⌂ Home   ⛭ About   → Login   ✎ Register   Q Search   ▣ Current   🗄 Archives   📢 Announcements   Statistics

User   ⌄
Notifications   ⌄
Journal Content   ⌄
Font Size   ⌄
Current Issue   ⌄
Visitors   ⌄

Vol. 20, No. 2, December 2021

Table of Contents

Articles

4/6/23, 6:16 AM

Munajat Tri Nugroho (Scopus ID: 57188969180), Universitas Muhammadiyah Surakarta, Indonesia,

Purwo Setiawan   Department of Industrial Engineering Universitas Muhammadiyah Surakarta, Indonesia,

Octalia Rahmasari   Department of Industrial Engineering Universitas Muhammadiyah Surakarta

10.23917/jiti.v20i2.14728

Developing Bus Rapid Transit's Schedule using Max Load Method (Trans Metro Bandung Corridor 2 Case Study)

Dionisius Aldwin   Universitas Katolik Parahyangan, Indonesia,

Fran Setiawan   Universitas Katolik Parahyangan, Indonesia,

Loren Pratiwi   Universitas Katolik Parahyangan

10.23917/jiti.v20i2.15639

Classification of Small and Medium Industry (SMI) in Malang Regency Using K-Means based Clustering Method

Sunday Noya   ,

Novenda Kartika Putrianto   Universitas Ma Chung, Indonesia,

Weshley Valentino Salendu

10.23917/jiti.v20i2.15374

Improving the Quality of Indihome Complaints Service Using Lean Service Method (Case Study of Customer Care Plasa Telkom Solo)

Eko Pujiyanto   ,

Fakhrina Fahma   ,

Savitri Kusumaning Ayu   Sebelas Maret University, Indonesia

10.23917/jiti.v20i2.15571

Reliability, Availability, Maintainability, and Safety Analysis of Finger Joint Fu-King Furnimate Machine in Wood Manufacturing Industry

Tegar Tri Nugraha   Telkom University, Indonesia,

Fransiskus Tatas Dwi Atmaji   Telkom University, Indonesia,

Sheila Amalia Salma   Telkom University, Indonesia

10.23917/jiti.v20i2.15591

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Implementation of Importance-Performance Analysis on Integrated Information System at Institut Teknologi Telkom Purwokerto

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Abstract. *Improving information systems is essential to increase user satisfaction which then has a positive impact on the institution. This study aims to measure the importance and performance of website service quality attributes on the i-Gracias ITTP using Importance Performance Analysis. This study integrate e-ServQual and WebQual to measure the level of student satisfaction with i-Gracias as a web-based information system service comprehensively. Generally, the satisfaction score shows that the performance of quality attributes does not meet the expectations of students as users. Of the 30 quality attributes measured, there is one attribute in quadrant I, 12 in quadrant II, 13 in quadrant III, and 3 in quadrant IV. The attributes that describe the fundamental functions of i-Gracias as an online service system are efficiency, security, fulfillment, information quality, and accessibility. The next priority for improvement for i-Gracias is efficiency improvement and process simplification.*

Keywords: *i-Gracias; information system; website service quality; IPA.*

I. INTRODUCTION

The acceleration of the use of information technology has recently become an unavoidable necessity. Information system is one embodiment of information technology. Information systems have been widely used in various fields to support business processes or core activities, including education.

Institut Teknologi Telkom Purwokerto (ITTP) is one of the Higher Education Institutions located in Banyumas Regency. ITTP uses an integrated information system to support all its activities that lecturers and students can use for all academic and non-academic processes. The information system is called i-Gracias. There are many menus or features in the i-Gracias system, such as student biodata, student course schedules, student grades, trial submissions, course registration, and others.

Based on the preliminary survey results conducted previously, it was found that students experienced five significant problems in using i-Gracias. The first problem is related to features in i-Gracias that are still not updated or cannot be used with a percentage of 28.95%. Second, the frequent errors when taking the Study Plan Card with a percentage of 26.32%. Third, too many menus with a percentage of 25.00%. Fourth, the i-Gracias integrated system server is often down with a percentage of 14.47%. The last problem is related to too many supervisory lecturer surveys with a percentage of 5.26%. The findings of the problems above become the focus of this research.

Student perceptions of the performance of educational services can be positive or negative, where it is directly proportional to student expectations of institutional performance. Suppose the reality that is experienced by students forms a positive attitude. In that case, the level of word-of-mouth promotion will also be positive, which will build high student loyalty. However, if what happens is the opposite, it will have a negative impact on the institution.

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Therefore, to increase students' positive attitudes towards institutions, universities need to realize that students have a role in evaluating educational services as feedback on the performance of higher education services themselves (Wang & Tseng, 2011). Measurement of customer satisfaction in the education world is an essential for developing businesses to evaluate the quality of education (Yanova, 2015).

One aspect that affects student loyalty to a university is their satisfaction with online sites (Leonnard, 2019). In addition, the COVID-19 pandemic requires every organization to shift business processes that were previously carried out face-to-face to online (Demir et al., 2020). Currently, most universities have websites or integrated information systems to accommodate academic and non-academic services more effectively and efficiently than manual services. Good quality online services will not only have an impact on student satisfaction. However, they will also help universities to achieve competitive advantages (Kim-Soon et al., 2014).

Assessment of service quality often uses Service Quality (ServQual) which consists of tangible, reliable, responsiveness, assurance, and empathy. The use of the ServQual dimension is quite broad. It can be used in various sectors that provide direct services, such as tourism (Swart, 2018), restaurants (Tjoanoto & Kunto, 2013), bank (Famiyeh et al., 2018), etc. The traditional ServQual was then developed into e-Service Quality (e-ServQual) along with the shift in service from what used to be direct services to services through electronic or online media. In addition, Website Quality (WebQual) is also an essential benchmark for understanding customer desires. WebQual has become considered because many industries use the website as the primary medium for transactions, promotions, and information. WebQual is necessary for quality improvement, especially technology (Andry et al., 2019).

The object of this research is an integrated information system, i-Gracias. The quality assessment used is e-Service Quality. The dimensions of e-ServQual used by previous studies often vary, according to the sector and context of the object. In e-commerce or online shopping, the dimensions of e-ServQual include website design, customer service, security, fulfillment, delivery, environment, outcome, efficiency, system availability, compensation, and responsiveness (Chuang et al., 2016; Rita et al., 2019; Suryani et al., 2020). In contrast to the hospitality industry, the e-ServQual dimension is often further specified. It consists of completeness, relevance, timeliness, esthetics, ease of use, navigability, interactivity, virtual involvement, assurance, security, responsiveness, empathy, functionality, customer experience, and reputation (Hung, 2017; Jeon & Jeong, 2017). While in the non-profit sector, the dimensions used are general dimensions, such as efficiency, system availability, fulfillment, privacy, website design, responsiveness, compensation, and contact (Ataburo et al., 2017; Demir et al., 2020). The dimensions of e-ServQual used are often intersected and only differ in terms.

WebQual dimension is simpler than e-ServQual. WebQual 4.0 is a development method from ServQual which has undergone several dimensions and question item improvements since WebQual 1.0 (Rerung et al., 2020). The dimensions of WebQual 4.0 include usability, information quality, and service interaction quality. The use of WebQual is quite broad and relevant to various industrial sectors (Andry et al., 2019; Chen et al., 2017; Garcia-Madariaga et al., 2019; Rerung et al., 2020; Utami et al., 2021).

This study combines e-ServQual and WebQual (referred to as Website Service Quality) to assess the quality of i-Gracias more comprehensively. This study aims to obtain facts, systematic, and accurate descriptions of the importance and satisfaction of students in using the i-Gracias service at the Institut Teknologi Telkom Purwokerto with an Importance-Performance Analysis (IPA) approach. Furthermore, the results of this study will be the main input in efforts to develop i-Gracias and bring out a better performance that meet users' satisfaction.

IPA represents the score of importance and performance of the attributes, which will later be described based on the dimensions of the website service quality that will be used. IPA is a

simple method but practical and does not require in-depth statistical analysis (Das & Basu, 2020). Its use has proven to be effective in various fields, such as satisfaction with educational services (McLeay et al., 2017), healthcare (Markazi-Moghaddam et al., 2019), tourism (Mimbs et al., 2020), project management (Haverila et al., 2020), and so on. The value of the level of importance and satisfaction will play an essential role in determining strategic priorities for the improvement of i-Gracias. In addition, with the IPA matrix, managers can effectively allocate resources to meet the needs of i-Gracias users.

II. RESEARCH METHOD

Website Service Quality

The service quality of the i-Gracias website in meeting the academic needs of students is measured using the Website Service Quality dimension. The quality dimension used in this study combines the dimensions of Website Quality and e-Service Quality to obtain a comprehensive assessment of online services through the website. This dimension aims to measure the quality of the i-Gracias website based on the perceptions of its end-users, namely

Table 1. Website Service Quality Dimensions

Dimension	Defintion	Attributes	References
Fulfillment	The accuracy of the website in providing services as promised (Veloso et al., 2020)	i-Gracias services are as they should be as a service system for students (FL_1) i-Gracias provides accurate feature services (FL_2) i-Gracias provides fast search results (FL_3)	(Ataburo et al., 2017; Zavareh et al., 2012)
Security/ privacy	The extent to which a website can protect and guarantee users' personal information (Li et al., 2021)	i-Gracias can protect users' personal information (SC_1) i-Gracias provides a sense of security when using its services (SC_2) i-Gracias protects information related to browsing behavior (SC_3) i-Gracias maintains information on exam results and login details (SC_4)	(Ataburo et al., 2017; Jonathan, 2013; Rita et al., 2019; Zavareh et al., 2012)
Responsive-ness	The ability and response speed of a website in solving user problems. (Menezes et al., 2016)	i-Gracias provides a fast response to requests and complaints (RP_1) i-Gracias can solve student service system problems quickly (RP_2) i-Gracias provides easy-to-access user service contacts (RP_3) There are Frequently Asked Questions (FAQ) on i-Gracias service (RP_4) i-Gracias responds according to the requests and complaints submitted (RP_5)	(Ataburo et al., 2017; Jonathan, 2013; Rita et al., 2019; Zavareh et al., 2012)
Website design	Tangible aspects of a website, including appearance and navigation (Wilson et al., 2019)	i-Gracias has an attractive appearance (WD_1) the i-Gracias content display is easy to understand (WD_2) Text on i-Gracias is easy to read (WD_3) i-Gracias has interactive features that help users in using the service (WD_4)	(Ataburo et al., 2017; Rita et al., 2019; Zavareh et al., 2012)
Efficiency	Ease and speed in accessing the website, including usability and accessibility. (Ataburo et al., 2017)	Users can find information on i-Gracias easily (EF_1) i-Gracias makes it easy to access all existing menus/features (EF_2) i-Gracias allows getting what students want quickly (EF_3) Information on i-Gracias is displayed in the appropriate format (IQ_6)	(Ataburo et al., 2017; Jonathan, 2013; Rita et al., 2019; Zavareh et al., 2012)

Table 1. Website Service Quality Dimensions (cont'd)

Dimension	Defintion	Attributes	References
System availability	The accuracy of the technical function of a website (Tobagus, 2018)	i-Gracias features and services can be used anytime (SA_1) There are no interruptions while accessing i-Gracias (SA_2) i-Gracias does not freeze after the user enters information or search words (SA_3) Fast i-Gracias loading process (SA_4)	(Ataburo et al., 2017; Rita et al., 2019; Zavareh et al., 2012)
Information Quality	How useful is the information on the website to assist users in using the service and making decisions (Mavetera et al., 2017)	i-Gracias provides accurate and reliable information (IQ_1) i-Gracias provides up to date information (IQ_2) The information on i-Gracias is quite helpful in using the service (IQ_3) The information provided by i-Gracias is adequate (IQ_4) The information provided by i-Gracias is quite detailed (IQ_5) Information on i-Gracias is displayed in the appropriate format (IQ_6)	(Andry et al., 2019; Suryani et al., 2020)

students. This study uses seven dimensions of website service quality: fulfillment, security/privacy, responsiveness, website design, efficiency, system availability, and information quality. In detail, the question attributes of each quality dimension can be seen in Table 1.

Importance-Performance Analysis

Importance-Performance Analysis (IPA) is a performance appraisal instrument that is widely used to assess user satisfaction. IPA is known for its practicality and ease of use, yet effective for demonstrating its managerial implications (Mimbs et al., 2020). IPA can be used to assess a user's view of service by comparing the performance and relative importance of a set of attributes (Markazi-Moghaddam et al., 2019).

IPA measures the level of importance and user satisfaction, which is then described in four quadrants (Martilla & James, 1997) shown in Figure 1. By mapping the position of website service quality attributes in each quadrant, improvement priorities can be determined effectively (Markazi-Moghaddam et al., 2019). Through an in-depth analysis of the results of this attribute mapping, organization can be helped to provide a better i-Gracias system by optimizing the available resources.

The IPA method used in this research passes through three main stages. In the first stage, the research instrument to measure the level of satisfaction and interest of i-Gracias users was compiled based on the Website Service Quality dimension. The research instrument consists of 30 question attributes, as listed in Table 1.

In the second stage, the level of importance and satisfaction towards the i-Gracias service was obtained from filling out questionnaires by ITTP students from all the study programs. The questionnaire consists of two parts. The first part describes the profile of the respondents, which consists of the origin of the study program, class, and frequency of using i-Gracias to obtain academic services. The second part contains 30 questions about students' level of importance and satisfaction on the seven dimensions and 30 attributes of web service quality on a 4-point Likert Scale. A value of 1 indicates very dissatisfied/important, and 4 indicates very satisfied/important. Number of respondents is determined using the Slovin formula with a total population (student body) of 3865. Thus, the minimum number of respondents can be calculated using equation (1).

$$n = \frac{N}{1+(N \, x \, e^2)} \quad\quad (1)$$

$$n = \frac{3865}{1+(3865 \, x \, 0,05^2)} = 360,83 \approx 361$$

With:

n : number of minimum respondents

N : number of populations

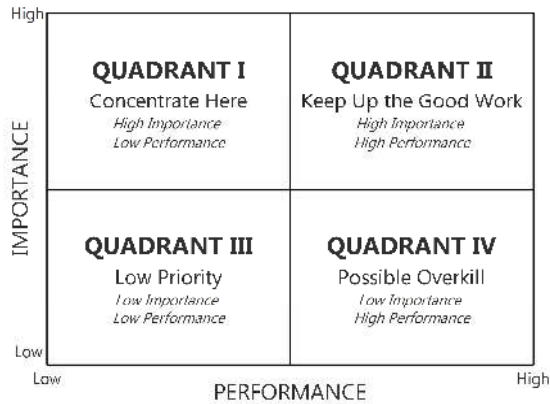e : inaccuracy tolerance of sampling error (5%)

Figure 1. Importance-Performance Matrix (Martilla & James, 1997)

In the third stage, each attribute is mapped into the Importance-Performance matrix (Figure 1.) based on the importance and satisfaction values obtained in stage two. Each quadrant has its interpretation that will help the organization to determine the priority of improvement. The purpose of each quadrant is as follows (Esmailpour et al., 2020):

a. Quadrant I – Concentrate here, shows the attributes that are the main weaknesses of the organization and must be corrected immediately.

b. Quadrant II – Keep up the good work, represent the attributes that are the main strengths of the organization. The attributes in this quadrant are considered necessary, and users are satisfied with the services they receive.

c. Quadrant III – Low priority, users are not satisfied with the performance of the attributes in this quadrant. However, this does not significantly impact the organization because of the low level of importance.

d. Quadrant IV – Possible overkill, users are satisfied with the performance of the attributes in this quadrant. However, these attributes have no significant effect on attracting new potential users.

III. RESULT AND DISCUSSION

Respondent Profile

Students filled out the questionnaires in this study as respondents from 11 study programs at

ITTP. The distribution of respondents consists of various generations so that the level of satisfaction and importance of website service quality attributes for i-Gracias can be described comprehensively. Table 2. shows the descriptive statistics of the sample characteristics in this study. Respondents in this study were dominated by students of the class of 2020 or first year at ITTP, with the highest frequency of i-Gracias access being 1-3 times and more than five times within a week. These results indicate that i-Gracias is the primary platform for students to use academic and non-academic services. Therefore, improving the quality of integrated information systems is one of an organization's main priorities, especially those engaged in education.

Table 2. Descriptive Statistics of Research Sample

Characteristics	Frequency (%)
Year	
2015	1
2017	2
2018	20
2019	32
2020	45
i-Gracias usage in a week	
< 1 time	19
1-3 times	43
4-5 times	16
< 5 times	22

Importance-Performance Analysis

The level of importance and satisfaction were analyzed based on the user's assessment of i-Gracias through a questionnaire with an interval of 1-4 values. The results of the level of importance and satisfaction felt between one respondent and another for the same attribute were not significantly different. Furthermore, the scores of importance and satisfaction can be seen in Table 3.

The i-Gracias user satisfaction score for each attribute shows a negative value. A negative value indicates that there are no quality attributes that meet user expectations. Therefore, service improvements are still needed to increase i-Gracias user satisfaction. Website service quality

attributes will be mapped into four quadrants of the IPA diagram (as shown in Figure 2.) based on the importance and satisfaction values. It helps to determine the priority of improvement.

Table 3. Importance and Performance Score

Attributes	Avg. Importance	Avg. Performance	Satisfaction (Gap)
FL_1	3.748	3.301	-0.447
FL_2	3.573	3.311	-0.262
FL_3	3.485	3.243	-0.243
SC_1	3.718	3.553	-0.165
SC_2	3.650	3.495	-0.155
SC_3	3.612	3.456	-0.155
SC_4	3.699	3.553	-0.146
RP_1	3.485	3.097	-0.388
RP_2	3.495	3.126	-0.369
RP_3	3.563	3.301	-0.262
RP_4	3.524	3.204	-0.320
RP_5	3.524	3.262	-0.262
WD_1	3.466	3.039	-0.427
WD_2	3.563	3.204	-0.359
WD_3	3.641	3.505	-0.136
WD_4	3.553	3.194	-0.359
EF_1	3.553	3.194	-0.359
EF_2	3.582	3.214	-0.369
EF_3	3.602	3.155	-0.447
EF_4	3.650	3.408	-0.243
SA_1	3.757	3.495	-0.262
SA_2	3.544	3.078	-0.466
SA_3	3.573	3.175	-0.398
SA_4	3.553	3.146	-0.408
IQ_1	3.670	3.495	-0.175
IQ_2	3.592	3.320	-0.272
IQ_3	3.631	3.330	-0.301
IQ_4	3.515	3.252	-0.262
IQ_5	3.602	3.311	-0.291
IQ_6	3.534	3.330	-0.204

After knowing the position of each attribute on the Importance-Performance diagram, management can take policies related to improvement priorities for improving i-Gracias services. From Figure 2., the 30 website service quality attributes used to measure user satisfaction are spread over four quadrants. There is one attribute in quadrant I, 12 in quadrant II, 13 in quadrant III, and three in quadrant IV. However,

the distribution of attributes is dominated in quadrants 2 and 3.

Quadrant I – Concentrate Here

There is only one attribute in quadrant I, namely EF_3, which is part of the efficiency dimension. The EF_3 attribute represents whether i-Gracias allows students to complete what they want quickly. Quick completion is an essential attribute for students. However, the features and services on i-Gracias are considered not able to fulfill this. The results of this study support Leonnard (2019) research, where efficiency has a significant effect on student satisfaction with online services at public and private universities in Indonesia. The result shows that the efficiency dimension is one of the improvement priorities.

The EF_3 attribute in quadrant I indicate that the steps to complete a particular task in i-Gracias are considered quite lengthy and complicated. Some processes still need to involve certain parties for completion. Therefore, process efficiency is a top priority in the further improvement of i-Gracias services.

Quadrant II – Keep Up the Good Work

Quadrant II contains attributes that are considered to have had a good performance. The attributes in quadrant II have a high level of importance and have performed well on the current i-Gracias system. Twelve attributes in quadrant II are part of the dimensions of fulfillment (FL_1), security (SC_1, SC_2, SC_3, SC_4), system availability (SA_1), website design (WD_3), efficiency (EF_4), and information quality (IQ_1, IQ_2, IQ_3, IQ_5).

All attributes in the security dimension are in quadrant II. In the academic field, every student who uses i-Gracias expects security and is not worried about their data being exposed illegally (Ali, 2019). So, it is not wrong when all attributes of the security dimension are considered necessary by students. At the same time, students are satisfied with the performance of i-Gracias. These results mean that the performance of i-Gracias in terms of its ability to ensure the security of users' personal information, such as
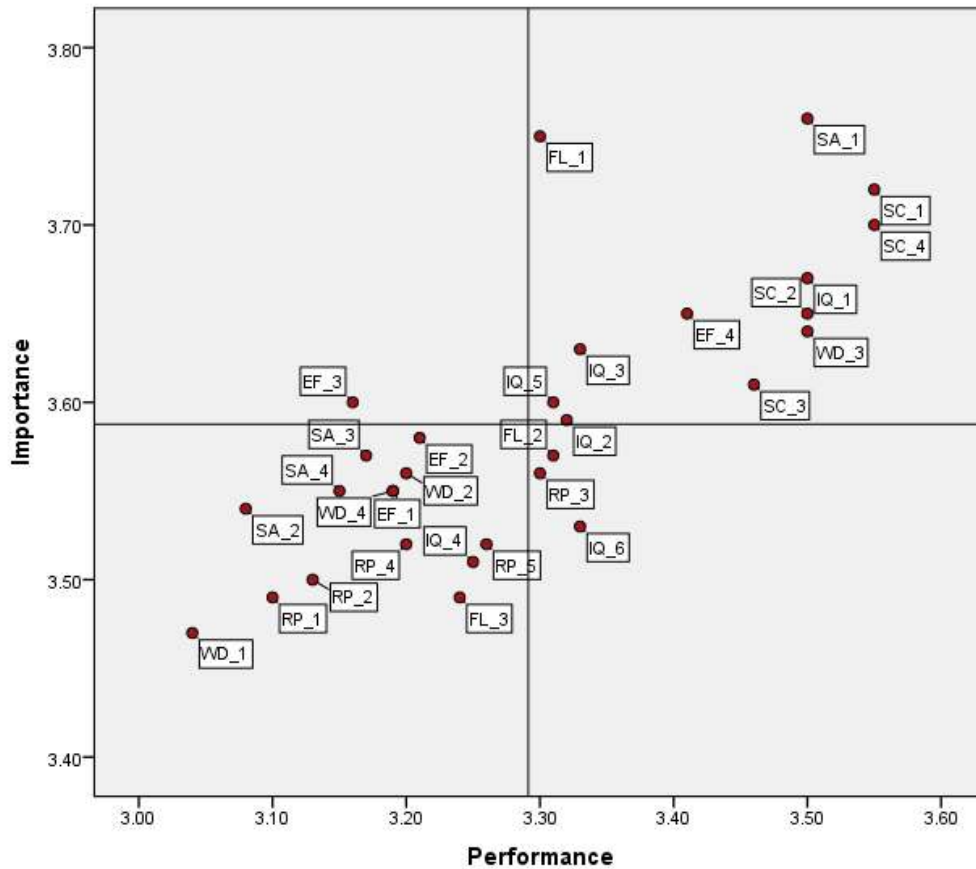
Figure 2. Importance-Performance Matrix Result

login details, GPA, to website browsing behavior, is good.

In addition, the results of this study also show that i-Gracias has been able to fulfill its function as an integrated service system for students and can be used anytime. The information displayed through the i-Gracias page, such as scholarship information, registration, exam schedules, etc. i-Gracias has fulfilled the student's wishes as accurate, up-to-date, detailed information and helps to use the service. Therefore, the performance of these attributes must be maintained, better improved.

Quadrant III – Low Priority

Quadrant III contains attributes that have a low level of importance and performance. In this quadrant, there are 13 attributes consisting of fulfillment (FL_3), efficiency (EF_1, EF_2), responsiveness (RP_1, RP_2, RP_4, RP_5), system

availability (SA_2, SA_3, SA_4), website design (WD_1, WD_2, WD_4), information quality (IQ_4). Of the 30 attributes measured in this study, most of the attributes are in quadrant III. Although many attributes have low performance, they do not provide a significant complaint to the i-Gracias service. It is because the level of importance according to students for these attributes is also quite low. Therefore, improvements for the attributes in this quadrant are not prioritized.

Most responsiveness dimensions are in quadrant III. These results indicate that students' perceptions of the responsiveness of i-Gracias administrators in responding to complaints are still low. In addition, the attributes SA_2, SA_3, and SA_4, which are part of the system availability dimension, are also in this dimension. The system availability dimension contains attributes that describe the technical functions of the website,

such as disturbances, freezes, and loading processes. It shows that there are still frequent disturbances when students use i-gracias. Therefore, students are not satisfied with system availability services.

However, the results of this study indicate that although technical problems often occur and the i-Gracias administrator's response to complaints is not adequate, this problem is not an important aspect for students. Another finding shows that the attractive appearance (WD_1) and interactive features (WD_4) of i-Gracias are not essential attributes. They can be influenced because i-Gracias is the only ITTP integrated information system. So, if students can still use i-Gracias for academic and non-academic services effectively, this is still considered unimportant by students.

This analysis is in line with the FL_1 attribute, which is in quadrant II, where the FL_1 attribute is considered to have had a good performance and is vital for students. The FL_1 attribute represents the student's perception of the i-Gracias service, whether it has fulfilled its primary function as a service system for students or not.

Quadrant IV – Possible Overkill

Quadrant IV consists of 3 attributes, namely FL_2, RP_3, and IQ_6. These three attributes indicate that the features, access to service contacts, and information formats in i-Gracias have provided a performance that exceeds the expectations of students as users. It can be seen from the current i-Gracias features, which are quite a lot, but they are minimally used. Therefore, the management should reallocate resources to improve the efficiency of i-Gracias which requires more handling and attention.

Overall Importance-Performance Analysis

This study indicates that the attributes that have a level of importance above the average are those that require efficiency, user information security assurance, function fulfillment, information quality, and ease of access. These attributes reflect the primary function of i-Gracias as an integrated information system. This result is in line with other studies which consider that

security, usability, and quality of information are important dimensions in a university academic website or portal (Ellyusman & Hutami, 2017; Jundillah et al., 2019).

On the other hand, quality attributes that are not considered important by students include responsiveness, system availability, website design, and features. These findings contradict most of the results of the research of Ataburo et al. (2017), who concluded that system availability and the website design are dimensions that affect the satisfaction of university website users. As previously explained, one of the reasons that could underlie this finding is that there is no other choice of information system for students other than i-Gracias. As long as the essential functions of i-Gracias have been fulfilled, students are still satisfied with the current performance of i-Gracias. In this study, the level of importance of the responsiveness attributes is below the average. This finding is following research by Ataburo et al. (2017). The responsiveness is often a critical quality dimension for commercial industries that offer products and services to increase customer satisfaction (Sundaram et al., 2017; Suryani et al., 2020).

Overall, the level of student satisfaction with website service quality attributes has reached 50%. Students are satisfied with the 15 performance attributes used to measure the performance of i-Gracias as an integrated information system. Practical implication of this study is to suggest improvement priority to ITTP related to i-Gracias performance. The main priority is process efficiency by simplifying the steps and procedures for completing a task. This improvement does not only involve the information system unit, but all organizing units within the ITTP environment that are involved in academic and non-academic activities. It is hoped that by knowing the priority of improvement, student satisfaction will increase, and the public's view of the institution will be more positive.

IV. CONCLUSION

This study uses the Importance-Performance Analysis (IPA) method to describe the level of

importance and performance of the ITTP i-Gracias information system based on student perceptions as users. Website Service Quality is applied to describe the dimensions of quality in a structured manner consisting of fulfillment, security, responsiveness, website design, efficiency, system availability, and information quality. Student satisfaction scores on i-Gracias services show negative results for all attributes. Therefore, in general, student satisfaction with i-Gracias has not been met.

Based on the importance-performance matrix, there is one attribute in quadrant I, 12 attributes in quadrant II, 13 in quadrant III, and 3 in quadrant IV. Attributes that indicate the possibility of i-Gracias to complete what students want quickly are in quadrant I, which means that improvements are needed as soon as possible for this attribute because of its high importance but low performance. Therefore, increasing efficiency and simplifying processes are priorities for the subsequent improvement of i-Gracias. This study also shows that the attributes that demand efficiency, user information security assurance, function fulfillment, information quality, and ease of access are considered necessary by students.

In this study, the dimensions used to measure the performance of i-Gracias are limited to service dimensions. An in-depth analysis of the technological aspect has not been carried out so that improvement priorities cannot be proposed. In addition, i-Gracias ITTP is intended for the entire academic community, consisting of students, lecturers, and supporting staff. However, this study only focuses on one stakeholder, namely students, so that the level of interest and performance described in this study may differ from the perceptions of other parties. Therefore, involving all i-Gracias users will help determine the overall level of satisfaction with i-Gracias.

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