



**UNIVERSITI PUTRA MALAYSIA**

***USER EMOTIONAL RESPONSES AND PERCEIVED QUALITY  
CHARACTERISTICS FOR SUSTAINABLE PRODUCT DESIGN***

**MOHAMAD SAIFUL SAZWAN BIN MOHD RASHID**

**FRSB 2019 4**



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CHARACTERISTICS FOR SUSTAINABLE PRODUCT DESIGN**

By

**MOHAMAD SAIFUL SAZWAN BIN MOHD RASHID**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,  
in Fulfilment of the Requirements for the Degree of Master of Science**

**November 2018**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science.

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**November 2018**

**Chairman: Hassan Hj. Alli, PhD**  
**Faculty: Design and Architecture**

Physical characteristic of products has a reflective significance in way the products are perceived. The design of a product regulates user's first impression when they communicate with the product. It has been seen equally as function criteria that able to determine the product personality and becomes a significant factor for a product to sustain and also, bring emotional responses to user. Emotional responses are important in product interaction that provides a strong influence between user's behavior and product attachment. Apart from emotions, perceived quality also contribute to evaluation regarding the product quality to meet individual's expectations. It refers to indirect intention among product features and user's orientation during decision-making process, helping the user to receive information about the product specifications. Nowadays, designers struggle to integrate a potential meaning to combine user's emotional attachment with good product characteristics. They need to employ appropriate method in order to obtain user's favorite product and establish the sustainable product. The purpose of this research is to develop a sustainable product design method that incorporate the user emotional responses, perceived quality characteristics and elements of sustainability as a design guideline in the early stage of product development process. A survey was conducted involving design experts and end users. The results show various variables were identified such sustainable product specification, perceived quality characteristics and element of sustainable product design. These fundamentals are contributed towards sustainable and successful product in the market.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains.

**TINDAK BALAS EMOSI DAN KRITERIA PERSEPSI KUALITI UNTUK  
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Oleh

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Ciri- ciri fizikal produk mempunyai kepentingan yang reflektif terhadap persepsi cara sesuatu produk itu dilihat. Reka bentuk sesuatu produk dapat mengawal kesan pandang pertama pengguna apabila mereka berkomunikasi dengan produk tersebut. Ia dilihat penting sama seperti kriteria fungsi yang boleh menentukan personaliti terhadap produk dan menjadi faktor penting dalam mempengaruhi perasaan pengguna serta menjadi faktor sesuatu produk itu bertahan. Respon emosi penting dalam interaksi terhadap produk dengan memberikan pengaruh kuat di antara perlakuan pengguna terhadap hubungan bersama produk. Selain daripada emosi, persepsi kualiti juga menyumbang kepada jangkaan individu dalam memenuhi penilaian tentang kualiti produk. Ini merujuk kepada tujuan tidak langsung terhadap sifat produk dan orientasi pengguna semasa proses membuat keputusan turut membantu dalam proses pemilihan spesifikasi produk. Pereka produk masa kini bekerja keras untuk mewujudkan suatu potensi yang boleh menggabungkan hubungan emosi pengguna dengan ciri-ciri produk yang baik. Mereka perlu mengaplikasikan cara yang bersesuaian untuk memperoleh produk kegemaran pengguna dan membangunkan produk yang lestari. Tujuan penyelidikan ini adalah untuk membangunkan panduan rekabentuk produk yang lestari dengan menggabungkan tindak balas emosi pengguna, ciri-ciri kualiti produk, dan unsur-unsur kelestarian sebagai garis panduan reka bentuk di peringkat awal proses pembangunan produk. Suatu kaji selidik telah dijalankan dengan penglibatan pakar reka bentuk dan pengguna. Hasil kaji selidik menunjukkan terdapat pelbagai pemboleh ubah seperti spesifikasi produk yang lestari, ciri-ciri persepsi kualiti, dan elemen produk yang lestari. Keperluan ini dibangunkan untuk membantu menyumbang ke arah produk yang lestari dan berjaya di pasaran.

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Mohamad Saiful Sazwan Bin Mohd Rashid  
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## TABLE OF CONTENTS

	<b>Page</b>
<b>ABSTRACT</b>	i
<b>ABSTRAK</b>	ii
<b>ACKNOWLEDGEMENT</b>	iii
<b>APPROVAL</b>	iv
<b>DECLARATION</b>	vi
<b>LIST OF TABLES</b>	xi
<b>LIST OF FIGURES</b>	xiii
<b>LIST OF ABBREVIATIONS</b>	xiv
<b>CHAPTER</b>	
<b>1 INTRODUCTION</b>	<b>1</b>
1.1 Introduction	1
1.2 Research Background	1
1.2.1 Statement of Issues	3
1.3 Aim	3
1.3.1 Research Questions	3
1.3.2 Research Objectives	4
1.3.3 Scopes and Area of Research	4
1.3.4 Significant of the Research	4
1.3.5 Limitation of the Research	5
1.3.6 Expected Contributions	5
1.4 Outline of the Thesis	6
<b>2 LITERATURE REVIEW</b>	<b>8</b>
2.1 Introduction	8
2.2 User in Product Development	9
2.2.1 Users Behavior	9
2.3 Emotional Responses	10
2.3.1 Descriptions of Emotions	10
2.3.2 Theories of Emotions	11
2.3.3 Measuring Emotions	11
2.3.4 Product Emotion	12
2.3.5 A Process-Level Approach to Product Emotion	13
2.4 Perceived Quality	14
2.4.1 User Decision on Perceived Quality	14
2.4.2 Perceived Quality Characteristics	15
2.4.3 Product Quality Approaches	16
2.5 Sustainability Elements	19
2.5.1 Sustainability in Product Design	21
2.6 Sustainable Product Design Specifications	21
2.6.1 Product Design Characteristic	22
2.6.2 The Successful Characteristics in Product Design	22
2.6.3 Strategies for Sustainable and Successful Product	23

2.7	Conclusion	24
<b>3</b>	<b>RESEARCH METHOD</b>	<b>26</b>
3.1	Introduction	26
3.2	Research Plan	26
3.3	Data Collection	28
	3.3.1 Questionnaire	29
	3.3.2 The Questionnaire Design	29
3.4	Source of Data	29
	3.4.1 Empirical Study	31
	3.4.2 Design Experts	31
3.4.3	End User	32
	3.4.4 Development of the Design Method	33
	3.4.5 Validation Analysis	34
3.5	Data Analysis	34
3.6	Conclusion	35
<b>4</b>	<b>DATA ANALYSIS AND RESULTS</b>	<b>36</b>
4.1	Introduction	36
4.2	Data Analysis and results of Design Experts	36
	4.2.1 Reliability of the Research Instrument	36
4.3	Results of Design Expert Survey	37
	4.3.1 Characteristics of Respondents	37
	4.3.2 User Contribution in Product Development	37
	4.3.3 User Emotional Responses for Sustainable Product Design	38
	4.3.4 Perceived Quality for Sustainable Product Design	38
	4.3.5 Product Quality Approaches in Design Process	39
	4.3.6 Element of Sustainability in Product Design	40
4.4	Data Analysis and Results of End User Survey	42
	4.4.1 Reliability of the Research Instrument	42
42	4.5 Results of End User Survey	42
	4.5.1 User Emotions Responses in Product Design	43
	4.5.2 Elements in Product Design	48
	4.5.3 Product Quality Characteristics in Product Design	51
4.6	Conclusion	52
<b>5</b>	<b>DEVELOPING OF SUSTAINABLE PRODUCT DESIGN METHOD</b>	<b>54</b>
5.1	Introduction	54
5.2	Product Design Developments and Process	54
	5.2.1 Procedure of Sustainable Product Design Requirements	55
	5.2.2 Twenty-eight Sustainable Product Design Specifications	56
	5.2.3 Mapping the Sustainable Product Requirements	58
	5.2.4 Factors Contributing to Product Quality	59

	Characteristics	
5.3	Sustainable Product Design Method	59
	5.3.1 Development of Design Method	60
5.4	Theories and Method Verification	61
	5.4.1 Verification of Validation	61
	5.4.2 Reliability of the Research Instrument	64
5.5	Results of Product Validation	64
	5.5.1 Product User Survey and Product Design Analysis	64
	5.5.2 Sustainable Product Design Specifications in Successful of iPhone	67
	5.5.3 Requirement of Product Quality Characteristics for iPhone 6	67
	5.5.4 Element Sustainable Product Design	68
5.6	Conclusion	70
<b>6</b>	<b>CONCLUSION AND RECOMMENDATION</b>	<b>71</b>
6.1	Introduction	71
6.2	Conclusion	71
6.3	Research Contribution to Knowledge	72
	6.3.1 Novelty of Research	73
6.4	Limitation of the Research	73
6.5	Recommendation for Future Research	74
	<b>REFERENCES</b>	<b>75</b>
	<b>APPENDICES</b>	<b>83</b>
	<b>BIODATA OF STUDENT</b>	<b>110</b>
	<b>LIST OF PUBLICATIONS</b>	<b>111</b>

## LIST OF TABLES

<b>Table</b>	<b>Page</b>	
2.1	Dimensions of quality use as a framework for strategic evaluation	17
2.2	Successful product characteristics	24
3.1	Measurement of data collection	29
3.2	Type of non-probability sampling	30
3.3	Type of probability sampling	31
3.4	Cronbach's alpha by Lee Cronbach	35
4.1	Reliability of research instrument statistic for design experts' survey	37
4.2	Designation of respondents	38
4.3	Respondent year of experience	38
4.4	User contribution in product development	39
4.5	Emotions responses in product design	39
4.6	Perceived quality for sustainable product design	40
4.7	Product quality approaches	40
4.8	Social element of sustainable product design	41
4.9	Economical element of sustainable product design	42
4.10	Environmental element of sustainable product design	42
4.11	Reliability of research instrument statistic for users' survey	43
4.12	Age of respondent	43
4.13	Employment Status of respondent	44
4.14	User emotions responses on kettle A	44
4.15	User satisfaction value on kettle A	45
4.16	Boredom value on kettle A	45
4.17	User emotions responses on kettle B	46
4.18	User admiration value on kettle B	46
4.19	Boredom value on kettle B	47
4.20	User emotions responses on kettle C	47
4.21	Fascination value on kettle C	47
4.22	Disgust value on kettle C evaluation	48
4.23	Aesthetics elements of product design	50
4.24	Function elements of product design	51
4.25	Product quality characteristics in product design process	52
5.1	Variable level of sustainable product	57
5.2	Sustainable product code	57
5.3	Aesthetics elements of product design and its description	58
5.4	Function elements of product design and its description	58
5.5	Sustainable product requirements	59
5.6	Quality characteristics in product design	60
5.7	Reliability of research instrument statistic for end users' validation survey	65
5.8	Emotional responses of iPhone 6	66
5.9	Aesthetics elements of iPhone 6	66
5.10	Function elements of iPhone 6	67
5.11	Sustainable product design specification contributed to the iPhone 6 success	68
5.12	The importance of iPhone 6 quality characteristics	69

5.13	Elements sustainable product design of iPhone 6	69
5.14	Sustainable elements of iPhone 6	70
5.15	Guideline for sustainability and successful product	70



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## LIST OF FIGURES

Figure		Page
1.1	Research methodology and associated thesis chapter	7
2.1	Area of literature review	8
2.2	Pictorial illustrations in PrEmo software	13
2.3	A framework of process-level approach to product emotion by Norman	14
2.4	Quality perspectives in an organization	19
2.5	Three-dimensional of sustainable intersection	20
2.6	Sustainable product design method	25
3.1	Research methodology framework	28
3.2	Process of conducting design experts survey	33
3.3	The framework for the survey of end user	33
3.4	Process of conducting end user survey	34
3.5	Kitchen appliance (Electric Kettle)	34
3.6	Data analysis workflow	35
4.1	Product quality approaches	40
4.2	Sustainable elements in product design	42
4.3	The analysis of user emotion responses within kettle A, B, and C	49
4.4	Most important aesthetics elements in product design	50
4.5	Most important function elements in product design process	51
4.6	Most significant product quality characteristics in product design	52
5.1	Sustainable product design process	55
5.2	The process of Sustainable Product Design Method	61
5.3	iPhone adoption statistics (source: Localytics)	63
5.4	iPhone model break market share (source: Localytics)	63
5.5	Specifications of iPhone 6	64
5.6	The aesthetics elements based on iPhone 6 user requirements	66
5.7	The important of function elements based on iPhone 6 user preferences	67
6.1	Sustainable Product Design Method	74

## LIST OF ABBREVIATIONS

EAe	Emotional Aesthetics Elements
EFe	Emotional Function Elements
Em	Emotion
ER	Emotional Responses
ES	Element of Sustainability
ESPD	Element of Sustainable Product Design
PS	Product Success
PQC	Perceive Quality Characteristics
SAM	Self - assessment manikin
Se	Sustainable Elements
SP	Sustainable Product
SSP	Successful Product
SPR	Sustainable Product Requirements
SPDS	Sustainable Product Design Specifications
SPDM	Sustainable Product Design Method
SPSS	Statistical Package for Social Sciences

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

The introduction chapter described and established the significance of this research, following with the aim, objectives, and the scope and area of study. Finally, the research contribution and structure of thesis is summarized.

### 1.2 Research Background

In recent years, the characteristic of products has a reflective consequence in the way that the products are perceived and sustaining in the market. The design of a product regulates the user first impression and also determines how it can communicate about function. The design of a product will also create user interpretations regarding product attributes (Pilditch, 1976; Berkowitz, 1987; Bloch, 2013) and direct application to product choice (Sundar et. al., 2014). Therefore, Rompay et. al., (2012) stated that the visual design elements of a product have significant factors on the appraisals that influence users' perceptions to evaluate a product on its aesthetics.

User emotions have been an essential element of product design study since the late 1980s. Users have to accept a design concept that acknowledges the different aspects of product design; for example aesthetics, function, and communicative relationships among them; different product aspects play different product roles. Despite the fact the roles are different; the frequently interrelated bases of interaction between user and product are same. The key for a long lasting value of products lay with the user by the constant interaction, which how they gave a meaning to things (Morillo et. al., 2015). According to Kwan (2016), many products are designed with less sustainability. Users do not get emotionally attached to products because they are excluded from the design and manufacturing processes. The lack of compassion causes a long lasting relationship between people and the products. Emotional responses can stimulate user to select a particular object from a row of similar products and will consequently have a considerable influence on purchase decisions. While, perceived quality is the user evaluation about the excellence of a product that meet individual's expectations. Researchers have recognized perceived quality as a cognitive response of a product which influences to product purchase intention (Jaafar & Latip, 2012), refer to indirect intention among product features and user

orientation which affected by internal or external motivations of product's quality through some perceive quality points during decision making process (Gogoi, 2013). Perceived quality is generally based on main measurements that consist of product specification (Alli, 2015).

Many people including product designers and manufacturers, unintentionally concentrated on physical appearance (visceral level) and functionality (behavioral level) of a product that are easily replenished, then on an emotional way (reflective level) to produce and maintain continuing emotions (Norman, 2007; Aftab & Agustin, 2017). Product designers face the difficulty to integrate a meaning in future product design because they are not simply creating products, but in making user want them to be responsive towards their emotions and making a long lasting product. User could have problems in assessing the product and less of product appreciations while the product meaning that are communicated are not clear. Users have to interpret the product meaning and create their own emotional significance of the product. Product designers need guidelines that may be used at the early stage of the design process or in product assessment studies. In design practice, emotional responses can be used to assess new designs or comparing different kind of prototypes. It also helps define the user involvement in a future product design (Desmet & Schifferstein, 2012).

Therefore, the sustainable product design is not essentially about new technologies, but about reconsidering how to meet the need for growth and decreasing negative impacts at the same time. The idea of sustainable is becoming progressively important all over the world by involving incorporated approach indicators that link a community's economy, environment, and society. According to Flint (2013), three dimensions of sustainable as development the link between economical and environmental through social standards. Sustainable product design and development ideas can be further extended to meet consumer demand that can lead to more effective use and reduce consumption of resources by lessening the effect of product life cycle on the environment (Ricardo et. al., 2012; Guidat, 2014; Lifset & Graedel, 2015). A product's positive and negative impacts are determined throughout the evaluation of lifecycle criteria by decisions during product development (Huang, 2016). It is imperative for designers to integrate a sustainable decision model for product development at the early stage.

The users can positively contribute in creating a product that satisfies the expectation; increase product quality and the probability of success of the product on the market (Taha et. al., 2013; Alli, 2015). They attempt to produce product characteristics based on the needs, wants, and wishes of the users (Taha et. al., 2013; Ulrich & Eppinger, 2016).

### 1.2.1 Statement of Issues

Product characteristic is important as a significant factor for a product to sustain. While, emotional responses and perceived quality are important aspects of product interaction in helping a user to choose and get attach with the product. However, the designers nowadays have a difficulty on to integrate potential meanings in designing a new product and finding the product characteristic attributes user perceives. Hence, the product designers should be able to understand the importance of detaining user's selection that could affect products sustainability as well as increased probability its success in the market. Therefore, there is need a specific approach that will help the product designer to establish the sustainable product design specifications especially in the early stage of new product development process.

There are three main research problems are held out in this research:

- I. Users do not get emotionally attached to products and have a problem in assessing the product understanding.
- II. Many products are designed with less sustainability causes lack of compassion between user and the products for long lasting relationship.
- III. Designers nowadays have a difficulty to integrate potential meanings in designing a new sustainable product and finding the product characteristic attributes that user perceives.

### 1.3 Aim

The aim of this research is *to develop a new sustainable product design method*. The method proposes as a design guideline that incorporates the user's emotional responses and perceived quality characteristics for sustainable product design, and as well as to increase probability it success in the market. The process will be conduct on users and product designers in other to achieve the research objectives followed by a validation based on the design guideline.

#### 1.3.1 Research Questions

To meet the objectives of this research, there are three research questions that are developed to be to further investigate:

- I. What are emotional responses and perceived quality characteristics involve in product design?
- II. What are the elements of sustainability contribute toward product success?
- III. How emotional responses, perceived quality characteristics, and elements of sustainability incorporated to establish the sustainable and successful product?

### **1.3.2 Research Objectives**

To attain this research goal, there are three objectives are held out:

- I. To investigate user emotional responses and perceived quality characteristics involve in product design.
- II. To identify the element of sustainability contribute toward product success.
- III. To develop a sustainable and successful product design method that incorporates user emotional responses, perceived quality characteristics, and the elements of sustainability.

### **1.3.3 Scopes and Area of Research**

This research investigates both of the design experts and end users, who are the main stakeholders in determining the emotional responses and perceived quality characteristics. It explores and investigates the emotional responses and perceived quality theories, attributes, function, and approach. Therefore, the study also specifically investigates the elements of sustainability that contributed in the success of a product. In particular, this research is conducted to increase concern from product designer works towards sustainable product design. This is because many of them are still facing difficulties in ensuring and constructing a sustainability product in the market. The information is gained to develop a new design guideline that will help the product designers to establish sustainable product design and increase probability of its success.

### **1.3.4 Significant of the Research**

This research will contribute to the improvement of product characteristics based in other to achieve a success and sustainable product. I hope that this research will encourage an effective strategy that will benefit the product success and its marketability. The outcomes to be considered consist of a design guideline following: the users emotional responses and perceive quality characteristics as a preferences in determine the sustainable product; development of a new framework towards product design; increase in product technical and its competencies that meet design demands; enhancing designers by integrate a potential meaning in product design; and integrate a sustainable decision model for new product development.

### **1.3.5 Limitation of the Research**

The research was conducted by using only small representative sample of the overall population of product users at several Harvey Norman stores in Selangor, Malaysia to evaluate the emotional responses and perceived quality characteristics for sustainable product design. These data gained from these users, hence may not be generalized to the entire population in Malaysia.

Besides, as mention above, this research investigated the relationship between user emotional responses and perceived quality characteristics. However, it is undeniable there are factor that effect the users emotion evaluation because they are not familiar with the given emotion pictorial illustrations. Since users are not familiar with the perceived quality characteristics, it becomes an issue that can be seen as related in contributing to the characteristics of product success. The scope of this study is limited to assessing on emotions and perceived quality only based on product characteristics in other to achieve a successful and sustainability of product.

### **1.3.6 Expected Contributions**

The outcomes of the study are expected to:

- I. Provide a new design guideline that incorporates user emotional responses, perceived quality characteristics, and the elements of sustainability toward sustainability and the success of a new product.
- II. Present the theoretical and empirical evidence of user emotional responses and perceived quality characteristics contributed in the establishment of sustainable product design.
- III. Increase the effectiveness of user selection and decision-making process in product purchase.
- IV. Increase the possibility of sustainability and successful product in the market.

## 1.4 Outline of the Thesis

This study involved of two parts, which are a theoretical study and a survey. The theoretical study attempts to establish a framework from literature review for the survey. There are six chapters in total and each chapter is associated with each phase of the research works, as illustrated in Figure 1.1 below.

**Chapter 1 Introduction** - It begins with discussion of the research background, statement of issues, the aim of the research, research questions, research objectives, scope and the area of research, significant of the research, limitation of the research. Finally, the expected contribution and structure of the study also are discussed

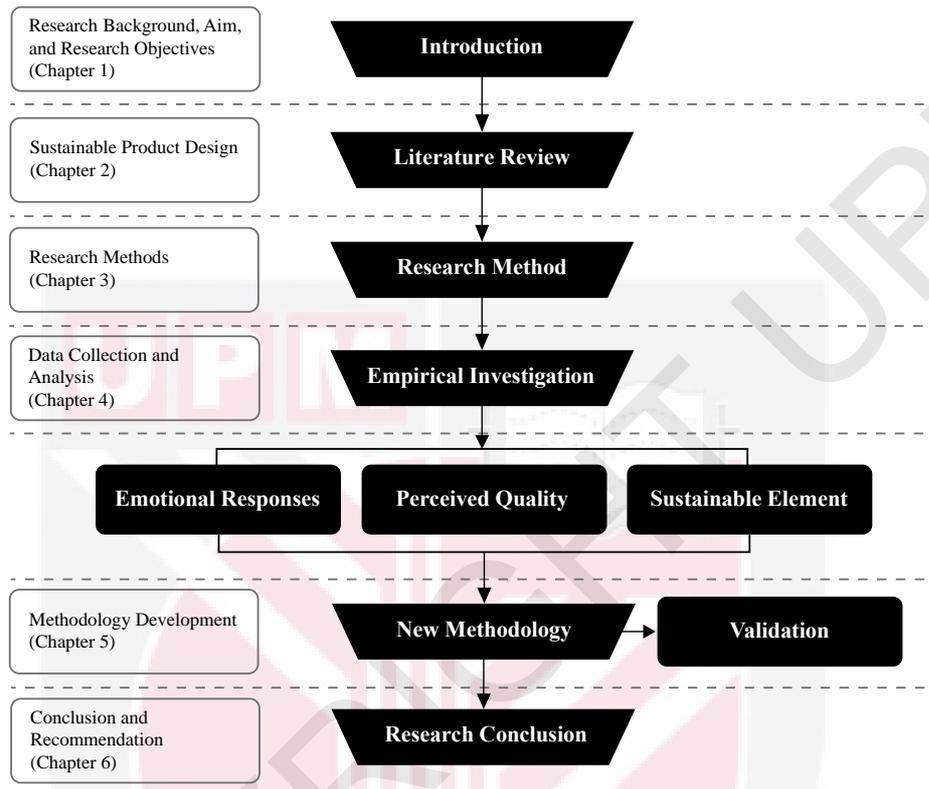
**Chapter 2 Sustainable Product Design** - This chapter presents a review of significant issues in undertaking research. At the end of this chapter, the research gaps are identified and a new strategy is proposed.

**Chapter 3 Research Methods** - This chapter describes the research method. It explains the research work and how it was performed. The analysis of the data and validation process are also explained.

**Chapter 4 Analysis and Results** - Deals with data analysis and results. The significant of user emotional responses, perceived quality characteristics and the elements of sustainability is further investigated. Several characteristics and elements are identified. An in-depth study is conducted to validate the characteristics and elements resulted in sustainability and successful product in the market.

**Chapter 5 Developing Sustainable Product Design Method** - Explain the development of a sustainable product design method as a new design guideline that incorporates user emotional responses, perceived quality characteristic and the element of sustainability towards sustainable product design as well as increase its success in the market. The design guideline acts as a tool attempts to verify and establish the sustainable product design specifications in the early stage of the design process. The chapter also presents the validation of sustainability and successful product through sustainable product design method.

**Chapter 6 Conclusion** - This chapter is the conclusion and summary of the research contributions. Recommendations for further research are also stated at the end of this chapter.



**Figure 1.1: Research methodology and associated thesis chapter**

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