

Quality Function Deployment Analysis for Improvement of Practicum on Mechanical Engineering Education University of Palangka Raya

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Abstract—The implementation of the practicum by the mechanical engineering education program becomes an important part because it provides experience in strengthening the students skills. From the results of observations made to students participant practicum production process II, got some things into the main desire. Of the 6 attributes of the need then the management of Technical Response to answer what the needs of respondents. The team set up a technical response to address the critical issues demanded by respondents using the House of Quality that has received the highest priority increase from the Technical Response as proposed to the faculty with the practicality required for the laboratorium material and additional strengths that contribute approximately 30.3%, set up a practical schedule and dividing the practical group contributed 19.5%. The addition of the proposed class has a 15.3% contribution and set up a practical schedule with a practical implementation target involving a block system where it contributes up to 14%. Then proceed with the next step to provide guidance and instruction for laboratory staff before starting practical activities around 6.2% and rearranging administrative service SOPs to be simpler and relatively increase 41% contribution.

Keywords—*quality function deployment; laboratory; house of quality*

I. INTRODUCTION

Law Number 20 of 2003 concerning the National Education System Article 21 states that: "Vocational education is a level of secondary education that prepares students especially to work in certain fields". So that it can be concluded, the function of vocational education prepares graduates to become productive workers who are ready to enter the workforce and are able to develop professional attitudes in the vocational field. Graduates also become productive individuals who are able to work as intermediate workers and have readiness in job competition [1].

To achieve this goal the learning activities of the lab in the laboratory, workshop or workshop must be carried out. This is regulated in the Minister of Education and Culture Regulation Number 49 of 2014 concerning National Standards of Higher Education, in article 14 Paragraph d; "Practicum, studio

practice, workshop practice, or field practice;" [2]. Understanding of the laboratory according to the Indonesian Dictionary, is a certain place or room which is equipped with equipment to conduct experiments [3].

According to the Regulation of the Minister of Administrative Reform Number 3 of 2010, Article 1, namely "Laboratory of education, hereinafter referred to as a laboratory is an academic support unit in educational institutions, in the form of closed or open spaces, permanent or mobile, systematically managed for testing, calibration, and / or production on a limited scale, by using equipment and materials based on certain scientific methods, in the framework of implementing education, research and / or community service" [4].

The role and function of the laboratory is not just a building, but more than that is a place to conduct educational activities, research students and lecturers, and or a place of production of certain materials based on their respective types of knowledge. According to Government Regulation Number 5 of 1980, concerning University Principles or State Institutions, in Article 1 Point g; "Laboratories / studios are supporting facilities in the fields of education and teaching, research, and community service". Government Regulation Number 5 of 1980, Article 28; "Laboratory / Studio has the task of carrying out activities in certain branches of science, technology or art as supporting the implementation of the Department's main tasks in accordance with the provisions of the relevant field" [5].

Then confirmed in Article 29; To carry out these tasks in Article 28, the Laboratory / Studio has the functions: (a) preparing supporting facilities to carry out education and teaching in one or part of certain branches of science, technology or art in accordance with the relevant field of study; (b) preparing supporting facilities to carry out research in one or more branches of technology, or certain arts in accordance with the field of study concerned. The implementation of practicum activities by the Mechanical Engineering Education Study Program is intended or intended as a process that provides opportunities for students to test and carry out the learning that has been obtained in the lectures [5].

Practicum activities that have been carried out are in accordance with the courses that have been taken by each student. The ratio of the number of equipment to the number of students is based on References of assessment standards. The ideal ratio of the number of tools and students is 1:1. Implementation of the practicum still does not meet of standard assessment criteria. To overcome this problem, the welding practicum activity uses the first regulation of assessment standards references 1:2. Observations were made on 16 students to find out how assessment the participants of Production Process II practicum. The assessment criteria used are divided into 5, namely; excellent, very good, good, enough and Poor. From the results of the assessment criteria, obtained a percentage that is as much as 12.5% gave a good rating, 31.25% said it was good enough, 56.25% of respondents said it was not good, and on the criteria of "excellent" and "Poor" respondents did not give an assessment or as much as 0%. The distribution of assessments given by respondents regarding the implementation of practicum activities is shown in table 1.

TABLE I. ASSESSMENT CRITERIA RESPONDENTS ON PRACTICAL IMPLEMENTATION OF PRODUCTION PROCESS 2016/2017

Assessment criteria	Survey Results	Percentage Rate (%)
Excellent	0	0
Very Good	2	12.5
Good	5	31.25
Enough	9	56.25
Poor	0	0

To identify what is the respondent's complaint, an interview is conducted to find out what their complaints are at the practicum. The research variables referred to are components that are related to practicum implementation. According to Sonhadji, the implementation of the practicum required preparation, explanation, demonstration, assignment, evaluation of the process and results of activities [6].

The interview was conducted to find out what the respondent's complaints were at the implementation of practicum. The research variable in question is a component related to the implementation of the practicum. According to Sonhadji, the implementation of practicum requires preparation, explanation, demonstration, assignment, evaluation of processes and results of activities [6].

Components related to the implementation of practicum are education and training programs, human resources, facilities, education management, students and costs. Based on preliminary observations, the interview guidelines were divided into 3 dimensions, namely is facilities, human resources and practicum activities with each quality indicator, as shown in table 2.

TABLE II. TYPES OF COMPLAINTS ARE BASED ON THE QUALITY INDICATOR

Dimension	Quality Indicator	Complaint Result
Facilities	Availability of welding tools (welding machines)	7
	Availability of Practicum Room	1
	Availability of practicum materials	14
	Electricity/ electricity network availability	2

Table 2. Cont.

Human Resources	Laboratory Skills demonstration tool	2
	Availability of personnel administration of the laboratory	6
Practicum Activity	Suitability between learning in class and practicum	2
	Schedule of practicum implementation	4

There are still complaints from students regarding the implementation of practicum activities, it is can indicated that the implementation practicum has not been maximum. From identification of the problem, what will be the problem will be formulated, namely recommendations for improvement of practicum implementation by using Quality Function Deployment (QFD). According to Wahyu in Munawir, et al., Quality Function Deployment (QFD) or the distribution of quality functions is a tool used to support the implementation of total quality management and quality improvement programs [7].

II. RESEARCH METHODOLOGY

The location of the research was carried in the Teaching and Education Faculty of Program Mechanical Engineering Education University of Palangka Raya. Research respondents were students participating in Production Process II practicum activities in the academic year 2016/2017. Data collected in this study is primary data obtained through questionnaires that contain a list of questions consisting of variables, sub variables, dimensions and items or statement attributes.

A. Identification of Research Variables

Sugiyono, states that the research variable is anything in the form of what is determined by the researcher to be studied so that information is obtained about it, which conclusions can then be drawn. In conducting research, the research variables should be determined based on 3 dimensions, namely facilities, human resources and activity activities with each quality indicator as shown in table 3. This is so that the research variables are relevant to the research objectives and can be observed and can be measured and does not cause errors in data collection and processing [8].

TABLE III. OPERATIONAL VARIABLES IN LEARNING QUALITY

Dimension	Quality Indicator
Facilities	Availability of welding tools (welding machines) (X11)
	Availability of Practicum Room (X12)
	Availability of practicum materials (X13)
	Electricity/ electricity network availability (X14)
Human Resources	Laboratory Skills demonstration tool (X21)
	Availability of personnel administration of the laboratory (X22)
Practicum Activity	Suitability between learning in class and practicum (X31)
	Schedule of practicum implementation (X32)

B. Determination of Research Samples

The research sample used was divided into 2, namely the sample of the preliminary questionnaire and the actual questionnaire sample. The method used to take samples using Non Probability Sampling. According to Sugiyono this method is a sampling technique that does not provide equal opportunities or opportunities for each element or member of the population to be selected as a sample. In the technique of determining the sample using the Accidental Sampling method, which is based on chance, anyone who incidentally meets a researcher can be used as a sample, if it is considered that the person found suitable is chosen as a respondent in the study [9].

According to Supranto the number of samples used in the study had a minimum requirement of 30 respondents or more [10]. According to Roscoe quoted in Sugiyono, the size of the study sample that is feasible to use ranges from 30 to 500 respondents. All students participating in the production process II odd semester 2015/2016 and 2016/2017 academic year as many as 30 people were used as samples, so that they met the minimum criteria suitable for use in the study [9].

C. Research Measurement Tool

Quality Function Deployment (QFD) defined by Akao is a methodology for translating consumer desires and needs into a product design that has certain technical requirements and quality characteristics [11]. Cohen states QFD as a structured method for planning and developing thus enabling the development team to classify consumer desires and needs, evaluate each of the uses of the ability of products or services systematically to meet consumer needs [12]. QFD implementation uses House of Quality which consists of several parts / submatrix, which are interconnected with each other in the House of Quality Musyarofah [13].

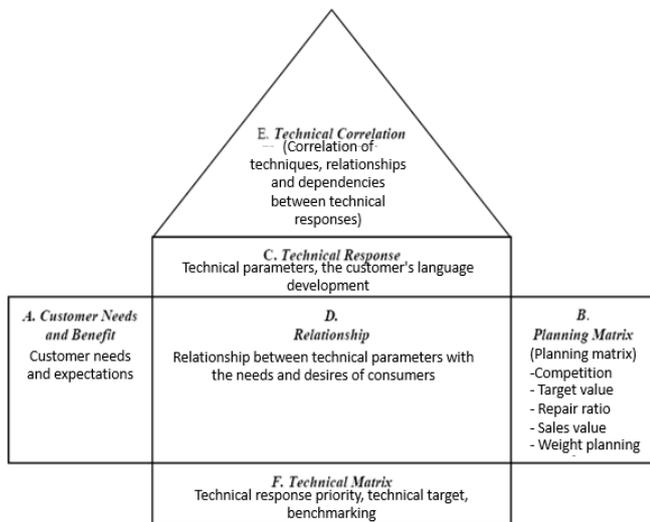


Fig. 1. House of Quality Matrix [12]

- Customer Needs and Benefits (A); namely a matrix that describes the desires and needs of consumers through Voice of Customer [12]. The data used is qualitative

data, generally obtained through surveys, discussions, interviews and other techniques.

- Planning Matrix (B), quantitative data used in this section, aims to indicate the level of importance, customer satisfaction to the product or service that has been provided.
- Technical Response (C), is part of The Hows whose function is to answer what is Voice of Customer (The Whats). Consisting of data or technical capabilities of the manufacturer related to the development of the planned product or service. This is a response or response to meet the needs and desires of customers in part A.
- Relationship (D) This stage is a step to determine the strength of the relationship between technical responses in the section of The Hows (C) to the user's needs on The Whats (A).
- Technical Correlation (E), this submatrix is a technical correlation section that contains an assessment of the relationship between technical responses. The aim is to map whether the relationships are mutually supportive or contradictory. Also referred to as the roof of the House of Quality.
- Technical Matrix (F), there are various information, such as technical performance targets that have been set according to resources owned by agencies or companies

III. RESEARCH RESULT

Instrument Validity and Reliability Test Test the validity of the preliminary questionnaire and the actual questionnaire, this is intended to show the score as desired. This test is constructive, where the validity concerning the theoretical variables to be measured. Test calculations are carried out with the SPSS version 21.0 program.

A. Validity Test

Validity test R table value at the significance level of 0.05 with the number of data as many as 30 respondents, then with $df = 2$ obtained r table of 0.361. If there is a r count $<$ r table the item is invalid, as shown in table 4. The variables X11 and X31 are discarded because they have a value smaller than $<$ r table 4.

TABLE IV. VALIDITY RESULT

Var	r	Perception		Espectation	
		r ^{hit} n=30, df=28		r ^{hit} n=30, df=2	
X11	0,361	0.80	Valid	0.2	Not Valid
X12	0,361	0.71	Valid	0.43	Valid
X13	0,361	0.67	Valid	0.59	Valid
X14	0,361	0.67	Valid	0.57	Valid
X21	0,361	0.54	Valid	0.65	Valid
X22	0,361	0.39	Valid	0.87	Valid
X31	0,361	0.35	Not Valid	0.76	Valid
X32	0,361	0.67	Valid	0.56	Valid

From table 4, it can be seen that the validity test on performance tests and interests results in $r_{count} > r_{critical}$. From the test results, all items are valid, so it can be concluded and stated that the questionnaire will be used in the actual questionnaire.

B. Reliability Test

Reliability test used Alpha Cronbach method, Alpha coefficient. From the perception level test output it can be seen that the Cronbach Alpha value shows the number 0.855 (shown in table 5). This value is above the Alpha Cronbach value > 0.60 so it can be stated that all questions are reliable.

TABLE V. PERCEPTION LEVEL RELIABILITY TEST RESULTS

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.855	.854	8

To test the output level of expectations, in Table 6, Cronbach Alpha value indicates the number 0.846. This value is already above the Cronbach alpha values > 0.60 so that it can be stated that all the questions have been reliably.

TABLE VI. EXPECTED RELIABILITY LEVEL TEST RESULTS

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.846	.835	8

C. House of Quality

The final result of the quality home analysis can be seen based on the weighting value. Of the 6 respondents' needs, there are some needs that have the highest weighted values in sequence. The availability of electricity / electricity network has a weight of 22.87 with a target value of 5, for the availability of practicum room weight value of 20.02 with a target value of 5, the availability of practicum material has a weight of 16.65 with a target value of 5, the availability of administrative personnel has a weight value of 16.12 with the target value 3, laboratory skills demonstrate the tool has a weight of 12.54 with a target value of 3 and the practical schedule has a value of 11.21 with a target value of 4.

Judging from the targets to be achieved in columns 1 - 8, the main priority of improvement is to submit proposals to the Faculty with practical requirements for practicum materials and addition of electrical power having a contribution of 30.3%, for the second priority is to prepare a practicum schedule and group practice. which contributed 19.5%. The solution to submit a proposal to add a room to the Faculty / Rectorate to meet the minimum criteria for space has a contribution of

15.3%, and the action to set a practicum schedule with the target of practicum with the block system has a contribution of 14%. Then proceed with steps to provide briefing / direction to the laboratory before starting practicum activities with 10.6% contribution, arranging a schedule in accordance with the competence of the Laboratory Assistant with a 6.2% contribution and rearranging the administration service (standar operation procedure / SOP) more simply and quickly having a contribution of 4.1%.

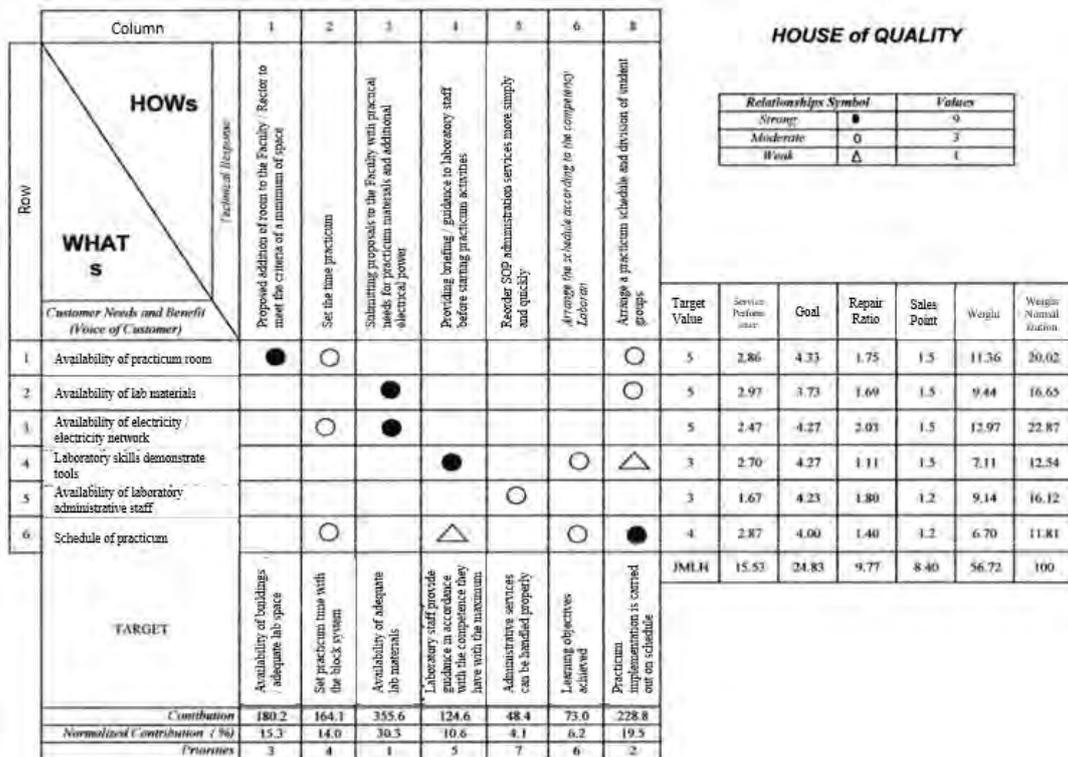


Fig. 2. House of quality.

According to Tjiptono, the perspective of core product solution services alone is not enough, but on the contrary the crucial factor that is emphasized is the development of every element of customer relations that integrates all types of services in one overall package. Priority through the House of Quality (figure 2.) shows the sequence of technical response implementation that can be developed by Mechanical Engineering Education Study Program by focusing more on service improvement based on the technical response that has the highest priority [14].

IV. CONCLUSION

From the results of data processing, it can be identified that the management is still not maximal in providing its services. The respondent's need for practicum materials and the addition of electrical power has the first priority that must be corrected by the management, the second priority is to prepare a practicum schedule and arrange the practicum group distribution. The management steps to submit a proposal to add a room to the Faculty / Rectorate to meet the minimum criteria for space to be the next priority and the regulation of the practicum schedule with the implementation of the practicum with the block system as the 4th priority. provide briefing / direction to laboratory staff before starting practicum activities, arranging schedules according to the competence of the Laboratory and rearranging the administrative service SOP more simply and quickly

Some suggestions that can be given include the following: policy making is to pay attention to and follow priorities that make the most contribution first. Taking into account the priority scale as an improvement effort will certainly have the greatest impact of change. The management also needs to conduct periodic and consistent evaluations that need to be carried out to determine the extent to which improvements have been made.

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