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Implementation of Quality Function Deployment (QFD) for Decision Making in Improving Integrated Academic Information System

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Abstract— Academic Information System is a tool to support academic activities in implementing education in institutions effectively and efficiently. Institut Teknologi Telkom Surabaya is an institution that already has an integrated academic information system called I-Gracias. I-Gracias uses a single-user system for all applications. Most users of I-Gracias are students, so student satisfaction with integrated academic information system services can be used as benchmarks in determining I-Gracias improvement plans. One method used for the I-Gracias improvement process is the Quality Function Deployment (QFD) method. This method determines the student's desire for I-Gracias using the House of Quality (HOQ) matrix. The result of this research is that the QFD method can prioritize technical responses to the main obstacles for students in using I-Gracias by correlating Voice of Consumer (VOC) and technical response. The highest priority for technical response is coordinating with other units with a technical importance rating of 620.9 and a relative weight value of 21%. Next is to update the module regularly, socialize i-Gracias, meet management targets, receive criticism and suggestions, carry out regular checks and recruit HR if needed as a sequence of improvements to i-Gracias.

Keywords—Quality Function Deployment (QFD); Academic information System; I-Gracias

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I. INTRODUCTION

An academic Information System is a means to support academic activities to provide education in higher education effectively and efficiently. Institut Teknologi Telkom Surabaya is an institution that already has an integrated academic information system called I-Gracias. I-Gracias uses a single-user system for all applications. I-Gracias integrates academic and non-academic activities and has features that the entire ITTelkom Surabaya academic community can use. Academic Information System is an internet-based application designed to meet users' academic needs [1], [2]. Universities must have an academic information system to support the achievement of good graduate competencies and provide convenience for organizational users to manage activities by integrating all aspects of activities. Service users in universities are students, lecturers, academic professionals or employees, and parents of students. Students are the most significant users of educational information systems. The value of student satisfaction with academic services is used to assess the quality of education in higher education[2], [3]. This study will focus on problems in the ITTelkom Surabaya integrated I-Gracias system. Problem-based on a preliminary survey conducted by researchers through questionnaires distributed to students regarding the ease of using i-Gracias, stability of the i-Gracias system, and obstacles when using i-Gracias by students. The preliminary survey results for this research indicate that most students believe that i-Gracias is easy to use. However, the stability and fluency of i-Gracias are not entirely stable. In addition, there are problems related to the system that has no integration with other units, too many menus, and several student problems with i-Gracias.

ITTelkom Surabaya is committed to providing quality services to students, one of which is academic services. A questionnaire was distributed based on input from students related to I-Gracias to find out problems associated with I-Gracias ITTelkom Surabaya. These problems will be used as a reference for ITTelkom Surabaya in recommendations for improvement. In addition, this research can also be used as one of the processes of modification, planning, and improvement of academic services oriented to student satisfaction. Planning and developing academic information systems are critical because they impact higher education services' quality. One method used to determine the user's consumer needs is Quality Function Deployment (QFD). QFD is a tool that researchers have widely used to design and improve services through improvement recommendations. The QFD method has also been applied to several studies for decision-making improvements in service entrepreneurship in education[4]. In this study, QFD aims to translate customer requirements into product/service characteristics, components, and processes. In addition, the QFD method is also used to improve health services by identifying technical responses related to the fulfillment of desires by consumers to ensure that a company

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focuses its attention on customer needs before each activity is carried out [5]. QFD is also used in research to define the priority needs to design quality improvements for an application based on the user's point of view [6]. House of Quality (HOQ) is one of the tools in QFD that can explain the relationship between customer desires and target products. The results are technical parameters related to technical factors in making services or products based on customer needs.

QDF is also used in improving the quality of academic services at Universitas Brawijaya using 15 attributes based on discussions with students and the campus. The results of the implementation of QFD are known to be five priorities for development and improvement to improve academic services[7]. QFD is also implemented in research to analyze satisfaction in the teaching and learning process at SMA Negeri 3 Mataram. In this study, researchers created an information system for teaching and learning satisfaction to facilitate the school in evaluating schools' teaching and learning process. The application of the QFD method on the system can produce a priority order that can be improved by the school[8]. QFD is also applied in the decision-making of large companies to determine critical characteristics based on customer needs to increase customer satisfaction[9]. In this study using the QFD approach, the results explain that the QFD approach can improve the group's accuracy analysis in making decisions. The QFD method is also applied to find the best solution to add parameters in a transition problem and the adoption of electric vehicles in increasing the attractiveness of electric vehicles in emerging markets[10]. The QFD method is also used in research to determine the direction of DfRem repair accurately based on the failure mode in the automotive field[11]. A study that aims to develop the product life cycle in the Textile Industry also uses the QFD method to estimate the order of priority. This study shows that QFD can provide recommendations for technical activities for customer satisfaction[12][13].

From the problems that have been described, it can implement the QFD method to increase student satisfaction with academic information system services by providing quality I-Gracias according to the needs of students as the most significant users of i-Gracias. Based on the research that has been described, the QFD method can solve problems in terms of decision-making. The QFD method can provide technical priority in solving I-Gracias problems for proposed improvements to the IT-Support division.

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II. RESEARCH METHOD

The stages of this research are arranged in a flow diagram to explain the stages carried out. The flow diagram can be seen in Figure 1. The stages of this research will be used by researchers as a reference so that this research can be carried out systematically and measurably.

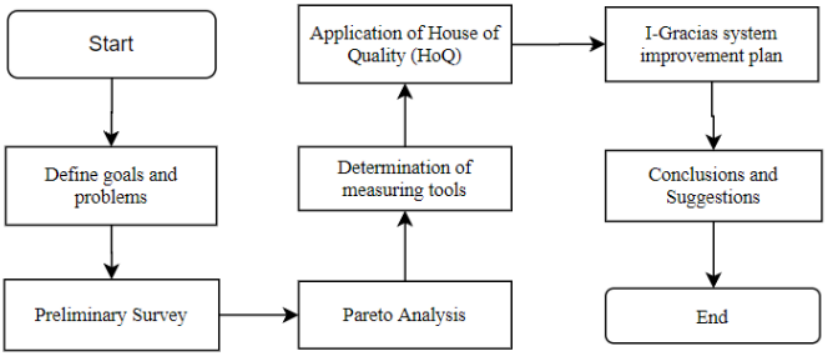

Figure 1. RESEARCH FLOW DIAGRAM

A. Problem Analysis and Preliminary Survey

The analysis of the problem in this study is by conducting a preliminary survey by distributing initial questionnaires to ITTelkom Surabaya students in seven study programs from the 2018 to 2020 class. The questionnaire distributed to students is a prefix questionnaire used to collect problems that are often felt by students related to I-Gracias. The distribution of this preliminary questionnaire aims to identify the issues and student perceptions of the I-Gracias integrated system in general. The initial survey results are described using a Pareto diagram with the 20:80 principle, namely 20% of problems that will impact 80%, focusing on fixing minor issues but having a high impact. Several studies have widely used Pareto diagrams to identify failures or critical areas that require rapid treatment [14][15][12]. In addition, the Pareto chart can also identify company priorities that must be resolved by management [16]. In this study, the Pareto diagram provides information on students' main preferences for I-Gracias problems by comparing all existing I-Gracias problems.

B. Questionary Preparation

The scaling technique used for this questionnaire is the Likert scale. The Likert scale was chosen because it provides a clear and equal distance between intervals and neutral. The Likert scale used to give importance and satisfaction by respondents has a scale of 1-5 starting from 1 for very important to 5 for strongly agree. Next is data collection as primary data, namely questionnaires distributed to students online. Before processing the data, the researcher pre-processed the data. The data obtained from the

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questionnaire distribution would be cleaned of outliers before being processed using descriptive statistics to increase the validity and reliability of the measuring instrument used.

C. Validity and Reliability test

Validity and reliability tests will be done after pre-processing the data. The validity and reliability test of the measuring instrument aims so that the information obtained is following research needs and can achieve research objectives. A validity test is used to test how accurately the measuring instrument performs its function[17]. This questionnaire can be said to be valid if the questionnaire can reveal something that the questionnaire will measure. The technique used to determine the validity of the questionnaire questions is Pearson's product-moment correlation with the following formula (1).

$$r_{xy} = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n\sum_{i=1}^{n} x_i{}^2 - (\sum_{i=1}^{n} x_i)^2)(n\sum_{i=1}^{n} y_i{}^2 - (\sum_{i=1}^{n} y_i)^2)}} \quad (1)$$

r_{xy} : the correlation coefficient between variable x and variable y
x_i : the i data value for the variable group x
y_i : the i data value for the variable group y
n : a large amount of data

The reliability test is used to determine the consistency of the measuring instrument. In this case, to determine whether the questionnaire is reliable and remains consistent if the measurement is repeated. The instrument reliability coefficient was calculated using Cronbach Alpha with formula 2.

$$r = \left(\frac{k}{(k-1)}\right)\left(1 - \frac{\sum \sigma_b{}^2}{\sigma_t{}^2}\right) \quad (2)$$

r : the instrument reliability coefficient (Cronbach Alpha)
k : number of questions
$\sum \sigma_b{}^2$: a total variant of question items
$\sigma_t{}^2$: total variant

D. Determination of the Number of Questionnaires

Determining the minimum number of samples is essential in a study because the sample is a research unit. After all, it represents the population for research data collection, but it is enough to take only part of the population to be used as research samples. The population of this study was ITTelkom Surabaya students' classes in 2018, 2019, and 2020. In this study, the Slovin formula was used to calculate the minimum number of respondents [18]. Determination of the sample with the Slovin formula (3):

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$$= \frac{N}{1 + (N.e^2)} \quad (3)$$

Formula description:
n = minimum number of samples
N = population
e = tolerance for inaccuracy due to errors in sampling

Before preparing the House of Quality (HOQ), Voice of Customer (VOC) was conducted to determine customers' needs. In this study, students were I-Gracias users [19]. Assessment can be done by direct discussion interviews with students to identify customer needs. House of Quality (HOQ) is a term used to describe the structure of Quality Function Deployment[20]. QDF also combines customer needs in the design process and is one of the tools to implement it in the House of Quality [21][22][23][24].

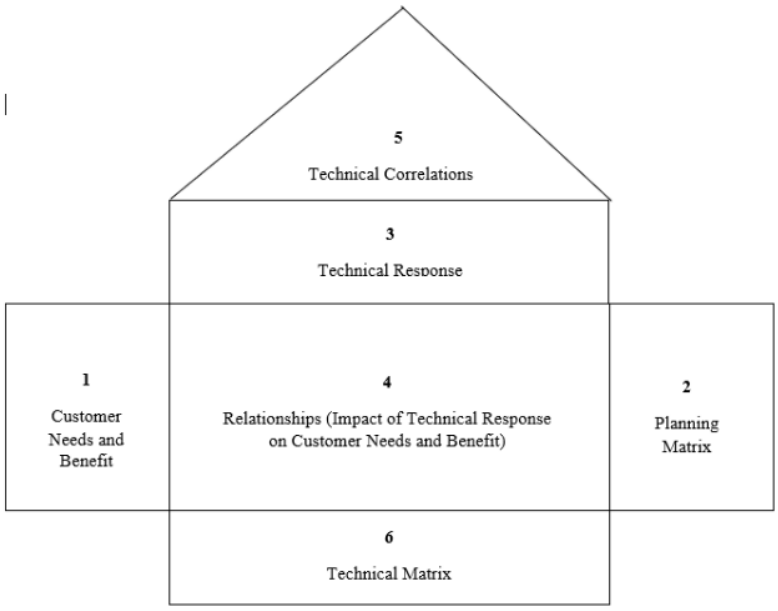

Figure 2. HOUSE OF QUALITY

Figure 2 is a House of Quality model consisting of 5 parts: customer needs and benefits, planning matrix, technical response, relationship, or impact of technical response on customer needs and benefits, technical correlation, and technical matrix. Consumer needs list customer wants or needs for a particular product or service. The planning Matrix contains quantitative data on consumer needs and performance goals to be achieved. Making a planning matrix can be

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determined by finding how much service improvement must be made to meet customer desires or the value of the Improvement Ratio with the equation (4):

$$Improvement\ Ratio = \frac{goal}{responden\ satisfaction} \quad (4)$$

Next, look for information about selling products or services based on how much each customer's needs are fulfilled or sales points. The value is 1 for the less attractive point, 1.2 for the point that provides average attractiveness, and 1.5 for the point that provides strong attraction. Salespoint value is determined based on Importance to Customer, where the most critical attribute by consumers has the highest sales point value. Then determine the weight of attribute obtained from the multiplication of the vital factor, the ratio of improvement, and the value of the sales point, which is called the raw weight, with the equation (5).

$$Raw\ Weight = Consumer\ Importance\ x\ IR\ x\ Sales\ Point \quad (5)$$

Then the weight normalization of each service attribute is carried out with the following equation (6):

$$Normalized\ raw\ weight = \frac{raw\ weight}{raw\ weight\ total}\ x\ 100\% \quad (6)$$

The technical requirements in the house of quality (HOQ) are the requirements of the design or the technical aspects of user requirements based on the company description. Next, determine the relationship matrix that explains the relationship between customer needs and the technical aspects specified by the QFD team. The relationship is in the form of firm, medium, weak, and no relationship. Symbols of technical response to needs can be seen in Table 1.

Table 1. TECHNICAL RESPONSE SYMBOL

Technical Response Relationship		
Symbol	***Description***	***Value***
●	Strong Relationship	9
○	Medium Relationship	3
△	Weak Relationship	1

Then determine the correlation of technical requirements to describe the relationship between technical requirements, which can be divided into robust positive correlation, strong positive enough, firm negative, and strong enough negative, and there is no relationship between technical responses as shown in Table 2.

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Table 2. RELATIONSHIP BETWEEN TECHNICAL RESPONSE

Technical Response Relationship		
Symbol	***Description***	***Value***
++	positive, strong Relationship	+9
+	Medium relationship	+3
Empty	No relationship	0
-	negative Relationship	-3
-Z	Negative strong relationship	-9

III. RESULT AND DISCUSSION

A. Preparation of Questionnaires, Validity and Reliability Test

The results of a preliminary survey conducted on ITTelkom Surabaya students to identify problems and student perceptions of the integrated academic information system (I-Gracias) are features that have not been integrated with other divisions. Sometimes the server is down when taking study plan cards; many menus are cannot be used yet. There are bugs, so I-Gracias cannot run properly.

The Pareto diagram in Figure 3 illustrates the problems obtained by distributing questionnaires to ITTelkom Surabaya students. In the questionnaire results, seven issues are often experienced by students about I-Gracias. The issues are (1) students who feel that the features in gracias are not integrated, totaling 41 respondents, (2) the server is often down by 26 respondents, (3) the system cannot be accessed when taking a study plan as many as 21 respondents, (4) many menus in I-Gracias that cannot be used are 19 respondents, (5) System bug, (6) 17 respondents are less user friendly, and (7) there are too many menus in I-Gracias as many as 11 respondents. The highest frequency of occurrence then sorts the results of these problems to calculate the cumulative frequency and the total percentage achieved. The problem definition is used as the basis for taking attributes. After defining the problem, the next step is to determine the minimum number of respondents using the Slovin formula. The minimum number of respondents obtained is 98 respondents. A Pareto diagram describes the analysis of the problem with the principle of 20 - 80 with the following results can be seen in Figure 3.

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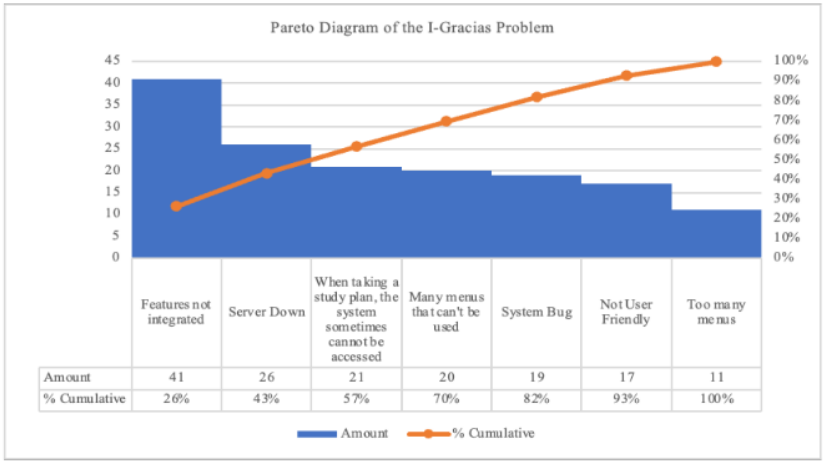

Figure 3. PARETO DIAGRAM

Table 3 and Table 4 show that the measuring instrument for assessing student interest and satisfaction is valid. The questionnaire can be valid because the calculated correlation value (count) is more significant than the r table. Where r table with a significance level of 0.05 and the number of items 30 is 0.361.

Table 3. VALIDITY TEST OF CONSUMER NEED

Validity Test of Consumer Need							
Item	***Pearson Correlation***	***Sig.***	***Status***	***Item***	***Pearson Correlation***	***Sig.***	***Status***
P1	.678	.000	Valid	P16	.727	.000	Valid
P2	.754	.000	Valid	P17	.833	.000	Valid
P3	.695	.000	Valid	P18	.765	.000	Valid
P4	.777	.000	Valid	P19	.706	.000	Valid
P5	.849	.000	Valid	P20	.834	.000	Valid
P6	.451	.000	Valid	P21	.785	.000	Valid
P7	.693	.000	Valid	P22	.882	.000	Valid
P8	.850	.000	Valid	P23	.868	.000	Valid
P9	.681	.000	Valid	P24	.854	.000	Valid
P10	.846	.000	Valid	P25	.750	.000	Valid
P11	.885	.000	Valid	P26	.567	.000	Valid
P12	.918	.000	Valid	P27	.850	.000	Valid
P13	.776	.000	Valid	P28	.534	.000	Valid
P14	.790	.000	Valid	P29	.858	.000	Valid
P15	.905	.000	Valid	P30	.762	.000	Valid

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Table 4. VALIDITY TEST OF CONSUMER SATISFACTION

Validity Test of Consumer Satisfaction							
Item	***Pearson Correlation***	***Sig.***	***Status***	***Item***	***Pearson Correlation***	***Sig.***	***Status***
Q1	.495	.000	Valid	Q16	.761	.000	Valid
Q2	.583	.000	Valid	Q17	.698	.000	Valid
Q3	.690	.000	Valid	Q18	.664	.000	Valid
Q4	.897	.000	Valid	Q19	.819	.000	Valid
Q5	.911	.000	Valid	Q20	.884	.000	Valid
Q6	.568	.000	Valid	Q21	.919	.000	Valid
Q7	.845	.000	Valid	Q22	.879	.000	Valid
Q8	.896	.000	Valid	Q23	.887	.000	Valid
Q9	.846	.000	Valid	Q24	.873	.000	Valid
Q10	.846	.000	Valid	Q25	.820	.000	Valid
Q11	.942	.000	Valid	Q26	.827	.000	Valid
Q12	.797	.000	Valid	Q27	.759	.000	Valid
Q13	.894	.000	Valid	Q28	.811	.000	Valid
Q14	.928	.000	Valid	Q29	.839	.000	Valid
Q15	.760	.000	Valid	Q30	.787	.000	Valid

Table 5 is the result of testing the reliability of measuring instruments or questionnaires in this study. The limit value of the reliability coefficient of the measuring instrument that can be accepted is 0.60 [25]. All items meet the reliability requirements, namely having Cronbach's alpha value above 0.60, and can be said reliably.

Table 5. RELIABILITY TEST RESULT

Reliability test		
Indicator	***Cronbach's Alpha***	***Status***
P	0.974	Reliable
Q	0.981	Reliable

B. Preparation of the Planning matrix in the House of Quality

The planning matrix is divided into the level of interest of the respondents to determine the extent to which they value expectations, the level of student satisfaction, the value of the target (goal), the increase ratio, sales point, raw weight. And the normalized raw weight. The weight of each aspect can be seen in table 6.

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Table 6. HOUSE OF QUALITY MATRIX

No	*Requirement Weight*	*Sales Point*	*Raw Weight*	*Normalizes Raw Weight*	*Satisfaction*	*IR*
V1	4.47	1.50	7.86	0.04	4.27	1.17
V2	4.52	1.20	6.37	0.81	4.25	1.18
V3	4.39	1.00	5.12	0.80	4.29	1.16
V4	4.27	1.00	4.99	0.98	4.27	1.17
V5	4.37	1.00	5.09	1.02	4.29	1.16
V6	3.91	1.00	4.91	0.96	3.99	1.25
V7	4.61	1.50	7.69	1.57	4.49	1.11
V8	4.52	1.50	7.83	1.02	4.33	1.16
V9	4.60	1.50	7.92	1.01	4.35	1.15
V10	4.57	1.50	7.75	0.98	4.42	1.13
V11	4.59	1.50	7.78	1.00	4.42	1.13
V12	4.54	1.00	5.12	0.66	4.44	1.13
V13	4.43	1.00	5.10	1.00	4.34	1.15
V14	4.48	1.50	7.70	1.51	4.36	1.15
V15	4.68	1.50	7.85	1.02	4.47	1.12
V16	4.71	1.00	5.24	0.67	4.50	1.11
V17	4.56	1.50	7.65	1.46	4.47	1.12
V18	4.63	1.50	7.76	1.01	4.48	1.12
V19	4.69	1.50	7.82	1.01	4.50	1.11
V20	4.56	1.50	7.63	0.98	4.48	1.12
V21	4.63	1.50	7.79	1.02	4.46	1.12
V22	4.44	1.00	5.03	0.65	4.41	1.13
V23	4.41	1.00	5.07	1.01	4.35	1.15
V24	4.36	1.00	5.02	0.99	4.34	1.15
V25	4.22	1.00	4.94	0.98	4.27	1.17
V26	4.06	1.20	5.88	1.19	4.14	1.21
V27	4.50	1.50	7.62	1.29	4.43	1.13
V28	4.41	1.50	7.52	0.99	4.39	1.14
V29	4.61	1.50	7.79	1.04	4.44	1.13
V30	4.36	1.50	7.35	0.94	4.45	1.12

C. Determination of technical response

The technical response in this study refers to the Information System section of ITtelkom Surabaya to meet the needs of students. The researcher conducted a Focus Group Discussion (FGD) with the Information Systems ITTelkom Surabaya. The technical response used is based on the documents of the ITTelkom Surabaya information system division regarding management contracts. This document is used as a reference in developing I-Gracias to suit the needs of consumers, especially students. The technical responses obtained from the information system manager are as follows:

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Table 7. TECHNICAL RESPONSE

No	Technical Response
1	There is a management target every year.
2	Modules will be updated or added as needed.
3	Perform periodic checks I-Gracias
4	Coordinate with other units
5	In the process of adding a student achievement module
6	In the process of adding a counseling module
7	Receive criticism and suggestions regarding the I-Gracias system
8	Recruiting employees as needed
9	Socialization related to the use of the I-Gracias feature

After knowing the value classification, the next step is to analyze the relationship between consumer needs and technical responses, as shown in Figure 4. After determining the relationship between consumer needs and technical characteristics, the next step in compiling a correlation matrix is identifying the correlation between technical characteristics. The following are symbols and the degree of relationship between technical characteristics. Based on Figure 4 can be seen that there are no contradictory or negative technical characteristics, so there is no need for elimination. The picture combines all the technical characteristics and attributes. Figure 4 explains two types of data in making the HOQ: the level of importance to the technical response and the target for the technical response.

D. Correlating Voice of Consumer (VOC) and technical response Matrix

The correlation between Voice of Customer and technical response is carried out through Focus Group Discussions between Researchers and IT Support. The 30 attributes used are mapped with technical responses following the rules in Quality Function Deployment by determining the relationship between the two. If there is a strong relationship, it can be given a score of 9 by mark "●. " If the relationship between the attribute and technical response is of moderate value. A score of 3 is given. It is equal by giving a "○" mark, and if the relationship between the two is weak, a score of 1 or a "▽" mark can be given. ". This score is obtained based on the rules on the QFD model used.

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Column #						1	2	3	4	5	6	7	8	9						
Row #	Weight Chart	Relative Weight	Importance Level	Maximum Relationship	Consumer Need / Technical Requirements	There is a management target every year.	Modul akan diperbarui atau akan ditambah sesuai dengan kebutuhan	Perform periodic checks I-Gracias	Coordinate with other units	In the process of adding a student achievement module	In the process of adding a counseling module	Receive criticism and suggestions regarding the I-Gracias system	Recruiting employees as needed	Socialization related to the use of the I-Gracias feature	Tingkat Kepuasan	Goal	Improvement Ratio	Sales Point	Normalized Raw Weight	Row #
1		3%	4.47	9	Personal data information	○	○	▽	●	○		●	○	●	4.27	5	1.17	1.50	0.04	1
2		3%	4.52	9	Information on registration for competitions, scholarships and other events	●	○	▽	●	●		○	▽	○	4.25	5	1.18	1.20	0.81	2
3		3%	4.39	9	Application for dispensation	●	●	○	●			○	○	○	4.29	5	1.16	1.00	0.80	3
4		3%	4.27	9	Student counseling registration	●	○	▽	●		●	○	○	○	4.27	5	1.17	1.00	0.98	4
5		3%	4.37	9	Record student counseling results	○	●	●	●		●	○	▽	○	4.29	5	1.16	1.00	1.02	5
6		3%	3.91	3	The process of uploading proof of semester bill payment	▽	○	○	○			○		○	3.99	5	1.25	1.00	0.96	6
7		3%	4.61	3	Information about billing payments each semester	▽	○	○	○			○		○	4.49	5	1.11	1.50	1.57	7
8		3%	4.52	9	Financial free validation for graduation administration	○	○	○	●			○	○	○	4.33	5	1.16	1.50	1.02	8
9		3%	4.60	9	information and submission of application for practical work	○	●	○	●			○	○	○	4.35	5	1.15	1.50	1.01	9
10		3%	4.57	9	Submission of an application for permission to collect data for the final projec	○	○	○	●			○	○	○	4.42	5	1.13	1.50	0.98	10
11		3%	4.59	9	Application for internship cover letter	○	●	○	●			○	○	▽	4.42	5	1.13	1.50	1.00	11
12		3%	4.54	3	Application for a temporary transcript of grades	○	○	○	○			○	○	▽	4.44	5	1.13	1.00	0.66	12
13		3%	4.43	9	Letter of application for college leave, active Return and resignation	○	●	○	●			○	○	○	4.34	5	1.15	1.00	1.00	13
14		3%	4.48	9	Request for data collection for college assignments	○	○	○	●			○	○	○	4.36	5	1.15	1.50	1.51	14
15		3%	4.68	9	Information on accreditation certificates, legalization of diplomas and transcripts	○	○	○	●			○	○	●	4.47	5	1.12	1.50	1.02	15
16		4%	4.71	3	Information on all course grades	○	○	○	○		○	○	▽	○	4.50	5	1.11	1.00	0.67	16
17		3%	4.56	3	Syllabus information and lecture materials	○	○	○	○			○	▽	○	4.47	5	1.12	1.50	1.46	17
18		3%	4.63	9	Lecture attendance information	○	○	●	○			○		○	4.48	5	1.12	1.50	1.01	18
19		3%	4.69	3	information on class schedules and exams	○	○	○	○			○		○	4.50	5	1.11	1.50	1.01	19
20		3%	4.56	9	Information on the process of the Final Project until the trial	●	○	○	●			○	○	●	4.48	5	1.12	1.50	0.98	20
21		3%	4.63	9	Input TAK	○	●	○	●	●		○		●	4.46	5	1.12	1.50	1.02	21
22		3%	4.44	9	Training related to foreign language education	○	●	○	●			○	○	●	4.41	5	1.13	1.00	0.65	22
23		3%	4.41	3	Complaints and help desk	○	○	○	○			○	○	▽	4.35	5	1.15	1.00	1.01	23
24		3%	4.36	3	equivalence menu (course equalization)	○	○	○	○			○	○	○	4.34	5	1.15	1.00	0.99	24
25		3%	4.22	9	Borrowing tools or space	○	●	○	●			○	▽	○	4.27	5	1.17	1.00	0.98	25
26		3%	4.06	3	Guardianship with guardian lecturer	○	○	○	○			○	▽	○	4.14	5	1.21	1.20	1.19	26
27		3%	4.50	9	Career development information	○	●	○	○			○	▽	○	4.43	5	1.13	1.50	1.29	27
28		3%	4.41	9	Quickly pick up the Study Plan Card (KRS)	○	○	○	○			●	○	○	4.39	5	1.14	1.50	0.99	28
29		3%	4.61	9	Recommended elective courses that can be taken	○	○	○	○			○	○	●	4.44	5	1.13	1.50	1.04	29
30		3%	4.36	9	Responsive Helpdesk and IT Support	●	○	○	○			●	○	○	4.45	5	1.12	1.50	0.94	30
					Max Relationship	9	9	9	9	9	9	9	3	9						
					Technical Importance Rating	386.2	479.7	320.5	620.9	71.38	68.5	359.2	203.6	402.3						
					Relative Weight	13%	16%	11%	21%	2%	2%	12%	7%	14%						
					Weight Chart															
					Priority	4	2	6	1	8	9	5	7	3						

Figure 4. RELATIONSHIP BETWEEN CHARACTERISTICS AND TECHNICAL RESPONSE

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Based on the matrix of the relationship between technical response and consumer needs in Figure 4, the highest priority for technical response is shown in table 8.

Table 8. PRIORITY CALCULATION RESULT

No	Technical Response	Technical Importance rating	Relaive Weight	Priority
1	There is a management target every year.	366.2	13%	4
2	Modules will be updated or added as needed.	479.7	16%	2
3	Perform periodic checks I-Gracias	320.5	11%	6
4	Coordinate with other units	620.9	21%	1
5	In the process of adding a student achievement module	71.38	2%	8
6	In the process of adding a counseling module	68.5	2%	9
7	Receive criticism and suggestions regarding the I-Gracias system	359.2	12%	5
8	Recruiting employees as needed	203.6	7%	7
9	Socialization related to the use of the I-Gracias feature	402.3	14%	3

IV. CONCLUSION

The research concludes that the goal value for each attribute of interest is given 5 points so that the service is given optimally. The sales point value is given a maximum value of 1.5 for providing top service to students. Based on the weighting and normalization of attributes, the priority for repairs can be sorted sequentially, namely coordinate with other units, which means that each section head must coordinate to make I-Gracias improvements with a relative weight value of 21%. The second is that modules will be updated or added as needed. These modules are adapted to academic and student activities with a relative weight value of 16%. The third order is the socialization related to using the I-Gracias feature for students and users to make it easier to understand when I-Gracias undergoes changes or updates with a relative weight value of 14%. The fourth-order meets the management target, which means that each unit has a better target for I-Gracias improvement with a relative weight value of 13%. The fifth order accepts criticism and suggestions from students and users with a relative weight value of 12%. The sixth is that IT Support development should periodically test or check I-Gracias to find shortcomings and problems with a relative weight value of 11%. The seventh order is to recruit employees. Suppose the IT Division needs experts in specific fields in IT Support development with a relative weight value of 7%. In that case, the eighth order is to add student achievement features to facilitate student academic transcripts by 2%. The last is to add a counseling module between

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students and student psychologists by 2%. At the same time, the highest satisfaction value for Consumer needs attributes relates to information on the value of all courses quickly at 4.50, displaying and printing test schedules of 4.50, payment information every semester, and features related to the final project 4.80. All attributes have an average level of satisfaction of 4.37.

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