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<sup>5</sup>**Product design of kolang kaling grass jelly drink through the application of quality function deployment method (case study in meru betiri national park, banyuwangi district)**

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**Abstract.** Kolang kaling grass jelly drink is a functional food product that is beneficial for health. Consumer demand for beverage products that have a good impact on health is increasing due to high public awareness of the importance of health. The home industry of kolang kaling grass jelly drink must be able to know the criteria of attributes needed and desired by consumers. One effective method for determining the needs and desires of consumers is Quality Function Deployment (QFD). This method starts from the product planning matrix (house of quality), followed by the planning matrix, the process planning matrix, and the production planning matrix. From the results of the QFD analysis, it is necessary to improve the planning process of making grass jelly drinks, then realized using the strategy formulation implementation strategy based on mapping the main needs and performance to be achieved. Through the QFD approach, it is expected to help businesspeople formulate process improvement priorities so they can produce jelly drink products that are following the wants and needs of consumers.

## 1. Introduction

Health was one of the important things in supporting human life, therefore needed food that could improve health. Awareness of the importance of food in the prevention or cure of diseases encourages the development of food products that not only met the desires or tastes but also expected to meet nutritional needs and contained health benefits and called by functional food. It was food that includes active component content which could provide health benefits beyond the benefits provided by the nutrients contained therein. The current trend in functional food ingredients was contained fiber, phytoestrogens, omega-3, probiotics, prebiotics, symbiotics, and phenolic compounds [1].

Unhealthy lifestyles and environments cause high exposure to free radicals. Therefore we need antioxidant intake to fight the free radical attack. Indonesia is famous for its biodiversity, especially plant diversity. More than thirty thousand species of plants in Indonesia, more than a thousand species



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have been used for treatment [2]. Indonesia is very rich in the diversity of plants which are health-supporting food ingredients and medicines. One of the plants that are functional food is grass jelly. Grass jelly plants are native to Indonesia. There are two types of grass jelly known to the public, namely green grass jelly (*Cyclea barbata*) and black grass jelly (*Mesona palustris*).

Green grass jelly tree has many benefits starting from the root can be used as a medicine for colic, fever-lowering, green grass jelly leaves can be used as gelatin as a medicine to reduce high blood pressure. Green grass jelly is very easily developed by the propagation of seeds, shoots, and root cuttings [3]. According to [4], green grass jelly leaves contain carbohydrates, fats, proteins, chlorophyll, and other compounds such as polyphenols, flavonoids, and minerals and vitamins including calcium, phosphorus, vitamin A, and vitamin B. The content of polyphenols and flavonoids is contained in green grass jelly leaves which functions as an antioxidant. Antioxidants can fight free radicals in the body. One cause of free radicals is the consumption of food additives.

Making grass jelly is traditionally considered impractical so this drink needs to be processed into functional beverage products according to community preferences and developed on an industrial scale. Modifications were made to improve the taste without reducing the efficacy of the drink, by making it in the form of a ready-to-drink drink (RTD) combined with palm sugar (*Arenga pinnata*).

Kolang kaling is an endosperm from palm seeds, has a chewy texture, oval shape, and white color. The fries also have many health benefits if consumed. The foliage has a very high water content reaching 93.6%, protein 2.334%, crude fiber 56.571%, and carbohydrates 10.524% [5]. The crude fiber contained in food consumed can launch the process of excretion regularly, prevent: obesity; coronary heart disease, colon cancer, and diabetes. Besides, carbohydrate content in the underpass can provide a feeling of fullness thereby reducing appetite, thereby reducing the consumption of food, so that it can be used as diet food.

Recently, there is a tendency for people with dense activities, especially in productive age, which causes many people to look for practical products so that ready-to-drink (RTD) is preferred because they are more practical. Ready to drink beverage is a term used for types of drinks that are sold in one package and consumed immediately without further processing. Jelly drink in RTD products is very suitable to meet the lifestyle of today's society. This has led to the development of a product called kolang kaling grass jelly drink. To find out the requirements of the kolang kaling grass jelly drink desired by consumers, researchers will examine the design of the kolang kaling grass jelly drink. The purpose of this research is to design a product of kolang kaling grass jelly drink using the Quality Function Deployment (QFD) method which includes customer analysis and technical requirements using the home quality matrix (main matrix), design planning analysis using design deployment matrix, planning analysis process using process planning matrix and planning production analysis and supervision using a production planning matrix..

## 2. Method

Creating products following the wishes of consumers is not easy, it needs careful research so that the products produced are products that are needed by consumers. Many companies compete to create new products that can speed up their marketing time. One method commonly used to manage product development is the Quality Function Deployment (QFD) method.

Quality Function Deployment is a systematic translation of products desired by consumers (voice of customers) into tangible products made by companies. By using this tool, it is expected that the resulting product can be following consumer desires. The main planning tool used in QFD is the House of Quality (HOQ). HOQ is a house-shaped matrix that connects the customer's desires (what) and how the product will be designed and produced to meet the customer's desires (how). The steps to compile the HOQ matrix are to design products for jelly grass that forms the customer requirements (what), compile technical responses (how), develop a matrix of relationships between customer needs and technical responses, develop a matrix of relationships between technical responses, evaluation competitive, developing priority customer requirements (level of customer interest, target value, scale-

up factor, point of sale and absolute weight) and developing priority technical responses (target value, absolute weight, and relative weight of technical requirements).

### 3. Result and Discussion

#### 3.1. Matrix Whats

The important thing for consumers who need to be considered In choosing a beverage product consumers pay attention to color, aroma, taste, texture. Product color is a color that is observed visually. The product's scent is assessed by the sense of smell which is defined as an odor that is felt through the nose and olfactory retronasal, ie through the back of the mouth where the nasal cavity and mouth are interrelated. Taste is a taste that distinguishes the sweet, sour, bitter, or salty qualities of a solute and is mediated by a taste on the tongue. The texture is assessed using the sense of taste. To assess color, aroma, taste, and texture using the sensory qualities determined during the chewing process.

Collaboration between the sense of sight, sense of smell, and sense of taste determines color, aroma, taste, and texture. In the process of sensory testing, the first thing to do is to visually observe as color, and then feel it by biting and chewing food that is destroyed by the teeth. The taste and taste will be released in the mouth, pieces of food moistened with saliva in a liquid bolus that makes it easy to swallow [6]. Damage to the structure of food determines texture. The size, wettability, and composition of the food that is destroyed in the mouth will determine the viscosity of the bolus [7].

#### 3.2 Technical Response Matrix (Matrix Hows)

The technical response matrix (hows) contains several attributes of technical characteristics (technical requirements) that need to be carried out. The technical response matrix is obtained by translating customer expectations or desires (whats) into the form of product development characteristics that need to be done to meet the expectations and desires of consumers.

The results of interviews and observations obtained seven attributes of technical responses, namely: sorting raw materials, cutting the jellies and jellyfish, washing, boiling jellyfish, making syrup, tempering, and packaging. Sorting raw materials (grass jelly) is done by sorting good quality raw materials from less good ones. Cutting the back and forth into two parts to meet the aesthetic element of the product, and grass jelly cut into cubes. Then washed to remove contaminants that can reduce product quality. Boiling the ingredients separately between the grater and grass jelly. Kaling boiled for about an hour because it has a rather hard texture, and grass jelly boiled for only about 10 minutes and then make gel from grass jelly by squeezing the leaves of grass jelly until some bubbles appear and the water turns green. Bubbles indicate that grass jelly leaves have been extracted. The result of extraction is a green solution and then separated from the rest of the juice. The water solution is left in the container and will become a gel. The gel is formed because the leaves contain high amounts of polysaccharides with the ability to absorb large amounts of water [6]. The making of syrup is boiled with sugar mixing ingredients (11%), citric acid (0.05%), sodium benzoate (0.03%) for about 20 minutes (100 °C). Tempering is about one hour and then followed by packaging the product in a bottle. Based on Figure 1 there was a relationship between the matrix of what and how. There was a strong relationship between sorting raw materials and cutting raw materials with the resulting texture of the product. By sorting good raw materials would affect the quality of the kolang kaling and grass jelly with a good standard so it would affect the resulting of texture.

Cutting of kolang kaling and grass jelly also affects the texture of the product. Large or small pieces greatly affect the texture when bitten and chewed in the mouth. There was a strong relationship between washing raw materials with the result flavor and taste of the product. Washing was to clean the kolang kaling and grass jelly from dirt that clings. If the raw material cleaned, the taste and flavor produced would be great. There was a strong relationship between boiling raw materials with the taste and texture of the product. Boiling will change the taste of the kolang kaling and grass jelly that was previously raw to mature and produced a different taste from the original raw material and would

change the texture from hard to soft. There was a strong relationship between making the syrup with color, aroma, and taste of the product. The syrup was made based on consumer preferences, many variants of syrup that could be made to enhance the taste of the product. With the different syrup variants, the color, aroma, and taste produced will be different too.

Sub Matrix Importance to Customer (Importance of Customer Level). The sub matrix *importance to customer* contained of consumer ratings of each product quality attribute. Based on Figure 1 the sequence attributes of *importance to customer* from the highest was included: taste, color, texture and aroma.

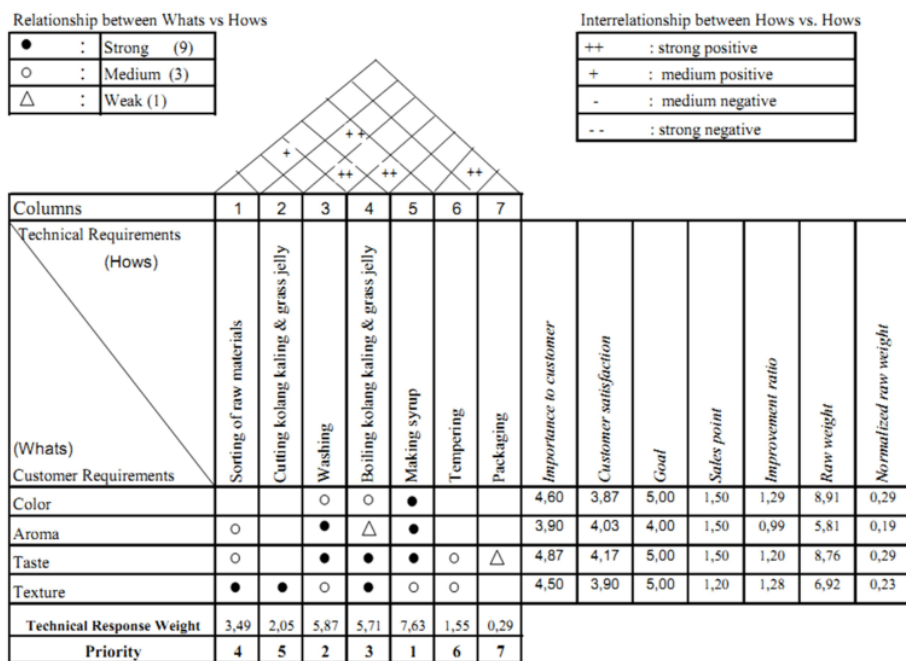


Figure 1. Figure of house quality products for kolang kaling grass jelly drinks

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3.2.1 **Sub Matrix Customer Satisfaction Performance (Consumer Satisfaction Level)** Customer satisfaction performance was consumer perceptions about product quality obtained from product hedonic testing using 30 panelists. The sensory test was to measure the acceptance of a product based on the human sensing process as the main measurement tool. The level of preference of a product could be measured using the Hedonic Test or Preferred Test method and to the next level analyze data using the type of Independent T-test [3]. Based on Figure 1 The sequence attributes of customer satisfaction performance from the highest were included: taste, aroma, texture, and color.

3.2.2 **Sub Matrix Priority** Sub matrix priority was obtained by sorting the value of technical response weights from the highest to the lowest value. Technical responses that had a weighted average need to be prioritized first because it had a major contribution to the quality of the product. The value of the technical response weight was obtained by multiplying the normalized raw weight with the numeric relationship matrix. Based on Figure 1 priority order the technical response of the kolang kaling grass jelly products from the highest was included: making syrup, washing, boiling kolang kaling and grass jelly, sorting of raw materials, cutting kolang kaling and grass jelly, tempering and packaging.

#### 4. Conclusion

The important thing for consumers to consider when choosing a product for the kolang kaling grass jelly drink includes taste, color, texture and aroma. The priority order of the technical response of the kolang kaling grass jelly products from the highest includes: making syrup, washing, boiling kolang kaling and grass jelly, sorting of raw materials, cutting kolang kaling and grass jelly, tempering and packaging.

#### Acknowledgment

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