

Implementing Importance-Performance Analysis (IPA) for Measuring Students Satisfaction Levels

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Abstract— Understanding student perceptions and levels of satisfaction with the services provided are one way for colleges to increase their competitive advantages. Most of the colleges have established a quality control system to evaluate services that have been provided to students. However, the service evaluation questionnaire only measures the level of performance on each service attribute provided. While the colleges have limited resources, so it would be better if prioritizing improvements to service attributes that are rated important from the student's perspective. Importance-performance analysis (IPA) can be used to resolve this problem. IPA provides valid information on which products or services should be prioritized for immediate improvement. The results of this evaluation will provide a clear sight of which service attributes are already good, and which service attributes are still not good. Implementing IPA for measuring student satisfaction levels provide an overview of service attributes that are very important based on the students' perspective. So the college can improve the quality of services that are assessed most important to increase student satisfaction in the future.

Keywords— *Students Satisfaction, Evaluation Service, College, Importance-Performance Analysis (IPA), Competitive Advantages*

I. INTRODUCTION

Colleges are one of the non-profit companies that have a purpose to develop science and ability of the students. Some of the services provided by the college aim to support all students needs, especially in the academic field. At this time colleges are required to provide the best services. Good academic services become one of the benchmarks of quality assessment at a college. Various efforts to improve the quality of education in the colleges have been, are being, and will continue to be done [1]. Research on the quality of service in education has increased in line with demand for quality education [2]. One way is to make game-based learning by developing a data-driven procedural content generation (PCG) approach benefiting from a genetic algorithm and support vector machines to automatically generate educational-game contents tailored to individuals' abilities [3]. Furthermore, there is a demand to understand the deeper learning process by breaking it down into simpler and separate mechanisms. This field of research will continue to make invaluable contributions to the development of dynamic, powerful and accurate games, both for designers and for players [4].

The colleges require continuous innovation, diversity in structure, and finding new ways to provide increased quality services to students as customers effectively and efficiently [5]. This is intended to increase competitive advantages. One way that can be done is to more understand the perceptions

and levels of student satisfaction with the services provided. The colleges still haven't given more attention to serving their students [6].

Most of the colleges have established a quality control system to evaluate all aspects of academic services, in the form of questionnaires filled out by the students. Commonly, the service evaluation questionnaire at colleges only measures the level of performance for each service attribute provided. Low-performance attributes will be prioritized for improvement. While the colleges have limited resources, so it would be better if prioritizing improvements to service attributes that are rated important from the students' perspective.

Mentioned problems before can be resolved by implementing importance-performance analysis (IPA). IPA is a utilized model to identify the attributes (Products or services) to be focused by the company to improve customer satisfaction [7] [8] [9] [10]. IPA had been implemented as a means to identify customers' needs and desires for the products or services within a company.

This research aims to implement IPA for measuring students' satisfaction levels. The results of this evaluation will provide a clear sight of which service attributes are already good, and which service attributes are still not good, so it needs to be improved in the future.

II. LITERATURE REVIEW

There had been many kinds of research that use importance-performance analysis (IPA) as a model to analyze customer satisfaction levels in the company. IPA can be used in evaluating mobile-based hotel applications [11]. Attributes related to mobile-based hotel applications, such as information of reservations, information of hotels, features while in the hotel, social media links, and additional features & functions. Most of the features and functions related to information of reservations and information of hotels are generally available and are highly rated in terms of performance and importance based on the perception of users.

IPA can be used to determine critical job satisfaction factors at an inn [12]. Several factors are in the dimensions of importance and satisfaction, including evaluation and promotion, compensation and benefits, job content, work environment, supervision & leadership, and interpersonal relations. In the IPA, compensation is the main problem that must be addressed, followed by the work environment, interpersonal relations, and supervision.

III. METHODOLOGY

Importance-performance analysis (IPA) is a measurement model of a personal level of satisfaction by comparing the association between customers' perceptions and priority of the attributes (Products or services) that companies must improve for increasing the competitive advantages. There are 3 main steps for making IPA, which is measuring the level of suitability, creating a position map of IPA, and quadrants analysis [13].

1. Measuring the level of suitability is used to discover how much the degree of customer satisfaction with the services given. The formula used is as follows.

$$Tki = \frac{\bar{X}i}{\bar{Y}i} * 100\% \quad (1)$$

With:

Tki : Level of suitability of respondents

$\bar{X}i$: Total of performance score

$\bar{Y}i$: Total of importance score.

2. The second step is making a map position of IPA which consists of a space that is divided into 4 quadrants that delimited by 2 lines intersecting perpendicular to the points as follows [13].

$$\bar{X} = \frac{\sum Xi}{n} \quad (2)$$

$$\bar{Y} = \frac{\sum Yi}{n} \quad (3)$$

With:

\bar{X} : Average score of performance

\bar{Y} : Average score of importance

n : Number of respondents.

3. The final step is to perform the analysis by dividing the product or service attributes assessed. The four IPA quadrants are shown in Fig. 1.

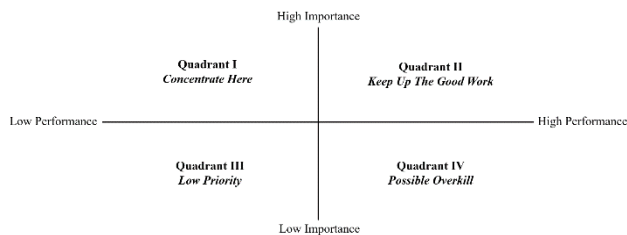


Fig. 1. The four importance-performance analysis (IPA) quadrants [9]

- Quadrant I (Concentrate Here) contains low-performance attributes, but customers assess the attributes in this quadrant as important.
- Quadrant II (Keep Up The Good Work) contains high-performance attributes in this quadrant and customers assess the attributes in this quadrant as important.
- Quadrant III (Low Priority) contains low-performance attributes and customers assess the attributes in this quadrant as not important.

- Quadrant IV (Possible Overkill) contains high-performance attributes, but customers assess the attributes in this quadrant as not important [14].

IV. RESULT AND DISCUSSION

This section shows examples of importance performance-analysis (IPA) calculations to measure students' satisfaction levels. There are several main steps in IPA, as explained in Section III.

Data were collected by distributing college services quality questionnaire that was responded by 97 students. Performance and importance assessment in this questionnaire uses 5 points Likert scale (Very dissatisfied represents value 1 and very satisfied represents value 5). The questionnaire is prepared based on research Phadermrod et al [14], but some sections were adjusted to the destination college for this research. Based on the completed questionnaire, the results of student satisfaction with college services were obtained, consisting of several attributes, namely lecturers, educational staff, facilities & infrastructure, and additional services. The attributes and factors used in this questionnaire are shown in Table I.

TABLE I. LIST OF ATTRIBUTES AND FACTORS ARE USED IN THE QUESTIONNAIRE

Attributes	ID	Factors
Lecturer	P1	Lecturer arrived on time
	P2	Lecturer understand the material presented
	P3	Lecturer explanation is easy to understand
	P4	Lecturer master learning media
	P5	Implementation of learning according to the academic calendar
	P6	Implementation of examination according to academic calendar
	P7	Academic adviser provide directions to students in completing studies
Educational Staff	P8	Educational staff master their duties
	P9	Educational staff serve quickly
	P10	Educational staff serve with a low error rate
	P11	Educational staff provide clear instructions in serving students
	P12	Educational staff is careful & thorough in examining files
Facilities & Infrastructure	P13	Classrooms are clean, neat & comfortable
	P14	Learning facilities in the classroom are adequate
	P15	The library is clean, neat & comfortable
	P16	The laboratory is clean, neat & comfortable
	P17	Clean & well-maintained washroom facilities
	P18	The worship place is clean, adequate & well maintained
Additional Services	P19	Service is available for parents to consult for the progress of their children's achievements
	P20	Scholarships are available for outstanding & underprivileged students & are already effective

TABLE II. CRONBACH'S ALPHA OF ALL ATTRIBUTE GROUP

Attribute	Cronbach's Alpha
Lecturer	0.675
Educational Staff	0.605
Facilities & Infrastructure	0.657
Additional Services	0.616

Based on **Table II**, Cronbach's Alpha (CA) is used to assess the questionnaire's reliability. The value of CA for each college services attributes is about 0.605 - 0.675. The CA off all group is higher than 0.6. So it can be concluded that the questionnaire used in this research is reliable.

After collecting the questionnaire data, the IPA is calculated. The steps in calculating IPA have been explained in **Section III**. The questionnaire results are recapitulated and then calculate the total score for each performance and importance assessment. Then measure the level of suitability. The results of the suitability level measurement (Tki) are shown in **Table III**.

TABLE III. RESULTS OF SUITABILITY LEVEL MEASUREMENT

ID	Performance Score (Xi)	Importance Score (Yi)	Level Of Suitability (Tki)
P1	293	309	94.82
P2	304	309	98.38
P3	295	305	96.72
P4	303	285	106.32
P5	288	313	92.01
P6	304	283	107.42
P7	318	289	110.03
P8	292	294	99.32
P9	279	310	90.00
P10	289	305	94.75
P11	307	308	99.68
P12	265	302	87.75
P13	291	302	96.36
P14	284	295	96.27
P15	310	313	99.04
P16	293	321	91.28
P17	269	271	99.26
P18	289	298	96.98
P19	312	303	102.97
P20	293	292	100.34
Total	5878	6007	97.85

Based on **Table III**, the suitability level of all attributes in the questionnaire reached > 90%, with an average value of 97.85%. So it can be concluded that the performance of college services has been very good, or it can be said that the performance given by college has met or even exceeded student expectations.

The next step is making an IPA position map. An average calculation is performed for each performance and importance scores. Then the total value of average performance and importance scores divided by the number of respondents is used to divide the space into 4 quadrants. Results of the average calculation of performance and importance scores in IPA are shown in **Table IV**.

TABLE IV. AVERAGE CALCULATION RESULTS OF PERFORMANCE AND IMPORTANCE SCORES

ID	Average Performance Score (Xi)	Average Importance Score (Yi)
P1	3.02	3.19
P2	3.13	3.19
P3	3.04	3.14
P4	3.12	2.94
P5	2.97	3.23
P6	3.13	2.92
P7	3.28	2.98
P8	3.01	3.03
P9	2.88	3.20
P10	2.98	3.14
P11	3.16	3.18
P12	2.73	3.11
P13	3.00	3.11
P14	2.93	3.04
P15	3.20	3.23
P16	3.02	3.31
P17	2.77	2.79
P18	2.98	3.07
P19	3.22	3.12
P20	3.02	3.01
Total	\bar{X}	\bar{Y}
	3.03	3.10

Based on **Table IV**, \bar{X} has a value of 3.03 and will be the intersection point for the x-axis (Performance). Whereas \bar{Y} is 3.10 and will be used as the intersection point on the y-axis (Importance) in the IPA quadrants.

The final step is to map out the assessed attributes into the IPA quadrants. Mapping results are shown in **Fig. 2**.

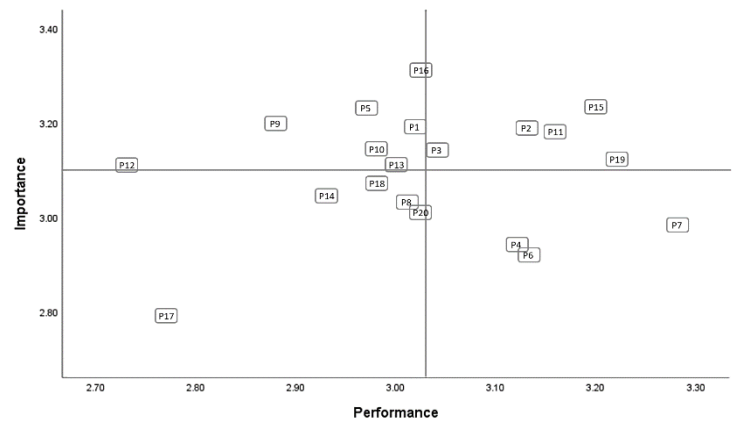


Fig. 2. Mapping results importance-performance analysis (IPA) quadrants

Based on **Fig. 2**, it can be seen that there are several attributes that are scattered in the IPA quadrants. Here are the analysis results using IPA:

A. Quadrant I (Concentrate Here)

Quadrant I contains low-performance attributes, but students assess the attributes in this quadrant as important. Attributes that are in this quadrant are the main disadvantages. So the college is required to improve its performance in order to produce higher student satisfaction rates. The college must mobilize more resources to improve

performance in this quadrant. Here is the quadrant I attributes.

- P12 - Educational staff is careful & thorough in examining files
- P9 - Educational staff serve quickly
- P5 - Implementation of learning according to academic calendar
- P10 - Educational staff serve with a low error rate
- P13 - Classrooms are clean, neat & comfortable
- P1 - Lecturer arrived on time
- P16 - The laboratory is clean, neat & comfortable.

B. *Quadrant II (Keep Up The Good Work)*

Quadrant II contains high-performance attributes and students assess the attributes in this quadrant are important. The quadrant II attributes include the main advantages of college, and their performance must be maintained in order to maintain competitive advantages. The attributes in quadrant II, namely:

- P3 - Lecturer explanation is easy to understand
- P2 - Lecturer understand the material presented
- P11 - Educational staff provide clear instructions in serving students
- P15 - The library is clean, neat & comfortable
- P19 - Service is available for parents to consult for the progress of their children's achievements.

C. *Quadrant III (Low Priority)*

Quadrant III contains low-performance attributes and students assess the attributes in this quadrant are not important. Therefore, the quadrant III attributes are not prioritized in order for performance improvement. Here are the attributes that are included in the quadrant III.

- P17 - Clean & well-maintained washroom facilities
- P14 - Learning facilities in the classroom are adequate
- P18 - The worship place is clean, adequate & well maintained
- P8 - Educational staff master their duties
- P20 - Scholarships are available for outstanding students & underprivileged students & are already effective.

D. *Quadrant IV (Possible Overkill)*

Quadrant IV contains high-performance attributes, but customers assess the attributes in this quadrant are not important. So college is required to move the excess resources in this quadrant to the needy quadrant, namely quadrant I (Concentrate Here). The attributes in quadrant IV, namely:

- P4 - Lecturer master learning media

- P6 - Implementation of examination according to the academic calendar
- P7 - Academic adviser provides directions to students in completing studies.

V. CONCLUSION

This research aims to implement IPA for measuring students' satisfaction levels. Based on the assessment, the level of suitability is reached an average score of 97.85%. So it can be concluded that the performance of college services has been very good, or it can be said that the performance given by college has met or even exceeded student expectations.

The assessment results are able to show which service attributes already have good performance, such as lecturer explanation is easy to understand, lecturer understand the material presented, educational staff provide clear instructions in serving students, the library is clean, neat & comfortable, and service is available for parents to consult for the progress of their children's achievements. Whereas service factors whose performance is still not good, such as educational staff is careful & thorough in examining files, educational staff serve quickly, implementation of learning according to academic calendar, educational staff serve with a low error rate, classrooms are clean, neat & comfortable, lecturer arrived on time, and the laboratory is clean, neat & comfortable.

Implementing IPA for measuring student satisfaction levels provide an overview of service attributes that are very important from the students' perspective. So the most important assessed service quality can be improved by the college to increase student satisfaction level and competitive advantages level in the future.

REFERENCES

- [1] A. Supriyanto, "Implementasi total quality management dalam sistem manajemen mutu pembelajaran di institusi pendidikan," *Jurnal Cakrawala Pendidikan*, vol. 1, no. 1, 2011.
- [2] F. H. Silva and P. O. Fernandes, "Empirical study on the student satisfaction in higher education: Importance-satisfaction analysis," *WASET Journal*, vol. 293, pp. 1075-1080, 2012.
- [3] D. Hooshyar, M. Yousefi, M. Wang, and H. Lim, "A data-driven procedural-content-generation approach for educational games," *Journal of Computer Assisted Learning*, vol. 34, no. 6, pp. 731-739, 2018.
- [4] D. Hooshyar, M. Yousefi, M. Wang, and H. Lim, "Data-driven approaches to game player modeling: a systematic literature review," *ACM Computing Surveys (CSUR)*, vol. 50, no. 6, pp. 90, 2018.
- [5] R. Jain, G. Sinha, and S. Sahney, "Conceptualizing service quality in higher education," *Asian Journal on Quality*, vol. 12, no. 3, pp. 296-314, 2011.
- [6] M. Sharabi, "Managing and improving service quality in higher education," *International Journal of Quality and Service Sciences*, vol. 5, no. 3, pp. 309-320, 2013.
- [7] W. Deng, W. Chen, and W. Pei, "Back-propagation neural network based importance-performance analysis for determining critical service attributes," *Expert Systems with Applications*, vol. 34, no. 2, pp. 1115-1125, 2008.
- [8] N. M. Levenburg, and S. R. Magal, "Applying importance-performance analysis to evaluate e-business strategies among small firms," *E-service Journal*, vol. 3, pp. 29-48, 2004.
- [9] J. A. Martilla, and J. C. James, "Importance-performance analysis," *Journal of Marketing*, vol. 41, pp. 77-79, 1977.
- [10] K. Matzler, E. Sauerwein, and K. Heischmidt, "Importance-performance analysis revisited: The role of the factor structure of

- customer satisfaction,” *Service Industries Journal*, vol. 23, pp. 112-129, 2003.
- [11] M. M. Chen, H. C. Murphy, and S. Knecht, “An Importance Performance Analysis of smartphone applications for hotel chains,” *Journal of Hospitality and Tourism Management*, vol. 29, pp. 69-79, 2016.
- [12] F.C. Pan, “Practical application of importance-performance analysis in determining critical job satisfaction factors of a tourist hotel,” *Tourism Management*, vol. 46, pp. 84-91, 2015.
- [13] R. Nugraha, A. Harsono, and H. Ardianto, “Usulan Peningkatan Kualitas Jasa Pada Bengkel X Berdasarkan Hasil Matrix Importance Performance Analysis Studi Kasus Di Bengkel AHASS PD. Sumber Motor Karawang,” *Jurnal Online Institut Teknologi Nasional Reka Integra*, vol. 1, no. 3, ISSN: 2338-5081, 2014.
- [14] B. Phadermrod, R. M. Crowder, and G. B. Wills, “Importance-Performance Analysis based SWOT analysis,” *International Journal of Information Management*, vol. 44, pp. 194-203, 2016.F