

The Application of Quality Function Deployment (QFD) Method in Improving the Quality of Tape at UD. Raja Tape, Bondowoso Regency

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Abstract: Bondowoso is the best tape-producing region in East Java, with a production of 435,969 kg in 2018. One of the tape production centers in Bondowoso is UD. Raja Tape. This study aims to identify the quality attributes of Raja Tape products and determine the operational policies needed to improve product quality at UD. Raja Tape. The Quality Function Deployment (QFD) method is used to identify and understand customer needs and desires into relevant technical specifications for the production process. This research was conducted over three months, using primary data obtained through field observations and interviews, as well as secondary data from related literature. The research stages include identifying products and competitors, conducting product surveys to gather the voice of the customer, identifying technical parameters, analyzing the relationship between customer importance and technical parameters, and constructing the House of Quality (HoQ). The results indicate that the application of

QFD can identify key areas that need improvement in the tape production process, such as raw materials, fermentation techniques, and packaging. Implementing the recommendations from the QFD results led to significant improvements in tape product quality, marked by increased customer satisfaction and reduced complaints. This study demonstrates that the QFD method can be an effective strategy for improving product quality in the traditional food industry.

Keywords: Quality Function Deployment (QFD), Tape Production, UD. Raja Tape.

INTRODUCTION

Tape is one of the popular traditional foods in Indonesia, especially in cassava-producing regions like Bondowoso, East Java (Badan Pusat Statistik, 2019). The production of tape in Bondowoso Regency reaches a significant amount, indicating the importance of this industry in the local economy. However, to maintain and enhance the competitiveness of tape products, quality becomes a key factor that needs to be seriously considered. The tape production process involves several critical stages, such as cassava fermentation with yeast. The quality of raw materials and yeast is crucial to ensure the safety and quality of the final product (Turmidzi, 2021). Additionally, intense competition in the local market and the impact of the COVID-19 pandemic have added pressure on tape producers like UD. Raja Tape, which has experienced fluctuations in sales volume. Apart from issues in the production process, raw material inventory problems, especially cassava, also become a major concern (Khusuma & Utomo, 2021). The agricultural conditions in Nangkaan Village, where most raw materials are produced, face several challenges such as limited farmer skills, restricted agricultural technology, and competition with other commodities like sugarcane. These issues could negatively impact the operational sustainability of UD. Raja Tape and the tape industry as a whole. In this context, this research aims

to identify and analyze factors influencing the quality of tape products, as well as to develop appropriate operational strategies to improve product quality and address raw material inventory issues. The Quality Function Deployment (QFD) method is chosen as the primary analytical tool to understand consumer expectations and needs and link them to the quality attributes of tape products from UD. Raja Tape.

METHOD

This research will be conducted at UD. Raja Tape, Jl. Brigpol Sudarlan, Nangkaan, Kab. Bondowoso, East Java, for 3 months from March to May 2024. The research materials consist of secondary and primary data. Secondary data will be obtained from literature reviews and related institutions, while primary data will be collected through field observations and interviews with relevant parties. The tools used will be questionnaires and laptops, and data processing will be conducted using Microsoft Excel software. The Quality Function Deployment (QFD) method is used as the framework for improving product quality. This method was chosen based on previous successful research using QFD. The stages of this research include identifying the products under study and their competitors, product surveys, identifying technical parameters, analyzing the relationship between consumer preferences and technical parameters, correlating technical parameters, compiling House of Quality (HOQ), and analyzing and improving technical production aspects. Data collection will involve surveys and observations. Primary data will be obtained through surveys of consumers and interviews with relevant parties, while secondary data will be obtained from literature reviews and company documents. Data analysis will be conducted using the Quality Function Deployment (QFD) method, involving the formation of House of Quality (HOQ). Data will be collected and analyzed based on consumer needs, technical responses, relationship matrices, technical response correlations, and technical matrices to prioritize improvements in technical production aspects.

RESULTS AND DISCUSSION

UD. Raja Tape is a business engaged in the production of traditional foods or specialty souvenirs from Bondowoso, located on Brigpol Sudarlan, Nangkaan, Bondowoso Regency, East Java. UD. Raja Tape has been in operation for quite a long time, since 1987. This company is managed by Mr. Parayoga Tri Widodo, who has continued to develop this tape business inherited from his parents.



Figure 1. UD. Raja Tape (Raja Tape Production Site)

Cassava tape is a traditional food made from fermented cassava (Fitria, 2014). Raja tape products use butter cassava, which generally has an oval shape with a medium stem, brown outer skin, and yellow inner skin and flesh. When boiled, this butter cassava produces a sweet and tender taste. The tape products sold can

last for 3 to 4 days with airtight packaging. Raja tape products are marketed through souvenir shops, consumer orders, and bazaars.

A. Descriptive Analysis of Respondent Characteristics for Consumer Importance Level

To identify the level of consumer importance, the researcher used a questionnaire. The questionnaire required respondents to meet certain criteria: being aged 15 years or older and having purchased products from UD. Raja Tape (including sweet tape, prol tape, dodol tape, tape cake, and roasted tape). A total of 53 respondents filled out the questionnaire. The characteristics of the consumers who responded are illustrated in the following table:

Table 1. Characteristics of Respondents by Gender

Gender	Number of Respondents	Percentage (%)
Male	26 respondents	26
Female	27 respondents	27

Based on the data from the table, it can be observed that the respondents of the questionnaire regarding consumer importance level are mostly females, with a percentage of 27%. Meanwhile, male respondents constitute only 26% of the total 53 respondents.

Table 2. Characteristics of Respondents by Age Group

Age Group	Number of Respondents	Percentage (%)
15-18 years	2 Respondents	2%
19-25 years	10 Respondents	10%
26-30 years	15 Respondents	15%
31-35 years	20 Respondents	20%
>36 years	6 Respondents	9%

Based on the data in the table, it can be seen that the respondents of the questionnaire on consumer importance level are mostly in the age group of 31-35 years, accounting for 20% of the total respondents. Respondents aged 15-18 years have the fewest number of respondents, with only 9 people or a percentage of 2% of the total respondents.

Table 3. Characteristics of Respondents by Occupation

Occupation	Number of Respondents	Percentage (%)
Student/University	10 Respondents	10%
Employee	4 Respondents	4%
Civil Servant	22 Respondents	22%
Private Sector	10 Respondents	10%
Entrepreneur	7 Respondents	7%

Based on the data in the following table, it can be seen that the respondents of the questionnaire on consumer importance level are mostly Civil Servants, with a number of 22 people or a percentage of 22%. The fewest respondents are found in the Employee category, with only 4 people or a percentage of 4% of the total respondents.

Table 4. Characteristics of Respondents Based on Frequency of Purchasing

UD. Raja Tape Products in 1 Month		
Purchase Frequency	Number of Respondents	Percentage (%)
Once a week	10 Respondents	10%
< Once a week	16 Respondents	16%
4 times a week	23 Respondents	23%
5 times a week	3 Respondents	3%
6 times a week	1 Respondent	1%

Based on the data in the following table, it can be seen that out of 53 respondents, 16 of them purchase UD. Raja Tape products less than once a week. 10 respondents fill the questionnaire stating they purchase UD. Raja Tape products once a week, while 23 other respondents purchase UD. Raja Tape products 4 times a week.

Table 5. Characteristics of Respondents Based on Determinants of Purchasing UD. Raja Tape Products

Determinants	Number of Respondents	Percentage (%)
UMKM	10 Respondents	10%
Friends	15 Respondents	15%
Family	16 Respondents	16%
My self	12 Respondents	12%

Respondent characteristics based on factors determining the purchase of UD.Raja Tape products can be seen from Table 5, which shows that there are 10 individuals or 10% of respondents who are aware of UD.Raja Tape products from MSMEs, and 15% of respondents who are aware of UD.Raja Tape products from their peers, 16% of respondents are aware of UD.Raja Tape products from their family, while the remaining 12% of respondents are aware of UD.Raja Tape products themselves.

B. Cross-Tabulation Analysis of Consumer Importance Level Respondent Characteristics

From a total of 53 respondent data obtained from the consumer importance level questionnaire, a cross-tabulation analysis will be conducted on 2 or more variables of consumer importance level parameters and respondent characteristics from the consumer importance level questionnaire to determine the tendencies of each respondent characteristic from the questionnaire towards consumer importance level parameters.

The first analysis is the characteristics of respondents based on gender with the average consumer importance level values for each consumer importance parameter of UD. Raja Tape products consisting of shape, color, taste, aroma, and packaging of UD. Raja Tape products. The cross-tabulation results are shown in Table 6.

Table 6. Cross-tabulation of characteristics by gender and consumer importance parameters

Attribute Importance	Female	Male
Taste	4,19	4,31
Color	4,34	4,35
Maturity Level	4,38	4,35
Aroma	4,52	4,62
Packaging	3,93	4,20
Shape	4,19	4,43

Table 7. Cross-tabulation of characteristics by age group and consumer importance parameters

Attribute Importance	15-18 years	19-25 years	26-30 years	31-35 years	>36 years
Taste	4,5	4,28	4,34	4,11	4,4
Color	5,0	4,28	4,6	4,11	4,17
Maturity Level	4,5	4,10	4,4	4,48	4,4
Aroma	4,5	4,37	4,6	4,64	4,5
Packaging	4,0	4,37	4,34	3,85	3,7
Shape	4,0	4,28	4,47	4,06	4,17

Based on the table above, it can be seen that the 19-25 age group prioritizes all attributes more than other age groups. The 26-30 age group prioritizes taste, packaging, and shape attributes more, while the 31-35 age group prioritizes maturity level and aroma attributes. The >36 age group prioritizes the color and shape attributes when purchasing UD.Raja Tape products.

Table 8. Cross-tabulation of characteristics by occupation and consumer importance parameters

Attribute Importance	Student/University	Employee	Civil Servant	Private Sector	Entrepreneur
Taste	4,19	4,5	4,15	4,4	4,29
Color	4,28	4,5	4,34	4,4	4,15
Maturity Level	4,10	4,5	4,39	4,3	4,72
Aroma	4,37	4,5	4,62	4,7	4,58
Packaging	4,19	4,5	3,86	4,1	4,15
Shape	4,19	4,5	4,43	4,1	4,29

Based on the table above, the highest average consumer importance values can be seen for each type of occupation for each parameter. Students prioritize taste, color, aroma, packaging, and shape, while employees and civil servants prioritize all attributes more than other workers. The private sector prioritizes aroma, taste, and color attributes in purchasing UD.Raja Tape products, while entrepreneurs prioritize maturity level, aroma, and taste attributes.

The next cross-tabulation analysis is characteristics based on frequency of purchase and frequency of consuming UD.Raja Tape products. It is known that there are five categories of characteristics, namely 1 time/week, <1 time/week, 4 times/week, 5 times/week, and 6 times/week.

Table 9. Cross-tabulation of characteristics by frequency of purchase and consumer importance parameters

Attribute Importance	1 time/week	<1 time/week	4 time/week	5 time/week	6 time/week
Taste	4,37	4,2	3,05	4,34	4,0
Color	4,10	4,54	3,22	4,34	4,0
Maturity Level	4,10	4,54	3,27	4,34	4,0
Aroma	4,46	4,74	3,31	5,0	5,0
Packaging	4,0	4,14	2,96	4,0	5,0
Shape	4,37	4,4	3,14	4,34	5,0

C. Consumer Importance Level Identification

Consumer importance level identification is the assessment of the importance level for each quality attribute of Raja Tape.

Table 10. Consumer importance level values

Ranking	Quality Attribute	Consumer Importance Value
1	Taste	4,25
2	Color	4,33
3	Maturity Level	4,36
4	Aroma	5,31
5	Packaging	4,04
6	Shape	4,31

Based on the data in Table 10, the most important quality attribute according to UD. Raja Tape consumers is aroma with an average value of 5.31, while packaging is the attribute with the smallest value with an average value of 4.04. With these average values, it indicates that consumers of UD.Raja Tape products highly prioritize all attributes except for packaging in purchasing UD.Raja Tape products. Some respondents feel that their assessments are not sufficient, thus they provided additional quality attributes that influence their

decision-making when purchasing UD.Raja Tape products. The additional quality attributes suggested by respondents can be seen in the table below:

Table 11. Suggested Additional Quality Attributes	
Additional Attribute	Number of Respondents
Aroma	1
Advertising and promotion	4
Product quality	2

The most suggested quality attribute by respondents is advertising and promotion. Respondents expect advertising and promotion to be present in MSMEs, and it is also a quality attribute used by some respondents in purchasing UD.Raja Tape products. Additionally, the quality of UD.Raja Tape products is also a suggested attribute by respondents, along with another aroma attribute for Raja Tape products.

D. Analysis of Consumer Satisfaction Levels for UD.Raja Tape and Competitors' Products

The calculation of consumer satisfaction levels is done by obtaining the average value from the total scores for each attribute. For each attribute, the obtained values from 30 respondents are summed up and then divided by 30 (the number of respondents for the questionnaire). The summarized results of the satisfaction levels for Raja Tape and competitor products can be seen in the table below:

Table 12. Consumer Satisfaction Levels for UD.Raja Tape and Competitor Products				
No	Quality Attribute	Consumer Satisfaction Value		
		Raja Tape	Tape Handa Yani 82	Tape Manis 31 Jaya
1	Taste	4,27	4,53	4,23
2	Color	4,23	4,33	4,13
3	Maturity Level	4,30	4,53	3,90
4	Aroma	4,07	4,20	4,13
5	Packaging	4,13	4,43	4,03
6	Shape	4,03	4,27	3,93

Based on the data in Table 12, it can be seen that Raja Tape products have lower scores in all offered quality attributes compared to the competitor Tape Handa Yani 82. Looking at the competitor's score, it indicates that the quality attributes of UD.Raja Tape are perceived as still insufficient/not optimal according to respondents when compared to the competitor Tape Handa Yani 82.

E. Analysis of the Relationship Between Consumer Importance and Technical Parameters (Correlation Matrix)

A correlation matrix is a matrix that results from the interaction between organized technical parameters (HOWs) and consumer importance attributes or voice of customer (WHATs) by linking the two (Andayani et al., 2015). This correlation matrix is located within the body of the QFD house of quality (Candigo et al., 2022). The purpose of this matrix is to determine the influence of technical parameters of the processes carried out by the company in producing a product on consumer importance attributes.

The results of the analysis of the relationship between technical parameters and consumer importance attributes show consistency with the literature. In the peeling and cutting process of cassava and proper processing techniques, almost all secondary technical parameters in these primary technical parameters show a strong relationship with all importance attributes except packaging and shape. This is because if the

production process is not carried out according to the given instructions, it will affect the fermentation process of the product and may result in product damage.

The fermentation process is a chemical change process in an organic substrate through the enzyme activity produced by microorganism (Suryani et al., 2017). Tape yeast is used in the production of fermentation products. Tape yeast comes from rice flour mixed with other ingredients to help in the fermentation process. In this yeast, there are microorganisms that can convert carbohydrates (starch) into simple sugars (glucose), which are then further converted into alcohol and the subsequent reaction will produce acid (Islami, 2018). Fermented carbohydrates (starch) produce a certain amount of lactic acid which lowers the pH value, thus causing an acidic taste. Furthermore, in the packaging process where manual packaging is carried out, employees also inspect the fermentation results of tape to ensure that the fermentation results are successful and suitable for sale.

Table 13. Correlation between consumer importance and technical parameters

Ranking	Relative Im- portance Level Valuef	Importance Value	Consumer Importance Attribute					Raja Tape	
			Shape	Packaging	Aroma	Maturity Level	Color		Taste
			4,31	4,04	5,31	4,36	4,33	4,25	Importance Weight
2	0,130	137,94	○		●		●	●	Selection of the Right Raw Ma- terials
1	0,168	203,04	●		●	●	●	●	Proper Processing Techniques
7	0,101	138,09			●	○	●	●	Regulation of Raw Material Composition
4	0,128	60,54			●			○	Proper Storage Techniques
6	0,108	9,64			△		△		Production Equipment Mainte- nance
3	0,129	36,36		●					Packaging Design
6	0,108	12,12		○					Provision of Quality Infor- mation on Packaging
5	0,123	40,67	△	●					Pricing Determination

Note:

Simbol	Nilai	Arti
●	9	Hubungan kuat
○	3	Hubungan sedang
△	1	Hubungan lemah

F. Analysis of Correlation Between Production Processes (*Matrics Trade-off*)

In addition to the importance matrix and technical parameters, interaction between production processes is also necessary to determine the processes involved in manufacturing a product that are most related to each other. This parameter can also identify how strong the relationship is between these processes. This analysis

can help optimize processes in the production stage to produce products according to the characteristics desired by customers.

At this stage, the analysis results are obtained through discussions with UD.Raja Tape management. The analysis of correlation between production processes can be seen in the table below:

Table 14. Analysis of correlation between production processes

Production Process	Related Production Process	results	Reason
Selection of the Right Raw Materials	Proper Processing Techniques	++	If the raw materials are of poor quality, it will affect the production outcome, resulting in products that do not meet UD.Raja Tape standards.
Selection of the Right Raw Materials	Regulation of Raw Material Composition	++	If the regulation of raw material composition is not correct, it can affect the fermentation process, color, and taste.
Selection of the Right Raw Materials	Proper Storage Techniques	+	This process also greatly affects Raja Tape products because in this technical storage process, cassava mixed with yeast must be properly covered to obtain maximum product maturity.
Proper Processing Techniques	Regulation of Raw Material Composition	++	If the regulation of raw material composition is not correct, it can affect color, taste, aroma, and maturity level.
Proper Processing Techniques	Regulation of Raw Material Composition	++	In the storage of products, anaerobic or oxygen-free conditions are required. If the storage is not tightly closed, it will cause bacterial growth that can damage the quality of the tape.
Proper Processing Techniques	Production Equipment Maintenance	++	To ensure the tape production process is successful, we must maintain clean equipment and materials, especially from fats and oils. If the equipment used is oily, it will cause fermentation failure.
Regulation of Raw Material Composition	Proper Storage Techniques	++	Both of these processes greatly influence the Raja Tape production process to obtain optimal products.
Proper Storage Techniques	Production Equipment Maintenance	++	If we want to obtain optimal product results, we must maintain production equipment so that there is no damage to the production equipment or other storage and production processes can also run smoothly.

Proper Storage Techniques	Packaging Design	+	Packaging also serves to protect the product so that it does not affect the product value when consumed by consumers.
Packaging Design	Provision of Quality Information on Packaging	++	Packaging labels can be used as a source of information that makes it easier for consumers to buy products according to their needs.
Packaging Design	Pricing Determination	+	Proper pricing allows UD. Raja Tape to achieve high product demand figures and sales will increase, and with very attractive packaging, it will affect the selling price because the better the packaging design, the higher the selling price of the product and the higher the consumer interest in UD.Raja Tape products.

G. Formulation and Interpretation of the House of Quality Matrix

The House Of Quality (HOQ) matrix is the most recognized form of QFD representation or symbol of the Quality Function Deployment (QFD) method. This matrix essentially consists of two main parts (Sutoni & Ramadian, 2019). The horizontal part of the matrix contains information related to customers and is called the customer table. The vertical part of the matrix contains technical information as a response to customer inputs, and is referred to as the technical table. Customer information about consumers provides information in forming the QFD method, while technical information is the responses needed from consumers beneficial to the distributor (Guan et al., 2016).

The QFD method with the House of Quality enables an organization or company to prioritize 33 customer requirements, evoke innovative responses from customers, and improve processes in producing products or services to achieve maximum effectiveness. The House of Quality matrix (HOQ) consists of customer importance levels, customer satisfaction levels, the relationship between customer importance levels and technical parameters, analysis of interrelations among technical parameters, relative importance levels, company improvement targets, and improvement ratios arranged in one scheme.

The importance values of Raja Tape product attributes were obtained from discussions with UD.Raja Tape management. The importance weight values are obtained from overall customer satisfaction levels with UD. Raja Tape products, generally finding that the four most important quality attributes are taste, color, aroma, and maturity level. However, despite all the quality attributes that emerged, customer satisfaction with UD. Raja Tape products is still lacking compared to competitors in all quality attributes. After determining the discussion results with UD.Raja Tape management, several quality attributes that are priorities for improvement by the company are obtained, namely shape (1.11), aroma (1.10), and packaging (1.08). These values are obtained by dividing the target improvement value by the customer satisfaction value for Raja Tape products. Where the current customer satisfaction values for Raja Tape and competitor products are obtained from the average values from consumers.

The discussion results with UD.Raja Tape management show that some quality attributes have the highest improvement ratios, so the management chooses to improve the shape, aroma, and packaging attributes of

Raja Tape products. Proper processing technique is a very important technical parameter in producing a Raja Tape product, so it is necessary to be very careful in processing Raja Tape products, especially in the four attributes chosen by management. In addition, selecting quality raw materials is also an important factor in producing a product because if not done properly, it will lower the product's quality. Composition adjustment is an important factor because inadequate raw material composition adjustment will affect product maturity. Important factors in summary can be seen in the table below:

Table 15. Identification of important factors for each production process	
Production Process	Important Factors
Peeling and cutting of cassava	Selection of high-quality raw materials
Wrapping the cassava then let it cool after cooking	Proper processing technique
Prepare containers and line with banana leaves	Regulation of raw material composition
Adding yeast to cassava	
Arranging cassava in containers	
Seal tightly to obtain maximum results	
Let stand for approximately 2-3 days	Proper storage technique
	Production equipment maintenance
Packaging design	Packaging
	Providing quality information on packaging
	Setting the selling price

H. Analysis and Improvement Suggestions on Product Quality

After conducting an analysis of the House of Quality (HOQ) matrix, several quality attributes were identified as not yet optimal according to customers, thus requiring improvements to enhance the quality and overall offering of the product. These quality attribute improvements are necessitated because the satisfaction level associated with Raja Tape products is significantly lower compared to its competitors. Therefore, the company has set improvement targets that exceed the satisfaction level of competitors, resulting in a high improvement ratio. According to the House of Quality matrix, which can be seen in Figure 4.3, the quality attributes with high improvement ratios are Shape (1.11), Aroma (1.10), and Packaging (1.08). After discussions with the company management, all the mentioned quality attributes are prioritized for improvement.

Many believe that the aroma of UD. Raja Tape products is still weaker compared to its competitors, necessitating improvements in the technical parameters to enhance the aroma strength of Raja Tape products. According to Andi (2021), aroma is a component that shapes the taste of food or beverage products. Consumers can perceive the taste of food or beverages through the product's aroma. Regarding shape and packaging, respondents feel that they are less attractive and lacking in quality information, necessitating improvements in Raja Tape product packaging. Regarding shape, in-depth opinions suggest that the shape of Raja Tape products is less attractive compared to those of competitors. As for packaging, it plays a crucial role in product identity because it serves as an important link between the factory, retailers, and consumers. As an integrated part of marketing design, packaging should reflect the promotional theme to be conveyed (Setiawan, 2018).

Khoerudin (2021) defines packaging as the activity of designing and producing the wrapping or enclosure of a product. There are three reasons why packaging is necessary:

1. Meeting safety and usability goals

Besides giving a formal impression of a product, packaging also enhances consumer interest in making purchases. However, more importantly, within product packaging lies the company's identity. Product identity includes information such as ingredient composition, care instructions, usage, and product effects. With product identity, consumers who intend to buy or just browse will certainly read and benefit from information about the product.

2. Assisting marketing programs

With attractive packaging, consumers will give positive appreciation, even if they may not necessarily purchase the product immediately. However, at the very least, a visually appealing product packaging has been acknowledged by consumers. However, the purchasing decision-making process of consumers sometimes takes time.

3. Increasing company volume and profit

Directly, an increase in product purchases will affect company profits. The more sales volume increases and the less promotional activities are needed, the higher the profit gained. This phenomenon applies vice versa.

According to Dusauw et al (2023), packaging is the activity of designing and producing the wrapper or enclosure of a product. The wrapper or enclosure is called packaging. Based on the definitions above, it can be concluded that packaging is a container that protects a product from damage, facilitates shipping processes, and serves as a marketing blend for producers to ensure their products are remembered by consumers.

Improvements in technical production parameters are carried out by focusing on which production technical parameters should be prioritized based on the importance level in the House of Quality matrix. Therefore, the improvement suggestions proposed will refer to these three technical parameters.

I. Types of Raw Materials Used

Before making improvements to shape, aroma, and packaging, it is necessary to know the raw materials used in producing Raja Tape. Generally, cassava tape sold in the market has different fermentation results because the uneven size of cassava tape causes uneven fermentation results. There are tapes with soft textures both on the outside and inside, and also soft on the outside but still hard on the inside. In addition, tape is usually consumed immediately after fermentation and has a shelf life of approximately 2-3 days at room temperature.

1. Cassava

Good-quality tape is aromatic, tasty, soft, and not pungent due to high alcohol content. Good cassava for making tape is cassava that is over six months old but less than one year old. Cassava that is less than six months old still has a very high water content, so its starch content is still low. Likewise, cassava that is over one year old contains a lot of fiber, so its starch content has started to decrease and is not tasty to eat. The best cassava for making tape is cassava that has just been harvested and immediately steamed. Typically, the type of cassava used is yellow cassava, which has soft meat when cooked, easy-to-peel skin, relatively large size, and yellowish color (Zaini Miftach, 2018).

2. Yeast

Tape yeast is widely used as an ingredient in making tape. The fermentation process in tape comes from carbohydrates such as tubers, sticky rice, white rice, and others, which are fermented with yeast to produce tape liquid containing alcohol, white in color, appearing slimy upon sight, and having a sweet-sour taste. Tape yeast is widely used in fermentation to obtain bioethanol and usually has a flat, white appearance with a fine texture. Yeast in the tape-making process is a determining factor in making tape, whether it's cassava tape or sticky rice tape. The quality of yeast and the raw materials used in making cassava tape are essential. This is to prevent contamination of other bacteria. Because if the cassava tape-making process is contaminated with other bacteria, the fermentation process will be disrupted, and the tape will release bacteria that often produce harmful toxins for human health.

J. Improvement Recommendations on Technical Production Aspects

At this stage, improvements are made by considering the House of Quality matrix that has been prepared along with its interpretation, as well as discussions with UD. Raja Tape management regarding which improvement recommendations are deemed suitable for the company's internal conditions. The quality attributes prioritized by the company are shape, aroma, and packaging. The production process stages prioritized are the selection of appropriate raw materials and the application of proper processing techniques, so the improvement recommendations will focus on these two important technical parameters. Here are the improvement recommendations for the technical production aspects proposed to UD. Raja Tape management:

1. Addition of information labels on packaging

Improvement in packaging, as assessed by packaging satisfaction being the lowest among other quality attributes at 4.04, with a ratio of improvement being the third highest at 1.08. Thus, improvements are needed to enhance the quality of the product packaging. Currently, Raja Tape packaging lacks information because packaging labels can serve as a source of information that facilitates consumers in purchasing products according to their needs.

Therefore, UD. Raja Tape is expected to continuously innovate and be creative in designing packaging to convey appropriate messages and communicate essential branding elements. All branding elements conveyed through packaging can ensure customer loyalty and facilitate consumers in identifying product advantages or differences. Ultimately, it is hoped that packaging can become one of the promotion suggestions and an effective message conveyer.

According to Dhurup et al (2014), packaging quality is one aspect of consumer evaluation that can influence consumer purchasing decisions, such as shape, material, color, size, logo, and packaging attractiveness. Packaging design is an attribute that can reflect a product's personality after being properly packaged, thus encouraging consumers to repeatedly purchase the product. Consumers are not ready to buy products without packaging because it is not easy to store, transport, and protect the products. Consumers often want products with good packaging and their own lifestyle (Arief Marna Sonjaya, 2023).

2. Improvement in Aroma

Improvement in aroma, as assessed by aroma satisfaction having the second-highest improvement ratio at 1.10. Thus, improvements are needed to enhance the quality of the product aroma. Aroma is one of the many factors that support taste and determine the quality produced by a product. Aroma is also one of the indicators that determine the level of acceptance of a product by consumers. The strongest alcohol aroma is usually found in tape wrapped in banana leaves (Asmara, 2019). According to Rahmadhanimara et al (2022), aroma is also

an essential aspect of sensory marketing, and aroma is considered a primary element in the physical environment of a product. Aroma, as one of the elements of sensory marketing, is a growing marketing trend because aroma penetration into human olfactory nerves occurs unconsciously, allowing marketing through aroma to be done naturally.

To preserve the aroma in tape, it must be ensured that the tape is stored in a tightly sealed and airtight place so that the tape is not directly exposed to air. This condition will prevent the tape from oxidizing and undergoing changes in taste, texture, and aroma. Because a closed container can help prevent tape contamination by dust, insects, or dirt. Storing tape in a closed place can also prolong its shelf life, so with this, it is hoped that UD. Raja Tape will always be careful in storing Raja Tape products to maintain the aroma of the product for a long time and satisfy consumers.

3. Improvement in Shape or Product Size

Next, the size or shape of a product. The attribute of serving shape is strongly related to proper packaging techniques. Additionally, the serving shape is also strongly related to packaging design. Packaging that has a significant influence is primary and secondary packaging, which directly protects the product. Packaging is done tightly and neatly to produce good and attractive serving shapes. The presentation shape of Raja Tape must be consistent in each piece so that the serving size matches the packaging used. According to Tunky & Kohardinata (2016), packaging must be tailored to the product being packaged. For example, bottle-shaped packaging for liquid products. In the improvement of the quality attribute of product shape, this product has the third-lowest satisfaction value compared to other qualities, namely 4.31, and has the highest improvement ratio at 1.11. Thus, improvements are needed to enhance the quality of the packaging of UD. Raja Tape products.

CONCLUSION

Based on the House of Quality (HOQ) analysis, there are several quality attributes of UD. Raja Tape products that need improvement to enhance product quality, namely: product shape, insufficiently fragrant aroma, and less attractive packaging. To improve product quality, UD. Raja Tape needs to implement operational policies focusing on several technical aspects of production, such as: adding information labels on packaging with ingredient composition, care instructions, usage, and product effects, to increase consumer trust and interest, as well as to support marketing and sales. Improving aroma by optimizing the fermentation process using high-quality yeast and maintaining the cleanliness of raw materials, as well as storing the tape in closed, airtight containers to preserve the freshness of the aroma. Ensuring consistency in product shape or size through proper cutting and packaging techniques to enhance visual appeal and customer satisfaction. Finally, selecting the right raw materials, such as cassava aged 6 months to 1 year and high-quality yeast, to produce tape that is fragrant, tasty, smooth, and consistent in quality.

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