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Designing Instant Corn Rice Using the Product Design Phase of Quality Function Deployment

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Abstract. Corn rice is one of popular foods in Madura. It refers to main meal consisting of rice grains and grinding corn. Often, it takes long time for preparation; thus, instant product of corn rice is needed. The purpose of this study aims to design Madura instant corn rice products according to consumer preference. Development of product design development involves Quality Function Deployment (QFD) method of the product design phase. The results of this study indicate eleven stages of the process carried out to make instant corn rice products. The product was made as follows: (1) sorting, carried out to select good quality corn, (2) milling, carried out to operate size reduction of the corn, (3) sieving, carried out to produce uniform corn rice faction, and (4) weighing. Washing and soaking of corn was required to remove foreign materials; then followed by steaming, drying 1, boiling, cooling, and drying 2. Ultimately, instant corn rice was packaged. In this regard, boiling process showed importance, with a value of 492,921, then sorting with a value of 454,721, and drying process with a value of 432,446.

Keywords: Instant Corn Rice, QFD, Product Design

1. Introduction

Madura corn rice is one of the preparations of corn that is in demand by the Madurese community. However, the manufacturing process takes a long time so the development of instant Madura corn rice is needed. According to Hidayat et al, the technical requirements obtained in terms of products are corn type, corn color, corn rice size, soaking time, amount of washing, steaming time, coconut milk addition, corn rice moisture content, weight and shape of the product [1]. The technical requirements in terms of packaging are packaging tightness, type of packaging, the strength of packaging, the design of packaging images, the shape of the packaging, the color of the packaging, the size of writing, and the volume of packaging. The technical requirements will be used to continue the second phase of Quality Function Deployment (QFD) research, namely product design. The second phase of QFD is a continuation of the first phase of QFD, namely translating consumer requirements into product design matrices. The second phase of QFD requires the technical requirements of the first phase QFD. QFD is a technique in product development that takes into account customer need[1–3]. The potential use of QFD for developing food products is to increase the chances of success, produce high-quality products, reduce costs and development time.

QFD method has been widely used for product development in the field of food, namely for the development of organic food products from jelly [4], development of carrot-based food products into sweets and carrot syrup [1], ranking customer characteristics of virgin olive oil extracts [5], developing black Piper retrofractum Vahl tea (black PrV tea) products [6], developing crispy pepper



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fish products [7]. The use of the QFD method provides advantages in product development by shortening the time by 40% and reducing costs by 60% [8]. Besides this method can translate the needs and desires of consumers into the functional design [9].

2. Methods

The method used in product design development is the Quality Function Deployment (QFD) phase II product design method. Phase II QFD requires technical requirements and weights from the first QFD. The second step is a step that requires a more intensive process of brainstorming, benchmarking and research to produce new products. Building the second phase of QFD is almost the same as the formulation of the House of Quality (HoQ) matrix. The technical requirements of the HOQ matrix are converted to the left part of the product design matrix while the upper part consists of the critical section attributes. The second phase of QFD principles gives significant value to technical needs, identifies important parts, and builds weight for each important part. Building a second QFD, the steps that must be taken are defining part specifications, determining important parts, determining significant values, finding relationships between part specifications and important parts, and identifying important weights [9,10].

3. Results and Discussion

The primary data used in this study is data derived from preliminary research that produces a map of the operational processes used to produce instant Madura corn rice. This research uses the basic ingredients of local corn Madura varieties Tambin. The diagram consists of several stages, namely sorting, grinding, finishing, sifting, washing, cooking, cooling, drying, and packaging. From some of these processes, some processes require a long time, namely cooking with a time of 2 hours, drying with a time of 24 hours. The process is divided into two main processes, namely corn kernels, and corn rice. Corn kernels are ingredients before the process and corn rice is a semi-finished material from the process of making instant Madura corn rice. To produce instant corn rice, it is necessary to combine the two processes. The following is a map of the production process presented in the form of a flowchart diagram.

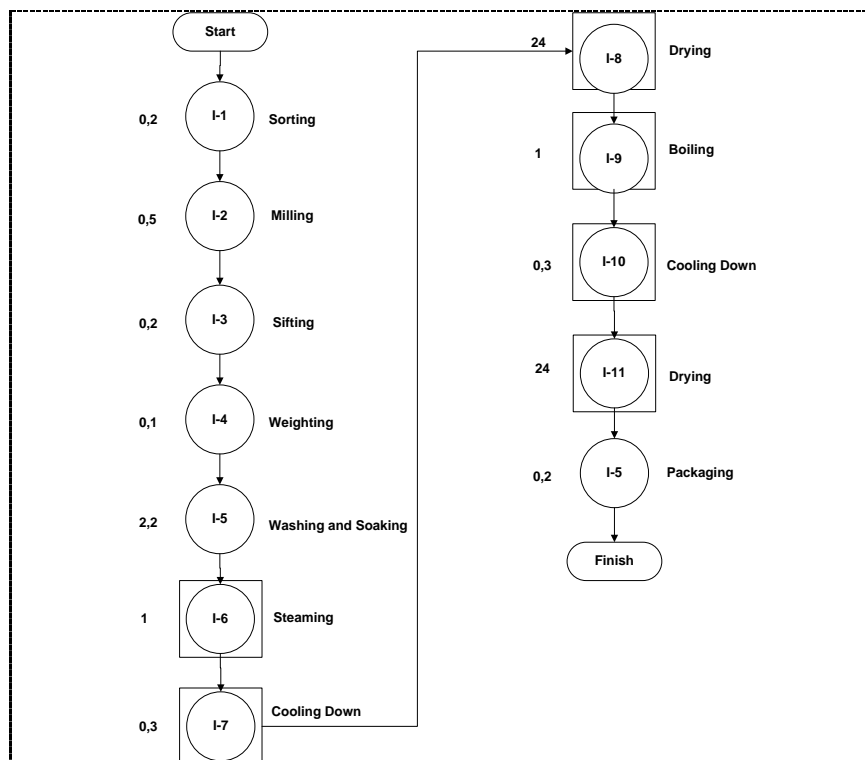


Figure 1. Operation process chart of of Instant Madura Corn Rice

3.1 Determination of Trade-off Value

This stage aims to find out how strong the relationship is between each critical point of the process of making instant Madura corn rice. Each critical point has a good relationship that the relationship is weak, medium, or strong. The relationship of each critical point will affect the success of making instant Madura corn rice products. In this study, it can be seen in Figure 2 the relationship between each critical point of the process of instant Madura corn rice production. This interaction matrix is located at the top of the quality houses that have been made.

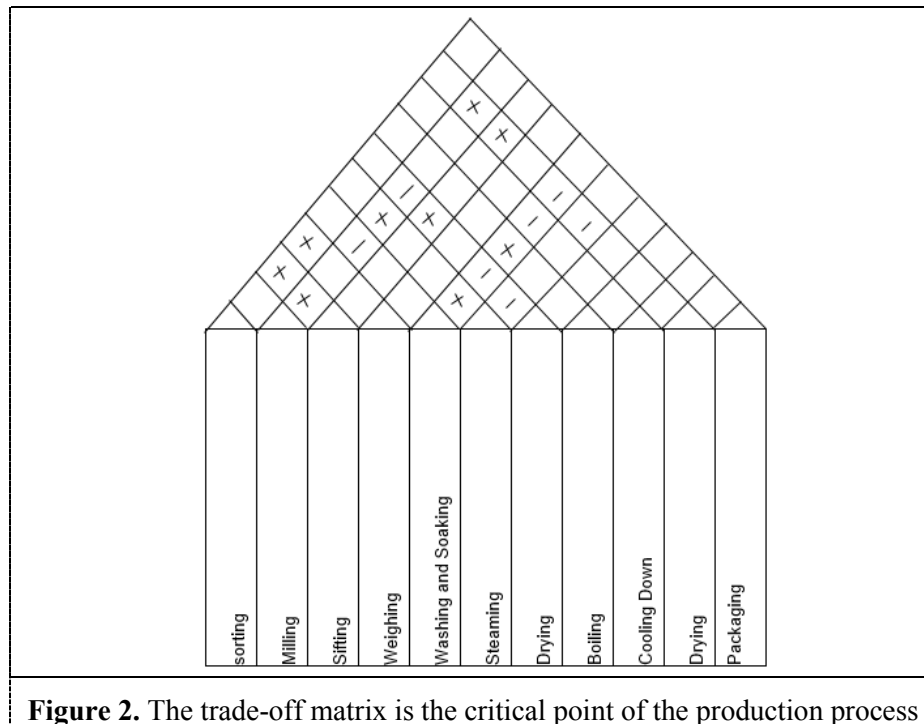


Figure 2. The trade-off matrix is the critical point of the production process

3.2 Determination of Production Processes and Procedures

In this study using a reference to the standard quality of extrudate snacks SNI 2886-2015 about extrudate snacks, which are snacks made from carbohydrate sources. Besides the standard used as a reference for labeling instant madura corn rice packaging is Government Regulation No. 69 of 1999 concerning food labeling and advertising. This regulation has set the product name, description of ingredients used, description of net weight, company name information and address, expiration date, registration number, production code, nutritional description, and others.

3.3 Design Matrix of Madura Instant Corn Rice Products

From the design matrix of instant Madura corn rice product design, it can be seen that the critical process that has the highest degree of importance is the boiling process. This means that boiling is the most important process in making instant Madura corn rice and can influence other processes. The second most important process is the sorting process, in this sorting process, it must be considered because non-uniform ingredients or ingredients mixed with other materials can reduce the quality of this instant Madura corn rice. The third most important process is the steaming process, the steaming process is as influential as the boiling process. Because the steaming process greatly affects the instant process in corn. The steaming process is a process for developing starch granules, which is the gelatinization process of corn starch found in Madura corn. The fourth most important process is the drying process using a cabinet dryer. This process is also very influential in the success of the process of making instant Madura corn rice. Because of the drying process is not going well, the results will

also be less good. This is because the instant Madura corn rice product is a dry product that is less than 12 % water content. If the water content does not meet the standards, it can affect the product storage time.

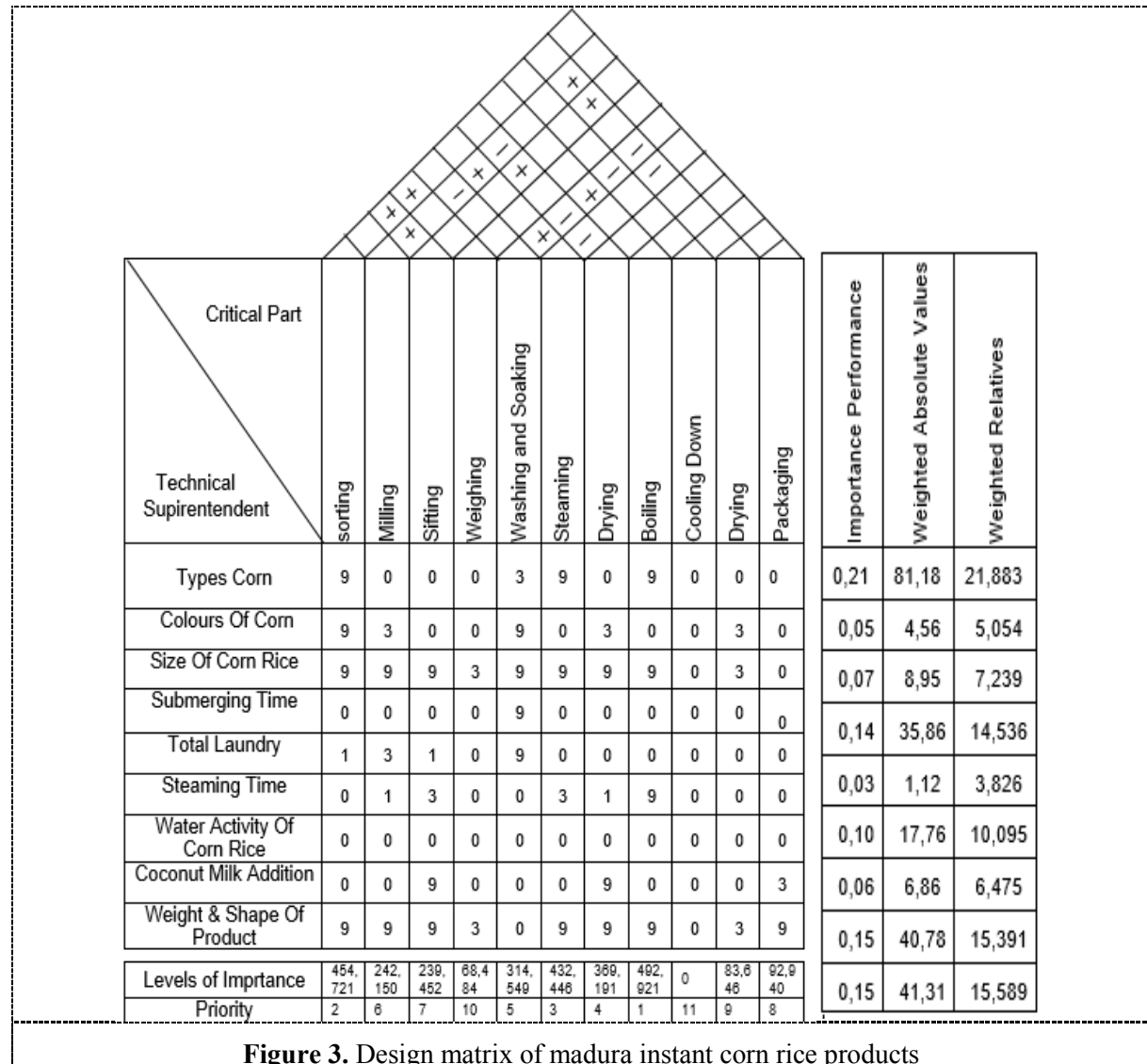


Figure 3. Design matrix of madura instant corn rice products

The fifth most important process is washing and soaking. This process can affect the quality of instant Madura corn rice because the washing process carried out until clean can determine the quality of corn rice. After being ground and sieved, there is a long cake which is still left, so to clean the cake, the washing process is repeated to clean the corn rice. After that, the corn rice is soaked so that the water content of corn rice increases so that during the steaming process the corn rice can expand. Because in the gelatinization process, corn starch requires water to be able to expand. The sixth most important process is grinding, this process affects the shape and size of corn rice. The shape of corn rice influences the cooking process of corn rice. From the size of corn rice also affects the water content that can be absorbed from corn rice. The seventh position is the sifting process, from the sifting process obtained a uniform size of corn rice. The sifting process and the milling process are mutually influential from the repeated milling process, we will get corn rice with a small mesh and if the milling process is done only once, the corn price is relatively large. The next position in a row is the packaging process, the second cabinet dryer drying process, weighing and finally the cooling process after boiling.

4. Conclusion

Based on data analysis using the Quality Function Deployment (QFD) method, the second phase of the design of instant Madura corn rice products. Then it was concluded there were eleven stages of the process carried out to make instant Madura corn rice products. From this process, it is known that the processes that must be considered are the boiling process, sorting process, and drying process based on the three highest points, namely the boiling process with a value of 492.921, the sorting process with a value of 454.721 and the drying process with a value of 432.446. From the value of the importance of Quality Function Deployment (QFD) the second phase of product design.

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