The Importance and Performance Analysis with Diagonal Regression Approach

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Abstract. This study aims to examine the importance and performance analysis using a diagonal regression approach. Scale measurement used semantic differential. The diagonal of the regression coefficient was used to map the coordinates of the balance of the importance and performance analysis assessments with an estimation of the data spread of the standard error of estimation at an error rate of 5%. The results of the study indicate that there are 5 strategic areas of IPA: high priority areas to be improved, areas of a balance of performance and importance (ISO-IPA), low priority, keep up the good performance, and possible areas of waste of resources indicator.

Keywords: Importance and Performance Analysis · regression approach · Standard Error of Estimate · ISO-IPA

1 Introduction

The IPA method is usually used to analyze the importance and performance of services in marketing studies, especially to analyze customer satisfaction. IPA has a strategic nature because it can determine the managerial aspects of a company, so it does not rule out the possibility of IPA being used in other fields of service, including in the study of Human Resource Management. IPA is a very simple and practical method. Its application does not require excessive knowledge and statistics [1]. The application of the scientific method in business studies has been reported in various service studies, such as medical services [2, 3], tourism [4, 5], studies of traffic and transportation services [6], education sector [7, 8], and research in the field of production [9]. This study will discuss the IPA analysis method with a diagonal regression approach with a data balance distribution of the standard error of the estimate.

There are many problems in scientific research, such as conceptualization and measurement of attributes, obtaining valid data, the accuracy of the analysis axes, and the accuracy of the recommendations of the analysis results [2]. Uncertainty in the placement of axes and quadrant determinants will affect the interpretation. Martilla and James considered that their position depends on the "good judgment of the researcher", because one of the advantages of the analysis is the identification of importance and relative ratings, rather than absolute judgments [10]. Consequently, most published studies have chosen to assign axes, either in the global mean of importance scores on the one hand

W. R. Murhadi et al. (Eds.): INSYMA 2022, AEBMR 223, pp. 487–494, 2023.
https://doi.org/10.2991/978-94-6463-008-4_62

and performance scores on the other [11] or in the center of the scale used [12]. The placement of the axes at different points can lead to different interpretations [13]. The difference between the value of importance and performance, the more significant the difference between the importance and satisfaction of the attributes, the greater the customer dissatisfaction [14], and the greater the need for corrective action for strategic actions [2]. The development of IPA from various cases generally reflects the existence of 4 formulas.

2 Research Methods

Initially, the IPA method was introduced to analyze 14 customer service attributes with the lowest score of 0 and the highest score of 10. Importance was placed on the horizontal line (X) and performance on the vertical line (Y), then the axis was placed in the middle of the scale (scale line 5) and fixed by the inventor on the second intermediate scale (on the 7.5 scale line) [10]. The results of this research resulted in four main strategies, namely, Keep up with the good, focus on improving performance (Concentrate here), low priority, and Possible overkill (Fig. 1).

The second method improves the first method by revising the second mid-scale change (scale 7.5) and changing the position of importance on the vertical line (Y) and performance on the horizontal line (Y) [10] to improve the resulting strategy because it is considered still possible to make improvements from indicators whose performance previously had to be maintained. The placement of the axes on the second middle scale, is considered to still have problems because it does not reflect a logical balance; it still provides contradictory information even though the original IPA quadrant representation still exists [13] (Fig. 2).

The third formula is to place the axes of the Cartesians diagram on the average or median of their respective dimensions. This method is considered rational because placing the Cartesians axis is based on the average distribution of interest data and

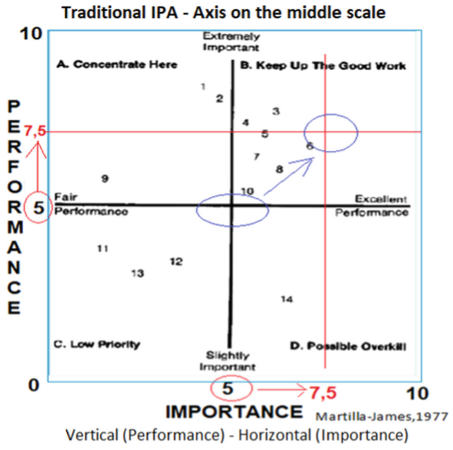

Fig. 1. IPA in The Centre Scale.

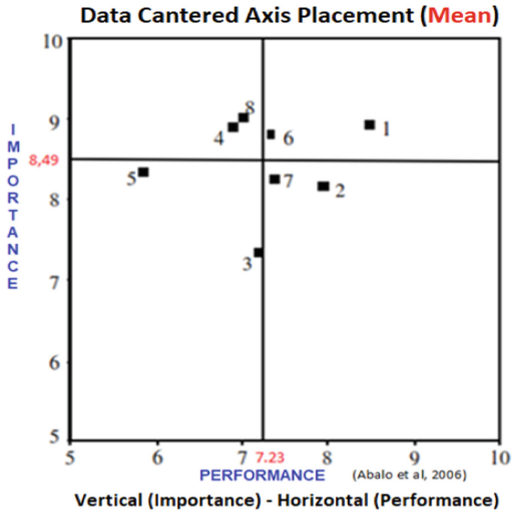

Fig. 2. IPA Axis on the Second Middle Scale.

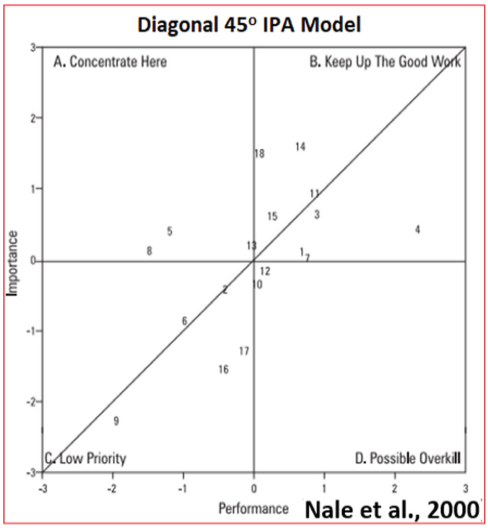

Fig. 3. Diagonal 45° IPA Model

the average performance [15, 16] and distributes different attributes between the four quadrants more equitably. According to this approach, the lower the deduction value from its importance and performance, the higher priority will be given to the organization's resources, both human and material and/or its economic value [17] (Fig. 3).

Formula 4 empirically compares a model based on quadrant representation (classical model) versus the so-called "diagonal model" [18], which divides the IPA space into two triangular parts [16]. The concept of the first diagonal divides the diagram into a

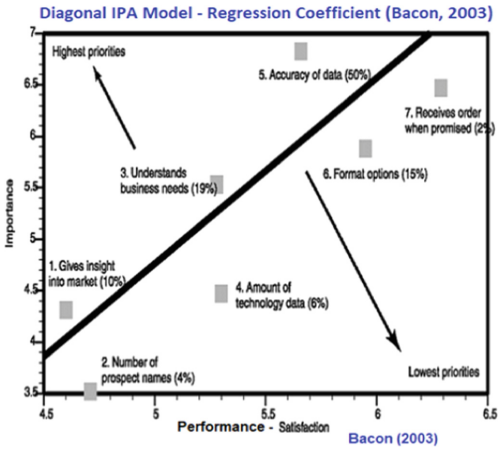

Fig. 4. Diagonal Regression IPA Model.

45° diagonal [19], and all points are spread across that diagonal. The second diagonal concept recommends a slope at an angle equal to the correlation coefficient [17]. The diagonal model was judged to be the best model, predicting the priorities expressed directly by the user, while preserving as much of the original IPA structure as possible (Fig. 4).

This study refers to the four methods that previous researchers have presented with the development of a data scale (semantic differential) and data analysis methods. At the beginning of its development, IPA was measured on an ordinal scale [10, 11, 17, 19–21]. Ordinal data represents numbers as ranked symbols, can place data at the right coordinates on a Cartesians diagram, but mathematically cannot be rationalized in calculating the average or in correlation analysis, so that the diagonal calculation with regression coefficients, the measurement scale must be increased at least an interval scale. On the other hand, the transformation of ordinal data into intervals can be calculated for the average and the regression coefficient. However, it will not provide an exact mapping of the coordinates of the scatter diagram so that errors can occur in strategic decision-making. Therefore, the quantification of the data in this study was carried out using a semantic differential scale on the bar scale with the lowest score of 1 (low score) and the highest of 5 (high score). The measurement results with the semantic differential scale are considered very precise because the data can be directly implemented in the coordinates of the Cartesians diagram, the average can be calculated, the regression coefficient and the standard error of estimate (SEE) to explain the diagonal balance line (ISO-IPA). The questionnaire was tested for validity and reliability before being distributed to 30 respondents. The questionnaire is reliable if it has Cronbach's alpha > 0.60. The number of samples is calculated as much as 5 to 10 times the largest number of indicators on each dimension of the research variable [22]. Average is used to define the cross axis of the Cartesians chart. Diagonal analysis of the regression model can provide good significance [23] because ordinary least squares analysis generally produces good conclusions

[24]. Estimation of the balance of measurement errors of data from the ISO-IPA normal line uses the Standard Error of Estimate (SEE) formula at an error rate of 5% [25].

$$Syx = \sqrt{\Sigma}\left(y - y'\right)^2 \tag{1}$$

$$SEE = t(Syx)\sqrt{1/n + \left(x^* - x'\right)^2/\left(x^* - x'\right)^2} \tag{2}$$

Estimate the distribution of data in the ISO-IPA LIC area of

$$Y'_{x^*} \pm t(Syx)1/n + \left(x^* - x'\right)^2/\left(x^* - x'\right) \tag{3}$$

3 Results and Discussion

IPA analysis using a diagonal regression approach produces an image model described in Fig. 5.

Figure 1 exhibits that: The regression line Y = a + b X shows the normal position line for the balance of importance and performance. Regression line Ymax = + SEE, is the position of Importance and Performance data above the normal balance line, at the Syx error estimation limit with Standard Error of Estimate SEE 5%. Regression Line Ymin = – SEE, is the position of Importance and Performance data below the normal balance line, at the margin of the Syx error estimation with the Standard Error of Estimate SE 5%. The smaller the standard error value (Syx), the better the representative level [26]. Data Importance and Performance at coordinates between (Ymax = + SEE) and (Ymin = −SEE) is data that are still in a controlled position because they are in the Syx standard deviation area with a Standard Error of Estimate 5%. This analysis still maintains the average value that can be implemented under the balance area which shows the condition of low priority, keep up the good performance, and possible waste of resources. High priority, being in the position above the regression diagonal, can focus on improvement so as to achieve the performance required by the customer. Keep up the good performance is an indicator that is below the ISO IPA diagonal but has importance and its performance is above the average, so it needs to be maintained. Low priority can be done for indicators that think the performance has exceeded the target importance. Possible waste of resources condition is an indicator that has performance

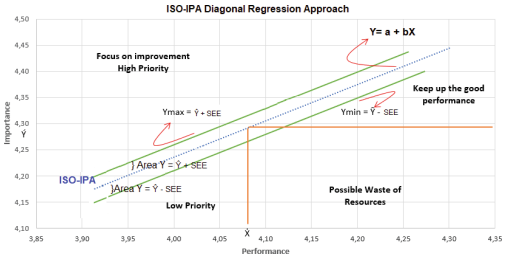

Fig. 5. ISO-IPA Regression Approach with Standard Error Estimate (SEE).

and importance below the average, so it needs to be ignored because it is considered excessive performance above its importance.

This IPA analysis can be used to improve the performance of higher education intellectual capital management as part of managing organizational assets because intellectual capital is a fundamental approach to managing organizational resources and assets [18]. In the study of lecturer intellectual capital (LIC), various literature explains the relationship that will not directly affect the performance of achieving the university's vision but must be accompanied by strategic performance in other fields, including strategic planning, financial management performance, policies, and support from external universities (HE). To increase the opportunity for the organization's market position, it is necessary to adopt a strategic approach to better management of the organization's intellectual capital [26]. With this IPA analysis, HE can focus more on understanding the indicators that need to be improved, leveled, and maintained so that opportunities to achieve the university's vision can be more effective and efficient.

4 Conclusion

IPA analysis using a diagonal regression approach, measuring data scale with semantic differential, and applying standard error (Syx) to measure the level of sample representation from the population and using Standard Error of Estimate (SEE) to estimate the position of the indicator balance (ISO) from the normal position of the population at the level of 5% error is considered better for predicting the accuracy of data predictions and strategic organizational improvement.

Regression analysis, Syx and SEE help assess the balance (ISO) of the measured indicators and predict the error rate to carry out risk management. Meanwhile, the assessment using the semantic differential scale produces data that can be used directly in the coordinates of the Cartesians diagram so that the position of the indicator will match the actual conditions. The semantic differential measurement method also produces numbers that can be used for regression analysis (no need for data transformation) to facilitate the analysis.

In this method, it is found that there is an indicator balance area that is clearer, and the level of error can be predicted as a balance area of importance and performance indicators that must be maintained. In this approach, the average value is still used to identify the indicator's strategic policy. Indicators above the diagonal line are identified as indicators that must be improved (high priority). Indicators under the diagonal line are identified as low priority indicators, keep up the good performance, and indicators assessed as a possible waste of resources.

For companies in the service sector listed on the Indonesia Stock Exchange, this research can be considered when making dividend payment policies. For service sector companies, dividend payout ratio and earnings volatility can increase investor confidence in viewing the company's good performance to reduce the risk of stock prices and make stock prices more stable. The author would like to thank LPPM University of Buana Perjuangan Karawang which has funded this research, as well as all lecturers and institutions in Indonesia who are involved in further research.

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