran, 2004). Scholars have noted some shortcomings in self-rated importance rating: (1) researchers tend to include variables salient to the customers (Chu, 2002); (2) self-rating of importance is subject to response bias due to the influence of social norms and this importance is not predictive of satisfaction (Brooks, Schellinck, & Pallis, 2010). Different methods are used for self-stated attributes: direct rating (mean and median values), constant-sum scale, anchored scale and partial ranking. The empirical investigation showed little difference between these self-stated methods (Crompton & Duray, 1985; Griffin & Hauser, 1993; Matzler, Sauerwein, & Heischmidt, 2003), which suggests a low sensitivity of importance weights to the measures of explicit importance.

There are different views on the measurement of implicit and explicit importance. Crompton and Duray (1985) hold the view that statistical methods are more appropriate than explicit importance as they correlate more closely with actual perceptions. Bacon (2003) argues that indirect methods may be distorted when the assumptions underlying their statistical models are violated. For example, Kirk-Smith (1998) notes that correlation and regression models assume interval measurement and linear relationships, however these conditions may not always hold. Bacon (2003) further argues that if some attributes and overall performance have little or no causal relation and they are used to estimate attribute importance, some importance will be overestimated; complex patterns of correlations may cause some attribute importance to be underestimated, especially when negative coefficients occur. Bacon's empirical test results showed that direct importance performed better than correlation-based and regression-based importance, and correlations were found to be more valid than regression coefficients. Van Ittersum et al. (2007), Magal et al. (2009) and Mikulic et al. (2012) note that derived importance is dynamic while stated importance is stable and the two measures are complementary rather than conflicting. They argue that they should not replace each other, each providing a different perspective on the value of the criterion. Thus these researchers recommend combination of these measures.

Deng et al. (2008) hold the view that implicit importance, which is derived from performance perceptions and aims to incorporate the determinant variable of performance into importance, may compensate the shortcomings and reduce the errors arising from subjective judgment. Different measures are used to assess the implicit statistical importance, including standardized/unstandardized regression coefficients, partial correlation, bivariate correlation, composite ranking, integrated partial correlation analysis and natural logarithmic transformation (Bacon, 2003; Deng, Kuo, & Chen, 2008; Huang, Wu, & Hsu, 2006; Matzler, Sauerwein, & Heischmidt, 2003; Slack, 1994). Crompton and Duray (1985) and Matzler et al. (2003) found that deriving implicit importance using different methods actually results in

similar outcomes.

To ensure that our investigation of the ports sector was both rigorous and to avoid bias, both explicit importance and implicit importance were investigated, allowing both subjective and objective importance to be addressed and compared. As there are no significant differences among the different methods to measure both explicit and implicit importance (Matzler, Sauerwein, & Heischmidt, 2003), in this study self-stated means were used as explicit importance and bivariate correlations of Spearman were employed to represent implicit importance.

Results generated by applying the four different IPA approaches

Analysis was conducted on the aggregate data (i.e. data from both the UK and China respondents). IPA is typically useful with aggregate data (Bacon, 2003). As the importance weights differ when different importance measures are taken, it is necessary to distinguish the explicit and implicit importance. The first step in the analysis was to compute the implicit importance. Table 3 presents the computed implicit importance, and also includes the questionnaire results on means of attribute importance, focal port performance, competitor performance, gaps between importance and performance, and gaps between focal port performance and competitor performance.

[Insert Table 3 here]

As IPA is a graphical technique, the boundary lines to separate the grid into four quadrants of the IPA matrix were defined by the overall means of the 15 attributes, following Martilla and James (1997), Yavas and Shemwell (2001), Huang et al. (2006), Deng et al. (2008) and Lin et al. (2009). For traditional IPA, the self-stated importance and performance means were used for plotting the IPA matrix. The results for traditional IPA are shown in Figure 4. Port safety, logistics services, risks and shipping services are key attributes with both high

importance and high performance. Management's job is to ensure that the ports "keep up the good work". Technical infrastructure, speed of cargo handling, skills and proximity are viewed as areas of "possible overkill". They are relatively unimportant to the customers, but the ports perform very well. Their resources need reallocating to other attributes that need urgent actions, such as shipping prices, overall cheapest shipping route, government support, and feeder services. Navigation and landside links are attributes of "low priority".

[Insert Figure 4 here]

We do not include a diagram for Gap 1 IPA (in contrast to the other three IPA approaches- Figures 4, 5 and 6) as the tool does not, as such, generate a matrix. Gap 1 (gaps between importance and performance) can be obtained from Table 3. The ports' performance scores were generally found to be lower than their importance scores. Particularly, shipping services have the biggest gap, this is followed by shipping prices, overall cheapest logistics route, government support and landside links in descending order. This implies that these attributes need urgent improvement due to large gaps between customer expectations and satisfaction. Following Chu and Choi (2000), Lin et al. (2009) and Tsai et al. (2011), understanding and narrowing these gaps is critical to success.

The "performance difference" column in Table 3 summarizes the performance difference between the focal port and its competitor (Gap 2). Figure 5 shows the IPA matrix using the explicit importance and Gap 2. In our dataset the ports performed relatively less well than the competitors in all attributes. In Quadrant IV, government support, feeder services and shipping services have the biggest gap with competitors. They need urgent actions for improvement. Conversely, resources for skills and proximity (in Quadrant II) are probably over-allocated and they can be diverted to Quadrant IV.

[Insert Figure 5 here]

With regard to IPA employing the three-factor theory, both explicit and implicit importance values were used to plot a two-dimensional four quadrant grid as shown in Figure 6. Following Matzler et al. (2003), three factor groups are identified and their service strategies are as follows.

[Insert Figure 6 here]

Referring to Figure 6, attributes in Quadrants IV (shipping prices, feeder services, overall cheapest route and risks) are basic factors. They are minimum and essential requirements for port services, they are expected as prerequisites. They are not important if their performance is satisfactory, however they become important if their performance falls short. They are all service quality related and should be taken most seriously with a top priority, which have to be identified and fulfilled. Attributes in Quadrant I (logistics services, government support, safety and shipping services) and Quadrant III (proximity, technical infrastructure and landside links) are performance factors with high importance and low importance respectively. Their satisfaction increases linearly depending on performance, which means higher performance will elicit higher customer satisfaction. Attributes in Quadrant II (skills, navigation, handling speed) are excitement factors. They are either highly unexpected or not expected to be delivered at such a high performance level; however, they strongly enhance customer satisfaction. They stand out from the competition if their performance is delivered.

Comparison of the results from the four approaches

In this study, empirical data from the ports sector are used to compare the different IPA approaches. When the results from the different IPA approaches are put together and

compared, some similarities and differences are observed. Deriving from the four approaches together, the most important attributes are identified as shipping services, shipping prices, feeder services, overall cheapest shipping route, landside links, government support and port risks. Major differences are summarized in Table 4.

[Insert Table 4 here]

Firstly, not all approaches recognize the same set of attributes as being the most important. For example, traditional IPA identifies four attributes (shipping prices, feeder services, overall cheapest route and government support) as the most important attributes, while IPA with Gap 2 analysis identifies three attributes (shipping services, feeder services and government support) as those most important. This is because different combinations of data are used by the different approaches.

Secondly, there is a difference between importance and urgency. While one attribute is considered as both important and urgent by one approach, it might not be considered the same by another approach. Take “shipping services” as an example. Although it is not in the urgent action quadrant of Traditional IPA (Figure 4), nor is it identified as a basic factor by IPA with the three-factor theory (Figure 6), it is still important as there is a significant gap between its importance and performance. Actually “shipping services” is highlighted as the biggest gap by Gap 1 analysis (Table 3). It is also recognized as very important in the Gap 2 analysis which compares its performance with competitor performance (Figure 5). Moreover, the ranking of its self-stated importance is the highest among the 15 attributes. Therefore, shipping services should be prioritized.

Likewise, “shipping prices” is identified as very important by all the approaches except Gap 2 analysis which compares its performance with competitors. “Feeder services” is considered very important by all the approaches except by the Gap 1 analysis which compares

customer expectations and satisfaction. “Overall the cheapest shipping route” is identified as very important by all approaches except by Gap 2 analysis which compares its performance with competitors. “Government support” is identified as a very important factor by all approaches except by analysis employing the three-factor theory. Only the IPA with the three-factor theory identifies “port risks” as very important. The findings not only confirm the claim of Matzler et al. (2003) that the importance-performance matrix is sensitive to the importance measures used, they also show that IPA is sensitive to the specific approaches used.

The interpretation of the results requires careful treatment of the borderline attributes. The results on “port charges”, “speed of handling” and “landside links” merit discussion. Firstly, “port charges” is not located at any important quadrant by any approach. In Figures 4 and 6, “port charges” is on the boundary line between urgent attributes and low priority attributes. If it is considered as an urgent attribute, the strategy is to take urgent actions for immediate improvement. However, if it is considered as a low priority attribute, no actions are supposed to be taken. In Figure 5, “port charges” is on the boundary between important attributes and excessive attributes. If it is treated as an excessive attribute, resources for this attribute can be reallocated to other attributes so that its performance will move to the lower priority Quadrant.

Secondly, “speed of cargo handling” by IPA with Gap 2 analysis (Figure 5) is on the boundary between the excessive and low priority areas. If its performance cannot be improved, it would also fall into the low priority area. Thirdly, “landside links” is not identified as very important by all the approaches except Gap 1 analysis. It is actually very close to the boundary between importance and unimportance. Using traditional IPA, IPA with Gap 2 analysis and IPA with the three-factor theory, “landside links” are all at the “possible overkill” Quadrant, which means its resources should be reallocated elsewhere. If so, its Gap 1 will become greater and further lead to lower customer satisfaction with lower overall service quality (Lin, Chan, & Tsai, 2009). The above analyses of borderline attributes show

that IPA analysis is highly sensitive - a slight change can put the attribute into a very different strategic position. All of these insights raise questions on the efficacy of the current IPA approaches.

INTEGRATION OF IPA APPROACHES

Rules for integration of IPA approaches

The different approaches produce different results because they employ different theories and different values of importance. The results show that each approach has its merits and it is impossible to conclude which is the best. The results also show that using only one of these four approaches could lead to biased interpretation. It could be problematic to apply only one approach. The results of our empirical study raise the question that the most commonly used approach, traditional IPA, may not be the right one to use on every occasion. Our conclusion is that the most effective way to apply IPA is to integrate all four approaches. The following paragraphs explain how the different IPA approaches can be integrated.

Firstly, traditional IPA should be integrated with Gap 1 analysis. Traditional IPA was initiated and developed as a tool to identify priorities for improvement and resource allocation by a self-stated importance and performance matrix. Its theoretical underpinning is that the understanding of both importance and performance is required to make better decisions. This theory is contradictory with the argument for focusing on the gap between customer expectations and experience (Parasuraman, Zeithaml, & Berry, 1988). In fact, this study demonstrates that simply taking consideration of the gap between expectations and perception is in itself not enough, as two sets of importance values could result in having the same gap. For example the importance and performance of “port risks” is 3.92 and 3.55, and the importance and performance of “navigation” is 3.74 and 3.37. In this case the two gaps are numerically the same (0.37) but, based on mean ranking, port risks have a higher priority, compared to depth of navigation (the importance of port risks is ranked no. 4 while the

importance of navigation is ranked no. 13). Thus, traditional IPA should firstly be combined with Gap 1 analysis, and then the results of gap analysis should be incorporated with mean ranking of importance, to yield more accurate analytic results (Fontenot et al., 2005). The integration of traditional IPA and Gap 1 analysis is thus more helpful in improving a resource allocation strategy, compared to merely using either approach.

Secondly, traditional IPA should be integrated with Gap 2 analysis, which provides salient factors for focal firms to become more prominent and provides attributes for urgent improvement against competitors. This is supported by the need for differentiation, according to the theory of competitive advantage (Porter, 1985) and the theory of competitive priorities from the manufacturing literature (Hayes and Wheelwright, 1984). For example, "shipping services" is not considered as an urgent-action attribute by traditional IPA but it is identified as urgent by Gap 2 analysis due to its large performance gap from the competitors. The existing literature shows that attributes with much better performance than the competitors' are salient, this study finds that identifying attributes with much worse performance than competitors is even more important. This is particularly true in today's severe financial environment, which is why the integration of traditional IPA and Gap 2 analysis is meaningful and useful.

Thirdly, we can take advantage of the three-factor theory by categorizing service attributes into basic factors, performance factors and excitement factors. This will provide very different insights for deciding whether the efforts and resources should be decreased, increased or remain as they are. The findingsfrom both the literature (Deng, Kuo, & Chen, 2008; Matzler, Sauerwein, & Heischmidt, 2003) and this study demonstrate that IPA employing three-factor theory is a very useful and practical instrument when deciding the areas for improvement. For example "shipping prices" and "cheapest route" are identified as basic factors by the three-factor theory, however they are not considered as very important by Gap 2 analysis, although there are large gaps between customer expectations and customer perceptions. Customer

perceptions are obviously too important to be ignored. This highlights why such integration may be meaningful and useful.

Finally, one can combine the results from the four approaches and prioritize the importance of different attributes. We propose the following general rules: (1) draw a table (Table 4) to list all of the very important attributes derived from all four approaches; (2) tick the corresponding box which shows that attribute is important subject to the analysis of that particular approach; (3) for each important attribute derived, count the number of ticks. The attribute having a larger number has a priority to the attribute having a smaller number; (4) if the numbers are the same, then the priority is decided by the mean ranking of relevant attributes for better accuracy.

Proposed action plans for ports

To demonstrate how the above rules can be applied to make more informed decisions, this study further develops action plans to prioritize and improve service attributes for the ports in our study. The first step is to identify the specific service attributes to be prioritized. Table 4 shows that “shipping prices”, “feeder services”, “overall cheapest route” and “government support” are the more important attributes (with three ticks). Next are “shipping services” (two ticks) and finally “landside links” and “port risks” (with only one tick each). For those with three ticks, after being incorporated in the self-stated mean rankings, “shipping prices” is more important than “overall cheapest shipping route” which, in turn, is more important than “government support” and “feeder services”. For those with one tick, “port risks” is more important than “landside links”. Therefore, the seven very important attributes are prioritized as follows: shipping prices, overall cheapest shipping route, government support, feeder services, shipping services, port risks and landside links.

The second step is to suggest strategies to improve each of the prioritized service attributes. Table 5 summarizes the different strategies to improve each port’s service

attributes. Shipping prices and overall cheapest shipping route are identified as urgent attributes by traditional IPA, Gap 1 analysis and the three-factor theory. Thus, its performance needs improving, and they should be treated as minimum and essential requirements. Government support is considered urgent by the traditional IPA, Gap 1 analysis and Gap 2 analysis; apart from the improvement of its performance and customer satisfaction, its competitiveness needs improving. Feeder services is identified as an urgent attribute by traditional IPA, Gap 2 analysis and the three-factor theory; its performance and competitiveness need improving, additionally, it should be treated as a minimum and essential requirement. For shipping services, due to its importance identified by both Gap 1 and Gap 2 analysis, both its customer satisfaction and competitiveness need improving. Lastly, with regard to port risks and landside links, as they are considered very important by Gap 2 analysis and Gap 1 analysis respectively, their competitiveness and customer satisfaction need improving accordingly.

[Insert Table 5 here]

The proposed action plans also take into account the limitation of IPA analysis in terms of borderline attributes. This study identifies “port charges”, “speed of cargo handling” and “landside links” as borderline attributes. A slight change in these attributes could lead to a very different strategy. Our advice is to avoid using Slack’s diagonal approach, because it is too difficult to practically define the threshold which separates urgent actions appropriately from excessive regions, and separates urgent actions from improvement areas. Bearing in mind this limitation, a precautionary principle needs to be adoptedtaking – always check Gap 1 and Gap 2 when a borderline attribute is identified. As customers are not very satisfied with the performance compared with customers’ expectations (Gap 1), and there are gaps between focal ports’ performance and competitors’ performance (Gap 2), port managers need to be

very careful with these attributes and treat them as very important attributes for improvement.

CONCLUSIONS AND RECOMMENDATIONS

This study contributes to the service industries' literature in a number of aspects. Firstly, the literature review helps to compare advantages and disadvantages and theoretical underpinnings of the four importance-performance analysis (IPA) approaches. In summary, each of the four IPA approaches has its unique advantages and theoretical lens: traditional IPA considers self-stated importance against self-stated performance; IPA with Gap 1 analysis considers expectations against satisfaction; IPA with Gap 2 analysis considers focal performance against competitors' performance; and IPA with three-factor theory distinguishes factors by categories of importance. This study helps to identify differences between the four IPA approaches

Secondly, this study demonstrate that the varying and sometimes conflicting results from the four approaches imply that simply using a single approach is biased towards a particular theoretical lens. This study reminds service theorists that, despite advancement of service theories, the traditional IPA approach with the most simplistic theoretical lens is still the most popular among the four approaches. Practitioners go for the simplest and most convenient approach. To enable the application of more advanced theories, this study demonstrates the value and needs of integrating these four approaches. The study also illustrates that the shortcomings of the theoretical underpinnings of the different IPA approaches can be supplemented by each other. In summary, Gap 1 analysis can be integrated with the traditional IPA analysis to highlight the difference between customers' expectation and perception. Gap 2 analysis adds performance benchmarking with competitors. Furthermore, three-factor theory divides service attributes into different hierarchies. Our proposed integrative approach is the first attempt to view the above different theories as supplementary and not rivalry.

Thirdly, the proposed action plan can be used as guidance for service managers to

prioritize and improve different service attributes. The empirical study shows that each approach derives some very important attributes (Table 4); however when the results from different approaches are collected together, some differences are observed. They are not fully consistent even though the analyses were based on the same dataset. Take “shipping services”, for example. It was identified as not very important by both traditional IPA (Figure 4) and IPA with the three-factor theory (Figure 6). Nevertheless, it was identified as very important when compared with the expectations and satisfaction by Gap 1 analysis and when comparing focal ports’ performance and competitors’ performance by Gap 2 analysis (Figure 5). There is also no shortage of research which attempts to identify and categorize important service attributes for different service sectors. Applying our integrative approach, such studies can help to not only identify a list of attributes, but also differentiate their importance and further assess service performance of different firms within a service sector.

Fourthly, this study compares traditional IPA, IPA with Gap 1 analysis, IPA with Gap 2 analysis and IPA with three-factor theory, and then explained their differences. The literature review and comparison of the different approaches using survey data in this study demonstrate that each IPA approach offers distinct advantages, owing to different theoretical foundations. The study shows that somewhat varying and conflicting results can be provided by the different approaches. This is an important and novel finding because it demonstrates that the four approaches analyze the same attributes but can yield quite different interpretations owing to the use of different theoretical lens.

Lastly, this study is the first attempt to integrate the four different approaches and theoretical lens. The study does not develop new service theories but it highlights and illustrates how the different theoretical lens of IPA approaches can supplement each other and outlines some general rules on how these approaches can be integrated. This new approach for integration of the different IPA approaches has significant managerial and theoretical implications. The rules for IPA integration seek to integrate the traditional IPA model, two

types of gap analysis and three-factor theory. The integration might be able to enhance the validity of IPA application, because it plots importance and performance simultaneously, compares customers' expectations and satisfaction, compares competitors' performance, includes three-factor theory to distinguish attribute categories, and then prioritizes the attribute importance. More significantly, we demonstrate that the usefulness of different service theories can be elevated when they are being used in an integrative manner with the different IPA approaches. On reflection, the use of multiple theory is useful when a single theory is inadequate to explain a phenomenon (Tsoukas, 1993), and in terms of the measurement and interpretation of service quality or performance, this study demonstrates that the combined use of different service theories for doing the same tasks could lead to better interpretations.

This study, while comprehensive, was limited to using data from one empirical study in one sector only. Future research using data from other sources or sectors can further verify the proposed integrative approach. Finally, the service literature has developed many theories on how service quality or performance can be measured, but this study highlights the need to understand how such theories are being used in practice, with the insights thus generated allowing further refinement and application of both theories and techniques to be used more effectively.

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Table 1 A review of importance-performance analysis literature

Author	Area	year	# of	response(rate)	IPA approach
Martilla and James	Commercial in automobile	197	14	44.80%	1
Crompton and Duray	Profile market	198	28	97%	1
Slack	Operations& engineer	199	7	4 focus group	1+3
Ford et al.	Education service	199	22	68.2%+focus	1+2
Sampson &	School food service	199	20	Focus group (4)	1+ranking
Johns	Professional association	200	22	22%	1 + PAT
Yavas and Shemwell	Medical service-hospital	200	15	72.70%	1+3 + RP
Slack et al.	Operations	200	7	unknown	3
Mangan et al.	Freight transportation	200	15	unknown	3
Matzler et al.	Bank	200	12	153 responses	1+4
Bacon	Services	200	4-20	2137 responses	1
Yeo	Banks-financial service	200	17	31.20%	3
Huang et al.	Highway transportation	200	24	98.40%	1
Eskildsen and	Job satisfaction	200	30	20%	1
Gregg et al.	Public administration	200	11	61%	1+4+simulation
Deng	Hot spring hotel case	200	20	412 responses	4+fuzzy
Deng et al.	Hot spring hotel	200	20	412 responses	1+3+4+ANN
Siniscalchi et al.	Training	200	18	unknown	1
Pezeshki et al.	Mobile communication	200	6	74.40%	1
Magal et al.	SME e-business	200	19	5.5%	1
Lin et al.	Human resource	200	52	82%	1+2
Riviezzo et al.	Service management	200	20	275 responses	1
Shieh and Wu	Retailer	200	18	300 responses	1
Lai and To	Tourism	201	28	23.30%	1
Brooks et al.	Port effectiveness	201	52	49%	1
Tsai et al.	Airport service quality	201	12	90.2%	1+2+AHP+VIKO
Ma et al.	Food services	201	22	82%	1+2
Arbore and Busacca	Bank	201	7	5209 response	1+4+regression
Teller et al.	Supply chain management	201	38	87%	1+SEM
Taplin. R.	Tourism	201	17	79%	2+3+CIPA
Mikulic et al.	Tourism	201	12/16	24.6%/89.3%	4+ ANN, MLP

Note: 1=Traditional IPA; 2=Gap1 (performance-importance) analysis; 3=Gap2 (focal performance-competitor's performance) analysis; 4=Three-factor analysis; PAT: Profile accumulation technique (Johns 2001); AHP: Analytical Hierarchy Process; VIKOR: Multi-criteria Optimization and Compromise Solution (Tsai et al. 2011); RP: Relative performance; CIPA: competitive IPA; ANN: artificial neural network; MLP-multilayer feed-forward perceptron

Table 2 Comparison of four approaches to IPA

IPA approaches	Summary	What is highlighted	Limitations
Traditional IPA	explicit importance vs. explicit performance	Consider importance and performance simultaneously	Base assumptions have limitations
IPA with Gap 1 analysis	IPA + gaps between importance and performance	Compare customer expectation and satisfaction; consider gap based on importance	Does not consider Gap 2 with competitors
IPA with Gap 2 analysis	importance vs. performance gap between focal and competitors	Compare focal performance and competitors' performance	Does not consider Gap 1
IPA with three-factor theory	Self-stated importance vs. implicit importance[1]	Category factors to reflect customer satisfaction	The way to determine implicit importance is debatable.

Note: implicit importance is derived from the attribute's correlation with an external criterion.

Table 3 Means of attribute importance, performance, etc. for both UK and China ports

Attributes	importance	performance1[a]	performance2[b]	implicit imp.	imp-perf	Perf2-perf1
1-shipservices	4.32	3.53	4.25	0.257	0.79	0.72
2-shippngprices	4.17	3.41	3.65	0.238	0.76	0.24
3-portcharges	3.86	3.36	3.66	0.233	0.50	0.30
4-feeders	3.88	3.47	4.17	0.229	0.41	0.70
5-overallcost	3.92	3.21	3.45	0.208	0.71	0.24
6-handlspeed	3.83	3.61	4.02	0.191	0.22	0.41
7-risks	3.92	3.55	3.63	0.178	0.37	0.08
8-safety	3.89	3.92	4.02	0.143	-0.03	0.10
9-techinfras	3.83	3.62	4.16	0.143	0.21	0.54
10-proximity	3.64	3.54	3.67	0.130	0.10	0.13
11-skills	3.31	3.52	3.83	0.112	-0.21	0.31
12-landsidelinks	3.84	3.25	4.04	0.103	0.59	0.79
13-logservices	3.91	3.79	4.12	0.103	0.12	0.33
14-govnmtsupt	3.89	3.18	3.82	0.103	0.71	0.64
15-navig.	3.74	3.37	4.00	0.021	0.37	0.63
Grand mean	3.86	3.49	3.90	0.159	0.37	0.41

([a]: focal port performance; [b]: competitor's performance; imp= importance; perf=performance)

Table 4 Comparison of results from different IPA approaches (factors appearing or not in the most important quadrant)

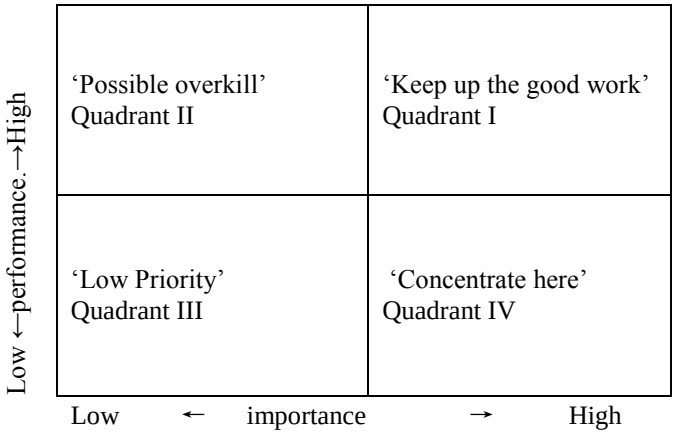
Attributes	Traditional IPA	Gap 1 analysis	Gap 2 analysis	IPA with three-factor theory	Importance by mean
Shipping services		√	√		√
Shipping prices	√	√		√	√
Feeder services	√		√	√	√
Overall cheapest route	√	√		√	√
Landside links	?	√	?	?	
Government support	√	√	√		√
Port risks				√	√

Note: "√" means this attribute is recognized as an important attribute by this approach of analysis.
"?" means this attribute is very close to the boundary but not actually in the very important quadrant.

Table 5 Management action plans for the most important attributes

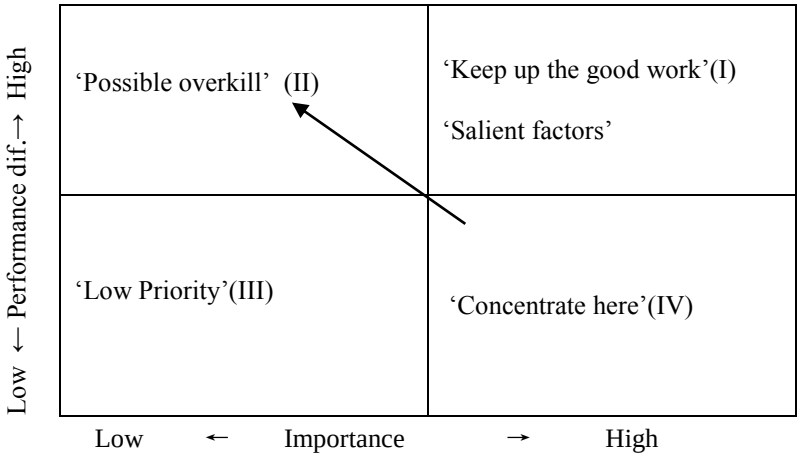
Attributes	Action plans
Shipping prices	Improve performance (Tra); Improve customer satisfaction (Gap1); Minimum and essential basic requirement (3-factor)
Overall cheapest route	Improve performance (Tra); Improve customer satisfaction (Gap1); Minimum and essential basic requirement (3-factor)
Government support	Improve performance (Tra); Improve customer satisfaction (Gap1); Improve competitiveness(Gap2)
Feeder services	Improve performance (Tra); Improve competitiveness(Gap2); Minimum and essential basic requirement (3-factor)
Shipping services	Improve customer satisfaction (Gap1); Improve competitiveness(Gap2);
Port risks	Improve competitiveness(Gap2)
Landside links	Improve customer satisfaction (Gap1)

Note: "Tra" refers to the traditional IPA.



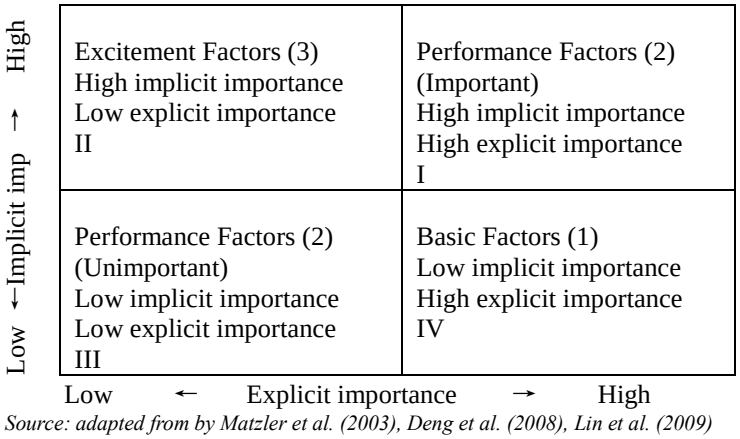
Source: adapted from Martilla and James (1977)

Figure 1 Traditional importance-performance grid



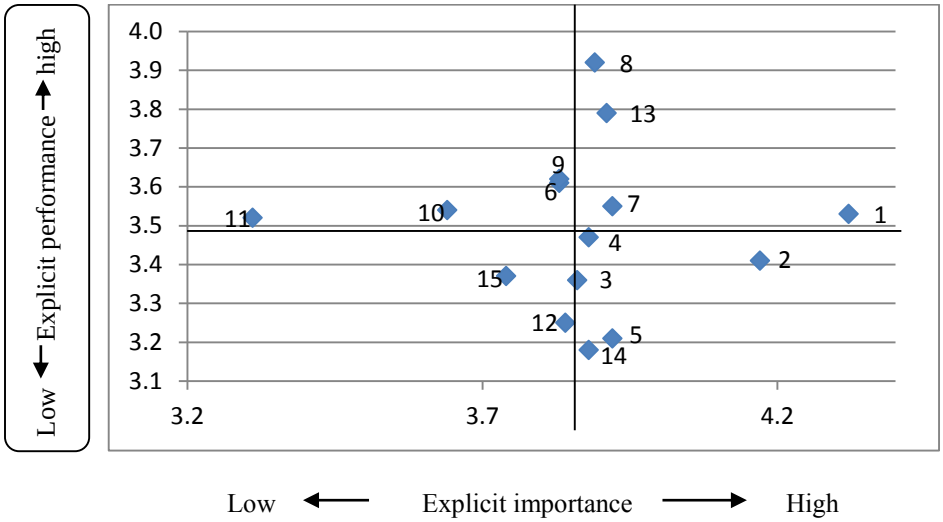
Source: adapted from Martilla and James (1977), Mangan et al.(2002), Deng et al.(2008)

Figure 2 IPA with Gap 2 analysis (performance difference between focal and competitors)



Source: adapted from by Matzler et al. (2003), Deng et al. (2008), Lin et al. (2009)

Figure 3 IPA with three-factor theory



Note: Numbers in Figures 4, 5 & 6. 1=shipping services; 2=shipping prices; 3=port charges; 4=feeder services; 5=overall logistics cost; 6=handling speed; 7=risks; 8=safety; 9=technical infrastructure; 10=proximity; 11=skills; 12=landside links; 13=logistics services; 14=government support; 15=navigation

Figure 4 Importance-performance matrix by "Traditional IPA" (i.e. importance against performance)

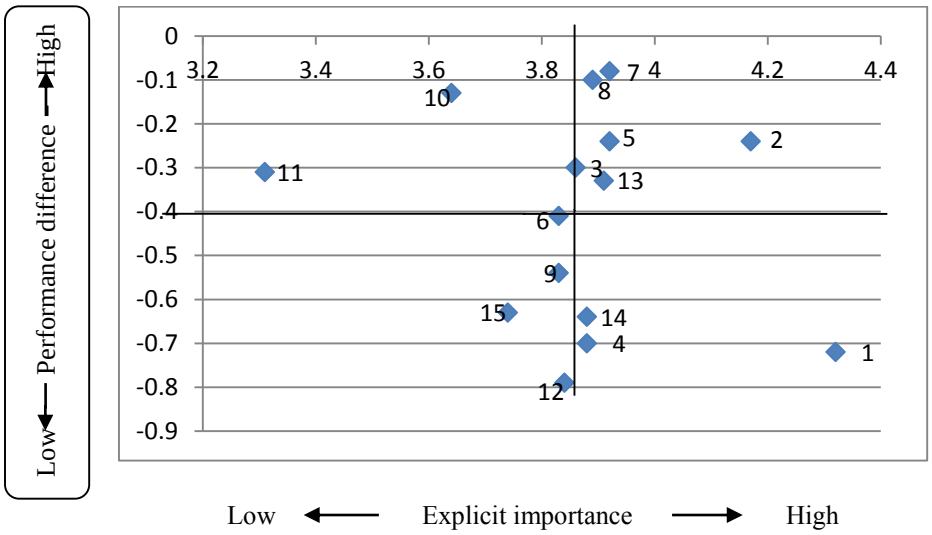


Figure 5 IPA matrix using Gap 2 analysis (importance against (performance1-performance2))

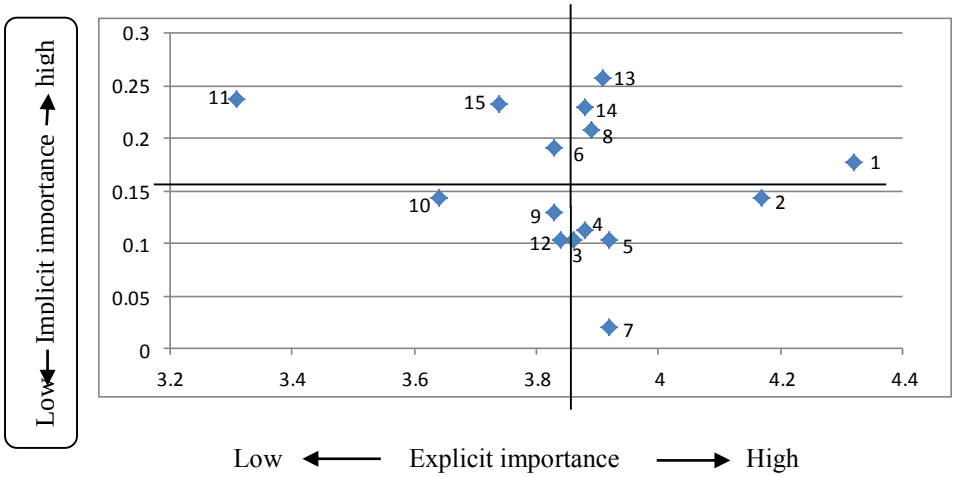


Figure 6 IPA matrix using three-factor theory (explicit importance against implicit importance)