

QUALITY DESIGN BASED ON FUNCTIONAL AND DYSFUNCTIONAL TOWARDS  
PRODUCT ATTRIBUTES OF THE COMPUTER MOUSE

MUHAMAD HAFIZAN BIN HANAFI

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## APPROVAL

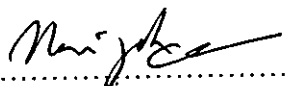
I hereby declared that I have read this thesis and this research is sufficient in term of scope and quality. This project is submitted to Universiti Teknikal Malaysia Melaka (UTeM) as a requirement for completion and fulfillment of Bachelor Degree of Technology Management (Innovation Technology) with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

**HASOLOAN HAERY I.P**  
PENSYARAH KANAN  
FAKULTI PENGURUSAN TEKNOLOGI  
DAN TEKNOUSAHAWANAN  
UNIVERSITI TEKNIKAL MALAYSIA

Signature : .....MELAKA.....

Name of Supervisor : Mr. Hasoloan Haery Ian Pieter

Date : 27/06/19

Signature : ..........

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

Date : 27/06/19

## DECLARATION

I hereby, declared this report entitled “Quality Design Based on Functional and Dysfunctional Towards Product Attributes of The Computer Mouse” is the results of my own research except as cited in references.

Signature

:



Name

: MUHAMAD HAFIZAN BIN HANAFI

Date

: 28/6/2019

**DEDICATION**

*For my beloved parents who were always supported me,*

Hanafi Bin Salleh

Zaleha Binti Che Muhammad

*For my supporting supervisor,*

Mr. Hasoloan Haery Ian Pieter

For my special partner (Muhammad Bin Su Azmi), families and friends,  
thank you for your love and care.

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## ABSTRACT

The main purpose of this study is to investigate the customer satisfaction and preferences based on the quality attributes and customer characteristic using the Kano Method and Big-5 Inventory respectively. A survey is distributed to the 280 respondents from Universiti Teknikal Malaysia Melaka (UTeM). The study employs the questionnaire method of which a total of 65 Computer Mouse Design were obtained from the market for the study purposes. A preliminary study was carried out by conducting a pilot test with expert opinions (7 lecturers) and sample respondents (60 respondents). The developed questionnaire contains information on customer preferences, product attributes (functional question and dysfunctional question based on Kano Method) and customer characteristic (Big-Five Inventory). The result showed based on customer satisfaction and preferences, the three attributes of the computer mouse are (i) mechanism related to the connection to computer (ii) shape design and (iii) the texture of the mouse grip such as Ball Roller vs. Sensor, Cable vs. Infrared, Colour vs. Black, Grip Texture, Mice Design, Remote Control. The customer preferences on products were having significant correlation with Extraversion (Assertiveness and Active), Neuroticism (Depression) and Openness (Ideas) types of the personality traits based on the Big-Five Inventory. The Openness type have significant correlation with Product Priorities (*i.e.*, Price, Brand, Durability, Colour, Design, etc.) and Product Condition (*i.e.*, Trendy, Uniqueness, Limited Stock, Size, Material, etc.) From the validation of study, it is found that these three attributes are the most preferred by customers and is consistent to the Big-Five Inventory characteristics types.

Keyword: *Customer Satisfaction, Big-Five, Product Attribute, Kano Method*

## ABSTRAK

Tujuan utama kajian ini adalah untuk mengkaji kepuasan dan keutamaan pelanggan berdasarkan sifat-sifat kualiti dan ciri-ciri pelanggan menggunakan Kaedah Kano dan Inventori *Big-5* masing-masing. Satu kaji selidik diedarkan kepada 280 responden dari Universiti Teknikal Malaysia Melaka (UTeM). Kajian ini menggunakan kaedah soal selidik yang mana sebanyak 65 Rekaan Tetikus Komputer diperoleh dari pasaran untuk tujuan kajian. Kajian awal dijalankan dengan menjalankan ujian permulaan dengan pendapat pakar (7 pensyarah) dan sampel responden (60 responden). Soal selidik yang dihasilkan mengandungi maklumat mengenai pilihan pelanggan, atribut produk (soalan fungsional dan soalan disfungsional berdasarkan Kaedah Kano) dan ciri pelanggan (Inventori *Big-5*). Hasilnya menunjukkan berdasarkan kepuasan dan keutamaan pelanggan, tiga sifat tetikus komputer adalah (i) mekanisme yang berkaitan dengan sambungan ke komputer (ii) reka bentuk dan (iii) tekstur cengkaman tetikus seperti *Ball Roller vs. Sensor*, Kabel vs Inframerah, Warna vs Hitam, Tekstur Grip, Reka Bentuk Tikus, Kawalan Jauh. Keutamaan pelanggan terhadap produk mempunyai korelasi yang signifikan dengan *Extraversion (Assetiveness and Active)*, *Neuroticism (Depression)* dan *Openess (Idea)* jenis sifat kepribadian berdasarkan Inventori *Big Five*. Jenis *Openess* mempunyai korelasi yang signifikan dengan Prioriti Produk (iaitu Harga, Jenama, Ketahanan, Warna, Reka Bentuk, dll.) Dan Keadaan Produk (iaitu Trend, Keunikan, Saham Terbatas, Saiz, Bahan, dll.) Dari pengesahan kajian, didapati bahawa ketiga-tiga atribut ini adalah yang paling disukai oleh pelanggan dan konsisten dengan jenis ciri-ciri Inventori *Big Five*.

Kata Kunci: *Kepuasan Pelanggan, Big-5, Atribut Produk, Kaedah Kano*

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## LIST OF ABBREVIATIONS

AFG	- As for gift
AV	- Availability
BR	- Brand
C	- Cheap/ expensive
CL	- Customer loyalty
CO	- Colour
CS	- Customer satisfaction
CT	- Connection type
D/	- Discount/ sale
DC	- Design/ shape of product
D	- Design
DF	- Dysfunctional
DI	- Dimension
DS	- Dissatisfaction
DU	- Durability
ET	- Easy to move
ETU	- Easy to use
F	- Functional
FC	- Favourite colour
FFM	- Five-factor model
HCWs	- Health care workers
LS	- Limited stock
M	- Material
NP	- New product
PR	- Price
PSM 1	- Projek sarjana muda 1
PSM 2	- Projek sarjana muda 2
QFD	- Quality function deployment
RE	- Recyclability
SARS	- Severe acute respiratory syndrome

SI	- Size
SPSS	- Statistical package for the social sciences
TR	- Trend
UN	- Uniqueness

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background Study

In today's global market, Lai et al, (2004:1085) stated that customer satisfaction is the major concern and prerequisite of the business competitiveness. Briefly, a business exists to satisfy customers while making profit (Iwu, 2010:2659). In this sense, Ngo (2015:1637) underlined about how to satisfy customers is as the ultimate concern of most companies in any kind of business. Awan and Rehman (2014:19) said, the customer satisfaction is becoming the guiding principle for establishing marketing tactics as well as developing marketing activities. Based on customers' satisfaction is as a significant factor that leads business to success (Dapkevičius and Melnikas, 2009:17), to determine their differences, Bilgilia *et al.*, (2011:830) asserted that the company is therefore necessary to understand the customer demands and needs as critical importance to their business. The customer satisfaction in this perspective, according to Szwarc (2005:6), is on how customers view an organization's products or services in light of their experiences with that organization (or product). Gustafsson *et al.*, (2006:211) argued that satisfaction can be used to explain loyalty as behavioural intentions (*e.g.*, the likelihood of repurchasing and recommending).

Specifically, Razak et al., (2016) stated about customer satisfaction that is determined by the quality and price of the products desired by the customer. At a basic level, Fornell (2010:29) argued that how someone spend money is related to

the degree of utility or satisfaction derives from consumption. Here, Jakpar and Goh (2012) discussed about value-based measurement to the product's quality based on the reasonable price accepted to consumers using the value-based approach. Since the level of customer satisfaction may be influenced by various attributes (*i.e.*, internal and external factors) and the relationship between quality attributes and customer satisfaction is asymmetric and nonlinear (Felix, 2017: 4), then some more detailed discrimination of their importance, however, need to be described as a valuable information for analysis conducted (Szymczak & Kowal, 2016:284). Specifically, for the improvement of quality attributes.

Moreover, to enhance customer satisfaction, Chang et al., (2012:217) said, there is an indirect influence to strengthening customer loyalty (CL). Generally, since satisfaction is the base to judge a quality product or service, Ruggieri and Silvestri (2014:22) argued that customer satisfaction based on the expectations of the client is a complex state of perception. To determine by "objective" quality factors and by "subjective" interactions, they said that customers (buyers or end users) memory with the experience of purchasing or using the products. Specifically, Cruz (2015) in his studied about the automobile industry, said that consumer perception has an equivalent role to play in the growth and development the products. This can be concluded that customer satisfaction is measured by the correspondence between perceived and expected quality (Ruggieri & Silvestri, 2014:22). Here, according to Saleem *et al.*, (2015), perceived superiority is defined as consumer finding about a product performance and how this product compared with their expectation. Based on this perspective, customer satisfaction is defined as an "evaluation of the perceived discrepancy between prior expectations and the actual performance of the product" (Tse & Wilton; 1988, Oliver 1999).

Furthermore, according to Ngo (2015:1637), due to its significant impacts on firms' long-term performance and also customer purchasing behaviours, there is an important to measure the customer satisfaction. Crostack et al, (2010:367) suggested that measurement should be prioritized and implemented in effectively way based on procedure to a necessary assumption for a suitable transfer of requirements into products which exactly correspondent to the wishes of the customers. For this purpose, an instance Wang and Ji (2010) said that Kano's model is a widely used tool to understand the voice of customers and their impact on

customer satisfaction. Kano approach to the consumer's feelings, according to Mikulić and Prebezac (2011:48), related to fulfilment of an attribute (a so-called "functional question") and non-fulfilment of an attribute (a so-called "dysfunctional question"). There are five categories based on Kano method towards perceived quality, such as attractive quality, must-be quality, reverse quality, one-dimensional quality, and indifferent quality. To better understand how customer evaluate and perceive quality attributes, he explained how the relationship between the degree of sufficiency and customer satisfaction with a quality attributes (Kano, 1984). Also, Kano model determine the dimensions of customer satisfaction and customer request is listed (Kılıç *et al.*, 2008). According to Witell and Lofgren (2007), product / service design can be accurately assessed through the Kano model.

In conclusion, customer satisfaction is very important in today's business world. To explore the relationship between customers' satisfactions towards the consumer behaviour derives from their decision making is the most interesting topics (Ilieska, 2013). Also, to the concept of quality because of people perceive quality differently (Cruz, 2015:5). In this perspective, Ma and Ding (2010) defined customer satisfaction is customer value. Yu (2007) found that "higher customer satisfaction leads to higher customer revenue and higher customer costs at the same time, and thus customer profits remain unaffected". However, many and various attributes of quality required to consumers differentiate product is as for company's benefits (Nørskov *et al.*, 2015). An instance, Pohlmeier (2012:184) suggested about the aesthetics and emotional involvement into the products that were more important in hedonic than utilitarian products. She said, attributes presented and instructed can be seen as distinct attribute classes. Here, the classification is based on subjective perceptions to the quality of products, subjective price perception, the preferences, and existing product (Tiilikainen, 2011:7-8). This basic attribute is necessary for product performance, while differentiating attributes are those to help firms distinguish their products from competitors' products (Bennur & Jin, 2013:308). According to Kessler and Chakrabarti (1998:316), the "best way" to produce high-quality new products where there were appropriate product design attributes existed, such as size, shape, surface and other engineering characteristics (Nagamachi, 2001).

## 1.2 Problem Statement

Since the focus on customer satisfaction is on the external approach, Jacka and Keller (2009:178) said that the customer in the process, is as alternative solution to enable the company understands a complete knowledge of the customers (behaviour, preferences, characteristics, *etc.*). To look at an overall relationship level, Szwarc (2005:99) stated that customer satisfaction can be measured at many different levels towards how customers feel about the products. According to Ilieska (2013:327) consumers are as the subjects that purchase goods and services to satisfy their needs.

After that, according to Ruggieri and Silvestri (2014:22), the customer satisfaction is differed conceptually, although quality and customer satisfaction need to be integrated. Kahn et al., (2003:185) argued that quality serves the purposes of consumers. Here, fitness for use is the extent to which a product successfully in the customers' eyes (Grigoroudis & Siskos, 2009:54). Consumer's perception of product superiority is compared with their anticipation. Compeau et al., (1998:295) stated that a consumer's judgments based on perception of overall quality products is generally considered as an integration of more specific intrinsic product characteristics, such as reliability, durability, and workmanship.

The facts, in defining quality that translate future needs of the user into measurable characteristics, according to Berander et al., (2005:4) is difficult. There is also some consumers may still find the difficulties to assess their valuations for the new attributes and thus the incremental utility of the new product (Jiang et al., 2017:4308). Specifically, when consumers purchase a product where their preference is influenced by design quality and functionality that meets the specific needs and feelings of consumers (Tsuchiya et al., 1996:135). Also, other aesthetic elements that is a critical point to the buying decision or to the customer satisfaction (Orsborn et al., 2009). In this sense, the aesthetic judgement based on the result of cognitive evaluation and aesthetic emotion to the product developed (Cheung et al., 2014). Wilhoit (2010:11) in this perspective suggested the exploring of consumers' visual aesthetic sensitivity and behavioural intentions.

Based on aforementioned, this study will carry out the investigation and the customer satisfaction based on quality design attributes. By generating survey questionnaires using quality attributes approach refers to Kano method, the

questionnaires developed will be constructed into functionality and dysfunctionality mode. While to measure the individual preferences, this study will also employ the personality test based on the Big 5 Personality Traits to explore the customer characteristics (*i.e.*, cognitive and behaviour) towards their preference to the quality of product and design. In this study, the statistical approach using software SPSS v.15 will be utilized to analyse and evaluate the results.

### **1.3 Research Objective**

The objective of this study based on the problem statement are:

- 1) To identify the customer satisfaction and preference based on Kano method.
- 2) To analyse the product attributes correlated to personality traits using Kano method.
- 3) To evaluate and validate the customer preferences towards the product attributes.

### **1.4 Scope of Project**

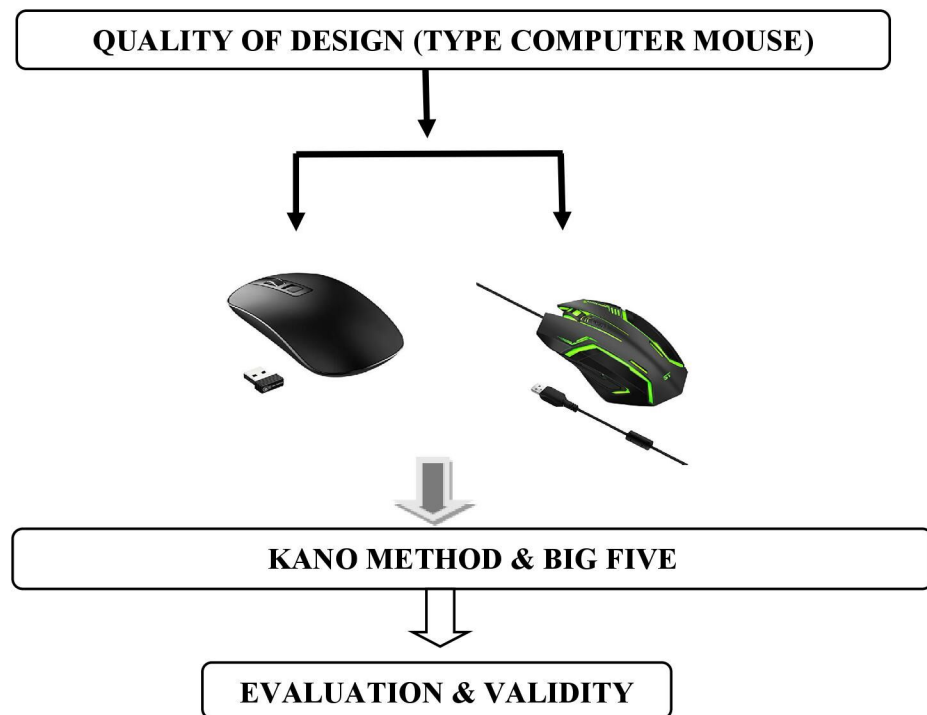
In this study, the approaches used to determine customer preference and satisfaction based on functional and dysfunctional towards the computer mouse product. The types of computer mouse are limited to two (2) types (Figure 1.1).

The survey conducted in this study is to look for quality design towards the preferences on the product based on functional and dysfunctional. With the analysis focused quality design based on functional and dysfunctional using the SPSS v.15 as statistical analysis software in the study conducted. The Choice Expert also is used to determine the preference that use the product analysis hierarchy.

The method used to obtain the data in this study is a questionnaire. This questionnaire has been distributed in Melaka based on the computer mouse product as a respondent. This questionnaire will cover the range of gender demographics, age, occupation, salary, etc. and computer mouse design features such as form, function, price, etc.

### 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.



**Figure 1.1:** Framework of Customer Profiling versus Product Aesthetic

## **1.6 Summary**

This chapter is introducing the project background and the objective of the project. In addition, the problem statement and scope of study also being clarify in order to limit the range of this project conduct. The following chapters consist of the literature review and knowledge that required in conducting the whole study