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Investigating the relationship among the Kansei-based design of chocolate packaging, consumer perception, and willingness to buy

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ABSTRACT

In this article, the influence of two design variables of chocolate packaging, i.e., material and graphic, has been examined on consumer impressions and willingness to buy. Kansei Engineering methodology has been applied to measure the emotional responses to the two chocolate packaging design variables. The influence of participants' gender has been also considered in this study. Three hundred and eighty-five consumers participated in this investigation, evaluating 14 Kansei words for seven different groups of packaging designs. Friedman test has been used to compare the mean ranks of Kansei words among different dimensions of packaging material and graphic design. Findings indicate that packaging material influences some of the components of sensory expectations, brand attitude, quality and price perception, while graphic design affects most of them. Willingness to buy is more related to the packaging graphic design than to the material. In addition, a comparison among the impressions of males and females indicates that females were more likely to be affected by the material of the package.

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1. Introduction

Nowadays organizations are continuously looking for the ways of increasing customer satisfaction, improving business processes, decreasing costs of organization and gaining competitive advantage. One of the challenges they are facing is the need to respond rapidly to the various and changing demands of customers (Shahin and Jaberi 2011; Shahin, Arab YarMohammadi, and Shahin 2017). One of the important demands of customers is packaging as the tangible feature of products which influences the willingness of consumers to buy. A product packaging, besides protecting the contents and expediting transport, handling, and storage, seeks to attract the attention of potential buyers, to influence their willingness to buy and even to increase the acceptance of product as long as they are purchased (Rebollar et al. 2012). In average, consumers face many decisions while entering the environment of each store. When a consumer is hesitant about a product and is at a critical time to decide, packaging can play an

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important role in purchase decision (Silayoi and Speece 2007). The way packaging interacts with the product influences the choice of consumers and this can be linked to marketing success (Gofman, Howard, and Mets 2010).

Packaging is an important form of marketing communication (Liao et al. 2015). Packaging, apart from its functional features, transmits product information to consumer (Orth, Campana, and Malkewitz 2010; Simms and Trott 2010), influences consumer perceptions and evaluations about a product (Mizutani et al. 2012) and affects consumer preferences and choices (Silayoi and Speece 2007), especially for food products that purchasing decisions are identified with low-level involvement and impulsive processes (Underwood 2003).

Awareness and understanding of consumers' perceptions and the way that they interact with products in target markets are crucial (Shahin, Kazemi, and Kazemi Mahyari 2012). In the food industry, packaging has a significant role in attracting customers and creating a psychological attractiveness and expectations for consumers and can influence the customer perspective and purchase decision (Chen and Chuang 2008; Simms and Trott 2010; Ranjbarian, Mahmoudi, and Shahin 2010), to the extent that it can be considered as a tool for choosing food products (Ares & Deliza, 2010). Food production companies, therefore, are increasingly interested in studying how packaging influences the expectations, perceptions, and impressions of buyers and consumers.

Increasing the interest of the company in packaging has inspired numerous studies on how packaging affects the expectations of buyers and consumers. As a result, numerous studies have been performed on how packaging affects the willingness of consumers to buy or purchase behavior in relation to material (Banks 1950), shape (Raghubir and Greenleaf 2006; Mutsikiwa, Marumbwa, and Mudondo 2013; Tama, Azlia, and Hardiningtyas 2015), color (Rebollar et al. 2012; Parise and Spence 2012; Beneke et al. 2015; Zekiri and Hasani 2015); graphic design and images (Parise and Spence 2012); or a combination of such elements (Ares and Deliza, 2010; Puyares, Ares, and Carrau 2010; Shokrinia Omrani and Vahedi 2015; Vyas 2015).

In some studies, the effect of package shape and color on consumer sensory expectations (Murray and Delahunty 2000; Ares & Deliza, 2010; Puyares, Ares, and Carrau 2010; Becker et al. 2011; Shokrinia Omrani and Vahedi 2015), brand personality perception (Hess et al. 2014; Jafari Darabjerdi, Arabi, and Haghhighikhah 2016), and perception of product quality (Joutsela 2010; Sioutis 2011) have been investigated.

Authors have found limited studies about the influence of packaging on consumer sensory expectations. However, a literature review on the advertising of consumer goods indicates that companies have grasped the consumer perceptions, expectations and perceptions to influence their purchase process.

As stated, packaging design plays an important role in deciding to buy a product by consumers. Therefore, to create the ability to influence consumer decision, product design should be able to penetrate consumer emotions. The emotional experience in packaging is achieved by observing or touching its wrapper.

Many companies worldwide have invested in designing different packs to achieve this goal and have been able to tempt customers to buy their products by the means of capturing showcases and shelves in stores and supermarkets and displaying their products, properly. In many chocolate brands, packaging both in design and geometric terms, not only does not add value to the product, but also questions the value of

production, and consumer suspects that he/she is facing a low-quality product and in many cases, the packaging application will only remain as a cover.

To resolve this problem, researchers have used Kansei engineering to translate customer perception of the product into design elements (Shahin, Moshrefjavadi, and Vaez Shahrestani 2014). Kansei engineering is a product development methodology, that is used to translate impressions, feelings, emotions, and demands of the customers on a product to design solutions and design parameters (Tama, Azlia, and Hardiningtyas 2015).

A key factor in maximizing the packaging effect is understanding the consumers' responses to packaging. Packaging is a key tool in affecting the sense, sensory perceptions and, ultimately, the purchase decision of the customer. In this way, this study aims to examine the role of two aesthetic elements of packaging (material and graphic) in forming the perception of product and symbolic meanings in the minds of consumers, and ultimately to respond to the question of what material and graphic design of product packaging can create a special emotion or association (the Kansei adjective) in the minds of the consumer?

Based on what was mentioned, the objectives of this study include:

- To examine the effect of chocolate packaging material on consumer impressions (sensory expectations, brand attitude, product quality perception, and price perception) and willingness to buy.
- To examine the effect of chocolate packaging graphic design on consumer impressions (sensory expectations, brand attitude, product quality perception, and price perception) and willingness to buy.
- To study the differences among males and females in terms of the impact of packaging design elements (material and graphic) on their impressions and willingness to buy.
- To investigate the relationship among different consumer impressions of packaging design and willingness to buy.

2. Consumer impressions of packaging

Packaging is the most important and the last tool which can reach the consumer, transfer the information, strength product positioning in consumer consciousness and influence his/her decision-making process (Butkeviciene, Stravinskiene, and Rutelione 2008). Although the main function of packaging is to preserve product integrity by protecting the actual food product against potential damage from climate, bacteriological and transit hazards, this role has been expanded. For example, the overall characteristics of a package can greatly affect quality judgments about product features and play an important role in forming brand preferences (Biljon and Rensburg 2011). Young (2008) clarified that package design can influence buyers in three ways: increasing the shelf effect and appearance; increasing product perceptions and brand image; and higher performance and satisfaction after it is used.

According to Underwood, Klein, and Burke (2001), the packet becomes a symbol that transfers the favorable or unfavorable meaning about a product. In many cases, when consumers see the image of the product on the package, some hypotheses about the

appearance, taste, and smell of the product will create in their mind, unconsciously. In addition, packaging is considered as the most immediate stimulus for buyers at the point of sale. The package can draw customer attention, convey a product message, impact on consumers by the product image and distinguish a product from others. For example, visual elements of package design influence consumer decisions and selections (Wang and Chou 2010). Visual perceptions of package designs can enhance consumer perceptions of the taste, quality and performance of the product and increase the likelihood of consumer purchasing (Metcalf et al. 2012).

Translating basic design elements into higher-order factors and more understandable holistic designs, including the impressions they evoke with consumers, is important in supporting firms better understand package design and consumers' responses to it. The literature has documented numerous impressions evoked by packages, and design has been repeatedly emphasized as an instrument for generating impressions. Designers develop packages that are believed to evoke the desired impressions (Orth and Malkewitz 2008). However, the question remains whether designs developed by designers effectively generate desired responses. This research investigates how firms can develop package designs for attaining desired responses.

3. Kansei engineering

Kansei engineering (Kansei ergonomic) was discovered about 30 years ago by Mitso Nagamachi in Hiroshima University and it aims to incorporate customer's feelings and demands in product design (Shahin, Shahrestani, and Iraj 2013). Looking at an image or object may create a 'good' feeling that is difficult to describe. Kansei is a personal mental imagination of a particular product, environment, or situation using five senses of sight, hearing, touch, smell, taste, diagnosis, and balance. Kansei means the sensibility, sense, aesthetic, feelings, emotions, affections, and intuition (Grimsaeth et al. 2010).

Kansei engineering (KE) has been defined as a technology that translates customer's Kansei (psychological sense) into design specifications (Djatna and Kurniati 2015). The analysis of the relationship among the qualitative attributes of human emotions and the quantitative attributes of design is the main purpose of Kansei engineering (Hung and Nieh 2013).

KE is a technical support of the product development, which is based on consumer orientation. The technology can transfer people's perceptual demands into the elements of the product's design (Hu, Wang, and Qiao 2016). KE System is used to analyze the product attributes that effect on the customer emotion. Consequently, the features of products can be designed regarding the emotion, feeling, and impression. KE has been applied in various industries in assisting designers to understand consumer (Kittidecha and Yamada 2018). This study used this methodology to identify consumer emotions and impressions evoked by two packaging elements (material and graphic design) based on Kansei adjectives.

4. Graphic design

Graphic design on packaging is to determine the elements on packaging, the psychological impact on consumers. Graphic designers can apply design principles in terms of images, color, and typography to create appealing packaging, to illustrate product

benefits, and to create a personality for the product. In addition, packaging also needs to establish brand recognition with consumers, who are the target group. Images mean that images and photos are used to convey similar characters, but the effect is more detailed and can also visualize reality. The visually create an instant insight without interpretation or understanding. In addition, images are known as a universal language, which even illiterate people can understand. Images are very meaningful and important to graphic design (Pensasitorn 2015).

Packaging is a multi-disciplinary process that involves professionals from various fields including graphic design. Two of them are packaging engineers and the designers that design and specify package systems, testing protocols and other requirements for the package (Oladumiye 2018).

Recently, researchers have begun studying specific ways through which graphic design of packaging elements can directly affect the product's perceived features (Krishna, Cian, and Aydinoglu 2017). In this way, this study aims to discover how the graphic design of chocolate packaging may influence consumers' different impressions related to their expectation, attitude, perception, and willingness.

5. Research methodology

5.1. Participants

The participants in this study comprised 385 people from the city of Isfahan (Iran). More than half were female (63%) and the rest were male (37%). The average age of participants was 31.10 with a standard deviation of 7.332. They were asked about their chocolate consumption habits. 27.3% responded that their consumption was almost daily, 34.5% stated that their consumption was occasional and 38.2% mentioned that they hardly consumed chocolate ever.

5.2. Procedure

Since the research questionnaire was designed online and two criteria were considered for entering the participants into the investigation. These criteria included having 18 < age < 40 and being a member of social networks. Participants were selected using snowball sampling. Since the areas of Kansei engineering, packaging design, and consumer impression have been studied by many researchers and they are not relatively new areas, however, the studies done in this area have been paid less attention to chocolate. In addition, in specific countries with specific tastes, consumer behavior and cross-cultural differences affect emotions. Therefore, in terms of field study it needs to do interviews and theoretical saturation, hence, snowball sampling used. This sampling method is particularly valuable for obtaining information on a relatively under-explored topic (Strydom and Delpont 2005), and where members of the population are difficult to locate (Babbie 2011). Therefore, the initial participants who had the criteria were randomly identified for participating in the investigation. After answering the research questionnaire, these individuals provided the user accounts of a few potential participants to ensure a continuous chain of sampling. Then, researchers contacted all potential participants by social networks and sent the questionnaire link to them.

The design of packaging prototypes was mainly based on research questions, and its purpose was to discover consumers' sensory and emotional responses to material and graphic design of chocolate packages. Two elements of packaging graphic design and material were selected for the survey in this study. Thus, the author designed chocolate packages with different colors and shapes for three materials (metal, fabric, and wood) and four graphic designs (pattern, product image, emotional attractions image, and being visible inside the package). Then, to prevent the increase in the number of packaging prototypes and to reduce the bias responses as a result of respondents' fatigue, a primary survey was done. Twenty chocolate consumers participated in this survey. In this survey, participants were asked to answer the research questionnaire separately for 11 universal colors and 4 shapes (circle, triangle, square, and hexagonal). In this way, those colors and shapes that more than half of the participants rated 3 were excluded from the study process. In this way, 35 packages prototypes were selected for the main study, according to [Appendix A](#).

In general, 35 prototypes were designed based on three packaging materials and four packaging graphic. A total of seven groups and five chocolate package images for each group were created (chocolate packaging prototypes are shown in [Appendix A](#)). The packaging prototypes were designed using Adobe Illustrator CS6.

In order to reduce biased data, displaying the chocolate package images were randomized. Therefore, seven images of chocolate packages (one sample from each group) which were selected randomly were presented to a participant for about 5 s. Then, the questions were displayed and the participant's emotions were surveyed based on the Kansei adjectives. Finally, his/her willingness to buy was measured by answering a question.

In order to remove the effect of brand familiarity on responses, the fictitious brand named 'Chocolate Packaging' was used on all packaging prototypes.

5.3. Measurement of data

In the first step, the information in the form of adjectives is collected which are used to describe the impressions on the packaging. These are collected from all available sources like magazines, literature, manuals, experts, ideas, and visions. This collection of words goes on until no new words occur. These adjectives are then analyzed and structured to find the high-level Kansei words that are representing the packaging. This is done manually in the semantic structuring phase. In the second step, the Kano model was used to select attractive adjectives. Using the Kano questionnaire, Kansei subsets, identified in the previous step, were classified by a statistical sample of 110 customers (male = 46%, female = 54%) in the form of Kano model categories (must-be, one-dimensional, attractive, indifferent, reverse, and questionable). Therefore, a total of 14 Kansei adjectives that were standing in the attractive category were selected. In the third step, 10 marketing experts with high experience in consumer psychology (a panel of experts) searched attractive Kansei adjectives that are relevant and put them into groups. These adjectives were divided into four categories: sensory expectations, brand attitude, product quality perception, and price perception.

A list of adjectives is presented in [Table 1](#). These adjectives were evaluated by a questionnaire ([Appendix B](#)). The first part of the questionnaire included demographic

Table 1. List of Kansei adjectives used in the investigation.

Sensory expectations	Brand attitude	Product quality perception	Price perception	Willingness to buy
Beautiful	Luxury	Harmless	Cheap	Willingness to buy
Unique	Immortal	Delicious		
Eco-friendly	Reliable	Fresh		
Delicate	Original	Fragrant		
Modern				

questions (age, gender, and chocolate consumption habit). Then, respondents were asked to rate seven chocolate packages using a 5-point semantic differential scale.

In order to evaluate the participants' willingness to buy, a 5-point Likert scale (1: would not buy under any circumstance to 5: completely willing to buy) was used.

5.4. Calculating validity and reliability

Validity was assessed by means of factor loading. According to Wu and Chang (2016), the factor load of all variables of factor dimensions (given as standardized regression weights in AMOS) must exceed 0.5 or higher, ideally 0.7 or higher and at a minimum statistically significant. The results in Table 2 showed that the numerical values of all dimensions in this study were above the criteria, so the convergent validity of the questionnaire was also high.

This study made an analysis of the reliability and validity of all measurement dimensions, as is shown in Table 2. The instrument's reliability and validity were confirmed through two indicators: Cronbach's alpha and factor analysis. According to Wu and Chang (2016), if a Cronbach's alpha value was over 0.7, the questionnaire featured a high level of reliability. The results showed that the overall reliability of the questionnaire was high because the Cronbach's alpha of all dimensions met the criteria. In

Table 2. Measurement models. Reliability and validity.

Factor	Factor loading	Cronbach's α value
<i>Sensory expectations</i>		
Beautiful	0.852	0.915
Unique	0.817	
Eco-friendly	0.701	
Delicate	0.833	
Modern	0.834	
<i>Brand attitude</i>		
Luxury	0.891	0.921
Immortal	0.790	
Reliable	0.892	
Original	0.885	
<i>Quality perception</i>		
Harmless	0.743	0.881
Delicious	0.857	
Fresh	0.818	
Fragrant	0.803	
<i>Price perception</i>		
Cheap	0.816	0.792
<i>Willingness to buy</i>		
Willingness to buy	0.778	0.808

addition, Cronbach's alpha value for the overall questionnaire was 0.970; the questionnaire featured a high level of reliability.

5.5. Data analysis

Several statistical analyses were conducted regarding the research objectives. The following comparisons were performed, in order to discover significant statistical differences among the groups of packaging prototypes:

- Difference among three packaging materials based on consumer impression (Friedman test)
- Difference among four packaging graphic designs based on consumer impression (Friedman test)
- Difference between males and females regarding their impressions of three packaging materials (Friedman test)
- Difference between males and females regarding their impressions of four packaging graphic designs (Friedman test)

In addition, the Spearman correlation coefficient was used to explore the relationship among different consumer impressions (sensory expectations, brand attitude, perception of product quality, and price perception) and willingness to buy.

SPSS (version 24) was used for data analysis.

6. Results

In this section, the packaging elements are compared based on the four categories of consumer expectations and perceptions (sensory expectations, brand attitude, product quality perception, and price perception).

6.1. Difference among three packaging materials

In [Table 3](#), the results of the Friedman test are addressed. Apparently, consumers' impressions of the delicacy, brand immortality and reliability, delicious, fragrant, and fresh product are not significantly different in three packaging materials (highlighted by * in [Table 3](#)). In addition, changing the material of the chocolate package does not affect consumers' willingness to buy.

6.2. Difference among four packaging graphic designs

Friedman test was conducted to examine statistical significance in the difference among four different graphics used on prototypes. According to [Table 4](#), the results indicate that there is a very strong statistical difference among four graphic designs regarding all Kansei words, except brand originality. This reflects the impact of packaging graphic design on consumer impression.

Table 3. Friedman test of packaging materials.

Kansei adjective	Mean rank			Sig.	Chi-Square
	Metal	Fabric	Wood		
<i>Sensory expectation</i>					
Beautiful	2.01	2.09	1.90	0.086	4.907
Unique	1.98	2.14	1.88	0.012*	8.898
Eco-friendly	2.03	2.18	1.79	0.000*	19.370
Delicate	1.99	2.05	1.97	0.614	0.975
Modern	2.09	2.09	1.82	0.002*	12.244
<i>Brand attitude</i>					
Luxury	2.12	2.09	1.78	0.000*	17.763
Immortal	2.05	2.05	1.90	0.144	3.874
Reliable	2.04	2.05	1.91	0.189	3.335
Original	2.06	2.11	1.83	0.002*	12.695
<i>Product quality perception</i>					
Harmless	2.06	2.15	1.79	0.000*	17.556
Delicious	2.02	2.05	1.93	0.327	2.238
Fresh	2.05	2.04	1.91	0.198	3.237
Fragrant	2.04	2.02	1.94	0.477	1.480
<i>Price perception</i>					
Cheap	1.93	1.83	2.25	0.000*	24.688
<i>Willingness to buy</i>					
Willingness to buy	2.01	2.03	1.95	0.650	0.862

Note: $P < 0.05$

Table 4. Friedman test of packaging graphic designs.

Kansei adjective	Mean rank				Sig.	Chi-Square
	Pattern	Product image	Emotional attraction image	Inside visible		
<i>Sensory expectation</i>						
Beautiful	2.20	2.36	2.65	2.78	0.000*	31.307
Unique	2.29	2.39	2.58	2.73	0.001*	17.198
Eco-friendly	2.40	2.35	2.46	2.79	0.000*	18.205
Delicate	2.39	2.35	2.45	2.81	0.000*	20.503
Modern	2.30	2.32	2.65	2.73	0.000*	20.974
<i>Brand attitude</i>						
Luxury	2.29	2.34	2.59	2.78	0.003*	22.399
Immortal	2.33	2.31	2.55	2.81	0.000*	23.755
Reliable	2.33	2.23	2.55	2.88	0.000*	37.506
Original	2.55	2.55	2.37	2.53	0.335	3.395
<i>Product quality perception</i>						
Harmless	2.32	2.32	2.60	2.77	0.000*	22.508
Delicious	2.25	2.33	2.53	2.89	0.000*	36.953
Fresh	2.30	2.29	2.54	2.86	0.000*	33.015
Fragrant	2.61	2.63	2.26	2.50	0.004*	13.499
<i>Price perception</i>						
Cheap	2.28	2.58	2.51	2.62	0.000*	18.112
<i>Willingness to buy</i>						
Willingness to buy	2.28	2.27	2.59	2.86	0.000*	35.409

Note: $P < 0.05$

6.3. Difference between males and females in their impressions of three packaging materials

In this section, the male and female impressions of three chocolate packaging materials were compared. The result of the Friedman test for males reveals that most Kansei words are not statistically significant regarding the difference in four graphic designs

except the harmless (Table 5). This indicates that the packaging material has no influence on impressions of male consumers and their willingness to buy the product.

On the other hand, packages with different materials have different meanings in the minds of female consumers. Data of the Friedman test (Table 6) indicates that most Kansei words (beautiful, unique, eco-friendly, modern, luxury, immortal and original brand, harmless, and cheap) are statistically significant regarding the difference in four graphic designs.

Table 5. Friedman test of packaging materials (males).

Kansei adjective	Mean rank			Sig.	Chi-Square
	Metal	Fabric	Wood		
<i>Sensory expectation</i>					
Beautiful	2.10	2.00	1.90	0.489	1.432
Unique	1.96	2.08	1.95	0.680	.772
Eco-friendly	2.08	2.07	1.86	0.372	1.977
Delicate	2.04	2.08	1.89	0.533	1.258
Modern	2.14	1.94	1.92	0.389	1.890
<i>Brand attitude</i>					
Luxury	2.09	1.98	1.92	0.601	1.018
Immortal	2.14	1.99	1.87	0.291	2.468
Reliable	2.17	1.96	1.87	0.212	3.098
Original	2.10	2.00	1.90	0.474	1.494
<i>Product quality perception</i>					
Harmless	2.10	2.14	1.75	0.045*	6.194
Delicious	2.12	1.92	1.96	0.451	1.593
Fresh	2.17	1.86	1.97	0.201	3.207
Fragrant	2.11	2.02	1.87	0.364	2.024
<i>Price perception</i>					
Cheap	1.86	2.04	2.10	0.338	2.168
<i>Willingness to buy</i>					
Willingness to buy	2.12	1.96	1.92	0.459	1.556

Note: $P < 0.05$

Table 6. Friedman test of packaging materials (females).

Kansei adjective	Mean rank			Sig.	Chi-Square
	Metal	Fabric	Wood		
<i>Sensory expectation</i>					
Beautiful	2.01	2.16	1.82	0.006*	10.242
Unique	1.95	2.20	1.85	0.004*	11.010
Eco-friendly	2.06	2.19	1.75	0.000*	15.500
Delicate	1.95	2.05	2.00	0.673	0.793
Modern	2.12	2.09	1.79	0.004*	10.926
<i>Brand attitude</i>					
Luxury	2.11	2.19	1.69	0.000*	24.005
Immortal	2.03	2.11	1.85	0.042*	6.350
Reliable	1.96	2.13	1.91	0.081	5.018
Original	2.03	2.18	1.79	0.001*	13.790
<i>Product quality perception</i>					
Harmless	2.03	2.15	1.82	0.013*	8.755
Delicious	2.02	2.10	1.89	0.149	3.809
Fresh	2.05	2.06	1.89	0.213	3.095
Fragrant	1.97	2.06	1.97	0.591	1.051
<i>Price perception</i>					
Cheap	1.90	1.79	2.31	0.000*	25.511
<i>Willingness to buy</i>					
Willingness to buy	1.98	2.13	1.89	0.108*	4.455

Note: $P < 0.05$

6.4. Difference between males and females in their impressions of four packaging graphic designs

In this section, the Friedman test was used to explore the differences between males and females in terms of the characteristics of the research. The result indicates that there is a statistically significant difference in most of Kansei words, except eco-friendly, delicate, original brand, fragrant, and inexpensive product (Table 7).

On the other hand, packages with different graphic designs have different meanings for female consumers. Indeed, packaging design graphics are capable of creating different impressions in female consumers for all of Kansei words, except brand originality (Table 8).

6.5. Relationship between consumer impressions regarding packaging design and willingness to buy

The Spearman correlation coefficients were used to investigate the relationship between consumer willingness to buy the product and his/her impressions of chocolate packaging design. According to the results (Table 9), four subscales of sensory expectation, brand attitude, quality perception, and price perception are correlated with each other and with willingness to buy (sig.<0.01).

Findings indicate that all variables, except perceived price, have statistical significance and positive correlations with willingness to buy. The correlation coefficients between willingness to buy and other variables are related to brand attitude (0.788), sensory expectations (0.715), perception of quality (0.632), and perceived price (-0.578).

Table 7. Friedman test of packaging graphic designs (males).

Kansei adjective	Mean rank				Sig.	Chi-Square
	Pattern	Product image	Emotional attraction image	Inside visible		
<i>Sensory expectation</i>						
Beautiful	2.10	2.44	2.70	2.76	0.007*	12.252
Unique	2.29	2.39	2.58	2.73	0.001*	17.198
Eco-friendly	2.26	2.46	2.47	2.80	0.094	6.381
Delicate	2.48	2.45	2.35	2.72	0.382	3.064
Modern	2.14	2.52	2.60	2.75	0.043*	8.145
<i>Brand attitude</i>						
Luxury	2.13	2.44	2.69	2.74	0.020*	9.846
Immortal	2.18	2.39	2.69	2.73	0.042*	8.193
Reliable	2.17	2.32	2.70	2.81	0.010*	11.244
Original	2.52	2.82	2.39	2.27	0.054	7.631
<i>Product quality perception</i>						
Harmless	2.18	2.36	2.74	2.72	0.025*	9.334
Delicious	2.06	2.53	2.63	2.78	0.001*	16.799
Fresh	2.10	2.29	2.77	2.84	0.000*	33.015
Fragrant	2.51	2.75	2.39	2.35	0.281	3.822
<i>Price perception</i>						
Cheap	2.74	2.68	2.30	2.28	0.061	7.370
<i>Willingness to buy</i>						
Willingness to buy	2.19	2.42	2.57	2.82	0.044*	8.079

Note: $P < 0.05$

Table 8. Friedman test of packaging graphic designs (females).

Kansei adjective	Mean rank				Sig.	Chi-Square
	Pattern	Product image	Emotional attraction image	Inside visible		
<i>Sensory expectation</i>						
Beautiful	2.26	2.28	2.61	2.84	0.000*	22.486
Unique	2.33	2.38	2.56	2.73	0.024*	9.410
Eco-friendly	2.47	2.21	2.49	2.83	0.000*	18.898
Delicate	2.41	2.25	2.49	2.85	0.000*	19.675
Modern	2.40	2.29	2.61	2.70	0.018*	10.096
<i>Brand attitude</i>						
Luxury	2.39	2.31	2.52	2.78	0.007*	12.067
Immortal	2.43	2.28	2.43	2.86	0.000*	17.786
Reliable	2.44	2.19	2.47	2.89	0.000*	24.858
Original	2.55	2.41	2.38	2.67	0.119	5.850
<i>Product quality perception</i>						
Harmless	2.42	2.28	2.52	2.78	0.005*	12.993
Delicious	2.35	2.20	2.47	2.98	0.000*	33.795
Fresh	2.47	2.23	2.48	2.82	0.001*	16.878
Fragrant	2.61	2.64	2.27	2.43	0.017*	10.146
<i>Price perception</i>						
Cheap	2.54	2.62	2.63	2.21	0.009*	11.487
<i>Willingness to buy</i>						
Willingness to buy	2.31	2.22	2.50	2.97	0.000*	31.061

Note: $P < 0.05$

Table 9. Spearman correlation coefficient.

		Willingness to buy	Emotional expectation	Brand attitude	Quality perception	Price perception
Willingness to buy	Correlation Coefficient	1.000	0.715 ^a	0.788 ^a	0.632 ^a	-0.578 ^a
	Sig. (2-tailed)	.	0.000	0.000	0.000	0.000
Emotional expectation	Correlation Coefficient	0.715 ^a	1.000	0.751 ^a	0.624 ^a	-0.601 ^a
	Sig. (2-tailed)	0.000	.	0.000	0.000	0.000
Brand attitude	Correlation Coefficient	0.788 ^a	0.751 ^a	1.000	0.714 ^a	-0.703 ^a
	Sig. (2-tailed)	0.000	0.000	.	0.000	0.000
Quality perception	Correlation Coefficient	0.632 ^a	0.624 ^a	0.714 ^a	1.000	-0.588 ^a
	Sig. (2-tailed)	0.000	0.000	0.000	.	0.000
Price perception	Correlation Coefficient	-0.578 ^a	-0.601 ^a	-0.703 ^a	-0.588 ^a	1.000
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	.

^a. Correlation is significant at the 0.01 level (2-tailed).

7. Discussion

In this section, the results are discussed regarding the objectives of the study. Subsequently, it discusses implications, limitations, and future research.

7.1. Influence of packaging material

Consumers associate the material of chocolate packs with the sensory and functional characteristics of chocolate. Therefore, participants felt a stronger impression of unique, modern, and eco-friendly on chocolate packs with fabric cover than on the other two materials. On the metal packs, Kansei word luxury brand was stronger in perception than the other two packs. On the packs with fabric cover, Kansei word original brand was stronger than on the other packs. Packs with fabric cover evoked a harmless product,

and wooden and then metal packs evoked less price. These findings reveal that the material of chocolate packs may influence consumer perceptions and emotions. In the study of Brown (1982) on packaging materials and taste perception, it was explored that the wrappers from different materials resulted in different perceptions of the freshness of the product inside the package. Wu et al. (2009) also found that metal gives a high-tech product experience and a sense of pride, while wood and other natural materials connect consumers to the nature.

In addition, packaging material had no influence on the willingness of consumers to buy the product. It means that changing the material of the chocolate packs could not encourage the consumer to buy it.

7.2. Influence of packaging graphic design

In terms of Kansei words beautiful, unique, delicate, and modern, pattern had the lowest rank among graphic designs. For packs with inside visible, Kansei words harmless, delicious and fresh chocolate and willingness to buy were stronger than for the other packs. Packages that had an image of emotional attractions have made the respondents feel more fragrant than other graphic designs. Pattern design on chocolate packs made respondents perceive lower prices.

7.3. Influence of gender of consumers on their impressions of four packaging graphic designs

For males, packs with a fabric cover and then wooden packs transferred the sense of harmless product further. The results indicated that the package material did not have any effect on the willingness of males to buy the product. On the other hand, chocolate packs with different materials had different meanings for female respondents. The greatest impact of packaging was related to sensory expectations (beautiful, unique, eco-friendly, and modern) and their brand attitude (luxury brand, immortal, and original). For female respondents, packs with fabric cover were more beautiful, unique and eco-friendly, while metal packs seemed more modern. In the opinion of female consumers, the brand of fabric packs was more luxury, immortal, and original, and the products inside these packs were more harmless. Wooden packs were associated with lower prices, and fabric packs were associated with higher prices. The willingness of female respondents to buy the product was not affected by the material of the chocolate package.

Male participants felt a stronger impression of beauty, uniqueness, and modernity on chocolate packs of which insides were visible than the others. These packs had a more luxury, immortal, and reliable brand and more delicious product. Packs with images of emotional attractions, such as musical instruments, natural landscapes, were more harmless and the willingness of males to buy these packs was more than packs with other packaging design styles. In contrast, packaging graphics were able to create different perceptions among female respondents. Female participants felt a stronger impression of beauty, uniqueness, eco-friendliness, delicacy, and modernity on chocolate packs with inside visible graphic design. On such packs, Kansei words luxury, immortal, and reliable brand, and harmless, delicious, and fresh product were stronger

in perception than the other three packs. On the other hand, for the packs with product image Kansei word fragrant product was stronger in perception. In addition, females were more tended to buy packs with visible inside.

7.4. Relationship between consumer impressions and their willingness to buy

All variables except perceived price had statistical significance and positive correlation with willingness to buy the product. The correlation between brand attitude and willingness to buy was stronger than those of other variables. These results indicate that creating more positive attitudes toward a brand can increase his/her willingness to buy the product more than the other consumer impressions.

7.5. Implications, limitations, and future research

The data and results of this study can be used in different ways. Practitioners can use the study findings as a reference in their actual packaging designs regarding the impact of materials and graphics on a better impression. In addition, this study was an example of the application of Kansei Engineering in the field of food packaging design. Compared to the numerous cases that are available in the automobile and electronics industry, this study can be considered as one of the very few studies in the field of food packaging. However, it should be noted that the main purpose of this study was not to use the emotional design for marketing and advertising purposes. Instead, the aim was to show that how consumer perception can be improved by discovering opportunities to stimulate and control their sensory and emotional responses/perceptions through the use of special design elements on the packaging of products, such as materials and images. Therefore, in order to create a wanted emotional response, designers and marketers should choose the specific packaging elements that best fit their goals or consider a combination of elements to provide the best perceptions of the brand and product quality in consumers.

It is imperative that packaging designers understand which income segments will be targeted and how packaging design elements would result in perception of price. This has implications for the material and graphics usage on packaging, since the results indicated that packaging elements can affect consumer perceptions of the price of a product, in a way that the fabric packs and the packs with product image represent higher prices. Therefore, by focusing on the study findings, chocolate brands with such packaging may attract a higher share of the market in lower income segments. A package design with visible chocolates was found to create the perception of a higher quality product and as a result, attracted segments with higher income. Thus, graphic design can also be used on the chocolate packs as a cue for the price. This would allow marketers to create more tailored marketing campaigns that seek to attract members of their target market based on their graphic design preferences aligned to their income levels.

Findings of this study can provide an opportunity for retailers to differentiate themselves by offering merchandise tailored to their customer base. Notwithstanding the package design modifications based on color and shape, the important issues of product development and differentiation and recognition of distinct market segments have been

stagnated. It seems that entrepreneurs and SMEs can accelerate their growth by packaging development and differentiation through package innovation and modifying their material and graphic design.

As the limitation of this study, it should be mentioned that while merely two important variables in packaging design (material and graphic) have been studied, other variables that may affect product acceptance and consumer willingness could be also investigated. Examples include format, color, shape, price, and brand. Therefore, this study can be extended to analyze new design variables, such as color, format, size of packaging, the quality of materials and information used on the package.

Since young people have more potential to buy chocolate, the research population was limited to this sector. Since the number of Kansei words and suggested designs to be evaluated was very high, the application of the proposed approach might not be simple. A consumer survey can also be performed on the application of other methods such as physiological measures (skin conductance and facial EMG sensors) or an eye-tracking system. Such methods can be used to determine which packaging elements are most effective in attracting consumers while they are buying chocolate. Finally, since few studies have been done on the packaging material and graphic designs, performing studies with the subject of how packaging material and graphic affect the brand identity and personality can add value to the researchers and practitioners in the field of packaging and consumer behavior.

8. Conclusions

In this study, it was found that food packaging could have an emotional impact on consumers. Specifically, using Kansei engineering methodology for evaluating emotional responses to two food packaging elements (i.e., material and graphic design) in chocolate packs, it was found that packaging graphics create emotional responses more than packaging materials. The results also indicated that the design variable which has an impact on the willingness to buy is the graphic design of the packaging. In addition, the packs that were designed in such a way that the product was invisible, were preferred by consumers, while they perceived the price of such packs higher than the other packs. There was also a relationship between the packaging graphics and material and consumer impressions, although the ratio was different for four subscales of sensory expectations, brand attitude, quality and price perception. The remarkable design was making the inside of pack invisible, and the remarkable material was fabric, which should be considered in designing the chocolate packs.

Also, according to the findings, positive attitudes toward product brand could better explain the willingness to buy and therefore were more important than sensory expectations and quality perceptions. This finding suggests that managers should focus on promoting and improving consumers' brand attitude in various ways, including the use of packaging material and graphic design in accordance with the product, to increase the willingness of their consumers to buy products from their organization.

In addition, the results indicated that the emotional impact of packaging elements on male and female consumers was different. In other words, females were more affected by visual packaging elements than males. In fact, the packaging material affected the

attitudes and perceptions of females more than males. This suggests that chocolate packages can be designed and presented in different ways regarding gender differences. This, in turn, suggests that packaging designers can use gendered customization to differentiate product packaging for males and females.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix A. Pack prototypes

Packaging material			Packaging graphic design			
1 metal	2 fabric	3 wood	4 pattern	5 product image	6 emotional attraction	7 inside invisible

Appendix B. Research questionnaire

Age: Male Female

How often do you consume chocolate? Hardly ever Occasionally Nearly every day

You must describe what the image suggests to you, using the adjectives below the image.
The following example will help you:
You must fill in the box which show your reaction to the chocolate pack with regard to the adjectives *beautiful* or the opposite *ugly*:

If you recognize that the pack is *very beautiful*

1	2	3	4	5
ugly				beautiful

If you recognize that the pack is *somewhat beautiful*

1	2	3	4	5
ugly			beautiful	

If you recognize that the pack is *neutral* with regard to the adjectives beautiful and ugly

1	2	3	4	5
ugly		beautiful		

If you recognize that the pack is *somewhat ugly*

1	2	3	4	5
ugly	beautiful			

If you recognize that the pack is *very ugly*

1	2	3	4	5
ugly				beautiful

	Number of pack group	1	2	3	4	5	6	7
Sensory expectations	Beautiful	1 2 3 4 5 ugly beautiful	1 2 3 4 5 ugly beautiful	1 2 3 4 5 ugly beautiful	1 2 3 4 5 ugly beautiful	1 2 3 4 5 ugly beautiful	1 2 3 4 5 ugly beautiful	1 2 3 4 5 ugly beautiful
	Unique	1 2 3 4 5 regular unique	1 2 3 4 5 regular unique	1 2 3 4 5 regular unique	1 2 3 4 5 regular unique	1 2 3 4 5 regular unique	1 2 3 4 5 regular unique	1 2 3 4 5 regular unique
	Eco-friendly	1 2 3 4 5 non-eco-friendly eco-friendly	1 2 3 4 5 non-eco-friendly eco-friendly	1 2 3 4 5 non-eco-friendly eco-friendly	1 2 3 4 5 non-eco-friendly eco-friendly	1 2 3 4 5 non-eco-friendly eco-friendly	1 2 3 4 5 non-eco-friendly eco-friendly	1 2 3 4 5 non-eco-friendly eco-friendly
	Delicate	1 2 3 4 5 rough delicate	1 2 3 4 5 rough delicate	1 2 3 4 5 rough delicate	1 2 3 4 5 rough delicate	1 2 3 4 5 rough delicate	1 2 3 4 5 rough delicate	1 2 3 4 5 rough delicate
	Modern	1 2 3 4 5 old modern	1 2 3 4 5 old modern	1 2 3 4 5 old modern	1 2 3 4 5 old modern	1 2 3 4 5 old modern	1 2 3 4 5 old modern	1 2 3 4 5 old modern
Brand attitude	Luxury	1 2 3 4 5 simple luxury	1 2 3 4 5 simple luxury	1 2 3 4 5 simple luxury	1 2 3 4 5 simple luxury	1 2 3 4 5 simple luxury	1 2 3 4 5 simple luxury	1 2 3 4 5 simple luxury
	Immortal	1 2 3 4 5 mortal immortal	1 2 3 4 5 mortal immortal	1 2 3 4 5 mortal immortal	1 2 3 4 5 mortal immortal	1 2 3 4 5 mortal immortal	1 2 3 4 5 mortal immortal	1 2 3 4 5 mortal immortal
	Reliable	1 2 3 4 5 unreliable reliable	1 2 3 4 5 unreliable reliable	1 2 3 4 5 unreliable reliable	1 2 3 4 5 unreliable reliable	1 2 3 4 5 unreliable reliable	1 2 3 4 5 unreliable reliable	1 2 3 4 5 unreliable reliable
	Original	1 2 3 4 5 fake original	1 2 3 4 5 fake original	1 2 3 4 5 fake original	1 2 3 4 5 fake original	1 2 3 4 5 fake original	1 2 3 4 5 fake original	1 2 3 4 5 fake original
Quality perception	Harmless	1 2 3 4 5 harmful harmless	1 2 3 4 5 harmful harmless	1 2 3 4 5 harmful harmless	1 2 3 4 5 harmful harmless	1 2 3 4 5 harmful harmless	1 2 3 4 5 harmful harmless	1 2 3 4 5 harmful harmless
	Delicious	1 2 3 4 5 nasty delicious	1 2 3 4 5 nasty delicious	1 2 3 4 5 nasty delicious	1 2 3 4 5 nasty delicious	1 2 3 4 5 nasty delicious	1 2 3 4 5 nasty delicious	1 2 3 4 5 nasty delicious
	Fresh	1 2 3 4 5 non-fresh fresh	1 2 3 4 5 non-fresh fresh	1 2 3 4 5 non-fresh fresh	1 2 3 4 5 non-fresh fresh	1 2 3 4 5 non-fresh fresh	1 2 3 4 5 non-fresh fresh	1 2 3 4 5 non-fresh fresh
	Fragrant	1 2 3 4 5 non-fragrant fragrant	1 2 3 4 5 non-fragrant fragrant	1 2 3 4 5 non-fragrant fragrant	1 2 3 4 5 non-fragrant fragrant	1 2 3 4 5 non-fragrant fragrant	1 2 3 4 5 non-fragrant fragrant	1 2 3 4 5 non-fragrant fragrant
Price perception	Cheap	1 2 3 4 5 expensive cheap/economical	1 2 3 4 5 expensive cheap/economical	1 2 3 4 5 expensive cheap/economical	1 2 3 4 5 expensive cheap/economical	1 2 3 4 5 expensive cheap/economical	1 2 3 4 5 expensive cheap/economical	1 2 3 4 5 expensive cheap/economical

Number of pack group	1	2	3	4	5	6	7
Willingness to buy							