

# KANSEI-BASED DESIGN FOR AN INDONESIAN TRADITIONAL FOOD PACKAGING

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## Graphical abstract



## Abstract

One of the traditional specialties in Pariaman, West Sumatra, which is very famous, is *sala lauak*. *Sala lauak* is a dish in the shape of a thumb-sized lump made of fish dough that is mashed and collected with flour. *Sala lauak* specialties are in great demand by people within the region and outside the region. According to the Pariaman City government, *sala lauak* can be a souvenir for tourists with this potential. Pariaman City Government plans to develop *sala lauak* packaging. One way is to provide frozen *sala lauak*. However, currently, the frozen *sala lauak* packaging has not been developed by the Pariaman City Government. Whereas, unique, save, and attractive packaging is very important to increase the consumer purchasing power. Thus, this study designs frozen *sala lauak* packaging using a psychological approach based on consumers' feelings and emotions, namely Kansei Engineering. The design of frozen *sala lauak* packaging using the Kansei Engineering method uses 198 Kansei words, which are simplified into 19 Kansei words. The resulting packaging design consists of two design alternatives. Based on the design evaluation results using the Analytical Hierarchy Process (AHP) method, a design for frozen *sala lauak* packaging was selected. The packaging design chosen is in the form of a flat pouch in red, complete with product information and packaging attributes. The flat bottom packaging design gets a positive emotional response from consumers, so it is expected to increase consumer interest in buying *sala lauak*, especially as a tourist souvenir.

**Keywords:** Analytical Hierarchy Process (AHP), Design, Kansei, Packaging, *Sala lauak*

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## 1.0 INTRODUCTION

Pariaman City is an area in West Sumatra Province that can be developed in the tourism sector. The Pariaman City Government hopes that with the increasing number of tourists, these tourists' typical Pariaman souvenirs will increase. One of the typical Pariaman snacks that can be used as souvenirs is *sala lauak*. *Sala lauak* is widely sold in the Pariaman area, especially the Pariaman market and the Gandoriah beach tourism object.

*Sala lauak* is a dish in the shape of a thumb-sized lump made of fish dough, mashed and mixed with flour. *Sala lauak* is generally served as a complimentary dish for breakfast [1]. *Sala lauak* specialties are in great demand by people inside and outside the Pariaman area. According to the Pariaman City

government, *sala lauak* can be a souvenir for tourists with this potential. There are as many as 70 Small and Medium Enterprises (SMEs) that produce *sala lauak* across several districts. Production of *sala lauak* in Pariaman City in 2019 reached 70 tons of sala in a year. This production value is still not optimal because the production capacity of *sala lauak* can reach 86 tons per year. For this reason, efforts should be made to meet production capacity.

Packaging plays a vital role in purchasing decisions [2]. Attractive packaging plays an essential role in product appearance, where most of the impulsive buying occurs because of seeing the appearance of the product [3]. Impulsive buying is the tendency of consumers to spontaneously, reflexively, suddenly, and automatically [4]. Consumers can be attracted to a product only by looking at the packaging of a

product. Consumers who previously did not know the quality of the product will judge the product from the product's visual appearance [5]. Therefore, packaging can be a means of marketing communication used to attract consumer attention and influence the product selection process [6,7,8,9].

Packaging has a significant role: to function to hold, protect, and maintain the integrity of food products against potential climatic, bacteriological, and transitional damage [10]. The main requirement for the safety characteristics of packaging is the minimum possible interaction between food and packaging [11]. To create packaging according to these characteristics, packaging design is carried out. Packaging design involves visual elements, information elements, and functionality attributes. Visual elements are related to the packaging material and technology used and graphics, color, size, or shape of the packaging [12]. Informational elements consist of product identification, labeling, brand names, and claims [13,14,15,16,17,18].

Thus, designing frozen *sala lauak* packaging is one of the efforts to increase consumer purchasing power of *sala lauak*. With the packaging, *sala lauak* products can look neater, durable and easy to carry. Packaging can also increase the added value for *sala lauak*. Kottler and Armstrong (2012) stated that packaging involves designing and producing the container or wrapper for a product, so that the product message is conveyed to consumers [19]. Besides, an attractive and unique packaging design will increase consumers' purchasing power [20,21,22,23]. This study shows the design process of frozen *sala lauak* packaging using a psychological approach based on consumers' feelings and emotions, namely Kansei Engineering.

## 2.0 METHODOLOGY

The method used in designing the *sala lauak* packaging is Kansei engineering. Kansei engineering can translate consumers' emotional needs into concrete design parameters through specific technical techniques [24]. Analytical Hierarchy Process (AHP) was also used to choose the best alternative design.

### Kansei Engineering Method

The Kansei Engineering procedure follows Schutte [25]. The first process in Kansei Engineering is to determine the domain. Choice of the domain is selecting the target group of a product; usually, products are more specified based on type, function, and others [24]. Next is the span of the semantic space stage. The span of semantic space is the stage where the Kansei words are collected, structured, and recapitulated. To be able to recapitulate the Kansei Words, a questionnaire was developed and distributed. The questionnaire was developed using the Kansei Words. This questionnaire was designed with a 7 point rating scale (Semantic Differential Scale). The questionnaire was then distributed to a representative sample of the tourist population in Kota Pariaman. The number of respondents was calculated using the Lameshow formula [26] with a confidence level of 95% and an accuracy level of 10%, namely 97 respondents. Respondents gave assessment points to each Kansei Words that were deemed according to their wishes.

Then, the stage span the space of product properties. At this stage, each selected Kansei words is then grouped and given a factor. Then its relationship is calculated-the next the synthesis process. In the synthesis stage, span the space of product properties and the span of semantic space are connected [22].

### Validity and Reliability Testing

Validity is a measure that shows the extent to which the measuring instrument can measure what will be measured. A valid instrument means that the measuring instrument used to obtain the data is valid. Reliability is how consistent the measurement results of a variable are. A reliable instrument means an instrument that can produce the same data when used several times to measure the same object [27]. Cronbach alpha is commonly used to measure the reliability of a set of indicators from two or more variables. Cronbach alpha values range between 0 and 1, where a high alpha value indicates high reliability among these indicators [28]. For behavioral research, researchers can generally accept Cronbach's if it is greater than or equal to 0.60 [29]. The Product Moment correlation formula developed by Pearson was used for the validity test. To test the validity and reliability using SPSS 24.0 software.

### Factor Analysis

Factor analysis is an interdependence technique where the main objective is to explain the relationship between the variables in the analysis [30]. In principle, factor analysis is used to group several similar variables into one factor, so several attributes that affect one variable can be summarized into several main factors that are less in number. Factor analysis was performed using SPSS 24.0 software.

### Analytical Hierarchy Process (AHP)

In this study, AHP was used to determine the packaging model for frozen *sala lauak* based on consumer preferences. The basic concept of AHP is the use of a pairwise comparison matrix (pairwise comparison matrix) to produce relative weights between criteria and alternatives. The recommended values for creating a pairwise comparison matrix based on the Saaty's scale as presented in Table 1.

### Packaging Design

Design of frozen *sala lauak* packaging using CorelDRAW X-7 and Adobe Photoshop CS-3 Software. The design is based on assessing the Kansei Words variable obtained from the respondents and the selection results using the AHP method.

Table 1 Saaty's Scale [31]

Intensity of Interest	Definition
1	Both elements are equally important
3	One element is slightly more important than the other
5	One element is very important than the other
7	One element is clearly more important than the other
9	One element is absolutely important than the other
2,4,6,8	Values between two adjacent consideration

### Packaging Design Evaluation

The evaluation of the packaging design was carried out by giving a questionnaire to 30 respondents. The questionnaire contains a picture of the current frozen *sala lauak* packaging compared to the packaging design made. Furthermore, the respondents assessed some of these packages. Based on the questionnaire results, it can be determined which packaging was selected and became the recommendation for frozen *sala lauak* packaging.

10	Easy to open
11	Informative
12	Logo
13	Easy to close
14	Transparent
15	Neat
16	Simple
17	Multifunction
18	Unique
19	Convincing

## 3.0 RESULTS AND DISCUSSION

### Choice of the Domain - Findings

The domain selected in this study was packaging for frozen traditional food *Sala lauak*, which is attractive in order to increase consumer purchasing power. This definition identifies the market position and the product along with a latent target group. Subsequently, the respondents to the questionnaires ought to be accustomed to *sala lauak* products.

### Span the Semantic Space - Findings

Kansei words are words collected from various sources that can represent and describe the product domain. This study obtained 198 Kansei words from interviews with *sala lauak* consumers, journals, and previous research results. After structuring the Kansei words, 19 Kansei words were produced, which became the frozen *sala lauak* product packaging criteria. Table 2 shows the 19 chosen frozen *sala lauak* packaging criteria.

### Span the Space of Properties - Findings

The data collected in the Span the Space of Properties stage is in the form of product properties. Product properties are part of the product, which consists of product design elements. The design elements for *sala lauak* packaging are obtained based on literature and the researcher's knowledge. According to Klimchuck and Krasovec [32], a packaging product's design elements consist of primary and secondary design elements.

### Primary Design Elements

The primary design element is the main element, which consists of elements needed by marketers. Primary design elements include the brand name, product information, packaging form, and packaging materials.

### Secondary Design Elements

Secondary design elements are elements that comprise all additional design elements. Secondary design elements include colors, images, typography, illustrations, symbols, and layouts. The product properties identified for *sala lauak* packaging were presented in Table 3.

**Table 3** Determination of Product Properties

Primary Design Elements	Secondary Design Elements
Brand	Color
Product Information	Image
Form	Typography
Material	Illustration
	Symbol
	Layout

The Kansei words are then distributed to the respondents to assess the image given as positive or negative. The scale used is 1-7, ranging from very negative on the left to very closely relate to the right. The questionnaire was distributed to 100 respondents who are *sala lauak* consumers. The demography data of respondents were presented in Table 4. The results of the questionnaire were then used in the validity test. The test found that all questions on the questionnaire are declared valid and reliable.

Factor analysis was then performed on 19 Kansei word criteria. The first step in factor analysis is to look at the value of the Kaiser-Meyer-Olkin-Measure of Sampling Adequacy (KMO MSA) and the probability value (sig). If the KMO MSA value is > 0.050 and Barlett's Test of Sphericity value < 0.050, the factor analysis technique can be continued. The KMO value obtained is 0.831 (> 0.500), and the Barlett's Test (Sig) value is 0.000 (< 0.050). The factor analysis in this study can be continued because it meets the requirements, and the Anti-Image Matrices test was carried out. The test results show that the MSA value for all Kansei words is more than 0.500, which means the variable is worthy of further analysis. The subsequent factor analysis stage is to determine the Total Variance Explained by looking at Initial Eigen values and the Extraction of Squared Loadings.

**Tabel 2** Kansei Words Chosen

No.	Kansei Words
1	Durable Packaging
2	Attractive Packaging
3	Clear Brand
4	Proportional design
5	Innovative
6	Characteristic
7	Light
8	Environmentally friendly
9	Quality

**Table 4** Demography Data of Respondents

No.	Demography	Total	Percentage
1	Gender	Man	29 29%
		Woman	71 71%
2	Age	<25 year	63 63%
		25-35 year	26 26%
		36-45 year	1 1%
		>45 year	10 10%
3	Profession	Students	29 29%
		Private employees	24 24%
		Civil servants	7 7%
		Others	40 40%

Initial Eigen values indicate the factors formed. Adding all the factors together will show the number of variables. The requirement to be a factor is that the Initial Eigenvalues value must be  $> 1$ . Extraction of Squared Loadings indicates the number of variations or the number of factors that can be formed. Based on the analysis, it was found that the total value of Initial Eigenvalues on the factor 1 is 7.289, factor 2 is 2.261, factor 3 is 1.673 and factor 4 is 1.163. The four factors show a value  $> 1$ , so the factors that are formed are four factors. These factors are then given the name which reflects the variables incorporated in it. Factor 1 was named "Quality packaging"; factor 2 was "Attractive packaging", factor 3 was "Convincing packaging"; and factor 4 was "Informative packaging".

The results of the overall factor analysis can be seen from the Rotated Component Matrix results, were to ensure a variable is included in the group of a factor, it can be determined by looking at the most considerable correlation value between the variable and the formed factor. The next stage is to enter these variables into a factor by looking at the component matrix's value at its greatest. The product properties stage contains the process of identifying factors for each category. The results of identifying product properties were presented in Table 5.

**Table 5** Results of Factor Analysis Identification

Factor	1	2	3	4
	<b>Quality Packaging</b>	<b>Attractive Packaging</b>	<b>Convincing Packaging</b>	<b>Informative Packaging</b>
Kansei Words	Light	Durable Packaging	Logo	Distinctive
	Quality	Attractive Packaging	Simple	Informative
	Easy to open	Clear Brand	Multifunction	Easy to close
	Transparent	Proportional Design	Unique	
	Neat	Innovative Environmentally Friendly	Convincing Packaging	

### Synthesis

The synthesis stage is a stage that combines Semantic Space and space of properties, where each Kansei word is found in the product properties and affects the product. The synthesis method used in this study is Kansei engineering-type 1 (Category classification). Kansei words that have been processed at the Semantic Space stage are connected with

design elements at the space of properties stage. Kansei words that influence design elements are given a value of 1, and those with no influence are not given a value. The results show that all the Kansei words obtained affect each of the specified product properties, so these results are used for the next stage in designing the *sala laauk* packaging.

### Determination of Packaging Model

Determination of the packaging model was conducted based on the Kansei words criteria using the AHP method. Two experts from the Pariaman Cooperative and Trade Agency and 30 respondents (Consumers) contributed in giving an opinion on the criteria for frozen *sala laauk* packaging using AHP. Recapitulation of the AHP results was presented in Table 6.

**Table 6** Recapitulation of the AHP Results

No.	Criteria	Consumers' Opinion	Experts' Opinion
1.	Light	The material is a mixture of plastic and aluminium foil, is strong and light to carry.	Packaging with plastic material is lighter, cheaper, and suitable for frozen food.
2.	Quality and Durable	Plastic packaging is good, robust, safe, and resistant to water, oil, and odours.	Packaging from plastic or aluminium foil is strong and durable, so it is suitable for frozen food.
3.	Easy to open and close	The standing pouch with a zipper-lock is easy to be opened and closed safely.	The packaging has a zipper-lock, which makes it easy for food to be opened and closed.
4.	Transparency	The box-shaped packaging contains transparent plastic with a unique pattern in the middle of the package.	Partially transparent packaging, the transparent part can show the condition of the product, and the non-transparent part is used to include product information.
5.	Neat	The packaging looks neat; product information is placed on the side of the package.	The packaging of the product's neatness can be seen in the packaging of the product and the presentation of the information arrangement provided.
6.	Interesting and Unique	The packaging looks exciting and unique with cute shapes.	The packaging presents an attractive image, unique packaging form, and the right colour combination that arouses consumer interest.
7.	Clear Brand	The packaging is clearly branded and accompanied by a striking image.	The packaging has an exact brand accompanied by an image.
8.	Proportional Design	Packaging has a structured and proportional layout design; packaging looks neat and elegant.	The packaging has a structured layout so that it shows a proportional design.

Table 6 Recapitulation of the AHP Results (Cont.)

No.	Criteria	Consumers' Opinion	Experts' Opinion
9.	Multifunctional and Innovative	Multifunctional and innovative packaging with a flat bottom shape has a zip lock to function as a container for storing other food or drinks.	Multifunctional and innovative packaging on both models: stand pouch model or flat-bottom model with a zip lock.
10.	Environmentally friendly	Packaging can be recycled and used many times.	Frozen food products require water-resistant packaging, which is recyclable plastic.
11.	Logo	The packaging has a simple and straightforward logo, so it is easy to remember.	The packaging has a simple and straightforward logo.
12.	Simple	The packaging has a direct and simple appearance and has a handle making it easy to carry.	Consumers prefer packaging with a simple, minimalist design with attractive images.
13.	Reassuring	The packaging looks convincing with a standing pouch, and the quality of the plastic material is good and healthy.	The packaging in the form of a standing pouch with strong material quality looks convincing.
14.	Characteristic	The packaging has a distinctive regional appearance with a traditional house and striking colours.	The packaging is characterized by striking colours that make it look attractive.
15.	Informative	Informative packaging, which gives information such as presentation methods, nutritional value, and composition.	Informative packaging has complete information.

Product Design

The alternative packaging design provided is two packaging design models (Figure 1). The first alternative design is made in the form of a stand-up pouch with a zipper lock. The second alternative design is made with a flat bottom pouch model. This packaging model is a model made from a combination of a stand-up pouch model with a side gusset pouch model.



Figure 1 Alternative Designs of Frozen Sala Lauak Packaging

Evaluation of Packaging Design

The next stage is an evaluation of the design results. Evaluation of the design results of frozen *sala lauak* packaging is carried out by distributing questionnaires to 30 respondents. When filling out the questionnaire, consumers compared the current packaging images on the market with the packaging images that are designed as shown in Figure 2. The first design is made of transparent plastic (Design A), the second design is in the form of a plastic box (Design B), the third design is the first alternative packaging design in the form of a standing pouch (Design C), and finally the fourth design is the second alternative packaging design with a flat bottom pouch (Design D). The results of the design evaluation were carried out using the AHP method. The evaluation was carried out to 30 consumers using four selected criteria, including quality packaging, attractive packaging, convincing packaging, and informative packaging. These four criteria represent four factors that are formed from the results of the factor analysis processing. The evaluation results of the frozen *sala lauak* packaging design were presented in Table 7.



Figure 2 Comparison of Several Frozen Sala Lauak Packaging

Table 7 Evaluation Results of Frozen Sala Lauak Packaging Design

Factor	Quality Packaging Criteria	Attractive Packaging Criteria	Convincing Packaging Criteria	Informative Packaging Criteria
Design A	0.088	0.081	0.085	0.079
Design B	0.145	0.128	0.141	0.096
Design C	0.322	0.329	0.323	0.402
Design D	0.445	0.462	0.451	0.423

The values in Table 7 are obtained from the calculation of the AHP method using the Expert Choice software. Based on the design evaluation results, the design has the highest value on each criterion compared to the currently available packaging. The second alternative design packaging in the form of a flat bottom pouch has several advantages over another packaging such as this packaging is comfortable and easy to use, has more stability, has high compressive power, thereby reducing the risk of packaging breaking, and this packaging has a unique shape, and concise when stored. When the two designs are compared, the packaging chosen is the second alternative packaging or the 4th image in the evaluation

questionnaire. The second alternative packaging design has the highest value for each criterion and has more advantages than other packages.

#### 4.0 CONCLUSION

This study designed two alternative packaging designs for frozen *sala laauk* products using the Kansei engineering method. The design evaluation results showed that the second alternative design obtained a higher value than the first alternative for each criterion, including the value of 0.445 for quality packaging criteria, 0.462 for attractive packaging criteria, and 0.451 for convincing, and 0.423 for informative packaging criteria. Thus, the chosen frozen *sala laauk* product packaging design is the second alternative design, which is a flat bottom pouch in red, which is equipped with product information and packaging attributes.

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