INTEGRATION OF PACKAGING DESIGN IN FOOD KANSEI MODEL: CONCEPTUAL MODEL DEVELOPMENT

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Abstract

The success of Kansei/Affective Engineering System in product development, particularly durable goods, has inspired the development of similar methodology, especially for food products which called Food Kansei Engineering or simplified as Food Kansei Model. However, there are opportunities to develop Food Kansei Model as a methodology. This paper proposed a conceptual model development of the Food Kansei Model, particularly for packaging of packed food product group. Food Kansei Model considers packaging only as an extrinsic attribute of a product. Hence, aim of this paper was to develop a conceptual model that considered the packaging as both intrinsic and extrinsic attributes of the packed food products.

The proposed model was developed by reviewing literature and updating the schematic diagram of intrinsic and extrinsic attributes of the current model. Packaging as an intrinsic attribute was defined by structural components of the package (package material, shape and size), which serve to establish product appearance. Graphic elements on the package (colour, picture, symbol, typography) were categorized as extrinsic attribute. Even though they served as extrinsic attributes, these components play the key role as perceptual factors. Verbal elements of the package were product extrinsic components, which presented direct information for consumers. The information on the package, along with the other extrinsic attributes (price, product name, image of the shop where the product is sold, presentation, salesperson’s impression, promotion) served as a cognitive factor of pleasantness. Overall, packaging was an integral part of the product, as emphasized in the total product concept.

Therefore, based on the proposed model, the packaging design which considered intrinsic and extrinsic attributes affect perception that provided more pleasantness to the consumers.

Key words: Kansei, Packaging element, Packaged food, Perception.

1. Introduction

Kansei Engineering System (KES) method which was developed by Mitsuo Nagamachi in the 1970s in Hiroshima University, has contributed to numerous benefits in industries. KES is an effective technique in transforming human Kansei into the elements of product design [1]. Kansei can be interpreted as the consumers’ feeling and desire as a product domain or is often called psychological feeling.

This method has been applied to durable goods. There are several groups in which KES is applied: the automotive industry, electronic equipment, home appliances, architectural field, everyday objects, work equipment and basic research [2]. Also, further development and improvement of the method have been carried out creating various types of KES (KES type I to type V) [1, 3, 4, 5, 6, 7, and 8]. In Fast Moving Consumer Goods (FMCG), the application of KES method has only been limited for the packaging design [9, 10, 11, and 12].

In 1994, Sagara proposed the paradigm and methodology of Kansei Engineering, particularly for food product development [13]. This paradigm and methodolo-
Food Kansei Engineering, which then simplified in a model known as Food Kansei Model [14]. Food Kansei Model has been applied to design and develop various products, including green tea drink [14], flavoured sesame sauce [15], ready-to-serve soup [13], Danish pastry [16], and white bread [17]. Application of Food Kansei Model has succeeded in identifying and ranking the aroma components in a product of fermentation (cheese) [18]. Modification of Food Kansei Model has also been done by integrating personal attributes [19]. In this modification, results of quality assessment from consumer and expert panellists were compared.

Various studies of Food Kansei Model found in the literature are only focusing on intrinsic components or perception routes [13, 14, 15, 16, and 17]. However, studies on combining perception and cognition routes are insufficient. A study by Akiyama [20] concluded that it is possible to combine those two routes. Furthermore, Food Kansei Model has not specifically examined the packaging roles as part of a packed food product. In the group of the packed food product or FMCG, the role of packaging is essential due to the appearance of the product which is defined by its packaging [21]. Based on the aforementioned reasons, this article proposes the development of a conceptual model of Food Kansei Engineering by elaborating elements of packaging design.

2. Food Kansei Model

Food Kansei Model (Figure 1) is a simplification of Food Kansei Engineering, aimed to define the causal relationship between food product characteristics, especially physiochemical characteristics, and perception of product quality [14]. It consists of two components, food and individual. The food is identified by intrinsic and extrinsic attributes. The individual is identified by perception, cognition, and pleasantness.

Food (or product in general) is characterized by intrinsic and extrinsic attributes. Intrinsic attributes are the characteristics attached to the product and become the product property. These attributes are usually related to the physical composition of the product [22], which cannot be experimentally changed or manipulated without changing its physical characteristic [23]. Examples of the intrinsic attribute are appearance, taste, aroma, and texture of the product [13]. Extrinsic attributes are non-physical characteristics of the product that can be changed without changing the basic property of the product [22]. Extrinsic attributes on food are cognitive factors which affect the delicacy of food product [13]. Example of extrinsic attributes are: price, product name, the image of the shop where the product is sold, presentation, salesperson’s impression, promotion, and packaging [23]. These attributes are defined by marketing management policy [20].

Intrinsic and extrinsic attributes are used by consumers to determine the product quality when sensory evaluation on the product cannot be done upon purchasing. Consumers merely guess the quality and performance of the product by using specific information, which is called cue [24] or sign [25]. Cue or sign is a product attribute function which can be used to evaluate the quality of the product [24]. Nowadays consumers deal with various products using limited information. Thus, consumers are not able to perform a proper evaluation of the product. This indicates that the role of intrinsic and extrinsic attributes as cues and signs are critical.

The individual is the second component of Food Kansei Model. Each individual involves perception and cognition in assessing food to reach pleasantness feeling [14]. Perception, which is consumers’ evaluative consideration based on how they interpret the reality, influences the consumer in the product selection process. Consumer perceives the product (including food) based on their individual sensory observation on certain product characteristics [14]. Perception variable

![Food Kansei Model](image-url)
shows the quality perceived from food taste, flavour, and texture, which are sensed by consumers’ tongue, nose and also teeth [15].

Cognition is a process when an input is transformed, subtracted, elaborated, kept, regained and used [26]. Cognition shows a mental image in someone’s thought. This mental image is caused by recognition of extrinsic attributes by senses of sight and hearing [14]. Pleasantness (which indicates feeling) is the value or purpose of the food product for each individual [20]. Pleasantness is defined as something that can be felt by the individual; both emotion and feeling that arose because of perception and is mediated by an appetitive factor (preference and attitude), and cognition [14].

The relation between components in Food Kansei Model is divided into two, an upper route and a lower route. The upper route, often called perception route, describes the relation between intrinsic attributes, perception and pleasantness. The lower route, also called cognition route, describes the relation between extrinsic characteristics of product, cognition and pleasantness [14]. Both routes are independent, yet related to each other.

In the perception route, the relationship between intrinsic attributes and quality perception is called food perception phase, whereas between the quality perception and pleasantness is called food acceptance phase [14]. Product quality perceived by consumers is transformed into pleasantness based on preference factors [15]. Pleasantness through sensory perception, which is determined while swallowing, is considered experienced pleasantness.

Like perception route, extrinsic attributes are transferred to consumers through content, which is explained on the packaging (such as: product name, manufacturer and health benefits), presentation, shopkeeper’s impression, promotion, etc. [20]. Extrinsic attributes of a product are known as imaginary factors that arouse pleasantness. Extrinsic attributes are cognitive factors sensed by the senses of sight and hearing that affect pleasantness. Pleasantness which is produced by image based on extrinsic attributes is known as expected pleasantness, which is expected upon purchasing and consuming [14].

Packaging consists of a visual element and information element [29]. Visual elements consist of structure and graphic elements. Structure elements of the package are design elements in touchable three-dimensional form, such as shape, size and material that is used. Graphic elements are visual design elements of the package, such as colour, picture and typography. Information elements consist of product information and technology image [30]. Product information that is essential to provide is regarding the brand name and product information. Product information is provided on food labelling, which describes the product and its composing component, its benefits/advantages, and how to use it. The package also frequently provides information regarding consumer lifestyle. With the rising awareness of product quality, packaging technology has to be developed to ensure longer shelf life, environmental friendliness and ability to maintain nutrition content and to meet food safety requirement [30].

In marketing literature, the packaging is a part of a product [31] which is used as a part of marketing strategy [27]. The packaging is one of the competitive advantages for marketing [32]. At least there are five functions of packaging that gives added value for consumer, which are: brand identification, promotion media upon purchasing, the container to move the product, product storage at home, and as task assistance (also known as a convenience) [33].

Although the packaging is a part of a product, Olson and Jacoby [34] classified packaging as an extrinsic element of a product. Zeithaml, [35], stated that packaging is a cue or sign that is hard to be classified. Packing can be classified as intrinsic and extrinsic cues, depending on whether the package is a part of product composition or not. If a package is a part of the physical composition of a product, it is included in the group of intrinsic cues, and otherwise, if it functions as a shield or promotion tool, then it is included in the group of extrinsic cues. Numerous researches regarding packaging as the extrinsic signs have been performed by researchers [36, 37].

### 2.2 Responses to packaging

One of the roles of packaging is to communicating information. Packaging provides information regarding the food, convey wordless meaning, and help in decision making during purchasing [38]. As the main media of communication, packaging conveys the whole important information, either directly or indirectly [39], through verbal or visual elements [40]. Direct communication describes the product, its benefits/advantages and how it is used. This shall be conveyed with the verbal element on the package. Indirect communication uses non-verbal elements of the packaging or visual elements, such as: colour, shape, design and texture. In the communication process, the visual/non-verbal
element is admitted to be stronger and more reliable than the verbal element [38]. The non-verbal element is the element of packaging which is able to convey messages without using words. The visual/non-verbal element on a package is related to consumer’s affective response toward the product [30].

Packaging also plays a role as part of the product appearance. Therefore, the visual appearance of the product becomes important. In relation with the role of packaging as the tool to convey a message to consumer, Crilly et al. [41], developed an integrated conceptual framework regarding the product visual appearance, and used the product design as a communication process. If a product is considered as signs and interpreted by consumers, then it is important to consider consumers’ response toward the product appearance as a phase in the communication process (Figure 2).

Product appearance receives various responses from consumers, either psychological or behavioural responses [42]. Consumer’s psychological responses are distinguished into cognitive and affective responses [40, 41]. Those various responses from consumers are essential to be acknowledged and understood to produce products (including packaging) which is acceptable by consumers.

2.3 Packaging and content evaluation

In the group of food packaged product, the packaging is inseparable from the products within. Most of the time consumers use symbolic information as a base to deduce the content. This is based on an assumption that consumer uses symbolic information, which is connoted by various features, such as shape, colour and attractive material, to deduce the content [43]. This also applies although when the attributes of the product being evaluated, often are not correlated with its packaging appearance.

How the consumers use the aforementioned information to deduce the product content is not an intended process. It is more like an implicit process when consumers use the impression from a certain source (for example package shape) to build expectations for other products. This process happens because consumers receive incomplete information about the content/product. This incomplete information can be caused by the limited experience of using/consuming the product, or because the product is new [44].

Numerous researchers have studied how sensory attributes, such as taste, aroma and flavour, are connected with other sensory features, such as shape, name as well as sound. Human intuitively makes the connection of some sensory domains. This is called “Cross-modal Correspondence” [45]. Cross-modal correspondence is related to the tendency to match various attributes and sensory dimensions in various sensory modalities [46]. Several studies regarding the relationship between various sensory features of the package and sensory attributes have been performed [47, 48, 49, and 50]. Those studies describe the sensory attributes on packed-food products and contribute to the studies regarding product communication to strengthen the brand value. Various sensory features on food packaging can convey the cues about product taste/flavour.

2.4 Model development

Based on literature review, Food Kansei Model was developed particularly for packed food or beverage groups. Model development was carried out by further elaborating packaging elements (Figure 3).

The model shown in Figure 3 consists of two components: packed food and individual. The packed food consists of the content of the product and its package. As elaborated in the previous section, the food product in a packed food is identified with several intrinsic attributes (product appearance, taste, aroma, flavour, and texture). These attributes are associated with the physical composition of the product, which builds the product characteristics and becomes the product property. Food also has a physiochemical characteristic, caused by its composing materials, which is generated during preparation or even storage process. The physicochemical characteristics of food are perceptual factors that will shape perceptions in humans or individuals. These physicochemical characteristics create the intrinsic attributes of packaged products, along with the product appearance after being packaged.
Other component of packed food is the packaging. Packaging is an extrinsic component of the product that creates product appearance. The components of packaging are structural components (shape, size and packaging material) which important to create product appearance and to convey the intrinsic message of the product [38]. Structural component is one of the visual components of packaging. Other visual component of packaging is the graphic (such as colour, picture, symbol and typography). Although those components are extrinsic attributes, they can play a role as perception factor. The visual appearance of a package affects the perception on the product quality [38], so that in the model developed, the extrinsic component of the product also affects the perception which is indicated by an arrow that connects the visual element with perception.

Researchers have reviewed studies of various sensory features of packaging related to the perception of the product quality. The studies that have been carried out include: the influence of shape and colour packaging on consumer expectations [47]; packaging forms (round, square), typefaces, names, and sounds (can be combined) to convey information about the taste of the product (sweet, sour) [48]; cross-modal associations of consumers correspond to the colour of packaging against various flavours of potato chips [50].

Verbal/informational element of the packaging is product extrinsic attribute that provides direct information of a product for consumers. The information is about the product composition and their nutrition, the benefits/advantages, and how to use and keep the food. Information on the package functions as cognition factor of pleasantness, which is sensed by sight and hearing. This is along with other extrinsic attributes (price, product name, image of the shop where it is sold, presentation, salesperson’s impression and promotion).

The development of this model is intended to provide an integrated approach framework for product and packaging development. Packaging is an integral part of the product, as emphasized in the total product concept [27]. As an integral part of a product, the design of food product packaging must consider several things, including the type of product to be packaged, the needs of the product distribution, packaging raw materials, consumer needs and desires, markets and marketing, and considerations related to the environment.

Moreover, in packed food products, the packaging is an element that forms the visual appearance of the product. Product appearance plays significant roles, especially in determining consumer’s response and affects the success of the product in the market. Product evaluation by consumer toward product appearance has been studied by researchers [41, 42, 51, and 52], although the research objects are different and more on durable goods. Product appearance helps consumers in judging the product in term of functionality, aesthetic, symbolic and ergonomic [53]. From various literature, the six roles of product appearance are communication of aesthetic, symbolic, functional and ergonomic product information, attention drawing and categorization [51]. The roles of product appearance divide into three parts; visually demanding appearance, comprehension of intended function and communication of use [42]. Another role of concept of product appearance is an aesthetic impression, semantic interpretation and symbolic association [41]. Those differences are made to comprise the concept regarding the type of information communicated by a product. Furthermore, efforts were made to comprehend how the design and visual appearance of a product affect consumer’s response. From various roles of product appearance that have been mentioned above, it is suggested that in food group (and FMCG in general), packaging has to stand out to draw attention and for categorization [51].

![Image of the model](https://example.com/image.png)
3. Conclusions
- In the Food Kansei model, the packaging is food extrinsic attribute which affects cognition. The development of the conceptual model of Food Kansei by elaborating packaging element, particularly in the packaged foods group was discussed.
- This present model provided an integrated framework for product and packaging development. Packaging is an integral part of a product, as emphasized in the total product concept. Therefore, the design of packaging must consider several things relating to the food within, including the type of product to be packaged, the requirements of the product distribution, packaging raw materials, consumer needs and desires, markets and marketing, and considerations related to the environment.
- To facilitate the application of this conceptual model in the real world, it is necessary to further examine the other variables of the model and their measurement methods.

4. References


