CUSTOMER SATISFACTION AND PREFERENCES BASED ON QUALITY OF PRODUCT USING ANALYTICAL HIERARCHY PROCESS (AHP)

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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 fulfilment of Bachelor Degree of Technology Management (Innovation Technology) with Honours (BTMI)

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I hereby, declared this report entitled "Customer Satisfaction and Preferences Based on Quality of Product Using Analytical Hierarchy Process (AHP)" is the results of my own research except as cited in references.

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DEDICATION

For my beloved parents who were always supported me,

Su Azmi bin Daud

Nor Aziah binti Mamat

For my supporting supervisor,

Mr. Hasoloan Haery Ian Pieter

For my special partner (Muhamad Hafizan bin Hanafi), families and friends, thank you for your love and care.

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ABSTRACT

Customer's satisfaction and their preferences against the products always refer to design. The main purpose of this study to investigate the customer satisfactions and preferences based on design of product using the analytical hierarchy process (AHP) method, Kansei Engineering and the Eysenck Theory. The study utilized sixty-five (65) PC Mouse Design that are available in the market as the product case study for the study to make decision on the purchasing preferences reasons. A questionnaire was developed using customer preferences, product attributes, Kansei words toward the PC Mouse Design and customer characteristic (Eysenck Short Scale EPQ-R Test) as the variables. A preliminary study is conducted using pilot study to get opinions from experts (7 lecturers) and feedback from respondents. The final questionnaire is then distributed to 280 respondents who are students from Universiti Teknikal Malaysia Melaka (UTeM). The results from the survey showed that most of the respondent chosen Design-4 based on its Kansei word "Nice". It has also been confirmed that respondents chose Design 4- with the Kansei word 'Nice" using expert Choices software for the analytical hierarchy process (AHP). It Is also found that he highest result for Eysenck personality test is extraversion people.

Keyword: *Customer Satisfaction, Analytical Hierarchy Process, Kansei Engineering, Eysenck Theory*

ABSTRAK

Kepuasan pelanggan dan keutamaan mereka terhadap produk sentiasa merujuk kepada reka bentuk. Tujuan utama kajian ini untuk mengkaji kepuasan pelanggan dan keutamaan berdasarkan reka bentuk produk menggunakan kaedah proses hierarki analitik (AHP), *Kansei Engineering* dan *Eysenck Theory*. Kajian ini menggunakan enam puluh lime (65) reka bentuk tetikus komputer yang boleh didapati di pasaran sebagai kajian kes produk kajian untuk membuat keputusan atas sebab-sebab keutamaan pembelian. Soal selidik telah dibangunkan menggunakan keutamaan pelanggan, atribut produk, kata Kansei terhadap reka bentuk tetikus komputer dan ciri pelanggan (*Eysenck Short Scale EPQ-R Test*) sebagai pembolehubah. Kajian awal dijalankan menggunakan kajian perintis untuk mendapatkan pendapat daripada pakar (7 pensyarah) dan maklumbalas daripada responden. Soal selidik akhir diedarkan kepada 280 orang pelajar yang berasal dari Universiti Teknikal Malaysia Melaka (UTeM). Keputusan dari tinjauan menunjukkan bahawa kebanyakan responden memilih *Design-4* berdasarkan perkataan *Kanseinya* "*Nice*". Ia juga telah mengesahkan bahawa responden memilih *Design-4* dengan perkataan Kansei '*Nice*' menggunakan perisian Pakar Pilihan untuk proses hierarki analisis (AHP). Ia juga mendapati bahawa dia hasil tertinggi untuk ujian keperibadian *Eysenck* adalah orang-orang yang aktif dan .

Kata Kunci: *Kepuasan Pelanggan, Proses Hierarki Analisis, Kansei Engineering, Eysenck Theory*

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LIST ABBREVIATIONS, SYMBOLS AND NOMENCLATURES

AHP	-	Analytic Hierarchy Process
AV	-	Availability
BR	-	Durability
CAD	-	Computer-aided design
CAGD	-	Laptop-aided geometric design
CH	-	Cheap/Expensive
CI	-	Consistency Index
CO	-	Colour
CR	-	Contingency Ratio
CT	-	Connection Types (Cable of Infrared)
DE	-	Design/shape of product
DE	-	Design
DI	-	Dimension
DIS	-	Discount/Sale
DU	-	Brand
EEG	-	Electroencephalography
EM	-	Easy to move
EMG	-	Electromyography
EPQ	-	Eysenck's personality questionnaires
ERP	-	Event-related potential
EU	-	Easy to use
FACS	-	The Facial movement Coding device
FC	-	Favourite colour
FMRI	-	Functional magnetic resonance imaging
GI	-	As for gift
KE	-	Kansei Engineering
KES	-	Kansei Engineering System
KW	-	Kansei Words
LI	-	Limited stock
LTM	-	Long-term memory

MA	-	Material
NE	-	New product
PR	-	Price
QTY	-	Quantity
RE	-	Recycability
RI	-	Ratio Index
SCP	-	Systematic Creativity Process
SI	-	Size
SPSS	-	Statistical Package for the Social Sciences
TR	-	Trendy
TRIZ	-	Teoriya Resheniya Izobreatatelskikh Zadatch
UN	-	Uniqueness
WM	-	Working memory

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Nowadays, the term of customer satisfaction always be used in the field of marketing. According to Shen *et al*., (2000:92), customer satisfaction is an important goal for repeatable success. In the context of marketing, according to Churchill and Surprenant, (1982), customer satisfaction is the most important result of marketing practice and occupies a significant position in both observation and theory. They added that customer satisfaction is a good or bad feeling of someone after comparing the product presentation to the expectation. In this perspective, Dapkevičius and Melnikas (2009:17) emphasized the purchase is a significant factor that leads business to success based on customers' satisfaction. The facts, Huynh *et al*., (2010:575) added that nowadays customers are, howver, more demanding not only to quality, but also to their satisfaction in terms of psychological feelings about products purchased. To map the product design elements towards human affections, Ko *et al*., (2010) stated about the key issues in affective design is as the acquisition of Kansei knowledge.

Based on a basic assumption to the consumer's needs, Lee et al., (2001) said that by customer satisfaction understanding produced several important insights formation. Ilieska (2013:327) stated that is a suitable strategy required in the development of products that leads to the consumer's satisfaction. To make a well-designed product that appeals to consumers, Zhai et al., (2009) said that the product should not therefore only meet the physical requirements of consumers, but also has to satisfy their affective (psychological) needs. Jakpar and Goh (2012) described the

customer satisfaction based on product quality features into 8 dimensions namely, performance, features, conformance, reliability, durability, serviceability, aesthetics, and customer-perceived quality. Hence, a good design based on consumers' tastes, according to Chen and Chang (2006:2007) should be able communicated via product's form elements. Here, Grunert *et al*., (2004:264) said that quality is not an aim in itself, but is desired because it helps to satisfy purchase motives or values. Here, Khuong and Tram (2015:524) defined a new emotional marketing concept based on significance of emotional needs in the consumption environment as the basic prerequisite and a comprehensive experience to the consequent means of behavioral responses, significant results, physiological reactions, and subjective feelings.

In addition, customers is usually name many factors as needs (Kotri 2006:7). To understand them, the concept of creating value to the customer need to be systematically created through an understanding of what factors and values that would react the customers feeling. Here, the importance of establishing early communication with consumers, according to Kaulio (1998), therefore leads the design practices from "design for" to "design by" consumers. The reason to this argument is due to 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). In addition, according to Takeuchi and Quelch (1983), the consumers cannot always articulate their quality requirements. Even though, according to Desmet (2003:2), the designers can influence the emotions elicited by their designs because these emotions are not as intangible as they seem. In this senses, Andreassen and Lindestad (1997:10) suggested that positive and negative disconfirmations should weigh very differently on satisfaction. Between the expectations of the customer and the perceived quality level of products, Krafft (1999) defined the customer satisfaction is as a positive emotional reaction on a cognitive standard cycle. This meant, the integration of affective values in product design requires suitable methods that can capture and convert subjective feelings about a product into concrete design parameters (Schütte, 2005).

In conclusion, since people are concerned with how they think "they are perceived" by their product choices (Kälviäinen 2002:81), the treating of customer satisfaction should be constructed in multi-dimensional that incorporates cognitive

elements to expectations of a product and affective elements included emotions (White & Yu, 2005:411). This is due to usability and functionality are not sufficient to convey pleasure and 'happiness' to users, although there is undeniably very important attributes of products (Demirbilek & Sener, 2003:6). In addition, Levitt (1981) said that people use appearances to make judgments about realities. Based on this reason, Helander *et al*., (2013:456) in their study discussed about the emotional and cognitive components of decision making that are driven synergistically by separate brain mechanisms. Here, Hosoya *et al*., (2017:3) said that the aesthetic evaluation of stimuli both informs and results from the experience and regulation of aesthetic emotions. Since the quality is as the result of a subjective process (Suchánek *et al*., 2017:20) and as value blends excellence and worth (Kahn *et al*., 2002:185), there were the customer's expectations (compares their ideas to the reality) towards the concept of affordable excellence need to be constructed into emotional design towards customer satisfaction whereby a multi-criteria decision-making problem can be used to measure their preferences. In this sense, according to Achar et al., (2016:166) emotions are multidimensional feelings that reflect the information about consumers' relationship to their social and physical surroundings as well as their interpretations regarding these relationships.

1.2 Problem Statements

Today's business world is very competitive market. Kotri (2006:5) said that a successful product on the market will soon or after will be followed by the competitors. He added that competitive environment is also on how to satisfy their customers. Schütte (2002) said that customers will decide by highly subjective criteria which product to purchase. To understand how customers perceive quality, Takeuchi and Quelch (1983) said there were various factors influenced to consumers' perceptions of product quality.

In this context, to understand feelings (affective needs) of product quality, Nagamachi (2001) proposed Kansei Engineering refers to a Japanese word for an

individual's subjective impression from a certain artefact, environment, or situation using all the senses of sight, hearing, feeling, smell, taste as well as recognition. Ayas (2011) said that Kansei is a subjective effect, which cannot be merely described by words alone due to is as a cognitive concept related to the influences of a person's knowledge, experience and character. Sakurai et al., (2011) stated that kansei word (a sensitivity word) is as representation of a degree of feeling or impression. Matsubara and Nagamachi (1997) stated that Kansei Engineering is a method to convert customers' ambiguous images of a product into detailed design refers to consumers' feelings and images towards a physical design elements of product. However, according to Schutte (2002:2), the expression Kansei is difficult to translate, especially due to customers cannot always express their impressions about a certain artefact verbally in a proper way.

To address this issue, Liang et al., (2010:10) asserted about the cognitive psychology as for a scientific analysis of humans mental processes and structure for understanding humans behavior. Kim et al., (2009) related to the categorization process of cognitive operations suggested memory retrieval, association and transformation during sketching which is linked to working memory (WM) and long-term memory (LTM). Based on this reason, Lin et al., (2012) proposed a multidimensional variable KE (Kansei Engineering) to promote the affection-predicting capability of KE model to ensure more practical design rules. This is to address the subjective emotional relationships between consumers and products and to explore the affective properties that is communicated through their physical attributes (Carliner 2000). However, to capture and understand the customers' and users' affective needs, there is the importance of human factors towards the products values based on people's subjective responses to products (Ayas, 2011:48-49). Here, the measuring and identifying the properties of the product eliciting those responses. There is the dynamically changing feature of criterion deviation subjective to various searchers since the dynamic change of user's preference cannot be accomplished by using questionnaires (Sakurai et al., 2011).

In addition, there is high level descriptors as semantic adjectives (Kim et al., 2009) where cognition style related to the terms of 'visual form' limit to the qualities of an object that can be seen (Chen & Chang, 2006:208). Since product designs moved from the production-oriented approach in the past to a marketing-

oriented approach, and finally to a customer-oriented approach (Hsiao et al., 2010), there were the experience model of user and affection elements related to the function relation expression between independent variable and dependent variable need to quantified in multi-attributes. Here, a quantitative technique structured in a multi-attribute, multi-person and multi-period problem hierarchically to represent the elements of any problem hierarchically for a solution made (Saaty, 2000). This method is for formulating and analysing the decisions making based on Analytic Hierarchy Process (AHP) where there are a limited numbers of choices but each has a number of attributes (Eroglu, 2013). According to Syaifoelida et al., (2013:270) AHP uses s hierarchical model consisting of objectives, criteria (and some sub criteria) and alternatives for each issue or decision. This method, according to Nabavi et al., (2012:236), based on paired comparison to allows the evaluation and comparison based on various scenarios. Also, according to Oyatoye et al., (2018:277), to incorporate both objectives and subjective considerations in the decision making process. However, the approach using semantic (which is in nature is qualitative), while AHP is a quantitative technique, there are the model to measure the customer satisfaction and preferences based on quality of products design required.

Based on aforementioned, this study will carry out the investigation about the customer satisfaction and their preferences against the products refers to design. By using Kansei Engineering approach to articulate the design of products based on aesthetic values, this study will analyse also the customer characteristics based on their preferences. In this study, Esyenck' personality test will be utilized to figure out the individual preferences to the emotional design, while to calculate the preferences are based on objectives, criteria (and some sub criteria) and alternatives based on a multi criteria decision-making technique (AHP) that combines the quantitative and qualitative factors to sort the priorities, status, and evaluation of alternatives. In this study, the statistical software SPSS v.15 will be used for analysis, while Expert Choices to figure out the preferences based on AHP technique.

1.3 Objectives

There are three objective in this research study in order to gain more on understanding based on the problem statement and research question which is :

1. To investigate and identify quality of product based on the customer satisfaction using Kansei Engineering related to quality affective (emotional feelings).
2. To analyse and justify the quality of product by using AHP (Analytical Hierarchy Process).
3. To evaluate the customer satisfaction preferences toward quality of product.
4. To validate the analytical hierarchy process with customer satisfaction towards quality of product

1.4 Scope of the project

This study only focuses on a quantitative approach. The scopes for this study focus on the customer satisfaction that preference based on quality of product. This study will be carried out around Melaka. So, to identify, investigate and analyse the customer satisfaction that are preferences toward quality of product, the questionnaires for survey are made based on Kansei Engineering and after that will use Analytical Hierarchy Process (AHP). This study only focused on the product of Mouse and the survey will be carry out on certain are in Melaka.

1.5 Framework of Study

The framework of study is the fourth phase of this project which includes the collection phase, the analysis phase, the evaluation and the validation of the outcome phase. This framework for this study is shown in figure 1.1.

1.6 Summary

This chapter is about the study background and objective of the study. After that, the problem statement and scope of the study have been stated in order to limit the study that has been conduct. The following chapters consist of topic literature review and knowledge that required in conducting the study. This study is about customer satisfactions are preferences toward quality of product. So, this study will use AHP method and the Kansei will be concern in this study.

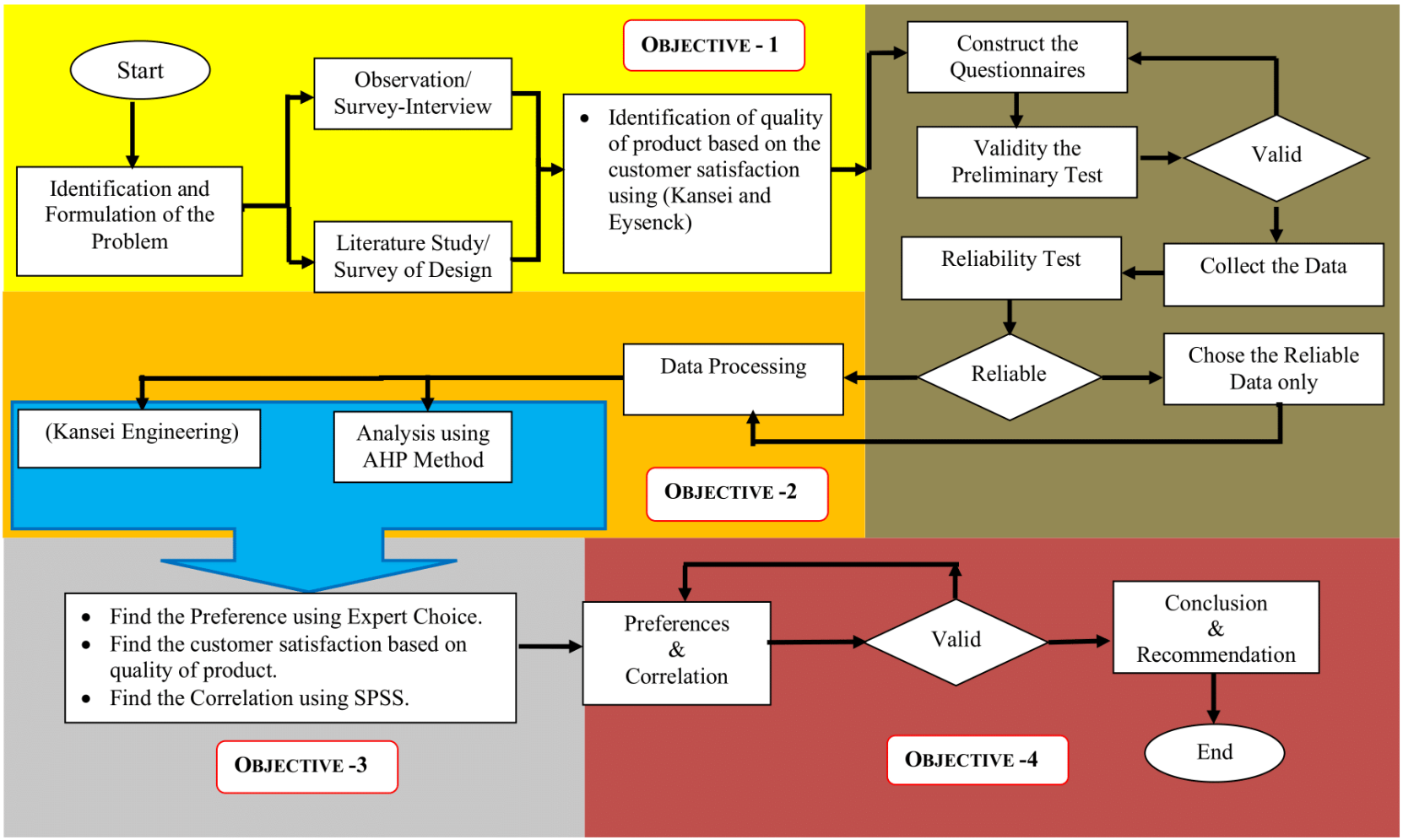

Figure 1.1: Framework of Objective

CHAPTER 2

LITERATURE REVIEW

2.1 Customer Satisfaction

According to the Hallowell (1996), Oliver (1997), Zeithamal and Bitner (2000) the customer satisfaction can be defined as a consumer reaction that carrying out their expectations and needs towards the product or services that have been delivered by the business or company. The customer satisfaction is an emotional state that arise after a customer having tried the product that delivered to them (Vavra, 2002). Kotler (1994) also defined the customer satisfaction as a result of the perception of service performance and production of the good in relation to the customers' expectations. At 1997, Serry have argued that the expectations can be considered as "sustained probability of the individual that a special reinforcement will occur as a function of a given behavior on a part in a particular situation". More than that, the customer satisfaction level depends on the extent to which the attributes of a product meet the needs and expectations as well as the overall product performance (Pires & Santos, 1999). Briefly from Gerson (1993) says that customer satisfaction is "when a product or service meets and exceeds customer expectation".

2.1.1 The Importance of Customer Satisfaction

The products can meet the needs of consumers by expressing themselves in formal styles. A good design is therefore meant to communicate the tastes of consumers