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Adding Value of Crispy Peperek Product Using Quality Function Deployment and Value Added Engineering

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Abstract. Peperek fish production is the seventh largest production in Lamongan, low price of fish has resulted in fishermen's income peperek too low, then if an attempt is prospective fishery products to be processed into other products that have value added. The development of product design used Quality Function Deployment (QFD) method especially the product design phase and value engineering method to analyze added value. The results of this study indicate that processed fish products that consumers demand peperek are crispy peperek (57.5%). Technical requirements regarding products that have the highest contribution value are the materials used are quality materials 0,1441, clean fish condition and repeatedly washed 0,1297, the rest of the cooking oil on fish is minimal 0,1270. Technical requirements regarding packaging that has the highest contribution value are the packaging should be tightly closed 0,1805 and packing not easily broken 0,1800. An alternative design chose by using value engineering method that is the best alternative with original taste crispy peperek, polypropylene plastic packaging, medium fish size, and net of 100 - 125 gram every pack. The added value of crispy peperek products is IDR. 4.692 every pack with a profit rate of 46,92%.

1. Introduction

Lamongan regency has the largest fishing industry in East Java. In 2014, sea fish catch production in Lamongan reached 71,553 tons. By 2015 the production of marine capture fisheries has increased to 72,346 tons (1). Peperek fish production is the seventh largest production in Lamongan much as 2.400,3 tons at a price of IDR. 3.458 / kg. The current sale of fish is still the sale of raw materials in the form of fresh fish with auction system (2). Therefore, the price of fish depends on the market mechanism where at the time of seafood increased precisely the price of fish fell sharply. Patterns of fish auctions currently felt only benefit the middlemen who have a major role in playing fish prices (3). The low price of this fish resulted in low fishermen income, so it is very prospective if the fishery product development business is to be processed into another product that has value added so that it will stabilize the fish price and increase the income of fishers in Lamongan regency especially in Brondong and Paciran area. By looking at this phenomenon, how can accommodate the fishermen's seafood by maintaining the stability of the selling price of seafood so that the fishermen are no longer

harmed? The development of this product is based on the fact that fish is food that has a very high nutritional value compared to other ground animal meat. In fish meat, there are elements that are very useful for the human body as well as proteins, fats, vitamins, mineral salts and others. Protein content in the fish body is the largest after other element. Fishery products included in the category of perishable food so that the quality is easy to experience a decrease in quality. In just about 8 hours after the fish is captured and landed there will be a process of change that leads to damage (4). This is because the fishery products undergo an enzymatic decomposition reaction in the fish body, requiring proper storage or processing treatment. From the background above can be formulated a problem that is how to develop a product processed seafood products that have value added (5–7).

2. Methods
This research uses Quality Function Deployment (QFD) method. Because this method is very suitable for use in product development (8–12). Before designing a product, data collection from fishers to find information about the characteristics of seafood as well as find information about processed products of marine fish desired by the community and actively prioritize consumers and determine the priority in product development and the resulting product become the needs of consumers (4,9,13). Data analysis aims to look at the attributes of consumer needs anywhere that quality needs to be improved or maintained. Value engineering method to analyze added value is consists of five stages; information stage, creation stage, analyzes stage, development stage, and recommendation stage (4,5,14–16)

3. Result and Discussions
Processing treatment on fishery products must comply with the characteristics possessed ingredients are moisture, fat, protein, ash and vitamins. Processing of fishery products, one of which is based on the effort to reduce the moisture content in the materials. The heating process does this, but other components in fishery products, which are proteins and vitamins easily damaged by sensitive to the heat treatment is not appropriate, therefore, required temperature right so that water can be evaporated in materials and other components are not damaged. There are sixteen crispy peperek product attributes, namely; fresh raw materials, fish must be clean from the inside of the fish, savory, durable, product crunchy, lots of flavors, their chilli products, oil slightly, size of fish used were large, without preservatives or additives that are dangerous, expand the spices in the spice, no fishy smell of fish, price cheap, frozen product, shape crispy peperek fish such as animation or letters, tasty products. While there are seven attributes packaging attributes namely; Packaging are closing and opening, complete product information, clear plastic packaging, packaging paper bag, the design should be attractive, convenient packaging that does not make the product withered, packed with plastic jars. Analysis of consumer interest level is done to know the attribute of consumer needs that have been obtained by looking at the value, so can be known which attributes are considered most important by consumers. Data on consumer needs level about processed products of peperek crispy fish obtained from the process of distributing questionnaires in writing to one hundred respondents. Examples of calculations on the attributes of fresh raw materials are as follows ;

$$CLI = \frac{\Sigma x}{N} \qquad\qquad (1)$$

$$CLI = \frac{418}{100} = 4{,}18$$

Table 1. Level of costumer needs as crispy peperek

Variables	Attribute costumer needs	Σ	Level of Costumer needs	Rating
Product	Fresh raw material	418	4,18	8
	Fish must be clean	355	3,55	12
	Savory	425	4,25	3
	Durable	425	4,25	6
	Crunchy	428	4,28	4
	Lots of flavour	375	3,75	10

Variables	Attribute costumer needs	Σ	Level of Costumer needs	Rating
	Chilli products	321	3,21	13
	Oil slightly	424	4,24	7
	Size of fish used were large	298	2,98	15
	Without preservatives that are dangerous	426	4,26	5
	Expand the spice in the spices	379	3,79	9
	No fishy smell	364	3,64	11
	Price cheap	429	4,29	2
	Frozen product	312	3,12	14
	Shape crispy peperek fish such animation or letters	248	2,48	16
	Tasty product	459	4,59	1
Packaging	Sealer model (open and close)	373	3,73	4
	Information	389	3,89	3
	Use clear plastic	338	3,38	6
	Use paper bag	320	3,20	7
	Attractive design	419	4,19	2
	Convienent packaging	445	4,45	1
	Packed with plastic jars	340	3,40	5

Based on the calculation of the level of consumer interest for peperek crispy products was found that palatable product attributes are a most important attribute of a group of products, while the grouping of attributes based packaging obtained the greatest value on packaging attributes that are not easy to make products wither. Analysis of consumer satisfaction conducted to determine how the level of customer satisfaction with the products that have been determined that the peperek fish. Data on the level of customer satisfaction with products such as peperek fish is obtained from the results of interviews with 30 respondents. Here is an example calculation level of customer satisfaction with products such as peperek fish by using the formula :

$$CLS = \frac{\Sigma x}{N} \tag{2}$$

$$CLS = \frac{123}{30} = 4,10$$

Table 2. Level of customer satisfaction crispy peperek

Variables	Attribute Customer Satisfaction	Σ	Level of customer satisfaction	Rating
Product	Fresh raw material	123	4,10	4
	Fish must be clean	121	4,03	6
	Savory	124	4,13	3
	Durable	116	3,87	7
	Crunchy	126	4,20	2
	Lots of flavour	96	3,20	12
	Chilli products	59	1,97	16
	Oil slightly	107	3,57	10
	Size of fish used were large	79	2,63	15
	Without preservatives that are dangerous	115	3,83	9
	Expand the spice in the spices	116	3,87	8
	No fishy smell	123	4,10	5
	Price cheap	107	3,57	11
	Frozen product	94	3,13	13
	Shape crispy peperek fish such animation or letters	92	3,07	14
	Tasty product	127	4,23	1
Packaging	Sealer model (open and close)	111	3,70	5
	Information	114	3,80	4

Variables	Attribute Customer Satisfaction	Σ	Level of customer satisfaction	Rating
	Use clear plastic	110	3,67	6
	Use paper bag	93	3,10	7
	Attractive design	115	3,83	3
	Convienent packaging	119	3,97	2
	Packed with plastic jars	132	4,40	1

Based on the calculation level of customer satisfaction for crispy peperek be obtained that in terms of products, consumers are very satisfied with the product attributes tasty with a satisfaction score of 4,23. While consumers are dissatisfied with the addition of fish sauce in the product if the product in terms of crispy peperek 1,96. In terms of packaging, consumers have a high level of satisfaction towards peperek crispy fish product packaging process if it is done with a plastic jar, with a satisfaction score of 4,40. While on the attributes of the packaging by using paper bag showed lowest ranking in terms of packaging products peperek crispy fish of 3,10. Value sufficiently low levels of satisfaction in terms product and packing on additional attributes sambal and packaging paper bag on peperek crispy fish causes need for evaluation and need to do repair or improvement of quality will these attributes. This was done with the aim of creating the satisfaction of consumers against attribute peperek crispy fish products completely. At the stage of product planning and development peperek crispy fish is done by determining the target value. The target value is used as a reference to determine what kind of products consumers demand more with these attributes - attributes and important technical requirements that must be considered. Targeting of forming a result was able to answer all customer expectations through quality assurance according to customer wishes. The target value is obtained by using the highest value of the comparison between the level of consumer interest with the level of customer satisfaction for each attribute the needs of consumers. The calculation of the improvement ratio (IR) made to identify and evaluate against each attribute of the needs of consumers (17). The following is the calculation of the value of improvement ratio (IR) by using the formula :

$$IR = \frac{target}{CLS} \tag{3}$$

Table 3. Improvement ratio for consumer needs of peperek fish

Variables	Attribute Consumer Needs	IR
Product	Fresh raw material	1,020
	Fish must be clean	1
	Savory	1,038
	Durable	1,099
	Crunchy	1,019
	Lots of flavour	1,172
	Chilli products	1,632
	Oil slightly	1,189
	Size of fish used were large	1,132
	Without preservatives that are dangerous	1,111
	Expand the spice in the spices	1,001
	No fishy smell	1
	Price cheap	1,203
	Frozen product	1
	Shape crispy peperek fish such animation or letters	1,001
	Tasty product	1,084
Packaging	Sealer model (open and close)	1,008
	Information	1,024
	Use clear plastic	0,922
	Use paper bag	1,032
	Attractive design	1,093

Variables	Attribute Consumer Needs	IR
	Convenient packaging	1,122
	Packed with plastic jars	1

From the calculation of the ratio of improvement can be seen which attributes need to be improved and also made improvements in terms of quality products. The evaluation was done on every attribute needs of existing customers. In the IR calculation values for each attribute has a meaning, if the calculation results show the value of IR> 1 it is necessary to process improvement or quality improvement on the attributes of the crispy fish peperek. If the IR value higher then those attributes that require greater effort in improving quality. There are several attributes, among others; fish must be clean from the inside of the fish, there is no fishy smell, frozen product, clear plastic packaging and packed with plastic jar shows the value of ≤ 1. This value indicates that the attribute is already considered to meet the desires of consumers the desired quality standards, so it does not need to be done improvement in quality.

Sales point is consumers desire to influence the competition that can be used in marketing. In determining the sales points will be known respectively each attribute of the needs of consumers can affect the level of product sales. Results attribute consumers needs in terms of products showing the results of the most influential is tasteful, the savory attributes indicate the results of the biggest selling points is 1,49. Other attributes are also instrumental in the sale is at a fish net from the inside of the fish and crunchy products, both of these attributes has a value of 1,48. In terms of packaging attributes packaged with plastic jar has the highest value of all the attributes in terms of packaging, so that the attribute is the attribute that most influences peperek crispy fish products in sales later. Calculation of raw weight is a great weight for each of the attributes consumers is the basis of an evaluation of the prioritization of fulfilling the needs and desires of customers. Raw weight calculation is obtained from the value of the interests of consumers, the ratio of repair and sales points. Calculation of Normalized Raw Weight is a percentage weight of an attribute overall consumer demand for consumer needs attribute weights for each attribute needs. One important step in product planning and development matrix is to translate customer needs into technical requirements to better specify a common design. So the technical requirements of a technical parameter that processed fish products produced peperek more in line with what customers want. The preparation of the technical requirements peperek crispy fish products obtained from interviews and discussions with the two speakers who have competence in the field of food (especially the crispy fish products) and also speakers who are experts in packaging. Selection of experts based on the ability and confidence to support the development of products to be more perfect. In general, the technical requirements established for processed fish products peperek crispy relate to the stages or the process of making peperek crispy fish. So before going into translating the technical requirements must be known before the manufacturing process flow peperek crispy fish.

After calculations on each of the steps QFD formation of phase 1 is HOQ (House Of Quality) has been completed, all data or further information be included and formed into HOQ matrix by section - section in accordance with the provisions of HOQ Matrix. From the results of the HOQ matrix that has been formed, it can be seen that there are two priority attributes that must be considered. HOQ matrix of results in terms of packaging, there are two attributes that must be considered from the attributes of consumer needs and technical requirements. Attributes of consumers needs, consumers want to design used on the peperek crispy fish products should be interesting. Technical requirements in terms of products that have the highest contribution value are the materials used are quality materials 0,1441, fish clean condition and washed repeatedly 0,1297, the rest of the cooking oil on fish is very small 0,1270. Technical requirements in terms of packaging that has the highest contribution value are the packaging should be tightly closed 0,1805 and Packing not easily broken 0,1800. Analysis of added value calculation on peperek crispy product aims to know the value of added value on a pack of peperek products after experiencing various production processes to be a new product that is crispy peperek products. The added value of a product can be affected by the price of the product produced,

the cost of the raw materials used to make the product and the cost of the additional material. Crispy peperek in accordance with the wishes of consumers and the best alternative according to the method of value engineering is the original taste of crispy peperek, polypropylene plastic packaging, medium size fish and net weight of each product packaging as much as 100 - 125 grams every pack. Making crispy peperek requires a fee of IDR. 6.268 in a product packaging, while the market price of IDR. 10.000. The added value obtained from the processing of peperek crispy in a product packaging amounted to IDR. 4.692 every pack with a profit rate of 46,92%. The added value is derived from the reduction of the value of products sold in the market with the price of the process of making crispy peperek.

4. Conclusion
There are sixteen crispy peperek product attributes, namely; fresh raw materials, fish must be clean from the inside of the fish, savory, durable, product crunchy, lots of flavors, there chili products, oil slightly, size of fish used were large, without preservatives or additives that are dangerous, expand the spices in the spice, no fishy smell of fish, price cheap, frozen product, shape crispy peperek fish such as animation or letters, tasty products. While there are seven attributes packaging attributes namely; packaging are closing and opening, complete product information, clear plastic packaging, packaging paper bag, the design should be attractive, convenient packaging that does not make the product withered, packed with plastic jars. Technical requirements in terms of products that have the highest contribution value are the materials used are quality materials 0,1441, fish clean condition and washed repeatedly 0,1297, the rest of the cooking oil on fish is very small 0,1270. Technical requirements in terms of packaging that has the highest contribution value are the packaging should be tightly closed 0,1805 and packing not easily broken 0,1800. Alternative design was chosen by using value engineering method that is the best alternative with original taste crispy peperek fish, polypropylene plastic packaging, medium fish size, and net of of 100 - 125 gram every pack. The added value of crispy peperek products is IDR. 4.692 every pack with a profit rate of 46,92%.

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