

# SEAWEED DODOL OF AULIA SARI SMALL MEDIUM ENTERPRISE PRODUCT QUALITY IMPROVEMENT USING KANO MODEL AND PRODUCT QUALITY DIMENSION INTEGRATION

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## Abstract

Aulia Sari is the only business entity that produces seaweed dodol in Java island. Dodol sales number in West Java is quite high because it is one of the typical souvenirs of West Java. Seaweed dodol Aulia Sari with many benefits offered from seaweed, did not get a big selling number in Bandung as the city where the business entity is established. This research is intended to improve the product quality of seaweed dodol to increase customer satisfaction level using integration of Kano method and Product Quality dimension. Advantages of using Kano and dimensions of product quality in product development has been proven in several previous studies to improve the product performance. This study uses 4 product quality dimensions that have been adapted to the product in the form of food and 22 variable of products quality derived from the Voice of the Customer and integrated with Kano method. The purpose of this study is to get what factors are going to be maintained, improved or removed from seaweed dodol products of Aulia Sari SME.

**Keyword:** kano, product quality, UKM.

## 1. Preface

Small Medium Enterprise (SME) is one of the important keys of economic development in Indonesia. Nowadays, there are 8.2 million units of SME sector in West Java with a huge contribution in growth level of the province. One of it is able to provide employment for more than 80% and can contribute more than 60% of the Gross Domestic Product (GDP) of West Java [1]. Aulia Sari is one of SME unit in Bandung which is focusing in processed seaweed production. One of the products of Aulia Sari SME who have a high enough potential is seaweed dodol product.

Table 1. Dodol Selling Number in West Java [2]

| no | Brand   | Year          |               |               |               |
|----|---------|---------------|---------------|---------------|---------------|
|    |         | 2009<br>(ton) | 2010<br>(ton) | 2011<br>(ton) | 2012<br>(ton) |
| 1  | Anugrah | 36.9          | 38.4          | 37.0          | 39.6          |
| 2  | Pusaka  | 51.3          | 54.1          | 52.8          | 54.5          |
| 3  | Picnic  | 63.0          | 65.0          | 66.4          | 66.0          |
| 4  | Winda   | 54.7          | 59.0          | 62.3          | 60.0          |
| 5  | Etc     | 425.8         | 418.6         | 418.0         | 432.7         |
|    | Total   | 631.7         | 635.1         | 636.5         | 652.8         |

Table 1 shows that Dodol product has a high demand in west Java. It can be seen from the positive trend of dodol product selling increasing number. Seaweed dodol Aulia Sari can reach a high selling number, based on the dodol selling number in West Java.

The other potential by using seaweed as a main ingredient of dodol is that seaweed has so many benefits for healthiness. It is rich of vitamins (A, B12, zinc, Potassium, Iodine, etc), rich of fiber, can prevent cancer (high anti-oxidant), and can help body detox [3].

With so many benefits of seaweed dodol, there are still some complaints from consumers to seaweed dodol Aulia Sari obtained through a preliminary survey conducted to 32 consumers of seaweed dodol Aulia Sari. Some complaints from consumers about seaweed dodol Aulia Sari can be seen in Table 2.

Table 2. Complaint from Preliminary Study

| Complaint         | Respondent numbers | Percentage |
|-------------------|--------------------|------------|
| Color complaint   | 16                 | 50%        |
| Taste complaint   | 12                 | 37.5%      |
| Texture complaint | 20                 | 62.5%      |
| Less Popularity   | 28                 | 87.5%      |

Table 2 explains that in addition to the big opportunity in the market, there are still shortcomings perceived by consumers on the seaweed dodol Aulia Sari which if not handled properly will cause customer satisfaction gap [4]. From the data in Table 2, the improvement of seaweed dodol Aulia Sari attributes is indispensable to eliminate the gaps. This research was conducted by using the integration model Kano model with dimensions of quality products that will generate an attribute that must be improved, maintained and removed to increase the level of customer satisfaction.

2. Literature Review

2.1 Product Quality Dimension

The product quality is characteristic of a product or service that relies on its ability to satisfy customers' needs are expressed or implied [5]. Product quality are the characteristics of products or services that depend on its ability to demonstrate its function and satisfy consumer's needs, in other words, product quality is a value of product that is served to the consumers.

Not all of the 8 quality dimensions can be applied to Aulia Sari seaweed Dodol product. Some theories adaptation needed to be adjusted to the product as the research object. Dimension selection process needed to analyze what dimensions are related to the product. Quality dimensions selection is based on research before and expert helps. Relevant dimensions comparison can be seen at Table 3.

Table 3. Relevant Product Quality

|           | Expert            |                      | Description  |
|-----------|-------------------|----------------------|--|
|           | Garvin [6]        | Marie Ferree [7]     |  |
| Dimension | Aesthetic         | Color                | How a product looks, feels, sounds, tastes, or smells. It is clearly a matter of personal judgment |
|           |                   | Uniform Size         |  |
|           | Perceived Quality | Reputation of Seller | The information of product attributes served in one product  |
|           | Durability        | Durability           | Amount of use one gets from from a product before its break down and replacement is prefer         |
|           | Conformance       | Taste                | The degree to which product's design and operating characteristics meets the established standard  |
| Labelling |                   |                      |  |

Dimensions of product quality on Table 4 related to the research object because it has similar characteristics which is food product. The purpose of this selection is to strengthen the analysis of the writer to decide the dimension which is relevant to the Aulia Sari seaweed dodol product. From the dimensions of the quality of this product, we will get the dimensions of the quality of products that are weak and strong that will be used in decision making of product improvement.

2.2 Kano Model

Kano model distinguishes between six types of product attributes category which influence customer satisfaction in different ways when met [8]:

1. Must-be requirements : If these requirements are not fulfilled, the customer will be extremely dissatisfied. On the other hand, as the customer takes these requirements for granted, their fulfillment will not increase its

satisfaction. The must-be requirements are basic criteria of a product, if they are not fulfilled, the customer will not be interested in the product at all.

2. One-dimensional requirements : With regard to these requirements, customer satisfaction is proportional to the level of fulfillment - the higher the level of fulfillment, the higher the customer's satisfaction and vice versa.
3. Attractive requirements : These requirements are the product criteria which have the greatest influence on how satisfied a customer will be with a given product. Fulfilling these requirements leads to more than proportional satisfaction. If they are not met, however, there is no feeling of dissatisfaction.
4. Indifferent Quality: These attributes refer to aspects that are neither good nor bad, and they do not result in either customer satisfaction or customer dissatisfaction.
5. Reverse Quality: These attributes refer to a high degree of achievement resulting in dissatisfaction and to the fact that not all customers are alike. For example, some customers prefer high-tech products, while others prefer the basic model of a product and will be dissatisfied if a product has too many extra features.
6. Questionable Category: This situation occurs when there is a contradiction in customer response to a question in pairs. Customer needs cannot be clearly interpreted in this dimension.

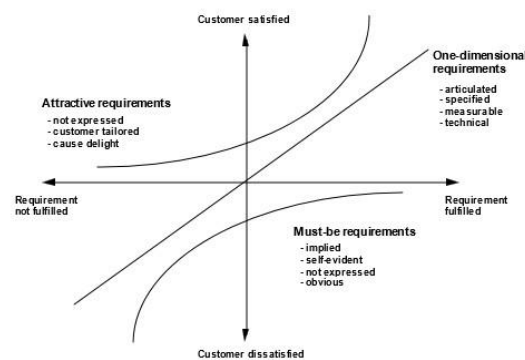


Figure 1. Kano Model [9]

Determination of categories for each attribute by Kano model is obtained by classifying categories of answers to the statement of functional and dysfunctional statement on Kano Model questionnaire. Kano model in this study will result in a Kano category and becomes the input for consideration of product quality improvement.

### 2.3 Integration of Product Quality Dimensions and Kano Model

In this study used the integration of Product Quality and Model Kano because not all attributes which are obtained from the customer needs is an attribute that needs to be maintained or developed. Obtained attributes will be grouped based on the dimensions of Product Quality and the categorization of attributes based on customer's satisfaction using Kano model.

Measurement of quality of products using questionnaires Product Quality attribute requirements that will produce strong and weak category, while the Kano Model questionnaire will generate attribute needs to category Must-Be, One-Dimensional, Indifferent, Attractive, Reverse and Questionable. These attributes will be integrated and the attributes which are needed to be improved, maintained, or eliminated will be known.

### 3. Research Methodology

This paper contains a study to get the attributes that will be improved, maintained, and removed for the seaweed dodol Aulia Sari product quality improvement. Research will be conducted in accordance with the conceptual model in Figure 2.

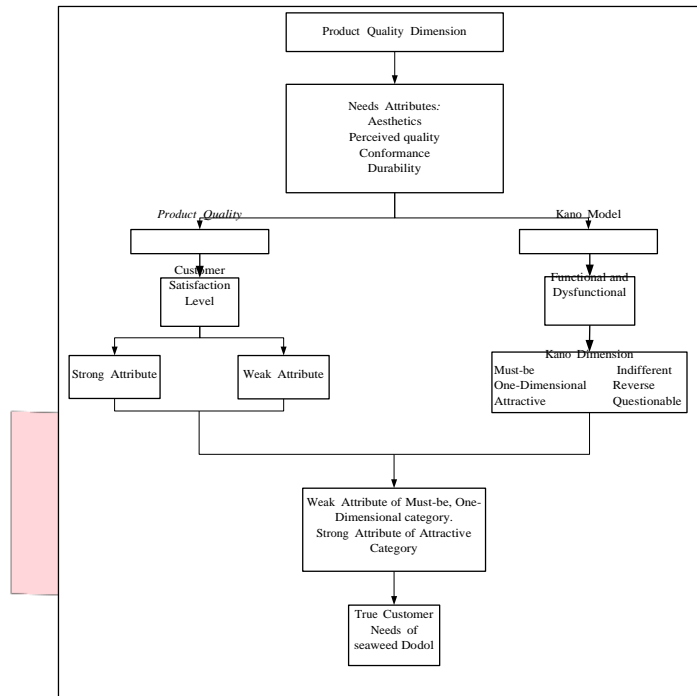


Figure 2. Conceptual Model

Figure 2 explains that needs attributes that have known in this study are grouped into product quality dimensions: Aesthetics, Perceived Quality, Conformance, and Reliability. There are two types of questionnaires used in this study, Product Quality questionnaire and Kano Model questionnaire. In the questionnaire will be known Product Quality customer satisfaction level, so the need attributes can be categorized into strong and weak attributes. The need attribute which is categorized into strong attribute is the one which has a positive Customer Satisfaction Level, and weak attribute category is the one which has negative customer satisfaction level.

In the Kano model questionnaire, the questions were made to the statement of functional and dysfunctional. The results of the questionnaire on the Kano model is an attribute needs are characterized by the dimensions of Kano: must-be, one-dimensional, attractive, indifferent, reverse, and questionable. At the end of the study will produce true customer needs, which is a weak attribute category: requirements must-be, one-dimensional and attractive as well as strong attribute category: attractive attribute.

**4. Data Collection**

This is the stage of data collection required for product quality improvement of Aulia Sari seaweed dodol. Data collection starts from identifying the product attributes of the object of research from the voice of customer which is obtained from in-depth interview. The interview is done to get a detail complaint and satisfaction level of customer to the product performance. Then the VoC will be the guide for making the product quality and Kano model Questionnaire. There are 4 product quality dimension with 22 needs attributes based on the VoC result. The questionnaire is spread to 120 respondents. The questionnaire is used to measure the customer satisfaction level and determine the influence of a particular attribute to the customer satisfaction level.

**5. The Result And Discussion**

**5.1 Needs Attributes Coding**

Needs attributes coding is done to facilitate the recapitulation stage of data processing of each attributes and Product Quality and model of Kano questionnaires data processing. Each attribute is given a letter code based on the dimensions of Product Quality and followed by a sequence number. Needs attributes coding can be seen in Appendix A.

### Product Quality Questionnaire Result

Product Quality questionnaire processing is calculating the gap or the difference between satisfaction value and expectations value of seaweed dodol product. The gap value will then be combined with the importance value which is obtained from Product Quality questionnaires by multiplying it to become customer satisfaction value. Calculation of the gap value and the CSV can be seen in Table 4.

Table 4. Product Quality Questionnaire Result

| No. | Attribute code | Expectati on | Satisfaction | Gap   | Importance | CSV   |
|-----|----------------|--------------|--------------|-------|------------|-------|
| 1   | AES_1          | 3,21         | 3,13         | -0,08 | 3,13       | -0,25 |
| 2   | AES_2          | 3,12         | 3,20         | 0,08  | 3,20       | 0,26  |
| 3   | AES_3          | 3,20         | 3,22         | 0,02  | 3,13       | 0,06  |
| 4   | AES_4          | 3,20         | 3,19         | -0,01 | 3,20       | -0,03 |
| 5   | AES_5          | 3,19         | 3,22         | 0,03  | 3,20       | 0,10  |
| 6   | AES_6          | 3,20         | 3,13         | -0,07 | 3,19       | -0,22 |
| 7   | AES_7          | 3,20         | 3,18         | -0,02 | 3,20       | -0,06 |
| 8   | REP_1          | 3,21         | 3,20         | -0,01 | 3,19       | -0,03 |
| 9   | REP_2          | 3,14         | 3,13         | -0,01 | 3,20       | -0,03 |
| 10  | REP_3          | 3,21         | 3,13         | -0,08 | 3,20       | -0,26 |
| 11  | REP_4          | 3,20         | 3,18         | -0,02 | 3,13       | -0,06 |
| 12  | CON_1          | 3,17         | 3,19         | 0,02  | 3,19       | 0,06  |
| 13  | CON_2          | 3,12         | 3,21         | 0,09  | 3,13       | 0,28  |
| 14  | CON_3          | 3,18         | 3,20         | 0,02  | 3,20       | 0,06  |
| 15  | CON_4          | 3,19         | 3,14         | -0,05 | 3,20       | -0,16 |
| 16  | CON_5          | 3,18         | 3,20         | 0,02  | 3,19       | 0,06  |
| 17  | CON_6          | 3,11         | 3,12         | 0,01  | 3,13       | 0,03  |
| 18  | CON_7          | 3,19         | 3,20         | 0,01  | 3,20       | 0,03  |
| 19  | CON_8          | 3,20         | 3,17         | -0,03 | 3,20       | -0,10 |
| 20  | CON_9          | 3,20         | 3,18         | -0,02 | 3,20       | -0,06 |
| 21  | DUR_1          | 3,20         | 3,40         | 0,20  | 3,40       | 0,68  |
| 22  | DUR_2          | 3,45         | 3,21         | -0,24 | 3,44       | -0,83 |

Needs Attributes which has positive CSV means that the attribute is categorized as strong attribute, while needs attribute that has negative CSV means that the attribute is categorized as weak attribute.

### 5.2 Kano Questionnaire Result

After doing assessment of each attribute that can satisfy or not satisfy customers. This assessment is done by categorizing each needs attribute using Kano categories, which are Must Be (M), One Dimensional (O), Attractive (A), Indifferent (I), Reverse (R), and Questionable (Q). The categorization is assessed by looking at the respondent's answers of each needs attributes with the functional and dysfunctional statements from Kano model Questionnaire. To determine the category of Kano of each attribute can be done by using Blauth's formula [8]. Results of the assessed Kano category for each attribute can be seen in Table 5.

Table 5. Kano model Questionnaire Result

| Attribute Code | A  | O  | M  | O+A+M | Q | R | I  | Q+R+I | Kano Category |
|----------------|----|----|----|-------|---|---|----|-------|---------------|
| AES_1          | 25 | 23 | 29 | 77    | 0 | 0 | 43 | 43    | O             |
| AES_2          | 24 | 10 | 27 | 61    | 0 | 0 | 59 | 59    | M             |
| AES_3          | 28 | 4  | 29 | 61    | 0 | 0 | 59 | 59    | M             |
| AES_4          | 22 | 15 | 27 | 64    | 0 | 0 | 56 | 56    | M             |
| AES_5          | 34 | 13 | 21 | 68    | 0 | 0 | 52 | 52    | A             |
| AES_6          | 50 | 11 | 15 | 76    | 0 | 0 | 44 | 44    | A             |
| AES_7          | 23 | 10 | 28 | 61    | 0 | 0 | 59 | 59    | M             |
| REP_1          | 51 | 17 | 15 | 83    | 0 | 0 | 37 | 37    | A             |
| REP_2          | 27 | 22 | 33 | 82    | 0 | 0 | 38 | 38    | M             |
| REP_3          | 18 | 18 | 45 | 81    | 0 | 0 | 39 | 39    | M             |

Table 5.. Kano model Questionnaire Result (cont.)

|       |    |    |    |     |   |   |    |    |   |
|-------|----|----|----|-----|---|---|----|----|---|
| REP_4 | 20 | 23 | 35 | 78  | 0 | 0 | 42 | 42 | M |
| CON_1 | 23 | 17 | 35 | 75  | 0 | 0 | 45 | 45 | M |
| CON_2 | 27 | 13 | 28 | 68  | 0 | 0 | 52 | 52 | M |
| CON_3 | 28 | 11 | 29 | 68  | 0 | 0 | 52 | 52 | M |
| CON_4 | 27 | 17 | 30 | 74  | 0 | 0 | 46 | 46 | M |
| CON_5 | 21 | 23 | 29 | 73  | 0 | 0 | 47 | 47 | M |
| CON_6 | 72 | 23 | 8  | 103 | 0 | 0 | 17 | 17 | A |
| CON_7 | 29 | 10 | 30 | 69  | 0 | 0 | 51 | 51 | M |
| CON_8 | 17 | 20 | 28 | 65  | 0 | 0 | 55 | 55 | M |
| CON_9 | 36 | 9  | 30 | 75  | 0 | 0 | 45 | 45 | A |
| DUR_1 | 1  | 52 | 12 | 65  | 0 | 0 | 55 | 55 | M |
| DUR_2 | 2  | 48 | 16 | 66  | 0 | 0 | 54 | 54 | M |

### 5.3 Product Quality and Kano Model Result Integration

The the strong and weak needs attributes are the result from Product Quality, while the results of the Kano model questionnaire are the needs attributes with Kano category. These results will be integrated in order to determine what needs attributes will be improved, maintained or removed. Integrated results of the Product Quality and Kano Model questionnaires can be seen in Table 6.

Table 6. Product Quality and Kano Model Result Integration

| Attribute Code | CSV   | Strength / Weakness | Kano Category | Priority   |
|----------------|-------|---------------------|---------------|------------|
| AES_1          | -0.25 | Weakness            | O             | Improved   |
| AES_2          | 0.26  | Strength            | M             | Maintained |
| AES_3          | 0.06  | Strength            | M             | Maintained |
| AES_4          | -0.03 | Weakness            | M             | Improved   |
| AES_5          | 0.10  | Strength            | A             | Improved   |
| AES_6          | -0.22 | Weakness            | A             | Improved   |
| AES_7          | -0.06 | Weakness            | M             | Improved   |
| REP_1          | -0.03 | Weakness            | A             | Improved   |
| REP_2          | -0.03 | Weakness            | M             | Improved   |
| REP_3          | -0.26 | Weakness            | M             | Improved   |
| REP_4          | -0.06 | Weakness            | M             | Improved   |
| CON_1          | 0.06  | Strength            | M             | Maintained |
| CON_2          | 0.28  | Strength            | M             | Maintained |
| CON_3          | 0.06  | Strength            | M             | Maintained |
| CON_4          | -0.16 | Weakness            | M             | Improved   |
| CON_5          | 0.06  | Strength            | M             | Maintained |
| CON_6          | 0.03  | Strength            | A             | Improved   |
| CON_7          | 0.03  | Strength            | M             | Maintained |
| CON_8          | -0.10 | Weakness            | M             | Improved   |
| CON_9          | -0.06 | Weakness            | A             | Improved   |
| DUR_1          | 0.68  | Strength            | M             | Maintained |
| DUR_2          | -0.83 | Weakness            | M             | Improved   |

The attributes that have to be improved is the weak attributes based on product quality questionnaire and kano categorized as Attractive, Must be, and One dimensional and the strong attributes and Kano categorized as Attractive. There are 14 attributes that need to be improved based on questionnaire data processing result. The attributes that have to be maintained is the string attributes base on product quality questionnaire and Kano categorized as must be attribute.

There are 14 attributes that need to be improved and 8 attributes that have to be maintained. There is no attribute that have to be removed in the seaweed dodol Aulia Sari product.

## 5.6 True Customer Needs

True customer needs is the needs attributes that are more expected by the customer which means that these attributes need to be given extra attention by the company. These attributes need to be analyzed and improved by Aulia Sari SME. The true customer needs of Aulia Sari seaweed dodol can be seen on Table 7.

Table 7. True Customer needs of seaweed dodol Aulia Sari.

| No | Attribute Code | Needs Attribute   |
|----|----------------|---|
| 1  | AES_1          | Balance blend between images and text on the packaging                                |
| 2  | AES_4          | Packaging writing clarity   |
| 3  | AES_5          | The smell of seaweed dodol aulia sari reflects its taste                              |
| 4  | AES_6          | Harmonization of seaweed dodol color and flavor                                       |
| 5  | AES_7          | Seaweed dodol size uniformity   |
| 6  | REP_1          | Aulia Sari brand identic with processed seaweed product                               |
| 7  | REP_2          | Aulia Sari advertisement scattered in every media campaign                            |
| 8  | REP_3          | Listing information about the outlet (address and telephone number) on the packaging. |
| 9  | REP_4          | Availability of seaweed dodol in the outlet   |
| 10 | CON_4          | Listing the composition of the product in the packaging                               |
| 11 | CON_6          | Compatibility of fruit flavor application in dodol product                            |
| 12 | CON_8          | Seaweed dodol chewiness   |
| 13 | CON_9          | Seaweed dodol crispness   |
| 14 | DUR_2          | Seaweed dodol durability (time)   |

The attributes that categorized as true customer needs are the attributes that become the weakness of the product which are kano categorized as Must be, One dimensional, and Attractive category and the strength of the product which are Kano categorized as Attractive category.

## 6. Conclusion and Suggestion

### 6.1 Conclusion

Based on this research objective, there are some conclusion from this research, there are:

1. There are 22 needs attributes which is identified by related Product Quality dimensions which are Aesthetic, Reputation, Conformance and Durability.
2. Based on Product Quality dimension data processing, there are 10 strong attributes which are already fulfilled the customer satisfaction and 12 weak attributes which are not fulfilled the customer satisfaction.
3. Based on Kano Model data processing, there are 10 attributes which are Kano categorized as Must Be category, 1 attribute which is Kano categorized as One Dimensional Category, and 5 attributes which are Kano categorized as Attractive category.
4. Based on the integration of Product Quality dimension and Kano Model data processing, there are 14 true customer need that have to be developed by the Aulia Sari SME, there are balance blend between images and text on the packaging, packaging writing clarity, the smell of seaweed dodol aulia sari reflects its taste, harmonization of seaweed dodol color and flavor, seaweed dodol size uniformity, Aulia Sari brand identic with processed seaweed product, Aulia Sari advertisement scattered in every media campaign, listing information about the outlet (address and telephone number) on the packaging, availability of seaweed dodol in the outlet, listing the composition of the product in the packaging, compatibility of fruit flavor application in dodol product, seaweed dodol chewiness, seaweed dodol crispness, seaweed dodol durability (time).

### 6.2 Suggestion

Based on the research that have been done, there can be a suggestion to this research such as:

1. In categorizing the voice of customer in the affinity diagram, there can be an analysis included to reduce the unnecessary or doubled needs attributes for the research.



2. This research does not have enough data about the competitor of the object competitor, so there is not enough data for comparing the analysis for further analysis of which attribute that need to be improved or maintained for the market.

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**Appendix:**

**Appendix A: Attributes Coding Result**

| No.                             | Product Quality Dimension | Needs Attributes  | Attribute Code |
|---------------------------------|---------------------------|---|----------------|
| 1                               | Aesthetics                | Balance blend between images and text on the packaging                                | AES1           |
|                                 |                           | The harmonization between color in the packaging                                      | AES2           |
|                                 |                           | Contains logo of Aulia Sari SME in the packaging                                      | AES3           |
|                                 |                           | Packaging writing clearness   | AES4           |
|                                 |                           | The smell of seaweed dodol aulia sari reflects its taste                              | AES5           |
|                                 |                           | Harmonization of seaweed dodol color and flavor                                       | AES6           |
|                                 |                           | Seaweed dodol size uniformity   | AES7           |
| 2                               | Reputation                | Aulia Sari brand identic with processed seaweed product                               | REP1           |
|                                 |                           | Aulia Sari advertisement scattered in every media campaign                            | REP2           |
|                                 |                           | Listing information about the outlet (address and telephone number) on the packaging. | REP3           |
|                                 |                           | Availability of seaweed dodol in the outlet   | REP4           |
| 3                               | Conformance               | Have a Halal label  | CON1           |
|                                 |                           | Listing the net weight of product in the packaging                                    | CON2           |
|                                 |                           | Listing the expired date of product in the packaging                                  | CON3           |
|                                 |                           | Listing the composition of the product in the packaging                               | CON4           |
|                                 |                           | Contains the product nutrition value in the packaging                                 | CON5           |
|                                 |                           | Compatibility of fruit flavor application in dodol product                            | CON6           |
|                                 |                           | Have a label and test pass number from Ministry of health on the packaging            | CON7           |
|                                 |                           | Seaweed dodol chewiness   | CON 8          |
|                                 |                           | Seaweed dodol crispness   | CON 9          |
|                                 |                           | 4   | Durability     |
| Seaweed dodol durability (time) | DUR 2                     |   |                |