Determining Ko Atek's Cakue Packaging Concept through Kansei Engineering Methodology

Novi Purnama Sari[*,a,1], Dimas Priyo Wicaksono[a,2], Khairunnisa Aristanti[a,3], Sesar Chairudin Slamet[a,4]
Jakarta State Polytechnic, Depok, Indonesia

*Corresponding Author: novipurnama.sari@grafika.pnj.ac.id

Abstract

Cakue Ko Atek is one of the culinary MSMEs in Jakarta that has been famous since 1971 until now. *Cakue* Ko Atek products have faced several challenges, especially in the packaging aspect, which still has many shortcomings, namely not having a clear product identity, using recycled paper, and being packaged with plastic, making it less attractive to consumers and having an impact on the environment. This packaging development research aims to formulate a new packaging design concept that is more aesthetic and functional but meets consumer expectations and desires. To achieve this goal, the *Kansei* Engineering method was applied in the process of determining the packaging concept with the aim of understanding and interpreting consumer perceptions of the ideal packaging design. The collected consumer perception data are then processed with the Principal Component Analysis (PCA) method to simplify the *Kansei* word data and find the main components in consumer perceptions. The analysis was conducted using R software to identify relevant key design concepts based on PCA. The results of this analysis showed that there was one Principal Component (PC) with the highest standard deviation in PC 1, which amounted to 6.686, which became the basis for formulating the design concept. The resulting design concept, based on the positive and negative quadrant analysis data on PC 1, is Usable-Simple, which reflects consumer needs for packaging that is easy to use and has a simple yet effective appearance. This research only produces design concepts that are in accordance with consumer preferences and has not evaluated specific design elements that can be implemented on packaging based on the concepts that have been formulated.

Keywords: *Cakue*, *Kansei* Engineering, Principal Analysis Component, Concept Design, Packaging

I. INTRODUCTION

Cakue Ko Atek is one of the MSMEs foods established since 1971 in Central Jakarta on Jl. Belakang Kongsi No.31 Pasar Baru. The *Cakue* Ko Atek product business can adapt and survive in market dynamics as one of the culinary icons in Central Jakarta [1]. *Cakue* Ko Atek not only offers delicious flavors, but also traditions that have been maintained from generation to generation. According to [2] *Cakue* Ko Atek has become a must-visit place for culinary lovers who want to experience the authenticity of traditionally processed *cakue*, but the use of packaging is still ineffective. In the tight competition of the modern market, the attractiveness of packaging is one of the important aspects in maintaining the existence of local products such as *Cakue* Ko Atek. Based on a survey, packaging has a direct influence on purchasing decisions, both in terms of the quality of protection and the aesthetic value conveyed [3]. The packaging process for *Cakue* Ko Atek products still uses recycled paper and is wrapped in transparent plastic without labeling, making it difficult for consumers to know the quality and safety of the product.

Well-designed packaging not only serves to protect food quality, but also provides added value to consumers and influences their purchasing decisions [4]. Packaging has a protective, communicative, and artistic function that can increase consumer interest [5]. Packaging is useful for providing convenience and comfort in use, thereby increasing consumer satisfaction [6]. The implementation of environmentally friendly packaging materials is also an important factor that modern consumers pay attention to in choosing food products [7]. Food-grade packaging materials are an important factor in maintaining the safety and quality of food products, which prevent contamination from harmful substances and potentially endanger consumer health [8], so that food-grade packaging has non-toxic properties, high and low temperature resistance, and strong durability. This is the basis for the need for packaging changes in *cakue* products to increase competitiveness in the market [9].

Cakue Ko Atek product packaging development needs to be carried out to determine the design concept following consumer preferences, namely Segmentation, Targeting, and Positioning [5]. One of the packaging development methods is *Kansei* Engineering. *Kansei* Engineering is a type of method that translates customer feelings into design specifications [10]. According to [11] *Kansei* Engineering is a method of integrating aspects of emotion and consumer satisfaction in the packaging design process. This method involves the five human

senses, such as smell, hearing, sight, taste, and touch [12]. The method of using *Kansei* engineering is very necessary to find out what consumers want. According to [13], the *Kansei* engineering method is oriented towards the human mind, so it is also known as human-oriented product development. Based on research conducted in the past 5 years, the use of *Kansei* engineering methods has been successful in several packaging design developments, including: Wedang Uwuh Packaging Design [14], Cracker Packaging Development [10]. Development of fried meatball packaging [15]. The output of *Kansei* Engineering is quantitative. The feelings and emotions of consumers are summarized in numerical data. Through this method, decision-making can be done more effectively [16]. The following Figure 1 is based on a survey in the field.

Figure 1 Product Packaging of Ko Atek's *Cakue*

Packaging design uses the *Kansei* Engineering method to understand and interpret consumers' feelings and emotions towards products, including packaging design. This method has proven to be effective in developing packaging designs that can attract consumers' attention and increase product competitiveness in the market.[16] Packaging design and development have an important role to play in increasing the attractiveness of consumers to be more interested in buying products. This process can be done based on the creativity of producers and consumer preferences. One of the ways that can be applied to develop fish cracker packaging that matches the emotions and desires of consumers is through the application of the *Kansei* Engineering method in packaging design and development [10]. The proper packaging design can create a positive impression and enhance the consumer experience when viewing or using the product.

This study aims to determine the concept of *Cakue* Ko Atek packaging design aligned with consumer preferences, the results of which can be used as a reference in analyzing packaging design. According to [17] *Kansei* Engineering data processing, which is quantitative and related to consumers' emotional responses, requires a comprehensive analysis stage. The *Kansei* Engineering method is combined with Principal Component Analysis (PCA) to form a comprehensive packaging design concept [18]. *Kansei* Engineering data processing, which is quantitative and related to consumers' emotional responses, requires a comprehensive analysis stage. The *Kansei* Engineering method is combined with Principal Component Analysis (PCA) to form a comprehensive packaging design concept [19].

II. METHOD

This research focuses on developing *Cakue* Ko Atek packaging design to increase visual appeal and meet consumer preferences. This topic was chosen because informative and attractive packaging plays an important role in shaping consumer perceptions and purchasing decisions, especially in traditional food products that still lack exploration of packaging design based on consumers' emotional preferences [20]. Therefore, a design approach that pays attention to emotional aspects is needed, and *Kansei* Engineering is an appropriate method because it is used to interpret consumer feelings into structured and quantifiable design elements [10]. The research used a descriptive quantitative approach with the *Kansei* Engineering method reinforced with Principal Component Analysis (PCA) for data processing. *Kansei* Engineering was chosen because this approach is oriented towards consumer emotions, which helps researchers in identifying design elements desired by consumers [12]. The PCA method was then used to simplify the collected data by reducing highly correlated variables into principal components. This approach is effective in summarizing data without losing the essence of relevant information [13].

.

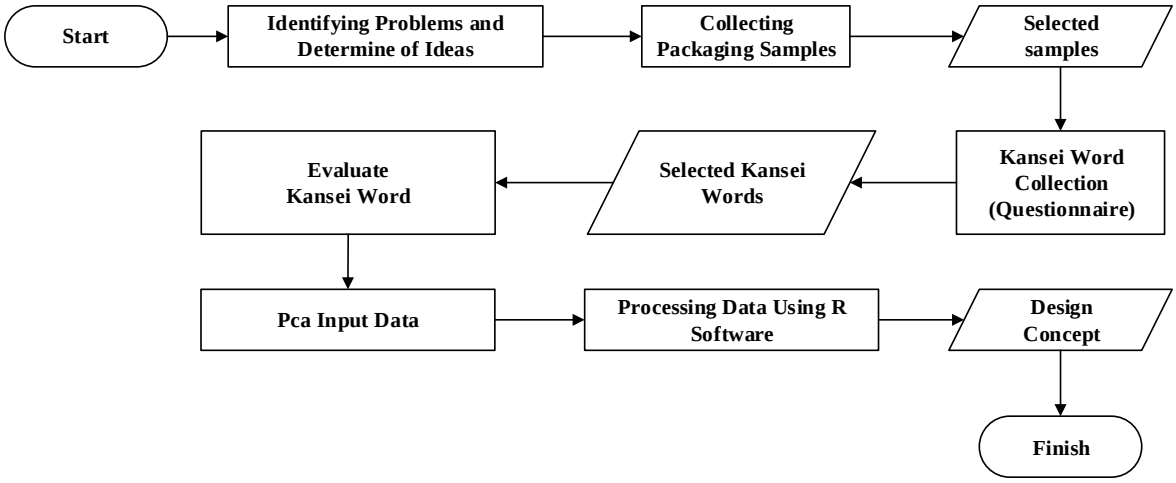

Figure 2 Process Flow Diagram

The problem identification process for *Cakue* Ko Atek products is carried out using direct and indirect observation methods as the main approach. Direct observation is carried out by visiting the *Cakue* Ko Atek store to buy products and assess the condition of the packaging and sales environment. This direct observation method obtains accurate data regarding the physical appearance of the packaging, interaction with consumers, and how the product is presented on site. Indirect observation was conducted through monitoring on social media and *Cakue* Ko Atek's official website, as well as trusted sources of information such as Kompas news. Indirect observation provides additional insight into consumer perceptions of the product and the MSME's image in the digital world [21]. As a result of these two observation methods, we found several main problems, especially related to the quality and information on product packaging, which prompted us to propose the development of *Cakue* Ko Atek packaging to better suit consumer needs and food safety standards, so it was continued in the packaging collection.

The packaging samples selected in this study serve as primary packaging for *cakue* products. Nagamachi states that the minimum number of packaging samples is 20 to 25 [22]. Packaging samples are collected by various types of packaging available in the market through internet searches, collected, and eliminated based on the similarity of shape, material, design, size, and features of the packaging [23]. The packaging samples that have been collected are intended to provide insight and information on packaging design concepts [22]. Samples were obtained through research from the internet or other relevant media sources by looking for *cakue* product packaging or similar products. The packaging samples that have been collected are then evaluated manually and optimized for characteristics such as container defense, aesthetics, and ease of use [3]. Therefore, we proceeded with the determination of the *Kansei* word.

The *Kansei* word identification process was carried out by distributing questionnaires and interviews to selected respondents. In collecting this data, we used a purposive sampling method to determine relevant respondents who have a deep understanding of *Cakue* Ko Atek's product packaging. Questionnaires and interviews aim to explore the emotional aspects of respondents in responding to packaging, with the help of sample packaging images and *Cakue* Ko Atek packaging stimulus videos as triggering tools [24]. Through this observation, we were able to identify the most dominant *Kansei* words based on the results of the word mode data submitted by the respondents [25]. The selected words were classified and transformed into adjectives to describe the packaging samples as the selected *Kansei* words, completed with their antonym word pairs, to provide a more thorough understanding of the emotional perception of these product packaging. The number of *Kansei* words obtained is generally between 50 and 600 words [26].

Semantic Differential is used as a *Kansei* data assessment that measures the emotional perception of respondents [27]. Semantic differential displays opposite pairs of words, like positive-negative, measured using a seven-point scale (-3 to 3), including values like -3, -2, -1, 0, 1, 2, and 3, aimed at capturing consumers' perceptions of product design in terms of ergonomics and estimation. The implementation of the semantic differential questionnaire serves as an effective method for packaging development [28]. *Kansei* words that have been evaluated are input using the Principal Component Analysis (PCA) method and then processed with R software. According to [29], R software is used for data analysis and generates graphs based on programming, so that the graphs have data distribution such as *Kansei* word graphs, screen plot graphs, and standard deviations. The results of the data analysis were discussed with expert panelists to determine the product packaging design concept.

III. Results and Discussion

A. Problem Identification

The problem identification and idea determination process involved distributing questionnaires via Google Form to evaluate three ideas: AHM MPX 2 Oil, Sabena Stick, and *Cakue* Ko Atek. Of the 40 respondents, 61.5% chose *Cakue* Ko Atek, 23.1% chose MPX 2 Oil, and 15.4% chose Sabena Stick, so that *Cakue* Ko Atek's packaging was selected for research. Packaging has an important role in protecting products, providing information, and enhancing brand image [30]. However, *Cakue* Ko Atek current packaging uses recycled paper and unlabeled plastic, and it lacks information like brand, expiration date, composition, and distribution license, which reduces consumer appeal and trust [31]. In addition, the absence of adequate labeling may lead to confusion in a competitive market [32]. Research shows that packaging with adequate protection and information is not only able to maintain product quality, but also improves consumer perceptions of product safety and professionalism [33]. Furthermore, the second survey with 30 respondents showed 81% very important and 19% important for packaging development and redesign.

Packaging has an important role in protecting products, providing information to consumers, and enhancing brand image [30]. However, *Cakue* Ko Atek's product packaging, which currently uses recycled paper and is covered in transparent, unlabeled plastic, has several limitations. The packaging does not include basic information such as brand, expiry date, ingredient composition, and distribution license number, which are important aspects for compliance with food safety standards and consumer trust [31]. The absence of labeling and product information on packaging can confuse consumers and reduce product attractiveness in a competitive market [32]. Research shows that packaging with adequate protection and information is not only able to maintain product quality but also increases consumer perceptions of product safety and professionalism [33]. The next stage is to distribute the second questionnaire through Google Form openly to confirm whether the *Cakue* Ko Atek packaging needs packaging development and design. The results were that 30 respondents stated that 81% were very important, and 19% were important for packaging development and design.

B. Packaging Sample Results

Packaging samples were collected by searching for image references via the internet, resulting in a variety of diverse packaging designs. Before collecting *Kansei* Word, the first step that needs to be done is to determine the packaging samples that will be used as a reference in determining *Kansei* Word. The appropriate packaging samples include various materials, such as ivory paper, art cardboard, kraft, and cardboard boxes with various shapes and sizes. The results of the sample selection can be seen in the table below.

Table 1. Sample Evaluation

Selected Packaging Sample				
				
A	B	C	D	E
				
F	G	H	I	J
				
K	L	M	N	O

				
P	Q	R	S	T
				
U	V	W	X	Y
				
Z	AA	AB	AC	AD
				
AE	AF	AG	AH	AI
				
AJ	AK	AL	AM	AN
				
AO	AP	AQ	AR	AS
				
AT	AU			

The method of collecting packaging samples based on references from the internet obtained 52 samples, then selected based on the conformity of the component elements in the sample, such as materials, size, shape, and label design style, as well as the features available [29]. After selection, 47 packaging samples were selected that had design elements that were different from one another. *Kansei* Engineering Consumer Perception Analysis focuses on how consumers feel and interpret the packaging design through the selected samples. Validation of technical and aesthetic aspects of packaging samples helps in assessing material quality, packaging use, ergonomic aspects, and visual appeal.

C. Kansei Word Selected

Kansei word collection is carried out by distributing Google Form questionnaires and direct interviews to *Cakue* Ko Atek consumers to fill out the questionnaires. Consumers are also given the freedom to comment on *Cakue* Ko Atek products. At the stage of gathering *Kansei*-related vocabulary, packaging samples and product videos are used as stimuli to emotionally illustrate the product's qualities [34]. The survey was given to 30 respondents, and 200 *Kansei* words were obtained. Furthermore, the *Kansei* words were selected based on the similarity of word meaning and resulted in 35 pairs of *Kansei* words and their opposite words, as in Table 2.

Table 2 *Kansei* Words Selected

No	*Kansei* Word	Antonym	No	*Kansei* Word	Antonym
1	The packaging design describes the product as crunchy	The packaging design does not depict a crunchy product	20	Efficiency	Not Efficient
2	The packaging design describes the product as soft	The packaging design does not depict a soft product	21	Practical	Not Practical
3	The packaging design describes the product as savoury	The packaging design does not depict a savoury product	22	Informative	Not informative
4	The packaging design describes the product as salty	The packaging design does not depict a salty product	23	Aesthetic Design	Ugly
5	The packaging design describes the product as crispy	The packaging design does not depict a crispy product	24	Minimalist design	Not minimalist
6	Food grade	Non-food grade	25	Elegant	Not elegant
7	Eco Friendly	Not Eco-Friendly	26	Informative	Uninformative
8	Ergonomic Packaging	Not Ergonomic Packaging	27	Hot-resistant packaging	Packaging is not heat-resistant
9	Easy to open	Packaging is not easy to open	28	Hygienic	Not Hygienic
10	Easy to close	Packaging is not easy to close	29	Unique packaging	Not unique packaging
11	Airtight	Not airtight	30	Clean	Not clean
12	Attractive	Not attractive	31	Adequate packaging	Inadequate packaging
13	Fitting packing size	Size does not fit / oversized and small size	32	Eye catching packaging	Not eye cathing packaging
14	Oil resistance	Packaging is not oil resistant	33	Easy-to-open close packaging	Difficult to open and close
15	Rigid	Flexible	34	Simple	Not Simple
16	Protection packaging	Unsafe Packaging	35	Functional	Not functional
17	Easy to store	Not easy to store			
18	Easy to carry	Not easy to carry			
19	Easy to put down	Not easy to put down			

The results of the questionnaire distribution (*Kansei* word) obtained 200 *Kansei* words, which were then evaluated and filtered into 54 *Kansei* words, and then categorized into two categories: design characteristics and adjectives (adjective word). Design characteristics include elements such as packaging material, packaging shape, and packaging features, while examples of adjectives include efficient, informative, and practical. The next step was to deploy a questionnaire using the semantic differential method. The Semantic Differential questionnaire is used to reveal consumers' emotional perceptions so that the data obtained becomes objective and measurable. The data were then integrated with the PCA (Principal Component Analysis) method to identify the results of the semantic differential questionnaire to simplify the data become simpler. In the *Kansei* word collection stage, a stimulus that can explain the product emotionally, using packaging samples and product videos, is used [34].

D. Kansei Words Results

A total of 35 *Kansei* words were identified and subsequently evaluated to determine their relevance and applicability to various packaging designs. The evaluation involved assessing how well each *Kansei* word corresponded with a collection of 47 packaging samples. This assessment process utilized a semantic differential questionnaire, which employed a 7-point bipolar scale ranging from -3 to +3, with the intermediate values of -2, -1, 0, 1, and 2 representing varying degrees of intensity. The negative end (-3) indicated a strong association with the negative attribute, while the positive end (+3) indicated a strong association with the positive attribute, and 0 represented a neutral or indifferent response. To ensure meaningful and focused insights, data collection was conducted through purposive sampling involving 30 respondents who were selected based on specific criteria relevant to the study—such as their familiarity with product packaging or design sensibility. These respondents were asked to evaluate each packaging sample about the given *Kansei* words using the semantic differential scale. The structure and layout of the questionnaire used in this evaluation process are illustrated in Figure 3. This approach enabled a nuanced analysis of the emotional and psychological impressions conveyed by the packaging designs through the lens of *Kansei* engineering.

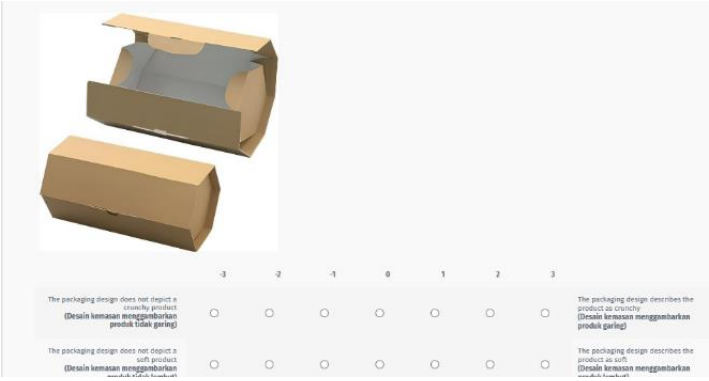

Figure 3 Questionnaire Semantic Differential Using Question.Pro

E. Principal Component Analysis Input Data

The results obtained from the semantic differential questionnaire serve as the input data for the subsequent design concept analysis, which is conducted using Principal Component Analysis (PCA) with the assistance of R software. This method helps to reduce dimensionality and identify the most influential components within the dataset. The analysis reveals that the first principal component (PC1) has an eigenvalue of 6.68, indicating its strong contribution to data variance. According to established criteria, a cumulative proportion of variance exceeding 80% is typically required to consider a principal component as significantly representative [35]. In this case, PC1 demonstrates a cumulative proportion of 95.1%, clearly surpassing this threshold. Moreover, PC1 alone accounts for 86.03% of the total variance in the dataset, which is well above the commonly accepted standard for adequacy in design-related studies [15]. These findings confirm that PC1 is highly representative and reliable for explaining the underlying structure of the Kansei evaluation data.

1. Determining the Number of Principal Components

PCA Principal Component Analysis was conducted using R software. Data in the form of average *Kansei* word scores that had previously been converted into Excel CSV format were entered into the PCA analysis script for processing. The results of this processing are numerical calculations and graphs that were used to determine the design concept based on Principal Component (PC). The number of PCs used can be determined by the following method:

a. Plot Scree

The scree plot derived from the PCA analysis indicates the extraction of one principal component. PC1 is the highest variable, so it is maintained. The results of the Scree Plot can be seen in Figure 4.

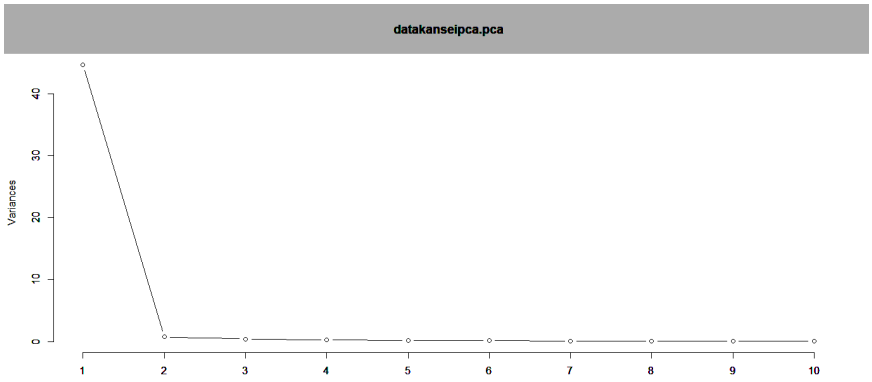

Figure 4 Plot Screen Graphic

b. Kaiser Method

Determination of the main component using the Kaiser method is done by looking at the variation value above 1 in the R software [15]. The figure below shows that the component that has a variation value > 1 is PC1 with a value of 4.469853e+01.

```
> (datakanseipca.pca$sdev)^2
 [1] 4.469853e+01 7.305016e-01 4.023868e-01 2.402650e-01 1.272983e-01
 [6] 1.203382e-01 1.005686e-01 8.271900e-02 6.200465e-02 5.233470e-02
[11] 4.873162e-02 4.049385e-02 2.925558e-02 2.634385e-02 2.557533e-02
[16] 2.430498e-02 1.931803e-02 1.783270e-02 1.665089e-02 1.315655e-02
[21] 1.161802e-02 1.133411e-02 1.072470e-02 9.596166e-03 8.959436e-03
[26] 7.958417e-03 6.537231e-03 5.844159e-03 5.757053e-03 5.549295e-03
[31] 4.696377e-03 4.631861e-03 3.881506e-03 3.482092e-03 3.158425e-03
[36] 2.740485e-03 2.396168e-03 2.225493e-03 2.043328e-03 1.809086e-03
[41] 1.517713e-03 1.436303e-03 1.104744e-03 1.047146e-03 7.079405e-04
[46] 3.562620e-04 2.738118e-04
```

Figure 5 Variation Value Results>1

Based on Figure 5, the variance value of PC1 of (4.469853e+01) means 44.699, PC2 of (7.305016e-01) means 0.73050, and PC3 of (4.023868e-01) means 0.4023. Therefore, it can be concluded based on [29], it is known that the selected PCs are those that have more than 1 variation and are retained. Based on Figure 5, only PC1 has a variation value result >1, while PC2 and so on are <1.

c. Standard Deviation

The standard deviation method states that the larger the number, the better [5]. In the PCA running results, there is 1 PC that has the largest number, namely PC 1 (6.686). The standard deviation results can be seen in Figure 6.

```
> datakanseipca.pca$sdev
 [1] 6.68569611 0.85469389 0.63433969 0.49016829 0.35678892 0.34689795
 [7] 0.31712545 0.28760912 0.24900734 0.22876778 0.22075240 0.20123084
[13] 0.17104264 0.16230790 0.15992290 0.15590055 0.13898932 0.13353913
[19] 0.12903832 0.11470200 0.10778693 0.10646175 0.10356012 0.09796002
[25] 0.09465430 0.08920996 0.08085314 0.07644710 0.07587525 0.07449359
[31] 0.06853012 0.06805778 0.06230173 0.05900925 0.05619987 0.05234964
[37] 0.04895067 0.04717513 0.04520318 0.04253335 0.03895783 0.03789858
[43] 0.03323768 0.03235964 0.02660715 0.01887490 0.01654726
```

Figure 6 Standard Deviation Result

d. Cumulative Proportion (of Variance)

The Cumulation of Proportion method, according to [36] the requirement for this method is a component that has a total Cumulative Proportion value above 80%. In the running results, the component that has a Cumulative Proportion above 80% is PC1 with a value of 95.1%. So PC1 is the best component. Cumulative Proportion results can be seen in Figure 7.

```
Importance of components:
                          PC1     PC2     PC3     PC4     PC5     PC6     PC7
Standard deviation     6.686 0.85469 0.63434 0.49017 0.35679 0.34690 0.31713
Proportion of Variance 0.951 0.01554 0.00856 0.00511 0.00271 0.00256 0.00214
Cumulative Proportion  0.951 0.96658 0.97514 0.98025 0.98296 0.98552 0.98766
```

Figure 7 The Cumulative Proportion Result

Based on the analysis of the four methods above, it can be concluded that the main component that needs to be maintained and implemented is PC1.

2. Principal Component Interpretation

The PCA analysis process using R software resulted in the visualization of the *Kansei* word distribution plot. The distribution of *Kansei* words on the positive and negative axes of each PC helps determine the design concept. A diagonal correlation with an angle of 180º forms a PC pair [35]. The *Kansei* words processed through PCA are displayed in the form of a distribution map. This map serves as the final step in PCA analysis to interpret the graphical components of the combined data along with the principal components, showing the scatter map generated by R software, including the distribution of *Kansei* words on PC 1 which shows good results, viewed from figure 8.

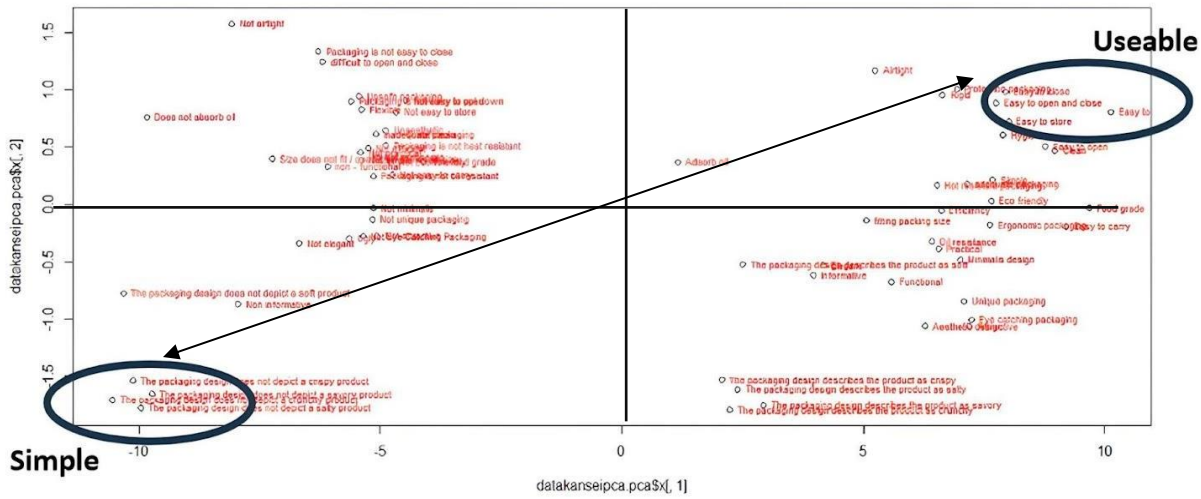

Figure 8 Representation of Design Concept based on PC1 Graphics

The concept results show that there is one positive PC (PC+), which includes aspects of clean, easy to open, and easy to carry. Meanwhile, for the negative PC (PC-), The Packaging design does not fit a crispy product, The Packaging design does not match a savory product, The Packaging design does not support a crunchy product, and The Packaging design does not fit a salty product. Based on these findings, PC+ was concluded as usable, functional, and practical, while PC- was rated as not informative and not attractive. The next step was to evaluate by expert panelists who have approximately 10 years of experience in the field, including material experts and design experts. The assessment results from the experts concluded that the packaging concept was rated as usable and simple.

IV. CONCLUSION

This current research concludes that the selected sample includes 47 *cakue* packages and 35 *Kansei* words. The *Kansei* words and samples were evaluated through a semantic differential questionnaire filled out by 30 respondents using the Purposive Sampling method. Data from this questionnaire were processed as PCA input using R software. Based on data analysis, the packaging design concept obtained consisted of 1 Principal Component with a cumulative proportion of 95.1%, resulting in a Usable - Simple concept. This design concept reflects respondents' preferences for user-friendly and simple packaging, following the essence of the *cakue* product to be presented. With the selection of a simple and functional design, the packaging is expected to meet consumer needs in terms of comfort and ease of use and provide a cleaner and more modern product image. This shows that the *Kansei* Engineering and PCA approaches are effective in developing packaging designs that are in accordance with consumer perceptions; thus, this method can be used as a reference in developing other product packaging in the future.

REFERENCES

[1] Y. E. Edbert Andy Junior, "Rancangan Buku Akulturasi Budaya Roti *Cakue* Dengan Pendekatan Fotografi," *Desain Komun. Vis. Manaj. Desain dan Periklanan*, vol. 08, no. 02, pp. 149–168, 2023, https://doi: 10.25124/demandia.v8i2.4827.

[2] T. Kompas, "*Cakue* Ko Atek , Jajanan Terkenal di Gang Kelinci Pasar Baru," Kuliner Jakarta.

[3] D. Darmawan, "Pengaruh Kemasan dan Harga Terhadap Keputusan Pembelian Produk Sayuran Hidroponik," vol. 1, no. April, pp. 1–10, 2017.

[4] A. P. Wijaya, D. Prihandono, R. R. E. Sutrasmawati, and F. Istanti, "Penguatan Pemasaran Melalui Desain Kemasan Untuk Meningkatkan Penjualan Abon Bonggol Pisang," *Pengabdi. Masy. Berkemajuan*, vol. 8, no. September, pp. 2796–2803, 2024.

[5] B. P. Pangestu, C. Amelia, R. A. Puspasari, and P. Sari, "Perancangan Konsep Desain Kemasan Makanan Kucing Menggunakan Metode *Kansei* Engineering," vol. 22, no. 2, pp. 143–150, 2023.

[6] M. E. Apriyanti, "Pentingnya Kemasan Terhadap Penjualan Produk Perusahaan," *Sosio e-kons Unindra*, vol. 2, no. 1, pp. 20–27, 2018.

[7] U. Yuniati, R. Ernawati, P. Prasetyaningtyas, H. N. Muthmainnah, A. N. Huda, and C. Utami, "Optimasi Media Pemasaran Melalui Penyusunan Content Pillar dan Pengembangan Olahan Sorgum," *Pengabdi. Masy. Univ. Pahlawan Tuanku Tambusai*, vol. 5, no. 5, pp. 10077–10085, 2024.

[8] B. Abellia *et al.*, "Edukasi Teknik Penyimpanan dan Pengemasan Daging Sebagai Keamanan Pangan," *Surya Abdimas*, vol. 8, no. 4, pp. 537–547, 2024.

[9] A. H. Asfar *et al.*, "Penyuluhan Inovasi Packaging Dan Branding Pada UMKM Sebagai Upaya Meningkatkan Pemasaran Dan Nilai Jual Lapis Ketan," *Pros. Semin. Umum Pengabdi. Masy.*, pp. 374–386, 2024.

[10] L. D. Fathimahhayati, C. I. Halim, and D. Widada, "Perancangan Kemasan Kerupuk Ikan Dengan Menggunakan Metode *Kansei* Engineering," *J. Rekavasi*, vol. 7, no. 1, pp. 7–15, 2019.

[11] D. Faisal, L. D. Fathimahhayati, and F. D. Sitania, "Penerapan Metode *Kansei* Engineering Sebagai Upaya Perancangan ulang Kemasan Takoyaki," *TEKNO*, vol. 18, no. April, pp. 92–109, 2021.

[12] C. P. Layla, N. P. Sari, and Muryeti, "Perancangan Desain Kemasan Corn Dog Menggunakan Metode *Kansei* Engineering," *Pros. Semin. Nas. Tetamekraf*, vol. 1, no. 2, pp. 217–225, 2022.

[13] R. W. Arini, R. S. Wahyuni, I. A. T. Munikhah, A. Yanyan, and A. Y. Pratama, "Perancangan Desain Kemasan Makanan Khas Daerah Keripik Tike Menggunakan Pendekatan Metode *Kansei* Engineering dan Model Kano," *Tek. Ind. Univ. Serang Raya*, vol. 9, no. 1, pp. 42–52, 2023.

[14] N. P. Sari, I. M. Habibi, and N. Nadifatu Nisa, "Pengembangan Kemasan Wedang Uwuh Menggunakan Metode *Kansei* Engineering," *Semin. Nas. Tek. Ind. Univ. GADJAH MADA Yogyakarta*, pp. 15–22, 2023.

[15] N. P. Sari, R. Rizwan, E. Hafidah, and S. Z. P. Andriyani, "Perancangan Desain Kemasan Bakso Goreng (Basreng) dengan Metode *Kansei* Engineering," *Performa Media Ilm. Tek. Ind.*, vol. 22, no. 2, p. 109, 2023, https://doi: 10.20961/performa.22.2.80674.

[16] K. Robintang and N. P. Sari, "Analisis Konsep Kemasan Umkm Martabak Dengan Pendekatan *Kansei* Engineering," *Semin. Nas. Inov. Vokasi*, vol. 3, no. 1, pp. 318–326, 2024.

[17] N. P. Sari, "Perancangan dan Pengembangan Kemasan," *Semin. Nas. Tetamekreaf*, vol. 1, no. 1, pp. 52–59, 2021.

[18] S. R. Arifin, S. Piu, I. Yulianadewi, □ Universitas, and D. Makassar, "Desain Kemasan Menggunakan *Kansei* Engineering Pada Produk Umkm Camilan Binaan PT Energi Bayu Jeneponto (Ebj)," *Arty J. Seni Rupa*, vol. 13, no. 1, p. 2024, 2024.

[19] Y. Nurohmah, R. Mayasari, and B. Nurina Sari, "Optimalisasi Performa K-Means Clustering Dengan Pca Dalam Analisis Tingkat Kemiskinan Di Jawa Barat," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 7, no. 3, pp. 1657–1665, 2023, https://doi: 10.36040/jati.v7i3.6884.
[20] M. A. Rahman, A. S. Wati, A. Marina, N. Ilma, and H. Kunio, "Peningkatan Pemahamanan *Kansei* Engineering Melalui Webinar *Kansei* Day 2024," *J. Pengabdi. Masy. Inform.*, vol. 4, no. 1, pp. 21–26, 2024, https://doi: 10.59395/abdiformatika.v4i1.215.
[21] S. Lockrey, "The role of packaging in minimising food waste in the supply chain of the future," RMIT University.
[22] A. Isna, N. P. Sari, D. Maharani, and F. Fadhillah, "Implementasi *Kansei* Engineering dalam Menentukan Konsep Pengembangan Kemasan Rujak Buah Potong," *J. INTECH Tek. Ind. Univ. Serang Raya*, vol. 10, no. 1, pp. 9–18, 2024, https://doi: 10.30656/intech.v10i1.7832.
[23] N. P. Sari, R. Naufal, S. Adristi, V. Aptriani, T. Grafika, and P. N. Jakarta, "Perencanaan Pengembangan Kemasan Detergen Bubuk Menggunakan Metode *Kansei* Engineering Abstrak," vol. 3, no. 1, pp. 482–493.
[24] H. Moeller, D. Martin, K. Schrader, W. Hoffmann, S. Pargmann, and J. Kurz, "Comparative studies of loading lipophilic substances into casein micelles and investigating the in fl uence of whey proteins and heat treatment on loading stability," no. Fda, pp. 1–12, 2015, https://doi: 10.1111/1471-0307.12535.
[25] H. Wang, M. Abdul, A. Ab, and C. Liu, "Impact of Snack Food Packaging Design Characteristics on Consumer Purchase Decisions," *Food Packag. Des.*, no. June, pp. 1–15, 2023, https://doi: 10.1177/21582440231167109.
[26] N. P. Sari, A. Isna, D. Maharani, and F. Fadhillah, "Implementasi *Kansei* Engineering dalam Menentukan Konsep Pengembangan Kemasan Rujak Buah Potong," *Tek. Ind. Univ. Serang Raya*, vol. 10, no. 1, pp. 9–18, 2024.
[27] M. A. Yasin, A. Hakim, and M. F. Perdana, "Penerapan *Kansei* Engineering dalam Desain Ulang Kemasan Kue Tambang di UMKM Sumber Jaya," *Teknol. Terap.*, vol. 8, no. 3, pp. 1705–1719, 2024.
[28] E. A. Pertiwi and E. Aristriyana, "Desain Kemasan Produk Pada UKM Berkah Dengan Menggunakan Metode *Kansei* Engineering Di Cipaku Kabupaten Ciamis," *Tek. Ind.*, vol. 01, no. 01, pp. 1–8, 2023.
[29] K. Amelia, A. Putri, N. E. Segita, R. N. Nuryadin, Y. L. Nur, and N. P. Sari, "Perencanaan Konsep Desain Kemasan Kerak Telor Menggunakan Metode *Kansei* Engineering," *Tek. Ind. ITN Malang*, pp. 12–21, 2024.
[30] J. Zhang, C. Cao, S. Zheng, W. Li, B. Li, and X. Xie, "Poly (butylene adipate- co -terephthalate)/ Magnesium oxide / Silver Ternary Composite Bio Films For Food Packaging Application," *Food Packag. Shelf Life*, vol. 24, no. December 2019, pp. 1–16, 2020, https://doi: 10.1016/j.fpsl.2020.100487.
[31] S. Rosandi and T. Sudarwanto, "Pengaruh Citra Merek dan Desain Kemasan Terhadap Minat Beli Konsumen Pada Produk Susu Ultra," 2015.
[32] UPN Veteran Jawa Timur, "Inovasi Pertanian untuk Meningkatkan Kesejahteraan Petani di Era Digital," in *Seminar Nasional Agribisnis*, 2021, pp. 1–97.
[33] M. R. Muis, M. Fahmi, M. A. Prayogi, and Jufrizen, "Model Peningkatan Loyalitas Nasabah Internet Banking Berbasis Persepsi Resiko, Persepsi Privasi dimediasi Kepercayaan dan Kepuasan Nasabah," *Bisnis dan Manaj.*, vol. 8, no. 1, pp. 22–37, 2021.
[34] F. Namira, P. Sari, T. Grafika, and P. N. Jakarta, "Penentuan Konsep Desain Kemasan Basreng Menggunakan Metode *Kansei* Engineering dan K-Means Cluster Abstrak," *Semin. Nas. Inov. Vokasi*, vol. 3, no. 1, pp. 281–290, 2024.
[35] A. Coghlan, *A Little Book of R For Multivariate Analysis*. 2014.
[36] S. Azhara, N. Purnama, and S. Muryeti, "Penerapan Metode *Kansei* Engineering Dalam Pengembangan Kemasan Kue Kacang (Studi Kasus : Kue Kacang Bintang Prima)," *Print. Packag. Technol. J. 2021*, 2021.