

**CUSTOMER CHARACTERISTICS TOWARDS AESTHETIC PRODUCT BASED
ON EMOTIONAL DESIGN APPROACH (WATER DRINKING BOTTLE DESIGN)**

KRISHYA NURAQILAH BINTI AHMAD

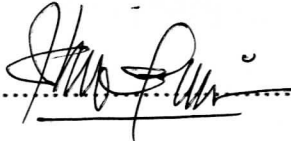
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SUPERVISOR'S APPROVAL

I hereby declared that I have read this thesis and this research is sufficient in term of scope and quality. This project is submitted to Universiti Teknikal Malaysia Melaka (UTeM) as a requirement for completion and fulfillment of Bachelor Degree of Technology Management (Technology Innovation) with Honours (BTMI)

Signature : 

Name of Supervisor : Mr. Hasoloan Haery Ian Pieter

Date : 28th June 2019


Signature : 

Name of Panel : Prof. Madya. Datin. Dr Norizah Mohamad

Date : 28th June 2019

DECLARATION

I hereby, declared this report entitled "*The Customer Characteristics towards Aesthetic Product Based on Emotional Design Approach*" is the result of my own research except as cited in references.

Signature : 
Author's name : KRISHYA NURAQILAH BINTI AHMAD
Date : 28/6/2019

Dedication

This thesis is dedicated to my beloved father and mother, Hj Ahmad Bin Yusof and Hjh Fauziah Binti Hj Mohammad, who are always give support on financial and motivation on each my step on doing this research.

To my supervisor, thank you very much for guide me well and sharing a new information and your knowledge, Mr. Hasoalan Haery Ian Peter.

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ABSTRACT

This project discusses the design features based on customer's emotions by using 'kansei engineering', 'kansei words', and 'face personality approach'. The focus of this project is the customer's characteristics of the aesthetics product based on the emotional design approach. This project is primarily to form aesthetic design of customer priorities through major research distributed to respondents in Melaka. There are 8 designs of drinking water bottles used in the questionnaire to investigate the design options of the drinking water bottle of the word Kansei out of 70 design bottles. 5 kansei which demonstrates customer satisfaction statements that represent customer designs towards 'stylish', 'unique', 'attractive', 'easy to handle', and 'simple' designs. Statistical statistics for social science (SPSS) are used to analyze answers respondents for statistical data in this project, ten designs of drinking water bottles for each category. 8 bottles design were choose out of 70 bottles towards design profile compatibility in terms of using 'emotional' and 'customer preferences'. For Kansei options, the average higher than the Kansei words is determined by using 'export choice'. The ' Cormfortable and Safety' word has a high average value. Meanwhile for Physiognomic characteristics shows product 4,5,6,7,8 have correlation towards eye lateral (width).

Keywords: Kansei Engineering, SPSS, Customer Satisfactions

ABSTRAK

Projek ini membincangkan ciri reka bentuk berdasarkan emosi pelanggan dengan menggunakan 'kansei engineering', 'kansei words', dan 'pendekatan personaliti wajah'. Tumpuan projek ini adalah ciri pelanggan produk estetika berdasarkan pendekatan reka bentuk emosi. Projek ini adalah terutamanya untuk membentuk reka bentuk estetik keutamaan pelanggan melalui penyelidikan utama yang diedarkan kepada responden di Melaka. Terdapat 8 reka bentuk botol air minuman yang digunakan dalam soal selidik untuk menyiasat pilihan reka bentuk botol air minum perkataan Kansei daripada 70 botol reka bentuk. 5 kansei yang menunjukkan kenyataan kepuasan pelanggan yang mewakili rekaan pelanggan ke arah 'bergaya', 'unik', 'menarik', 'mudah mengendalikan', dan reka bentuk 'mudah'. Statistik statistik untuk sains sosial (SPSS) digunakan untuk menganalisis responden responden untuk data statistik dalam projek ini, sepuluh rekabentuk botol air minuman untuk setiap kategori. Reka bentuk 8 botol dipilih daripada 70 botol ke arah keserasian profil reka bentuk dari segi menggunakan 'emosi' dan 'pilihan pelanggan'. Untuk pilihan Kansei, purata lebih tinggi daripada perkataan Kansei ditentukan dengan menggunakan 'pilihan eksport'. Kata 'Comfortable and Safety' mempunyai nilai purata yang tinggi. Sementara itu untuk ciri-ciri Physiognomic menunjukkan produk 4,5,6,7,8 mempunyai korelasi ke arah mata lateral (lebar).

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LIST OF ABBREVIATION

PSM 1	–	Projek Sarjana Muda 1
PSM 2	–	Projek Sarjana Muda 2
KE	–	Kansei Engineering
SPSS	–	Statistical Package for the Social Science
VOC	–	Voice of Customer
fMRI	–	Functional Magnetic Resonance
CARs	–	Consumer's Affective Responses
KES	–	Kansei Engineering System
PFFs	–	Product Form Feature
AESTHEMOS	–	Aesthetic Emotions Scale
SCP	–	Systematic Creativity Process
TRIZ	–	Teoriya Resheniya Izobreatatelskikh Zadatch
CAD	–	Computer-Aided Design
CAGD	–	Laptop-Aided Geometric Design
FACS	–	Face Coding System
MMFs	–	Multi- Dimensional Features
SVR	–	Support Vector Regression
OEM	–	Original Equipment Manufacturer
ODM	–	Original Design Manufacture

CHAPTER 1

INTRODUCTION

1.1 Project Background

Nowadays, most of the company carry out researches on how to fulfil their customer needs and wants towards the products, Cross (2000). Based on the customer needs towards the product, the company were required to provide a product that meet their customer to survive in the market competition. In this sense, Katicic *et al.*,(2011: 2) argued the customer satisfaction is the parameter to influence on the product success in market. This paradigm shifted the results to new challenges in modern marketing to be successfully affected the considered strategies (Reimann *et al.*, 2010: 1). Specifically, to the customer attractiveness on the product is as one of the factor that influence the company to find the different ways to make their product satisfy the customers (Pulles *et al.*, 2015:1). Based on key- parameters defined by Desmet (2003:1), there is an emotion to a product as an explanation about the complex of personal nature towards the product design.

Reimann *et al.*, (2010) in their study, as an example, found that consumers' choice responses were significantly having correlation to the aesthetic packages based on their measurement using functional magnetic resonance imaging (fMRI). Whiles, to emotion-inducing marketing in the form of advertisements, product packaging, positioning, events, *etc.*, Achar *et al.*, (2016:167) stated the emotional appeals that influence subsequent decision-making through modifying one's concept of self-relative to others. In this context, Levitt (1981) also emphasized intangibles

and tangibles to replace the terms of services and goods. This meant that attractiveness on the product would influence the customer to purchase the product. According to Pulles *et al.*, (2015:4), attractiveness is to develop not only in the initial development of a relationship, but also a relationship to have a long-term orientation towards buying firm attractiveness. Based on this reason, according to Lindley *et al.*, (2018:1), in the modern world the company are therefore necessary to provide the attractive attribute in the product, such as their features and product design. By understanding the emotional responses towards the products, Coelho (2002: 3) stated there is a necessary of theoretical propositions on how the emotional responses related and linked to the product's appearance and the characteristics of the person who experiences on emotions. In this sense, to characterize one's emotional state with specificity, Desmet (2012:12) suggested about the using of discrete emotion labels to refer the global feeling states. According to Fokkinga and Desmet (2012), for an example, negative usage expression give contribution and have meaningful experiences as illustration to design for negative emotions. Although the aesthetics in product may contrast based on the insight of the consumption domain, aesthetic designs have to cause a response towards consumers such as an immediate desire to own the product (Norman, 2004); pay off advanced willingness (Bloch *et al.*, 2003); and an arise the inclination to show off and care for that product (Bloch, 1995).

An instance, Burmester *et al.*, (1999) have studied the influence of visual aesthetic design on users' quality perceptions by using a traditional ways of a user interface to find the related aspect that convey impression, apparent usability, and dominance. The study based on the emotion refers to visual aspects of products have frequently been stated as most relevant for users' aesthetic response (Bloch, 1995). Hassenzahl (2006) differentiated the emotions as consequences of product use and affective reactions. Whiles, Zajonc (1980) and Schwarz and Clore (1983) discussed towards the affective reactions that can influence the cognitive processing of information about the interactive product. The affective reactions may in particular play a role in the perception of aesthetic components since aesthetic appreciation is often described partly affective process (Hassenzahl, 2007). According to the Chuang *et al.*, (2001), the visual image of design play the important role on the user towards the product.

Previous research by Yang (2011:1), as an example, has found that packaging is the essential and significant factor, which largely persuades the consumer buying behavior. The packaging that are colorful could attract the customer and impress them to purchase the product. Here, by employing the model of consumer's affective responses (CARs), they stated that the attractive design can make a product become unique and this is a way of the product look like is more important for the consumer to make purchasing decision. Moreover, towards Consumer's Affective Responses (CARs) in terms of basic expectation of Kansei Engineering System (KES) against a cause and-effect link the product form features (PFFs) , Han and Hong (2003) found that three component in this issue such as Kansei analysis, Kansei inference, and Kansei presentation. In this context, through the Kansei Engineering, Zhai *et al.*, (2009:1) stated a customer-oriented methodology for product development need the analysis of general style information inherited with the nonlinearity and uncertainty. Since Kansei Engineering is primarily a catalyst for the systematic development of new and innovative solutions, Nagamachi (2004:1) stated that this is also a tool for improving existing products and concepts. According to Shimizu *et al.*, (2004) this is why factory-made merchandise should be convertible to fulfill the individual demands in the term of the product practically, product type, design style others alternative aspects.

Moreover, since the expression on the feeling are the core factor to determine whether the customer purchased the product or not, Linkoping (2005) stated that the increasing of new consumer demands related to the improved on psychological feature and education for extremely advanced product components. The customer's expression on the product design that are important factor towards the purchasing decisions based on emotional expression, Huang *et al.*, (2012:2) stated a product evaluation are therefore requires a typical Kansei Engineering approach to gathers as many Kansei adjectives as the representation of emotional expression from customers as possible. This is also to the selection of the antonym scales (Kansei adjectives) is as most importance for the success of the Kansei engineering projects (KE) towards a significant interest to product design based on this methodology (Nagamachi, 1995, 1997; Schutte & Eklund, 2005).

Furthermore, Kaulio (1998) stated that establishing early communication with consumers is important during product development and this lead the design

exercises from “conception for” to “design by” consumers. Here, Hubka and Eder’s (1996) presented an outline of the design knowledge thoroughness of engineering design knowledge. They used the term of engineering design in the context of product evolution and design based on technical systems (engineering products, systems, objects or artefacts). An instance, Jordan (2000) outlined a unifying thread that passes through the ergonomic contributions for product development towards the experience of product development and design for pleasure. Here, he argued that the traditional ergonomics have widely used in the same standard, but do not apply on the pleasure, comfort or cognitive engineering. The comfort, according to Slater (1985), is as a pleasant state of physiological, physical and psychological harmony with the surroundings.

In conclusion, early work in the area of satisfaction suggested that it was a result of a comparison between a consumer’s expectations of the service/product and the actual experience (Oliver, 1980). The product taste is the human capacity to make distinctions between physical objects and to favors some of them (Kalvainen, 2002: 1). She stated that people with high optimum stimulation levels or high sensory innovativeness might prefer novel, irregular, or unconventional and sensuous designs that offer greater arousal. However, the way that consumers look at product image is usually different from the way that designers look at product elements or characteristics (Hsu *et al.*, 2000). To be best meet consumers’ need of a product from a design perspective, Aitken et al., (2003) said that the physical elements of the product require linked to consumers’ perception of the product. Through implementation the Kansei Engineering on the design of product, the designers can categorized the design according the type of user perceptions. Nagamachi, (1995) said that Kansei Engineering is a process of linking the users’ feeling (Kansei) of a product. . To understanding the customer satisfaction and need, therefore requires a creation of a value on the product systematically. Walters and Lancaster (1999) stated the value customized by any product or service components that motivates the customer to purchase a product for achieving goals. Here, the subjective perceptions of customer associated establish the relationship with the product’s style (Yang, 2011:12).

1.2 Problem Statements

Nagamachi (2008:290) classified two approach in product development, that is product- out and market-in philosophy. Based on this philosophy, he argued that the consumers' needs and wants are necessary to transfer to the product function and design. However, according to Helander *et al.*, (2013:117), the probability of the developed products successful in the market based on the improvement to the responding to customers' needs is not enough. Here, White and Yu (2005:114) criticize how treat the satisfaction is as a simple one-dimensional form. They argued that the satisfaction should be at a deeper level, multi-dimensional, and incorporated cognitive elements related to beliefs and expectations of a product/service. For an example, Kälviäinen (2002:77) discussed about the product taste is as the human capacity to make distinctions between physical objects and to favour some of them. Whiles, Reimann *et al.*, (2010: 434) discussed about one's emotional self-touch to a product that may automatically elicit an affective response as to explain emotions, moods, and feelings evoked by a product. Briefly, since emotional needs increased as the basic prerequisite which naturally calls for defining a new emotional marketing concept, Khuong and Tram (2015:525) said that emotions are as a distinctive element that must be added to enhance the basis supply of product/service, especially they are designed and managed with rigor and ethical spirit.

First, this is due to emotional is one of the factor that can be figure out the consumer when to make preferences on the design of product. Emotional can influence the customer to purchase the product. In his thesis, Coelho (2002:3) stated the difficulties to exemplify the nature of emotion towards the customer. To interpret the emotion, they need to use a tools or software to read their expression of emotion. Nevertheless, the emotion can evoked in the different ways. Myszkowski and Storme (2012:641) in this context stated that aesthetic emotions are the product of the appealingness of the product to an individual, which is produced by the interaction between both the characteristics of the stimulus (the product) and the individual's dispositional likings. With the different opinion on his study, Scharleman (2001: 3) in this context argued about the facial expression to provide information about formulating the trust and subsequent. Whiles, Hekkert (2002) established a basic '*product emotion model*,' to represents the process. Based on theories of emotion, Desment (2003:3) said that although emotions are idiosyncratic, the conditions that

underlie and elicit them are, however, universal. Second, consumers' constructions of meaning in product used, according to Kälviäinen (2002:80), rely on their capacity for symbolic thought and coding, which, in turn, is determined by the individual's cultural capital. Ayas (2011:1) said that affective responses for products generated by attributions, derived from product attribute satisfaction which, in turn, influence global satisfaction judgments where the meanings of products for users lie in understanding affective (feelings and emotion) needs and wants. In this sense, Levitt (1981) clearly emphasized that people use appearances to make judgments about realities is as a common sense and always depends to some extent on both appearances and external impressions. Third, Takeuchi and Quelch (1983) stated that consumers cannot always articulate their quality requirements, and even they often speak in generalities.

The fact, according to Fanghanel (2005:2), the great individuality of the face to represent emotion makes classifications more difficult. According to Po'ch, (1916), there were ten basic facial types such as elliptical, oval, inverted oval, round, rectangular, quadratic, rhombic, trapezoidal, inverted trapezoidal, and pentagonal. The important side are their hairline, shape of forehead area of the eyes as well as the region of nose, mouth and chin (Fanghanel, 2005:2). Through the face, unit of expression can be definitive. The emotion will include the joy, anger, fear, sad, disappointed, etc. In this context, there were physiognomic functions based on the flexibility of the facial skin, especially on the movement of the muscles by forming furrows, lines or dimples. Each of the face will show the features through their emotion. Emotion are embedded in the market stimuli can influence the decision making to purchase product on user. Emotion can skewing the consumer thinking towards the appraisal associated. Furthermore, emotion are closely with psychological on the human.

Based on her study, Picard (1997), as an example, defends for her influential work on affective computing towards computerized systems to perform better of emotional competencies. Dunne (1999) suggested that the designers must begin to think out of the box and in critical ways about the aesthetic role of their products in everyday life. Towards the high tech products, Demirbilek and Sener (2003: 10-11) in the context of robot-like products, suggested that a balanced combination of all the attributes should involve the emotional needs as the source of influence, *i.e.* the

attributes of 'cuteness' evoke 'happiness' and sense of protection. First, based on the Aristotelian conception of technology, Heidegger (1927) argued with the analysis of the world that can be further explored with human experience and understanding. Since the product have the important image for user as their preferences (Chuang *et al.*, 2001) and the image can be as the representation of perception towards the components of product (Nagamachi, 1995:3), there is the challenges to distinguish the basis of new function to most products (Overbeeke & Hekkert, 1999). This is due to, they said that an emotion can be negative and positive related to a level of technical perfection.

However, the excessive emphasis on aesthetics according to Papanek (1997) disregards human psychic needs at the expense of clarity. Therefore, core of the design thinking remains the ability to conceive, plan and present ideas about products. Schindler *et al.*, (2017) proposed the Aesthetic Emotions Scale (AESTHEMOS) since Aesthetic perception and judgement are not merely cognitive processes, but also involve feelings. Here, Helander *et al.*, (2013:455&456) stated the expanding the semantic approach to design by utilising affective design parameters, where the emotional and cognitive components for decision making are driven synergistically by separate brain mechanisms. Also, according to Rosett *et al.*, (1968:707), an additional cognitive control principle required towards an emotional or expressive quality (physiognomic perception).

Based on aforementioned problem, this study will carried out the survey using questionnaire generated refers to Kansei Engineering and distributed to the customer, where the customer characteristics is investigated and observed based on individual uniqueness using Physiognomic and the Personality Test. The statistical tools will be used to analysis the data, while the software such as surface and physiognomic intelligent or FBI face will used to identify the facial expressions and the attribute will screening out the correlation between the product design towards the feeling against the individual characteristics.

1.3 Objectives

Customers play important roles to determine the product whether it can be successful to penetrate the marketplace or not. Towards the water bottle drinking design, there are characteristics that can be found through the customer need and wants through the research. Furthermore, to produce a good design of product which can attract the customers feeling, this study will be employ the Kansei Engineering and Physiognomic and personality in order to investigate and evaluate the customer characteristics and preferences towards the water bottle drinking design.

The objectives of this research are as follows:

1. To identify the customer characteristics and aesthetic preferences towards the design product using Kansei Engineering and personality.
2. To analyse the customer characteristics and aesthetic preferences towards the design product based on Physiognomic.
3. To evaluate and validate the customer characteristics and aesthetic preferences towards the design product based on Kansei Engineering and Physiognomic.

1.4 Scope of Study

The approach used in this project is to identify and examine the customer satisfaction towards customer preferences that are focused on the product of drinking water bottle design. The types of drinking water bottle design are list according to 5 types of design such as stylish, easy to use, attractive, unique and simple. Specifically, the design of water bottle has been launched and manufactured since 2008 to 2018.

Moreover, the statistical approach is required by analysing and identify the data collected through the survey by providing questionnaires. The questionnaires developed is through preliminary stage in order to get the collecting data information from the customer and consumers. In the step developing the questionnaires, the physiognomic face towards the respondents are being used towards the word of

Kansei Engineering on the expression of the feeling or emotion are employed effectively towards the identification of product design on Kansei Engineering.

Besides, the statistical approach, this project will interpret and analyse using SPSS Excel in order to examine and identify the inter-relation towards the design of products. SPSS Excel will help to explain the data collected from the survey through quantitative questionnaires. (The design of product versus physiognomic).

The questionnaires will be distributed among the drinking bottle user in the Melaka area towards the consumer of people who are used drinking bottle. It will cover the demographic scale include their gender, age, etc. and their characteristics and style design on the product towards the item such as flip cap, body bottle design and colours. There also will provided the consumer profile and preferences on the products which show the word that express towards their feeling and emotion will be collected and manipulated in the data by using the SPSS software and digital physiognomic to analyse.

1.5 Framework of Study

Figure 1.1 show the products classification, while Figure 1.2 show the research framework study It will consists of three phases in this project which is collection phase, analysing and evaluate phase and validation of result based on the purpose phase. Each stage will explain more detail towards the research study.

1.6 Summary

In conclusion, the product design can be a factor that influenced the customer satisfaction. All the manufacturer will make an analysis towards the product design to make sure it can fulfil the customer needs and wants according to their personalities and data collected in the survey. In this research, the product design will used Kansei Engineering to determine the affective attribute towards the

characteristics of the product. Lastly, it will be analyse the customer preferences by using physiognomic and SPSS analysis.



Simple design



Uniqe design



Attractive design



Stylish design



Easy to use design

Figure 1.1 The Water Drinking Bottle Design