

NEW PRODUCT DEVELOPMENT FOR DRYER FISH FOR SMEs SCALE WITH QUALITY FUNCTION DEPLOYMENT (QFD) METHOD

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ABSTRACT

Drying fish as a way of preserving the most convenient, inexpensive, and is the oldest preservation method. In terms of energy use, drying by using sunlight is not considered at all costs, but require a large place and a long time for the drying process, especially in the rainy season that rely on weather conditions only. This becomes a problem for the artisanal anchovies in the scale of Small and Medium Enterprises (SMEs), which result in reduced production capacity and lowers their income. Based on this background, this research aims to design and create tools fish dryer to scale SMEs by using Quality Function Deployment (QFD). The stages of this study are as follows, the initial stage is done is to identify the needs of the consumer (customer needs identification) through consumer voice Voices of Customer (VoC) to the product dryer Fish, The next step is to translate the needs of these consumers into technical parameters (technical response) in product design process. Based on the results of the analysis will be made Dryer Fish QFD according to new product development capabilities of researchers that produced the draft Fish dryer can be used optimally without having problem by weather conditions. Tools Fish dryer capable of drying the results of this study as much as 4 kg fish for 2 hours using LPG fuel. The fish dryer has additional features check valve and has an automatic fire.

Keywords : fish dryer, voice of the customer (VoC), quality function deployment (QFD)

INTRODUCTION

Our country has a wider territorial waters than the mainland, so the number of highly abundant marine resources, one of which is a fish. Our fishermen in preserving the fish dried by the drying under the sun, it is a major constraint in terms of increased production because it depends on the weather. Dependence on weather conditions make its own problems for the fishermen. Therefore, we have developed a tool that fish dryer in accordance with the appropriate

requirements appropriate for the fishermen. The products to be developed are drier fish by using Quality Function Deployment (QFD). QFD is a method used to make improvements to the quality of a product based on consumer desires. How to identify consumer desires (the voice of customer), determine the technical description of the function, design and make products drier fish from the analysis of Quality Function Deployment (QFD) is appropriate for SME scale.

Problem Formulation

How is the development of new products for scale fish dryer SMEs to approach of quality function deployment (QFD) method?

LITERATURE REVIEW

The activities of designing and developing products, whether in the form of services and goods, not apart from a marketing concept which aims to meet the needs of customers satisfactory (Cagan & Vogel, 2002). In the context of competition between producers, we can identify the factors of the background for the emergence of design and product development activities (Nasution, 2005). In the phase of concept development, the needs of identified target markets, alternative product concepts generated, evaluated and one or more concepts selected for further development and experiments. The concept is a description of the form, function and appearance of a product and is usually accompanied by a set of specifications, analysis of competitors' products as well as economic considerations projects (Ulrich, 2008).

The concept of Quality Function Deployment (QFD) was first introduced by Dr.Yoji Akao in Japan in 1966. Akao defined QFD as a method to design quality with consumer expectations, then to translate of design the target and point of critical quality, so it can be used face the development of production / services (Akao, 1988). QFD is highly effective management tool, based on expectations of consumers, which is commonly used to control the product development process or develop services in the industry (Cohen, 1995). While the house is quality or commonly called the house of quality is the first stage of which should be applied in the method of Quality Function Deployment (QFD). This matrix converts sound into consumer demand for product designs that have specific targets that have been set. After that, do benchmarking against competitor products to determine the relative positions of the product (Louis, 1995).

RESEARCH METHODS

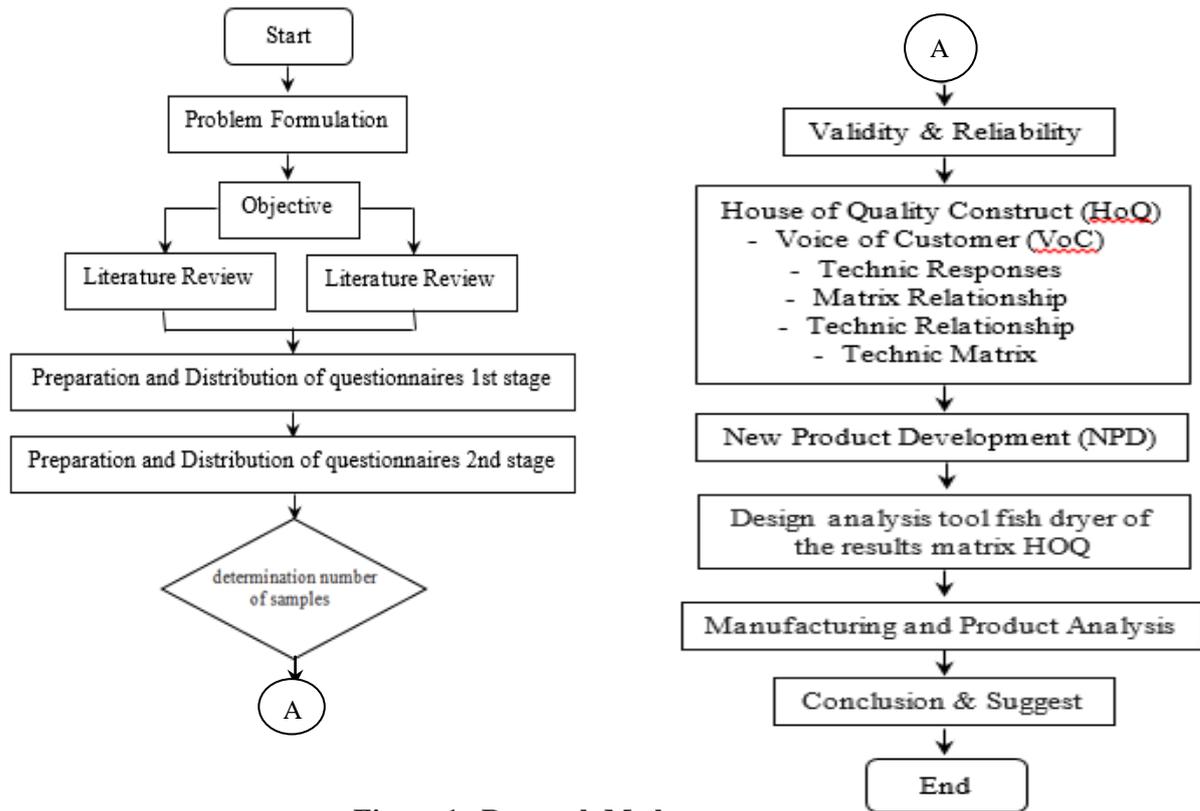


Figure 1. Research Methodology

Data Collection and Data Processing

Data Collection

Data collection phase conducted by researchers to obtain information and data of the object to be examined later . As for how or techniques used in the collection of data in this study are as follows:

a. Compilation and Dissemination Questionnaire Stage 1

To know and identify the things that are desired by consumers (the voice of customer) of the product drier fish that will be made then made the spread of the initial questionnaire to 42 people are craftsmen salted fish traditionally located in the fishing village Kenjeran precisely in the Village Sukolilo, District Bulak Surabaya, in order to obtain qualitative data in the form of attributes that are considered important to evaluate the product drier fish appropriate for the scale of SMEs.

Table 1. Data Attributes Tools Dryer Fish Results Questionnaires Phase 1

No.	Attribute
1.	The drying process is fast fish
2.	Energy saving
3.	Easy to Operate
4.	Safety for Use
5.	The capacity of many fish
6.	Strong and not easily broken
7.	Save labor (operational)
8.	The product price is affordable
9.	Easy to Clean
10.	Easy to Stored
11.	Easy to move
12.	Automation
13.	Attractive Design

b . Compilation and Dissemination Questionnaire Phase 2

The second questionnaire compiled from the results and conclusions of the first questionnaire submission to obtain quantitative data in the form of data of importance (weight), the perceived level of satisfaction and satisfaction levels expected by the respondents of fish products dryers.

Data Processing

a. Determination of Number of Samples Using Bernoulli Method

Phase 2 questionnaire distributed to 42 respondents, from 42 questionnaires distributed phase 2 there is one questionnaire was not filled completely (wrong), so there are 41 questionnaires were considered to be true and to do further processing. Here is the calculation of the amount minimum sample questionnaire with $\alpha = 0.05$ using the Bernoulli formula :

$$N = \frac{(Z_{0.05/2}) \cdot \left(\frac{41}{42}\right) \left(\frac{1}{42}\right)}{0.05^2} \quad N = \frac{(1.96)^2 \cdot (0.98)(0.02)}{0.05^2} = 30.118 \text{ rounded to 31 respondents.}$$

So the minimum number of samples to be dambil in this research is 31 respondents, the 41 questionnaires that truly meets the criteria sampling.

b . Validity Testing Data

If the total value of Pearson correlation of the mark (*) then the item is declared valid enough, if the sign (**) then the item is declared to have high validity. If the value of the correlation coefficient ($r_{\text{count}} \geq r_{\text{table}}$), then the item in question is stated to be correlated significantly to the total score of the item and declared invalid. Value Corrected Item - Total Correlation also compared with the value of r_{table} item is valid when the value of Corrected Item - Total Correlation $\geq r_{\text{table}}$. For the total sample of $N = 41$ and α r value of 0.05, the table is 0.306.

- a. Test Validity Importance (Weight)
All values Corrected Item - Total Correlation \geq r table value of 0.306.
- b. Validity Satisfaction
All values Corrected Item - Total Correlation \geq r table value of 0.306.
- c. Test Validity Expectancy
All values Corrected Item - Total Correlation \geq r table value of 0.306 .
- c. Testing Reliability of Data
Testing with SPSS Software can be obtained menggunakan value and the overall Cronbach's Alpha for each item in question. Criteria of the data is reliable if the Cronbach 's Alpha values \geq 0.6 is considered good (1) Reliability Test Importance value of Cronbach 's Alpha of 0,657, (2) Reliability Test Satisfaction value of Cronbach 's Alpha of 0,818, (3) Expectation Level Test Reliability Cronbach 's Alpha value for 0,726.
- d. Identification Attributes Consumer Interest From the results of questionnaires first stage of qualitative data obtained in the form of attributes that are considered important to evaluate the product Dryer Fish.
- e. Technical characteristics In this section there is a process of translation of the entire consumer (voice of customer) into a development language (voice of developer). Here is the technical characteristics to design products of fish dryers.
- f. Relationship Matrix
In the HOQ matrix made relationships between the attributes of a product with technical characteristics.
- g. Technical correlation
Technical correlation matrix is located at the top and resembles a roof. This matrix also describes the relationships and dependencies among the technical characteristics with the other technical characteristics.

Table 2. Technical characteristics of the dryer Fish Products

No.	Technical characteristics
1.	The drying process by using LPG
2.	Utility cross section of combustion by sand
3.	Using the check valve
4.	Using plated rack
5.	Construction of iron
6.	Giving the wheels on the legs
7.	Giving a handle on body
8.	Fire tunel
9.	Provision of paint on the body

h. Planning Matrix

This section is where targeting/product of interest, based on the interpretation that QFD team of researchers and engineers who will make these products.

1. Importance to Customer
2. Customer Satisfaction Performance
3. Goal
4. Improvement Ratio
5. Sales Point
6. Raw Weight

i. Normalized Raw Weight

Normalized Raw Weight column. By calculating this value, it could have determined the level of importance weight of each consumer desires without forgetting to consider other important matters such as the improvement ratio and sales point . Raw Weight = Importance to Customer x IR x SP contains the value contained in row weight column that has been converted into a percentage.

$$\text{Normalized Raw Weight} = \text{Raw Weight line } i / \text{Raw Weight Total}$$

j. Technical Matrix

This section includes the Technical Response Priorities contain values obtained from the contributions of time between Normalized Raw Weight value with the value of relationship then summed for each column technical characteristics.

Analysis Matrix House of Quality (HOQ)

The end result of QFD is a product development plan . The development plan can be seen on the target value is located at the bottom House of Quality (HOQ). QFD method includes the complete process from identification of problems to achieve its goals for development projects through the birth of a new design specifications in accordance with the wishes of consumers . Priority Levels Consumers desire can be seen in Table 3.

Table 3. Priority Level Needs / wants Consumer Products dryer Fish

Attribute	Raw Weight	Normalized Raw Weight (%)
Automation	10.49	11.85
Easy to Move	8.42	9.52
Man Power saving (operational)	7.45	8.42
Strong / Not Easily Broken	7.42	8.39
The product price is affordable	7.33	8.28

Dryer Product Design

Fish Dryer products Fish is a tool that helps crafters anchovies doing traditional fish drying process. The presence of this tool is expected to facilitate the drying process and can be used in any weather condition.

Preparation and Analysis of Fish Dryer Products

- a. Price and Material Requirements - Material Products Fish dryer . Needs cost of raw materials for the manufacture of dryer Fish IDR . 1.304 million, -
- b. Calculation of Cost of Production (HPP) and Product Sales Price Dryer Fish
- c. Analysis performed on the technical characteristics are a contribution analysis priority to every technical characteristics. Contributions priority will show how big an influence the technical characteristics of the product quality. The greater the value of the contribution, the more need to be prioritized. Priority Product Characteristics dryer Fish can be seen in Table 4.

Table 4. Priority Product Technical Characteristics Dryer Fish

Technical characteristics	Contributions	Relative Contributions (%)	Rangking
Using <i>check valve</i>	1.64	15.46	1
Fire Tunel	1.54	14.48	2
Giving the wheels on the legs	1.19	11.19	3
Using plated rack	1.17	11.06	4
Construction of iron	1.08	10.22	5

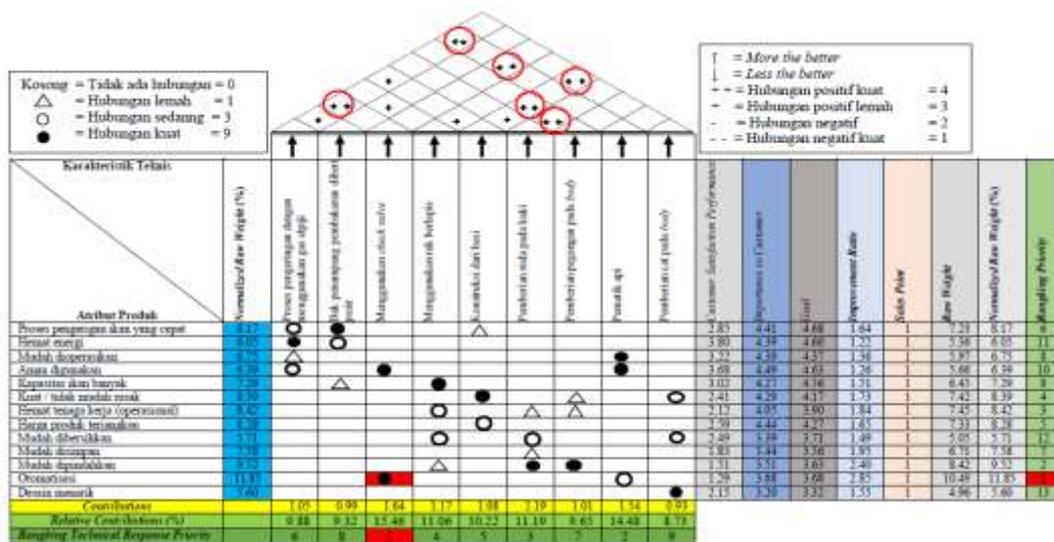


Figure 2. The House of Quality (HOQ) Dryer Fish Products

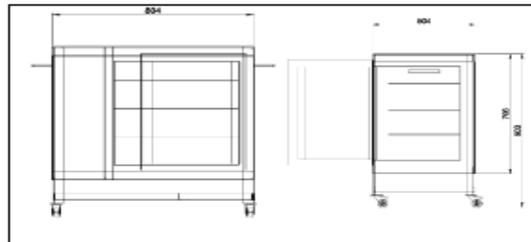


Figure 3. Design Fish Dryer

Total Cost = Total Fixed Cost + Total Variable Cost
 = Total Fixed Cost + (Cost of Raw Materials + Labor Cost)
 = IDR 0 + (IDR 1.304 million + IDR 1,000,000)
 = IDR 2.304 million, -
 So the Cost of Production (HPP) product Fish dryer IDR 2.304 M

c. Preparation and Analysis of Results of Testing Products dryer Fish

Here is the result of making products dryer Fish of the draft that has been prepared by the method QFD :

Table 5. Variable Costs for Making Dryer Fish Products

Work/Job	Utility	Price/Unit (IDR)	Needs (satuan)	Cost (IDR)
Welding	Unit	700.000	1	700.000
Painting	Unit	300.000	1	300.000
Total				1.000.000

Assuming a huge mark -up of producers is calculated at 15 % , are used to determine the sales price of products Fish dryer with the following formula :

Selling price = HPP x (1 + % mark up)
 = IDR 2.304 million x (1 + 15 %)
 = IDR 2.6496 million

So the selling price is Rp Fish dryer IDR. 2.6496 M



Figure 4. Overall dryer Fish Products

Advantages Products Dryer New Fish of Draft Results

Table 6. Comparison Between the Old Fish Products dryer New Fish and dryer Product results of Draft Results

Table 6. Criteria of Product

Criteria	Old Fish Dryer Product	New Fish Dryer Product
Has a check valve as a safety LPG	No	Yes
Having automatic fire tunnel	No	Yes
Easy to Move	No	Yes
Easy to Storage	No	Yes

CONCLUSION AND SUGGESTION

Conclusion

Priority attribute level of needs/desires of consumers (the voice of customer) to the Tools Dryer fish with a value of Normalized Raw Weight 11.85% is automation, 9:52% is easily moved, 8:42% labor saving (operational), 8:39% is strong/not easily broken, 8:26% is the price affordable products. Priorities overview target of the technical characteristics of the product Equipment Dryer Fish from the analysis of QFD is the product dryer Fish use Check Valve with contributions 15:46%, fire tunnel with contributions 14:48%, easily moved by the contributions 11:19%, using a rack plated contributed 11.8% and construction of steel with 10:22%, contributing. Product design results Fish dryer with a length of 804 mm, width 504 mm, height 706 mm Fish dryer and a foot high along with the wheel 17 mm. The result of the manufacture of dryer Fish from the analysis of Quality Function Deployment (QFD) add features check valve, flame cigarette lighter, the addition of wheels on the legs, shelf replenishment and construction of the iron-plated.

Suggestion

Selection of raw materials should be in accordance with a design capacity of drying fish in order to minimize production costs and is expected to be further research related to fish dryer equipment that is more automation.

Limitation and Further Research

Limitation

Research related to the development of fish dryer product still has its limitations. These limitations include fish drier has yet to have automation to control or regulate the temperature in addition to the tools still do not have enough indicators at the time of drying

Further Research

Subsequent research should think about adding automation to control and regulate temperature, able to be machine control can be turned off automatically when drying felt to be sufficient, but it is most important is the use of alternative energy that is cheap and convenient and environment friendly

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