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Determining Packaging Elements by Kansei Engineering Approach of Salt Bread Products

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Abstrak

Kemasan memiliki peran penting dalam suatu produk dan menjadi aspek utama untuk menarik perhatian konsumen agar melakukan pembelian. Elemen desain kemasan berfungsi sebagai media visual utama untuk menggambarkan karakteristik produk. Produk Salt Bread saat ini belum mengoptimalkan elemen desain dalam kemasannya, sehingga diperlukan pengembangan kemasan yang sesuai dengan preferensi konsumen. Penelitian ini bertujuan untuk menentukan elemen desain berdasarkan preferensi konsumen. Metode Kansei Engineering digunakan untuk memperoleh elemen desain yang sejalan dengan konsep desain yang dihasilkan, sedangkan metode QTT1 digunakan untuk menghasilkan elemen desain kemasan produk Salt Bread. Penentuan elemen desain dilakukan melalui penyebaran kuesioner skala Likert untuk menilai kesesuaian konsep desain terhadap 53 sampel kemasan. Konsep desain yang diperoleh adalah "Minimalis–Atraktif". Hasil pengolahan data QTT1 menggunakan R menunjukkan elemen desain berupa material art 213artón (X1.2), ukuran sedang (X2.2), bentuk kubus persegi (X3.4), tutup interlocking (X4.2), fitur window dan tray (X5.6), gaya desain klasik elegan (X6.8), serta teknik cetak langsung dan cetak tidak langsung berbasis kertas (X7.3). Elemen-elemen tersebut selaras dengan konsep desain kemasan Salt Bread sesuai dengan preferensi konsumen.

Kata kunci: *elemen desain, kansei engineering, salt bread, QTT1*

Abstract

Packaging has a crucial role in a product and is an important aspect in attracting consumer attention to buy a product. Packaging design elements serve as a key visual medium to describe product characteristics. Salt Bread products have not optimized the design elements in their packaging, so packaging development is needed. This research aims to determine design elements based on consumer preferences. This research uses the Kansei Engineering method to obtain design elements that align with the design concept that has been generated. Utilizing of the QTT1 method to produce packaging design elements for Salt Bread products. Determination of design elements is done by distributing Likert questionnaires to assess the suitability of the design concept with 53 packaging samples. The resulting design concept, namely "Minimalist-Attractive". The results of running QTT1 data with R software obtained design elements, namely art carton material (X1.2), medium size (X2.2), square cube shape (X3.4), interlocking lid (X4.6), window and tray features (X5.6), classic elegant design style (X6.8), and direct printing and paper indirect printing techniques (X7.3). The resulting elements on the Salt Bread packaging are in line with the packaging design concept according to consumer preferences.

Keywords*: design element, kansei engineering, salt bread, QTT1*

1. Introduction

The role of packaging is very crucial for a product. The basic function of packaging is to protect the product inside. Apart from protecting the product, packaging acts as a means of communication that conveys information about the product to potential consumers (Ermawati, 2019). Packaging and branding have a very close relationship in creating an attraction for purchasing products. Branding focuses on strategies to build a positive identity and perception of a product (Risana, 2021). Therefore, packaging not only serves as a protector, but also becomes an important aspect in attracting the attention of consumers to buy a product (Widyaningrum & Musadad, 2021).

Packaging design is one of the significant factors in influencing the attractiveness to consumers. Packaging design involves several aspects such as shape, color, typography, structure, illustration, material and other elements of design designed to enhance visual appeal to a product, as well as ensure it delivers a clear

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message to customers (Iznillah, 2022). Proper use of design elements can create emotional appeal while strengthening the brand image to consumers. The elements and feature features found in packaging design are very important to have a positive impact on consumers (Pramesti & Susilawati, 2021).

Salt bread is one product that is still lacking in optimizing the application of design elements on its packaging. The application of elements such as bold branding on bread packaging, attractive multi-color designs, and labeling that clearly and informatively lists product information are important aspects in increasing the appeal and trustworthiness of the product (Harahap et al., 2024). Design elements on packaging act as a medium of communication and describe product characteristics to consumers (Delfitriani et al., 2020) This results in salt bread packaging that is less effective in attracting consumers' attention and potentially reducing the competitiveness of products in the market. The need to develop packaging for salt bread products to determine the packaging design elements that suit consumer preferences. The importance of developing customized packaging to meet consumer needs, which will be used as a reference in determining product specifications (Ushada et al., 2016). The design concept is necessary as a basis for product design by considering various elements of packaging, so that the product looks more attractive to consumers (Prasetya et al., 2023).

The identification of problems in this study began with the lack of integration between the emotional aspects of consumers and packaging design elements, particularly in salt bread products. Available packaging generally emphasizes only basic functions, without considering the role of design in shaping emotional perceptions and enhancing product appeal. This situation creates a gap between consumers' emotional expectations and the visual appearance and functionality of packaging offered in the market. To address this issue, the Kansei Engineering approach was chosen as the primary method because it can identify and translate consumers' emotions and perceptions into measurable and applicable design attributes. This quantitative-based approach enables the subjective aspects of consumers to be processed into concrete data that can be used in the design process (Wang, 2018). The application of the kansei engineering method has proven to be effective in implementing the design elements of Excelsa Wonosalam coffee packaging (Bisma et al., 2024). Another study also used the Kansei Engineering method to design packaging for Djamudju Roast Bean coffee, resulting in packaging designs that matched consumer preferences and emotional perceptions (Munandar & Fahrulrozi, 2024).

The Kansei Engineering method is also recognized as having advantages over other methods in product development, such as Value Engineering, QFD or Kano models. This research is to redesign and redevelop the design elements of salt bread packaging, so it requires emotional customers. Therefore, Kansei Engineering determines elements in packaging design, as well as ensures the resulting design concept is able to meet customer needs (Faisal et al., 2021).The Kansei Engineering approach has relevance to other methods for deriving visual elements in packaging design. This method uses quantitative approaches, such as multivariant statistical analysis and artificial intelligence (AI) that make the decision-making process more objective and minimize uncertainty (Nagamachi & Lockman, 2015) (Sari, 2019). The principle of Kansei Engineering focuses on the interpretation of consumer feelings from an emotional psychological perspective, which is then analyzed by certain methods to produce packaging design elements (Lamalouk, E. I., & Simanjuntak, R. A. 2023). The Quantification Theory 1 (QTT1) method is used to analyze the correlation between packaging elements and packaging concepts (Nagamachi & Lokman, 2015). The application of both methods resulted in a packaging design that is more structured and relevant to consumer preferences.

Kansei Engineering, along with the QTT1 method, has consistently proven its effectiveness in various previous studies. Research on the development of ready to drink coffee beverage packaging was successful in developing two different coffee products using the Quantification Theory Type 1 (QTT1) method, resulting in a match between design elements and design concepts according to preference needs (Sari et al., 2024). QTT1 has accuracy compared to methods such as Conjoint Analysis, Partial Least Square (PLS), and other statistical methods, because it minimizes things that are still objective. Based on research on the development of bottled drinking water packaging using the Conjoint Analysis method, the process is still objective by focusing on a combination of attributes compared to using the QTT1 method which uses statistical analysis to measure the level of importance of each attribute separately (Ilyas et al., 2023).

Based on the problems in the design elements identified in the salt bread packaging, packaging planning and development is the right step to take. The purpose of this research is to determine the design elements based on the packaging concept that has been determined, namely “Minimalist-Attractive”, and then implemented into 3D packaging mockups according to consumer needs. It is hoped that this research will provide an alternative packaging model for salt bread to make improvements to the previous packaging.

2. Research Methods

The methodolgy for this research on Salt Bread packaging development involves the use of Kansei

Engineering combined with the QTT1 approach. The process of this study is shown in Figure 1 below.

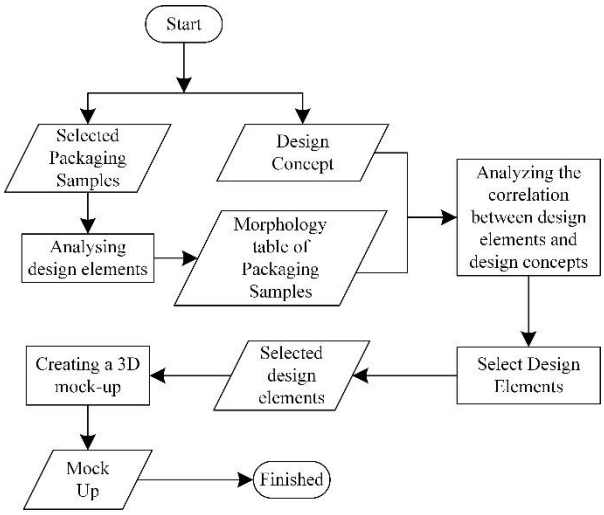


Figure 1. Process flow

2.1. Analyze Design Element

Design elements are produced through morphological analysis on packaging. Conduct a morphological identification of the packaging sample by carefully reviewing aspects of shapes such as materials and other design elements for each sample. Morphological analysis was applied to identify similarities and differences between samples (Delfitriani et al., 2020). Each design element was assigned a code or variation of each sample. After that, the samples were classified with expert panelists in the field of packaging design (Sari, 2019).

2.2. Analyzing the Correlation of Design Elements with Design Concepts

Evaluate the correlation of design elements with the design concept using a Likert questionnaire with a scale of 1 to 7 points to respondents (Isna et al., 2024). The use of a 7 point scale on a Likert questionnaire has the advantage of minimizing measurement errors and providing highly accurate results compared to a 5 point scale. The results of the evaluation were used as input to analyze the relationship between design elements and design concepts to run the QTT1 method using R software (Sari, 2019). The QTT1 method formula is used according to equation (1) (Hidayat & Wijayanti, 2021):

$$ys = \Sigma i = 1E \, \Sigma \, j = Ci \, xiijs + \epsilon \, (1)$$

Description:

S = Product Sample

I = Attribute index

E = Number of attributes

j = Category index on the i-th product attribute

Ci = Number of categories in the i-th product

ϵ = Skokastik variable with expected value E(ϵ) = 0

$xiijs$ = Dummy variable coefficient

2.3. Making Prototype (3D Mock Up)

The creation of a 3D mock-up design is an important stage in product development because it represents design elements based on the packaging concept, which begins with brainstorming using mind maps to develop ideas systematically (Hansen, 2021; Lie et al., 2024). This process is followed by the creation of a mood board to ensure that the visuals remain consistent with the concept and characteristics of the packaging design. Once the mood board is complete, the next step is to create sketches as an initial realization of the ideas developed during the brainstorming process, before they are then realized in the form of digital 3D mock-ups.

This study focuses on developing salt bread packaging as a research object using the Kansei Engineering and QTT1 methods. In implementing this method there are several steps, including (1) analyzing design elements, (2) analyzing the correlation of design elements with design concepts and (3) creating prototypes (3D mockups).

3. Results and Discussion

This study focuses on developing salt bread packaging as a research object using the Kansei Engineering and QTT1 methods. In implementing this method there are several steps, including (1) analyzing design elements, (2) analyzing the correlation of design elements with design concepts and (3) creating prototypes (3D mockups).

3.1. Analyzing Design Elements

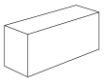
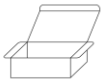
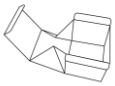
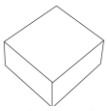
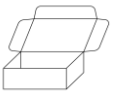
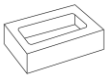
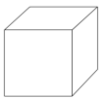
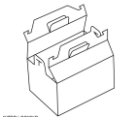
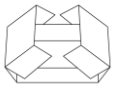
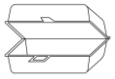
Research results on the analysis of design elements on packaging samples suitable for salt bread products were obtained from the research of several digital platforms. The design element is one of the important factors in the development of salt bread packaging. Analysis of the packaging elements was conducted on each packaging sample collected to determine the characteristics of the structure and design elements respectively. The resulting sample amounted to 53 packages. The selection of samples based on the classification of characteristic similarities, such as shape, material, color, typography, design layout and other aspects, is shown in Figure 2.

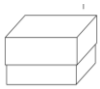
Figure 2. 53 Selected Samples

Based on the packaging samples collected in Figure 2, morphological analysis was carried out. Morphological analysis aims to assess the design elements relevant to the packaging sample, which will be made in table form. Morphological tables are broken down into different types or more detailed types based on the morphological characteristics of the packaging sample. This grouping of design elements aims to explain in more detail the various variations found in the packaging templates, shown in Table 1.

The design elements in the morphological table were generated based on discussions with 5-10 expert panelists (Sari et al., 2024). Expert panelists were invited to discuss in the field of materials, graphic design. Other aspects can be easily identified, such as shape, size and others. The results of morphological analysis include 7 factors, namely material ($X1$), size ($X2$), shape ($X3$), cap type ($X4$), features ($X5$), design style ($X6$) and printing technique (X7). Morphological analysis is done by observing the differences in each packaging sample, such as shape, material, graphic design, size and other elements. This approach helps in identifying specific elements present in each sample (Faradilla, 2023).

Table 1. Packaging Morphology

Design Element	Materials (X1)	Size (X2)	Form (X3)	Lid (X4)	Feature (X5)	Design Style (X6)	Printing Technique (X7)
Type 1	Ivory (X1.1)	Small (X2.1)	 Rectangle (X3.1)	 Top Flap (X4.1)	 Tray (X5.1)	Classic (X6.1)	Direct Print (X7.1)
Type 2	ArtCarton (X1.2)	Medium (X2.2)	 Flattened rectangle (X3.2)	 Lock tab Lid (X4.2)	Window & Tray (X5.2)	Classic & Elegant (X6.2)	Direct Print & Paper Indirect Print (X7.2)
Type 3	Craft (X1.3)	Large (X2.3)	 Flattened Square (X3.3)	 Tuck Top (X4.3)	 Window (X5.3)	Elegant (X6.3)	Paper Indirect Printing (X7.3)
Type 4	Bagasse (X1.4)		 Square Cube (X3.4)	 Flip Top (X4.4)	 Window & Double Bridge Handle (X5.4)	Minimalist (X6.4)	No Print (X7.4)
Type 5	Translucent Plastic (X1.5)		 Semi Tube (X3.5)	 Locking Flap Lid (X4.5)	Window & Tray & gable Handle (X5.5)	Simple (X6.5)	
Type 6			 Bag (X3.6)	 Interlocking Closure (X4.6)	 Gabled Handle (X5.6)	Modern (X6.6)	
Type 7			 Gusset (X3.7)	 Special Flap (X4.7)	 Bridge Handle (X5.7)	Illustrative (X6.7)	
Type 8				 Fold Over Closure (X4.8)	Ziplock (X5.8)	Fun (X6.8)	
Type 9				 Clamshell Closure (X4.9)	No Fitur (X5.9)		

Design Element	Materials (X1)	Size (X2)	Form (X3)	Lid (X4)	Feature (X5)	Design Style (X6)	Printing Technique (X7)
Type 10				 Two Piece (X4.10)			
Type 11				 Slide Lid (X4.11)			
Type 12				Sealer (X4.12)			

3.2. Analyzing the Correlation of Design Elements with Design Concepts

The initial stage of the correlation analysis began with an assessment of 53 packaging samples using a 7-point Likert scale questionnaire, as shown in Figure 3, given to 30 respondents. This scale was designed to measure respondent's perceptions of the "Minimalist-Attractive" design concept, where values 1–3 represent a minimalist impression, value 4 represents a neutral point, and values 5–7 represent an attractive impression. The assessment was based on respondent's visual perceptions of various design elements in each packaging sample.

The questionnaire results were then analyzed descriptively to obtain the mean, minimum, maximum, and standard deviation values for each sample, as shown in Table 2. The average questionnaire scores were used as input in the correlation analysis between design elements and design concepts using the Quantification Theory Type 1 (QTT1) method with the aid of R software (Sari, 2019). The statistical values presented in Table 2 served as the basis for the QTT1 modeling.

Figure 3. Likert Questionnaire View

Based on the 'Minimalist-Attractive' concept, the results of the QTT1 analysis are presented in the form of a histogram, as shown in Figure 4. This histogram consists of two sides, namely the left side and the right side, which represent the negative and positive correlation directions towards the design concept. The selection of design elements is based on the length of the histogram bars, where the longest bar indicates the most dominant contribution to design perception (Sari et al., 2023). Elements with the highest positive correlation values, located on the right side, are interpreted as the primary indicators for the 'Attractive' impression (Sari et al., 2024). In contrast, the bars on the left side represent elements that support the perception of 'minimalist.' Based on the correlation analysis results, shown in Figure 4, the design elements associated with the impression of 'Minimalist' include $X1.5$, $X2.3$, $X3.2$, $X4.12$, $X5.7$, $X6.4, and\ X7.3.$. In contrast, the elements contributing to the 'Attractive' impression include$X1.2$, $X2.2$, $X3.4$, $X4.2$, $X5.6$, $X6.8, and\ X7.2.$

Table 2. QTT1 Input Data

Sample	Design Element							Minimalist-Attractive Value			
	X1	X2	X3	X4	X5	X6	X7	Mean	Min	Max	St Dev
A	1	2	1	11	9	5	1	4.18	1	7	2.05
B	2	3	1	3	9	4	1	2.03	2	7	1.32
C	3	3	1	6	7	5	1	3.24	1	7	1.79

Sample	Design Element							Minimalist-Attractive Value			
	X1	X2	X3	X4	X5	X6	X7	Mean	Min	Max	St Dev
D	3	3	3	4	9	3	1	3.21	1	7	1.57
E	3	3	1	4	9	4	1	2.71	2	7	1.47
F	1	3	3	3	3	5	3	3.41	1	7	1.56
G	1	3	1	10	3	4	3	3.82	1	7	1.90
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
BH	1	2	6	6	7	5	1	3.24	1	7	1.72

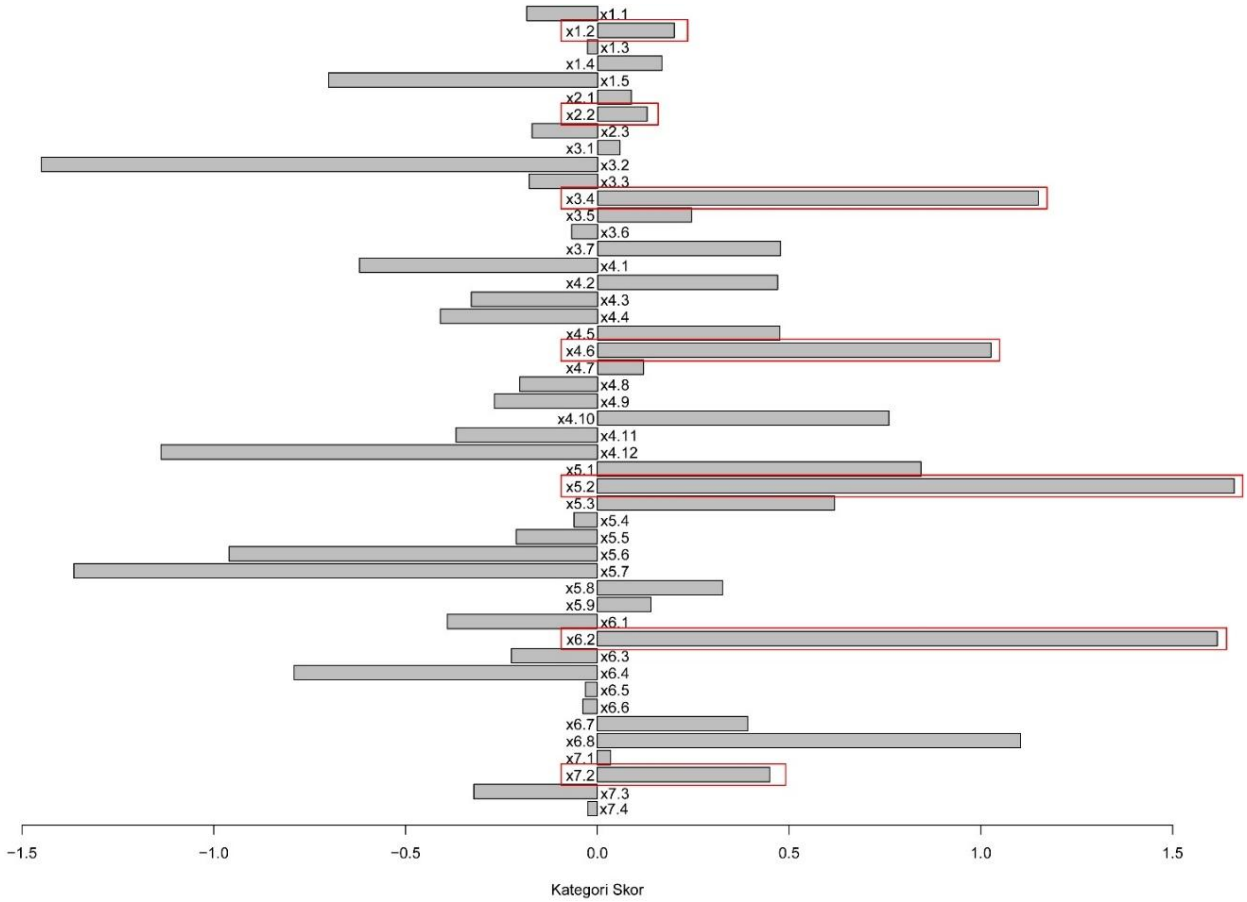


Figure 4. QTT1 Method R Running Software Results

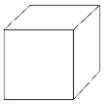
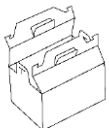
The QTT1 analysis results also result in Partial Correlation Coefficient (PCC) values used to prioritize packaging development (Sari et al., 2023). Higher Partial Correlation Coefficient (PCC) values indicate more significant design elements for "Minimalist-Attractive" as in Table 3. Therefore, on PC 1, elements such as design style (X6), Features (X5), and Close type (X4) became the main focus in the development of salt bread packaging.

Table 3. Selected Design Element based on PCCvalue

Design Element	PCC	Priority
Material (X1)	0.47048	5
Size (X2)	0.33959	7
Form (X3)	0.59552	4
Lid (X4)	0.75329	3
Features (X5)	0.79770	2
Design Style (X6)	0.83403	1
Printing Technique (X7)	0.41322	6

According to Figure 4 some design elements for "Attractive" are, art carton material (X1.2), medium size (X2.2), cube square shape (X3.4), interlocking caps (X4.2), window and tray features (X5.6), classic elegant design styles (X6.8), and paper direct and indirect printing techniques (X7.3) as shown in Table 4. The concept of "Attractive" became a major cornerstone in designing the development of packaging designs on salt bread products.

Table 4. QTT1 Running Result Design Elements

Materials	Size	Form	Lid	Fitur	Design Style	Printing Technique
Art Carton X1.2	Medium X2.2	Square Cube X3.4 	Interlocking X4.6 	Window & Tray X5.2	Classic & Elegant X6.2	Direct Print & Paper Indirect Print X7.2

3.3. Creating Prototype (3D Mock Up

The next stage applies the design elements from the selected concept into a 3D mockup using Adobe Illustrator and Blender software. Before starting the digital design process, a brainstorming session was conducted to determine specific detailed elements by creating mind mapping to collect ideas, as well as compiling a moodboard as a design reference, as shown in Figure 5.

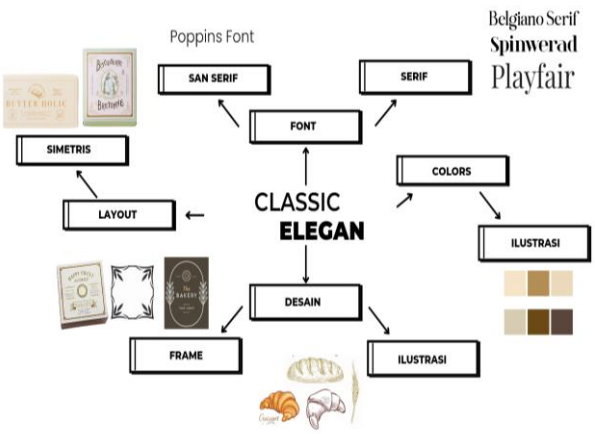


Figure 5. Mind Map and Moodboard

Based on the QTT1 analysis, the resulting design element is classic elegant (X6.2). This design style was realized through the use of bright, soft and brown tones. The use of serif & Script typography is suitable for the classic elegant design style (Kartika, 2015). Bread illustrations and frames illustrating the classic. Colors, typography, and illustrations in Figure are derived based on characteristic designs. After that, the creation of 3D sketches and mock ups to realize mind mapping and moodboards can be seen in Figure 2. The sketches that have been made are realized into Mockup. The creation of mockups to align the compatibility between the "Minimalist-Attractive" design concept and the existing design elements.

The resulting design element is compatible with the design concept, which includes art carton material (X1.2) to reinforce the elegant, medium-sized impression (X2.2) according to the needs of consumers buying in small or large quantities on Salt Bread products. The shape of the cube square (X3.4) and the interlocking cap (X4.2) facilitates storage. Window and tray features (X5.6) have a combination of increasing the aesthetic value of the packaging and improving functionality. Classic elegant design style (X6.8), supports minimalist lifestyle trends but still looks attractive in the eyes of consumers, the classic impression also gives its own unique impression. According to (Soenarno et al., 2022), the 18-34 year old generation is interested in a minimalist lifestyle. as well as direct printing and indirect printing (X7.3) techniques as Branding aspects of Salt Bread products. The design elements were realized by the manufacture of the 3D mockup shown in Figure 6.

Figure 6. 3d mock up results of salt bread packaging

4. Conclusion

The results of developing salt bread packaging using QTT1 produced art carton material (X1.2), medium size (X2.2), square cube shape (X3.4), interlocking lid (X4.2), window and tray features (X5.6), classic elegant design style (X6.8), and direct and indirect printing techniques on paper (X7.3). These elements address the problems of previous packaging, such as packaging that was unable to withstand oil due to the oily nature of bread, an impractical locking system, and packaging design that did not reflect the characteristics of the product, resulting in a more functional and aesthetic packaging solution. The final design of the salt bread packaging can be realized by consumer needs related to the research objectives. The design elements produced are in line with the concept of "Minimalist-Attractive". Packaging development was carried out using the Kansei Engineering approach with the Quantification Theory Type 1 (QTT1) method, which has been proven to contribute significantly to producing accurate salt bread packaging design elements based on consumer emotional preferences. However, this study still has limitations because it has not evaluated the extent of the packaging's effectiveness in real-world use, such as its durability under storage or distribution conditions. Further research is expected to conduct comprehensive performance tests on the design elements of salt bread packaging, so that

the results obtained are not only theoretical but also applicable in the context of marketing and everyday use.

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