



**DESIGN AND DEVELOPMENT OF AIR FRESHENER'S CASING BY USING  
KANSEI ENGINEERING AND KANO MODEL**



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**BACHELOR OF MANUFACTURING ENGINEERING TECHNOLOGY  
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**Faculty of Mechanical and Manufacturing Engineering  
Technology**



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**Nadiah Binti Zolkeflee**

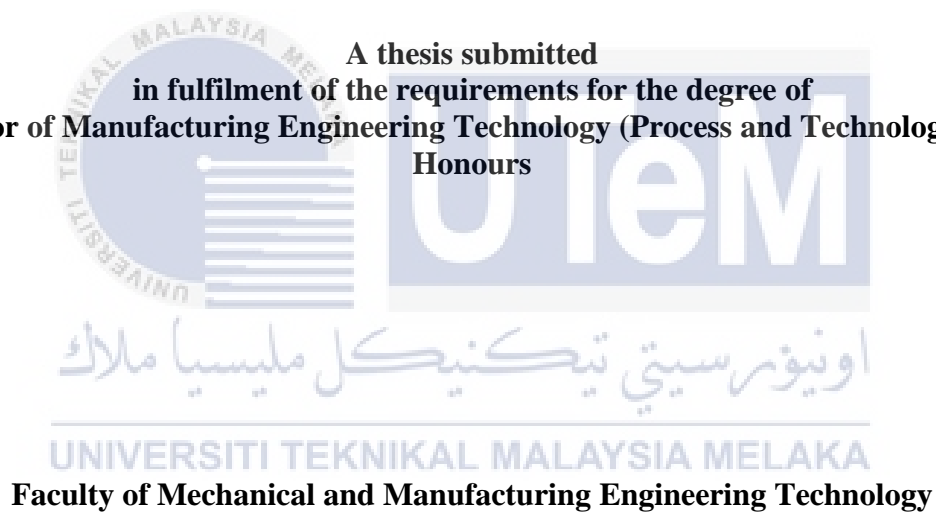
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**NADIAH BINTI ZOLKEFLEE**

**A thesis submitted  
in fulfilment of the requirements for the degree of  
Bachelor of Manufacturing Engineering Technology (Process and Technology) With  
Honours**



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2022**

## DECLARATION

I declare that this thesis entitled “Design And Development of Air Freshener’s Casing By Using Kansei Engineering ” is the result of my own research except as cited in the references. The choose an item has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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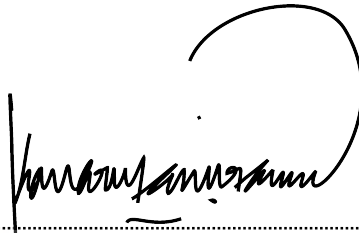
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## APPROVAL

I hereby declare that I have checked this thesis, and, in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Manufacturing Engineering Technology (Process and Technology) with Honors.

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## DEDICATION

This report is dedicated to my beloved parents in particular, for their endless love, support and encouragement. To my lecturer Ts. Dr Kamarul Bin Amir Mohamed who has guided me along the way to finish this project. Thank you for your support and give me strength until this project is finished.



## ABSTRACT

Most of the design concepts available in the market come from the ideas of designers who sometimes have opinions that are contrary to the definition of custom design concepts and as a result, it is always confusing. The purpose of this research conducted is to improve the design of air freshener casing that meets customer demand by using Kansei Engineering. Kansei Engineering is a tool used to interpret human feelings and opinions from users or customers into design parameters. The result of this study is the design of the air freshener casing, which satisfies the psychological feelings of the customers. With reference to the main objectives in this research, three objectives have been proposed. First, to study Kansei engineering and Kano model in air freshener's casing product design. The second objective was to analyse data using questionnaires by applying Kansei word embedding with the Kano model. The final objective of this study was to develop a 3D prototype of air freshener design using Kansei engineering (emotion) embedded with the Kano model (satisfaction). The Kansei survey consists of two parts. In the first part, a pre-survey was conducted to collect data on customer preferences for air freshener products available in the market. With reference to the highest scores from the survey for each question related to Kansei Engineering, it will be used in the main survey phase. A second survey was conducted to collect data on customer thought and opinions regarding the products selected in the pre-survey. To analyze the results in the second survey, use the SPSS software to find correlations between the two variables. Successful results were obtained, by using morphological chat to construct 3 concept designs for the new design of the air freshener casing. The final product of the air fresheners causing was chosen using the Pugh method, which is a process for ranking the three concepts, with concept design no 2 receiving the highest score.

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## ***ABSTRAK***

Kebanyakan konsep reka bentuk yang terdapat di pasaran datangnya daripada idea pereka yang kadangkala mempunyai pendapat yang bertentangan dengan definisi konsep reka bentuk tersuai dan akibatnya ia sentiasa mengelirukan. Tujuan penyelidikan ini dijalankan adalah untuk menambah baik reka bentuk selongsong penyegar udara yang memenuhi permintaan pelanggan dengan menggunakan Kansei Engineering. Kansei Engineering ialah alat yang digunakan untuk mentafsir perasaan dan pendapat manusia daripada pengguna atau pelanggan ke dalam parameter reka bentuk. Hasil kajian ini adalah reka bentuk selongsong penyegar udara, yang memenuhi perasaan psikologi pelanggan. Merujuk kepada objektif utama dalam penyelidikan ini, tiga objektif telah dicadangkan. Pertama, untuk mengkaji kejuruteraan Kansei dan model Kano dalam reka bentuk produk sarung penyegar udara. Objektif kedua ialah menganalisis data menggunakan soal selidik dengan mengaplikasikan benam perkataan Kansei dengan model Kano. Objektif akhir kajian ini adalah untuk membangunkan prototaip 3D reka bentuk penyegar udara menggunakan kejuruteraan Kansei (emosi) yang disematkan dengan model Kano (kepuasan). Tinjauan Kansei terdiri daripada dua bahagian. Pada bahagian pertama, pra-kaji selidik telah dijalankan untuk mengumpul data tentang pilihan pelanggan terhadap produk penyegar udara yang terdapat di pasaran. Dengan merujuk kepada markah tertinggi daripada tinjauan bagi setiap soalan berkaitan Kejuruteraan Kansei, ia akan digunakan dalam fasa tinjauan utama. Tinjauan kedua telah dijalankan untuk mengumpul data tentang pemikiran dan pendapat pelanggan mengenai produk yang dipilih dalam pra-kaji selidik. Untuk menganalisis keputusan dalam tinjauan kedua, gunakan perisian SPSS untuk mencari korelasi antara dua pembolehubah. Keputusan yang berjaya diperolehi, dengan menggunakan sembang morfologi untuk membina 3 reka bentuk konsep untuk reka bentuk baharu selongsong penyegar udara. Produk akhir penyegar udara yang menyebabkan telah dipilih menggunakan kaedah Pugh, iaitu satu proses pemeringkatan ketiga-tiga konsep, dengan reka bentuk konsep no 2 menerima markah tertinggi.



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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

In the few years ago before industry know about how getting customers satisfaction, usually designer will do the design by thinking it themselves. Sometime the design quite often does not usually meet great approval in the market. Furthermore, product designers are struggling searching to get a greater understanding of the individual feelings of users. In term of innovative product growth, the modern era is moving from a product-out to a market-in approach. It amplifies the user's needs to the same level as the other technical requirements of a good business marketing (A. M. Lokman, 2009) . Consumer satisfaction is described as a consumer's attitudes, research, and emotional reaction after a purchase based on a combination of a product's actual output feeling with the hope and evaluation experience of purchasing a product. Apart from that, company royalty is often a mentality and consumers' attachment, or belief based on feelings of enjoyment, popularity, and proud in being a customer of the famous brand. (A. M. Lokman & Aziz, 2010)

It is difficult to estimate implied demand because users' feelings are more difficult to quantify than over needs, which are easier to explain. Kansei engineering is a method that can used to evaluate feeling and impression of customers about a product (Schütte et al., 2004). Kansei engineering was invented by Nagamachi at Hiroshima University about 30 years ago, for a new product development (Matsubara & Nagamachi, 1997). Kansei engineering method can interpret customer's feeling and opinion into a data set that make easier to product designer know well about customer's demand. The aim in this method is

to get customers' opinion about existing product then produce new design or new product in market (Nagamachi, 1999).

Many product that applies Kansei engineering were sold well in Japan(A. Lokman, 2010). With this method become a main aim of research to collect customer's opinion or feeling about the design of automatic spray air freshener. Most of the house, office, and hotels in Malaysia have air freshener. The main purpose air freshener place in enclosure room such as kitchen, living room and bedroom is to reduce the unpleasant odor in house (Alshaer et al., 2019). There have many types of air freshener can be use such as spray, gel form and evaporative diffuser. Most of the user prefer an attractive design for air freshener as decoration. So far, there has not been a version of an automatic air freshener that uses the Kansei approach based on current literature. So, this research is performed to evaluate the users emotional then transfer it into the design elements combined with emotion influence to improve an automatic air freshener. Figure 1.1 shows the concept of Kansei Engineering generally.

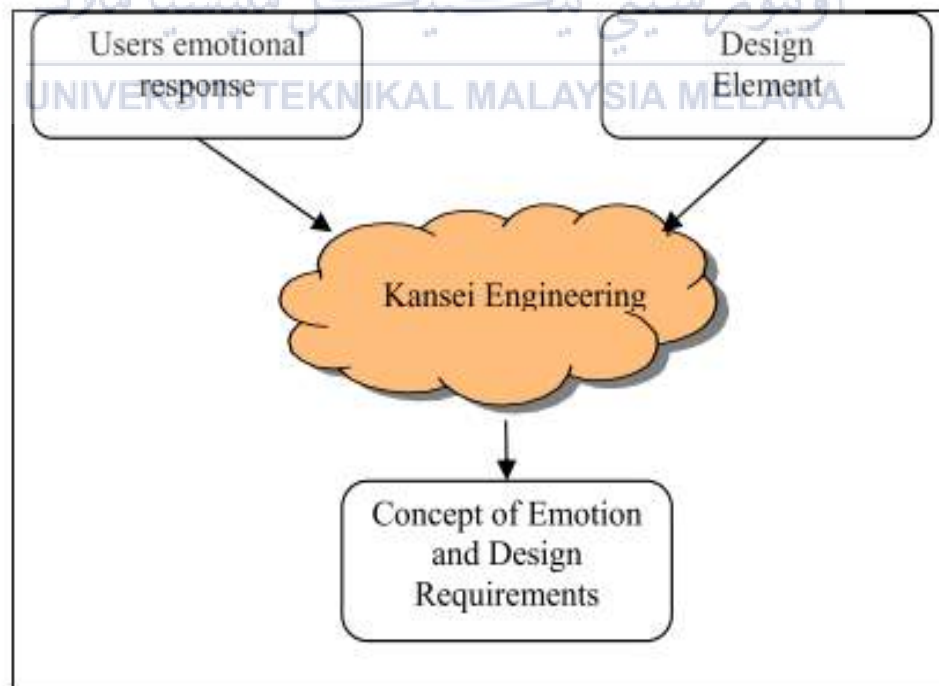


Figure 1. 1 Concept of Kansei Engineering (Nagamachi, 2003).

## 1.2 Problem Statement

There have several techniques can be applied to improve product as well as sell Kansei engineering is one of them. Moreover, Kansei Engineering is not a popular method used in Malaysia.

Air freshener is one of essential need in every house. Users look for appearance of casing air freshener then the scents. Most air freshener existing in market do not have an attractive design. Design that seller produce does not have decoration friendly. The production more focus on function of the air freshener. Some users need a new design of air freshener that can fit their interior decoration.

To find out the suitable product for users, should be given opportunity for users to select their own desire design for air freshener by applying Kansei engineering element during the survey. In addition, the product development of air freshener casing also will be referring customers opinion and feelings. Usually, designer or home fragrance manufacturer do not focus on the outer design but the smell of fragrance.

## 1.3 Research Objective

In this research have three main objectives need to be achieve at the end of this research:

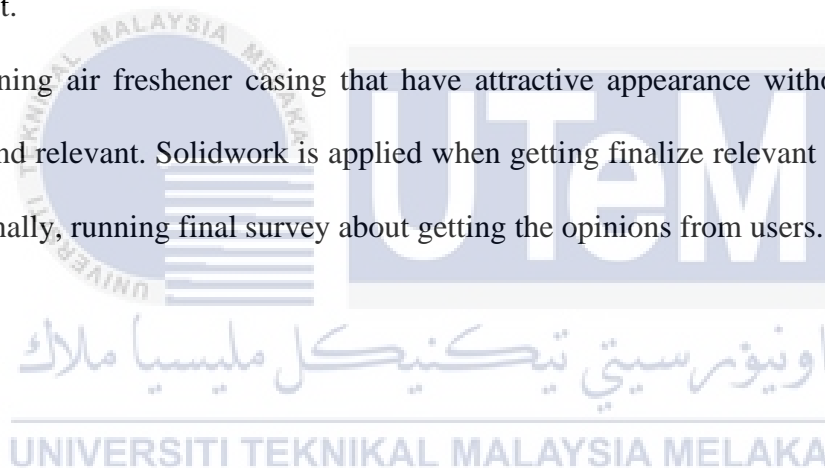
1. To study on Kansei engineering and Kano model in air freshener's casing product design.
2. To analyze data using questionnaires by applying Kansei word embedding with Kano model
3. To develop a 3D prototype of air freshener design using Kansei engineering (emotion) embedded with Kano model (satisfaction) .

#### 1.4 Scope of Research

This research is mainly to study Kansei engineering and Kano model method in order to improve existing product which is air freshener casing. So, in the end of this research the acceptable design and decoration friendly of outer casing for air freshener.

Relation between customer's desire, feeling and judgement with the product will be study further about Kansei Engineering in product development. As to collect the selected sample from users that related to domain product air freshener is using google form. Same as data collection for sentiment survey is using google form. Result from sentiment survey will analyze using SPSS software to getting the correlation between adjective opinion to the product.

Designing air freshener casing that have attractive appearance without change the function and relevant. Solidwork is applied when getting finalize relevant design for new design. Finally, running final survey about getting the opinions from users.



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

In this chapter, will be discussing about the literature review studies. It will explain the summary based on previous study that has a better experience. Besides, the basic theory that has relations with research that will be explained regarding the basic theory that has connections with research that would be done from textbooks and other resources is discussed in a literature review. The purpose of this chapter is to find out the difference between previous study with the research that would be conducted.

#### 2.2 Consumers Demand in Product Development

Consumers are the most important factor in the development of new products and determining product success requires an awareness of customer desires. Consumer interest in product growth, on the other hand, does not necessarily provide the desired results; however, contact with customers may mitigate the unexpected and generate foresight to help address potential consumer needs (Booz, 1982). Customer orientation is critical for a market orientation approach, and different approaches have been used to determine consumer needs. Nonetheless, a competitive economy with a large number of customers necessitates special measures to comprehend customer demand for new product growth.

New Product Development (NPD) refers to a company's operations that result in a continuous stream of new or modified product retail offerings over time. This includes the creation of opportunities, their collection and transformation into objects (manufactured products) and activities (services) for customers, as well as improving institutionalization of

new product development activities (Bangad, 2010) . Successful innovative technologies are a critical component to a company's development and productivity. And so, not all new products can succeed on the business; for example, the probability of a new product loss is balanced against the potential for economic growth.

Even though the risk is embedded in new product development, it can be quantified by using a formal method for handling new product behaviors. Figure 2.1 illustrates the Booz, Allen and Hamilton's New Product Process, which separates new product creation into seven stages: Idea generation, screening and evaluation, business analysis, development, testing, and commercialization are all steps in the development of a new product strategy (Booz, 1982).

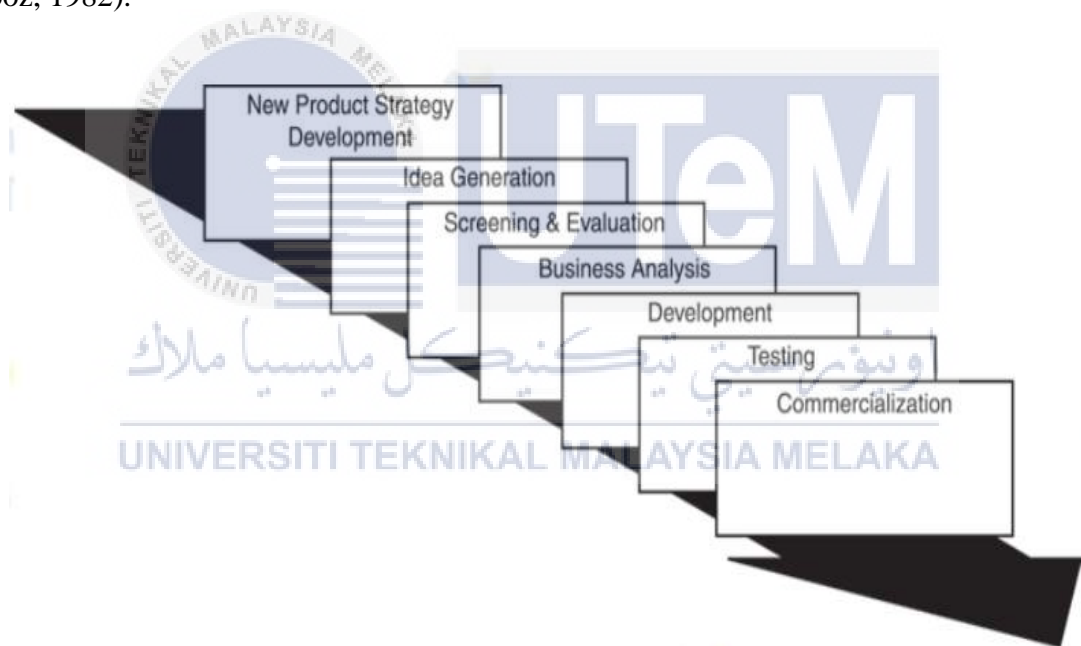


Figure 2. 1 New Product Process (Booz, 1982).

In the first stage is new product development. Creating the framework for the new product development process by evaluating missions and related objectives, as well as identifying roles that new products could play in achieving specific goals. This material highlights the strategic needs for new product as a guide for following stages of product innovation.

Generate the idea is the second step in the process of developing a new product. In order to discover a suitable and useful concept, an organization would usually produce a lot of them. The most creative companies also use a variety of sources of inspiration from emerging products, as well as a variety of methods to process such ideas. They must also boost employee ingenuity in order to operate the pipeline that feeds innovative product design and production (Bangad, 2010).

Idea screening is the following step after getting the list of idea. In this stage This is the first evaluation of a modern product concept. It entails filtering new product concepts in order to identify the best ones and exclude the bad ones as quickly as possible. Only concept concepts that will turn into useful goods are used in this process. The concept of development and testing. At this point, the product concept is transformed into a verbal or visual representation, with initial ideas for impediments, products, and technologies. Furthermore, emerging design ideas were checked with prototypes of potential audiences in idea testing to see whether they had a good impact on them.

Marketing strategy and business analysis involves developing an initial marketing plan for a new product based on the product idea. The marketing campaign statements are split into three sections which are an overview of the target market, the expected product placement, as well as revenue, market share, and benefit (Booz, 1982). This provides a study of new product revenue, prices, and earnings estimates in order to determine if these aspects meet the firm's goals.

Product development phase in this phase it involves the assembly of all the component and other works that related (Booz, 1982). It will transform into tangible shape and samples in this section to ensure that the product theory can be turned into an actual product.

Marketing testing is the process when the product prototype and marketing division was simulated in a more practical and real-time business scheme at this point of new product growth.

Commercialization is the final stage. This section simply refers to the launch of a new product into the industry using some campaign advertising tactic. A new product may be sold quickly, exclusively, or carefully in order to promote it(Bangad, 2010).

### 2.2.1 Kansei Engineering

Kansei Engineering (KE) is one of method product development process which related to consumer emotion and opinion. By referring to Japanese word Kansei means consumer's emotional feeling and image about a product(Nagamachi, 2003). Kansei Engineering is mostly used as a catalyst for the systemic development of new and creative ideas, but it can also be used to enhance current products and concepts (Zhabiz Shafieyoun, 2014) . The study of product emotion has shown that emotional design outshines useful and usable design. Figure 2.2 shows the Kansei Engineering system(Neto, 2015).

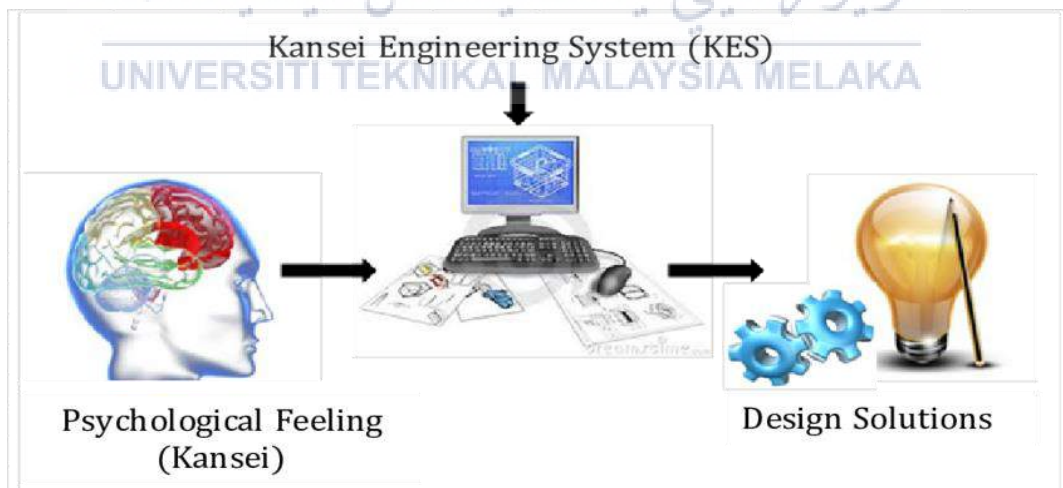


Figure 2. 2 The Kansei Engineering System (Neto, 2015).

The idea for a new product can be design according to customer's feeling and image by applying Kansei Engineering technology. According to the definition of Kansei