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Quality Improvement of Woods Product using the Quality Function Deployment (QFD) Method at PT. X

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Abstract. PT. X is a company engaged in manufacturing Finger Joint Laminated Board (FJLB) wood. The product manufacturing process is controlled by the product quality control section. However, in the implementation, there are product defects during the production process. Based on 2018 data, the percent yield of 25% mercury pine and 20% rubberwood. From extracted material which can be processed, there are wood parts which are discarded at each stage of the process because they are not in accordance with the desired wood specifications and there are defects such as wood eyes, rot, there are skins, cracks, twists, incompatible sizes and pointed or diameter ends less. The number of defects during 2018 is 22.05%. Quality improvement is carried out by using the Quality Function Deployment (QFD) Phase II method. Determination of product critical parts by using Quality Function Deployment (QFD) Phase II was obtained from the results of calculations using the Phase Function Quality Function Deployment (QFD) method. The result of Quality Function Deployment (QFD) Phase II shows the highest priority of critical part is the ability to laminate machines to have a value of difficulty level of 4 and the degree of importance is 17% and an estimated cost of 18%.

BACKGROUND

The importance of QFD as a tool of the fact that consumers and customers are forced to try to organize the project in fulfillment in accordance with the instructions that have been made in the form that has been submitted. As the results obtained include institutional documents, general reference points used for design improvement and successive analysis of details.

QFD Phase I showed that the attributes that had the highest degree of difficulty from the highest to the lowest were the merging time, cutting speed, drying time, storage time, cutting accuracy and preservative composition. The value of the difficulty level of production speed is 5 and the importance degree is 25%. However, further improvements need to be done by making improvements to critical parts of the wood product production process to reduce the level of product defects.

Phase II (Part Deployment Matrix) is carried out a comparison between product characteristics and part requirements which are the most important components in the product so that critical parts of a product can be determined. This is done to find out the critical parts on FJLB products.

Previous research establishes the conceptual design of mobile or portable health devices in the future using quality development functions[1]. Phase II is made a model of analyzing the data needs of materials or components that are able to meet the target value design criteria in the first phase. In this case it is done by translating the determination of Customer Requirements (DRs) into Critical Parts Characteristics (PCs) [2].

METHODOLOGY

The research objective is to determine the critical parts of the product to make improvements to product defects. The study was conducted by collecting data with literature studies, observations, interviews and questionnaires. The questionnaire used was the critical part questionnaire. The sampling technique used is the type of non-probability sampling used, namely total sampling.

The steps in making a QFD Phase II quality house are as follows:

1. Determination of priority technical characteristics based on Quality Function Phase I.
2. Determination Degree of importance of priority technical characteristics
3. Determination of the characteristics of components / critical parts
4. Determination of the relationship between the characteristics of components / critical parts
5. Determination of relationship level of product amongst the characteristics of components / critical parts with priority technical characteristics
6. Compilation of the House of Quality Phase II matrix [3][4]

The steps of the research process can be seen in Figure 1.

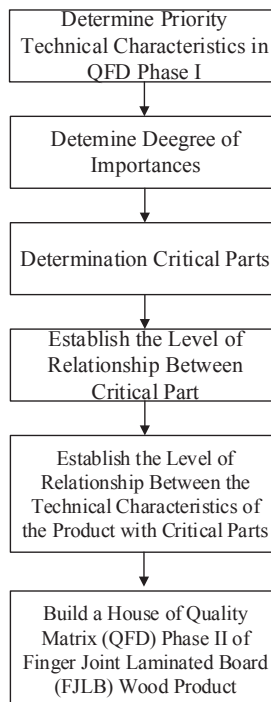


FIGURE 1. Research steps

RESULT AND DISCUSSION

Data collection

The questionnaire was given to the company management, namely the production manager. The critical part questionnaire contains questions about critical matters during the production process. The results of the questionnaire are used in data processing using QFD Phase II. Priority characteristic data is obtained from QFD Phase I processing.

Building the house of quality (HOQ) matrix phase II

Establishment of priority technical characteristics in QFD phase I

The input to be used in QFD Phase II is the result of QFD Phase I. For this step the technical characteristics that become priority are searched to determine the main weight, importance level, and estimated cost. Priority technical characteristics are obtained based on previous calculations using Phase Function Quality Deployment (QFD) I [5]. Priority technical characteristics in Phase I of QFD can be seen in Table 1.

TABLE 1. Results of Identifying Consumer Requirements

No.	Technical Characteristics
1	Duration of merger
2	Cutting speed
3	Drying time
4	Storage time
5	Accuracy of cutting
6	Preservative composition

Establishment of degrees of importance

The degree of importance is decided based on the level of difficulty of each priority characteristic in the QFD Phase I matrix. Result for the calculation of the level of importance is obtained from the open questionnaire. The degree of importance of each process technical characteristic can be found in Table 2.

TABLE 2. Degrees of Interest Technical Characteristics

No.	Technical Characteristics	Dof
1	Duration of merger	2
2	Cutting speed	4
3	Drying time	3
4	Storage time	3
5	Accuracy of cutting	3
6	Preservative composition	5

Establishment of critical part

The critical part is the selected technical needs to be developed transformed into a more technical concept design or factors that have important things that affect the quality of the product. The next step after establishing the priority of technical characteristics in developing Phase II HoQ is to establish a critical part in the planning of the production process. Establishment of the critical part is an analysis of the parts that are important / critical to the product produced [6]. Establishment of critical parts of product is based on discussions and interviews with the manager of the production. Meanwhile the critical part of FJLB wood products in more detail can be seen in Table 3.

Establish the level of relationship between critical part

At this phase, the level of the relationship among each critical part is determined to be confirmed whether there is a strong, weak or unrelated relationship between the critical parts.

Determination of the level of relationship amongst each of the existing technical characteristics is based on the following symbols:

V: shows a strong positive relationship = 4

4. Value 0: indicates no relationship at all [7]

The result of the relationship between technical characteristics and critical parts can be seen in Figure 3.

	Wood age	Diameter of log	Boiler temperature	Water content	The thickness of the glue	Storage stick	Finger joint	Laminating machine capability
Duration of merger	3	3	3	0	1	9	1	9
Cutting speed	1	0	1	9	3	3	9	0
Drying time	3	3	1	3	0	1	9	3
Storage time	9	3	3	0	1	3	3	1
Accuracy of cutting	3	1	0	3	3	1	1	3
Preservative composition	3	3	3	3	3	3	0	9

FIGURE 3. The Relationship Between Technical Characteristics and Critical Parts

House of quality (HOQ) phase II wood product matrix

The final step is to build QFD Phase II consists of three consideration, namely importance level, difficulty level, and estimated cost [8].

Determination of the degree of importance, level of difficulty, and estimated costs can be found in Table 4.

TABLE 4. Difficulty Levels, degree of importance and Estimated Costs

Degree of difficulty	3	2	2	3	2	3	3
degree of importance	15	9	8	12	8	14	16
Cost estimation	14	9	9	14	9	14	14

QFD Phase II of FJLB wood products can be found in Figure 4.

CONCLUSION

Conclusions obtained from research at PT. Karindo Sakti's sources are as follows:

1. The results of the Quality Function Deployment (QFD) Phase I of Finger Finger Laminated Board (FJLB) wood products indicate that the highest priority of technical characteristics is the duration of incorporation.
2. The results of weighting technical characteristics using the Analytical Network Process (ANP) method of the largest weight value are the merging time, cutting speed, drying time, storage time, cutting accuracy and preservative composition.
3. The results of the Quality Function Deployment (QFD) Phase II of the Finger Joint Laminated Board (FJLB) wood products showed the highest critical part priority was the ability to laminate the machine that have degree of importance of 17 % , difficulty level of 4, and cost estimation of 18 %.

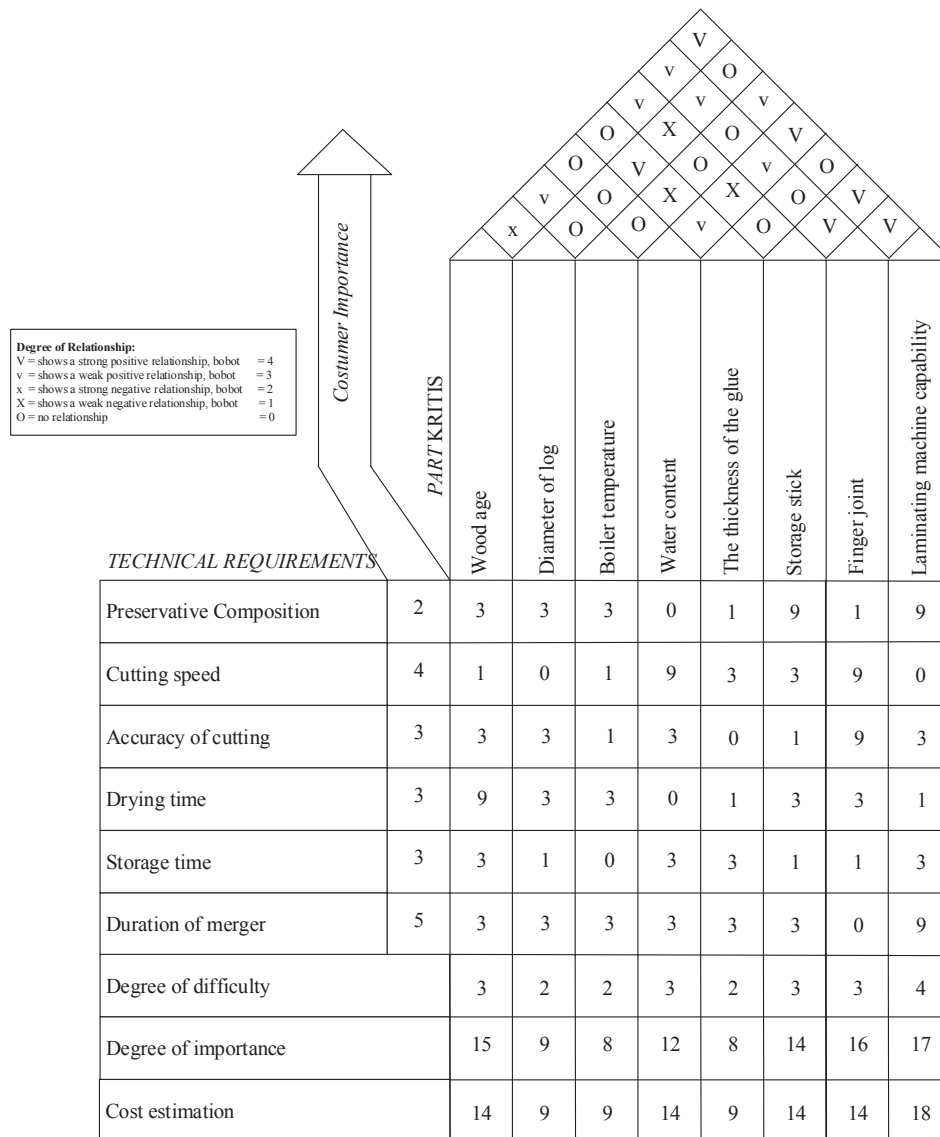


FIGURE 4. QFD Phase II of FJLB Wood Products

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