

# Semantic Questionnaire-Tool for Emotion Research The Integration of Consumer Behavior and Kansei Engineering (Case Study in Furniture Design)

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**Abstract-** One important task for researchers is to find the right research tool for their studies. Problematically, suitable research tool is not easily found, especially for multi-disciplinary researches. As a result, adjusted and combined tools are often utilized in order to obtain the needed data. Kansei engineering is a one of the research tool that has been used in the field of engineering, especially in emotion-related engineering. It systematically aids the conversion of human feelings into quantifiable data by calculating the emotion data in numerical order and processes the data to identify the relationship between the studied objects. However, the technique fails to notice some of the related information especially those influenced perception before emotion built up. To measure and quantify perception, it can be conducted by various approaches. Therefore, this study proposed the methodology, which combine two disciplinary, to develop the tool to extract the consumers' information. Questionnaire integrating concept of consumer behavior together with the use of Kansei engineering was developed, to be utilized as an effective tool to study consumers' requirements and responses.

**Keywords-** consumer response; emotion research, Kansei engineering; semantic questionnaire

## I. INTRODUCTION

One important task for most researchers is to find a suitable research tool for their studies. As there are many techniques available, it is somehow problematic for researchers to obtain appropriate research tool for their study, especially for multi-disciplinary researches. Often, researchers have to develop an adjusted, or combined tool to obtain the needed research data. Kansei engineering is a tool has been used in engineering research, especially in emotion-related engineering research. It is generally known as a technique which converts subjective information about human feelings into quantitative data by quantifying and processing the emotion data into numerical order to identify their relationship with the studied objects. A generic model of Kansei engineering searches for relationship between human emotions in response to the studied objects. By limitation, this generic model focuses only on certain relationship but overlooks other related information especially those that influence human perception prior to the build-up of such emotion. To measure and quantifying data about perception, there are many different approaches. This study

proposed a methodology, which integrated the concept of consumer behavior together with the use of Kansei engineering, in order to create the effective tool to study consumers' responses and requirements.

## II. LITERATURE REVIEW

### A. Consumer Behaviors

Consumer behavior is defined as "the study of individuals, groups, or organizations and the processes they use to select, secure, use and dispose of products, services, experiences, or ideas to stratify needs and the impacts that these processes have on the consumer and society [1]." From the definition, it shows that the study of consumer behavior involves with consumers' activities, decision making process that integrated with environment. Generally, study in the field of consumer behavior focuses on the consumer decision making process, individual differences, psychological process and environment interaction. Assael studied the implication of consumer behaviors in marketing context and divided methods in studying consumer behavior into two approaches, managerial and holistic [2]. The managerial approach focuses on the individual consumers in details, such as demographic, lifestyle, attitude, perception and etc., while the holistic approach aims at overall purchasing decision making process and seeking reasons on how the final decision was developed.

The consumer decision making model had long been studied to identify factors that drove the whole consumer decision making process and their interaction. Assael proposed a simple model of consumer behavior showing that the consumer response was a result of decision making, which was influenced by individual's consumer characteristics and environment [3]. He believed that the consumer decision making was based on the effect of consumer response integrated with individual consumer characteristics and external influences. Engel, Blackwell and Miniard suggested three main variables that influence consumer decision making, which were individual influences, environmental influences, and psychological process. The individual differences included consumer resources, knowledge, attitudes, motivation, personality, values and lifestyle [4]. The individual differences can be retrieved by conducting the empirical research based on demographic information. Environmental influences included

culture, social class, personal influences, family, and situation, which could be found by psychographic information and factors that influenced consumer buying decision.

### 1) Demographic Information

The demographic information is generally accepted as the standard criteria in order to obtain consumer background. It is usually utilized as the primary criteria in classifying consumer segmentation. Kotler classified consumers into groups by using demographic variables, such as age, family size, family life cycle, gender, income, occupation, education, religion, race, generation, nationality, and social class [5]. Michman categorized demographics by ten variables, which were age, sex, family size, family life cycle, income, occupation, education, religion, race and nationality [6]. However, many researchers argued that the use of demographic information solely can only explain their basic background, but cannot explain on consumers' personal characteristics in particular [7]. Therefore, various new techniques have been invented in order to seek for more specific consumer characteristics.

### 2) Psychographic Information

Psychographic information is one of the most widely used approaches in obtaining consumers' characteristics. Michman defined psychographic research as "a quantitative research intended to measure the psychological apart from the demographic dimensions of consumers [6]." It was applied for consumer researches in various fields such as brand image, private brand buyer, outer shoppers, and opinion leader [8,9,10]. Psychographic information benefits marketing team in terms of consumer insights as the more they understood consumers, the more effective they could able to communicate, market and deliver appropriate products to consumers [11]. Lazer was the first pioneer who applied the concept of lifestyle patterns to marketing in order to capture the consumer characteristics [12]. Plummer applied "AIO" method in conducting the psychographic research. This approach was based on three variables, which were activities, interests, and opinion [11] Assael suggested the psychographic information should include social class, values, personality and lifestyle [2]. Dhalla and Mahatoo introduced three key criteria for effective psychographic study, which were value orientation, role perception and buying style [13]. Kahle proposed the list of nine values as the benchmark for psychographic study, which included self-respect, security, warm relationships with others, sense of accomplishment, self-fulfillment, sense of belonging, being well respected, fun and enjoyment in life, and excitement [14]. Sirgy classified the role perception into four parts, which were actual self, ideal self, social self and looking glass self [15]. The impulse buying concept explained the reason why consumers buy products. Kalla and Arora suggested that the motives of impulse buying were from two sources, internal motives (self-discrepancy, hedonic needs, mood states, self regulatory resource availability, austistic stimuli, social status, subjective well being) and external motives (visual stimulus, shopping format, self-service, store environment, discounts, display, shelf space, ambient factors, social factors, perceived crowding and ownership of credit card) [16].

### B. Consumer Perceptions – The Marketing Stimuli

The key success factors for new product launch is to stimulate needs for the use of product and create the awareness on benefits of the products. The stimuli can be classified into two groups, first, marketing stimuli and the latter, environmental stimuli. The marketing stimuli are those related to selling and marketing of products, while the environmental stimuli are social and cultural influences [17]. Assael classified marketing stimuli into two groups, the primary stimuli and the secondary stimuli. The primary stimuli involve with product itself, such as form, functions, packaging and other physical characteristics. The secondary stimuli are linked with primary stimuli with the enhancement of product representation such as price, place, promotion, etc. Stimuli characteristics affect perception through sensory elements, such as sight, taste, smell, sound, touch, and structural elements through the understanding of each person.

### C. Kansei Engineering Technique

Kansei engineering is known as "translating technology of a consumer's feeling and image for a product into design elements" [18]. The objective of Kansei engineering is to develop a new product according to consumer's feeling/emotion. Kansei engineering has been applied in various industries, such as vehicle interiors, watches, telephone and etc., in assisting designers to understand consumer in term of emotion toward design elements [19,20,21]. It is obtained through experiment on consumer responses toward product's form by quantifying emotion and finding the relationship between these two variables. There are four main approaches in measuring the emotion for Kansei engineering, statistical scaling, magnitude estimation, Likert scale and semantic differentials method. [22]. However, the most widely use technique in Kansei engineering is semantic differentials method, as it integrates the bipolar adjective scales as the key of measurement [23]. Generic Kansei engineering experiment suggests six steps to create the list of measurement for Kansei engineering, which are decision of strategy, collection of Kansei words, setting of psychological measurement, collection of product samples, a list of item/category and evaluation experiment [24]. From this process, it shows that the design elements are firstly extracted from complete product images and matched with emotion, which are represented by adjectives (Kansei words), by conducting Kansei experiment. The result is stored in database and will be analyzed by using either statistical, soft computing or mathematical approaches. The result is suggested from Kansei analysis and summarized for designers to utilize in designing new product [25,26,27,28,29].

## III. METHODOLOGY

From the literature review, this study found resemblance and relationship in the concept of consumer behavior, consumer perception, and Kansei engineering. Therefore, this study integrated three concepts and proposed a methodology which consisted of tool to effectively extract the consumers' emotional data in response to products through the use of questionnaire. The methodology is divided into three phases,

which are the formulation of conceptual framework, research design, and questionnaire preparation.

**A. Conceptual Framework**

This phase illustrated how consumer behavior, consumer perception and Kansei engineering were integrated in order to create the conceptual framework. This step aimed to study the influences and impacts of demographic and psychographic factors on consumers behavior and their perception toward products. Figure 1 illustrated the conceptual framework of this study.

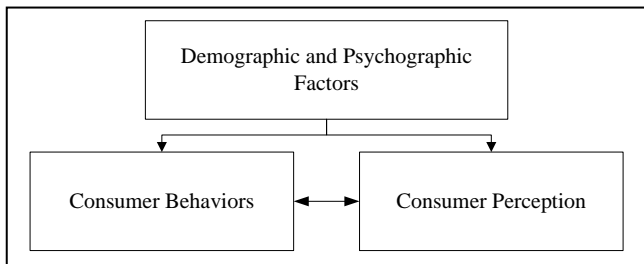


Figure 1. Conceptual Framework

**B. Research Design**

This research focused on the connections between each of the consumer characteristics, which were demographic and psychographic profiles, consumer behavior, and consumer perception. The study aimed to evaluate the relationship among all variables. The population for this study was sofa buyers, who lived in Bangkok with age range from 26-40 years old with no regard to gender. Since the exact number of population was not able to obtained, therefore, we applied W.G. Cochran theory by allowing 95% confidential level, 5% deviation and 0.2 of population portion. All participated subjects were asked if they were involved with any decision in buying sofa. The total sample size for this study was round up from 284 to 300 subjects by using quota sampling. The pre-test study was conducted utilizing 30 subjects, which randomly asked from sample group in order to evaluate the reliability of the questionnaire.

**C. Questions Preparation Phase**

This phase focused on details of the questions in order for them to effectively gain the most comprehensive data from the subjects. The questions were divided into three parts 1). Consumer characteristics by demographic and psychographic information, 2). Consumer motives and buying behaviors, and 3). Consumer perception through Kansei engineering.

*1) Questions on Consumer Characteristics by Demographics and Psychographics*

The questions in demographics and psychographics part were developed from 136 literature reviews on market segmentation, demographics, and psychographics. The

demographic questions consisted of 10 questions, which are gender, age, material status, number of family members, education, occupation, income, type of residence, residence ownership, and number of residents. All questions were multiple choices. The psychographic questions composed of 30 questions involved with value orientation, role perception and buying style. The questions were created in general statement with Likert 5 scale indication (Extremely disagree – Extremely agree) in order to evaluate the general psychographic consumer characteristics. All questions were reviewed and scored by five marketing experts in from the furniture industry in Thailand by utilizing “Item Objective Congruence Index” (IOC) in order to evaluate the content validity. After the content validity was conducted, 30 units of pre-test questionnaire were distributed to sample group to test the reliability of the questionnaire. The sample group was furniture consumers who live in Bangkok with age between 26-40 years. The Cronbach reliability test is was applied in order to verify the reliability of these questions [30,31]. Table II illustrated the lists of questions from demographics and psychographics part.

TABLE II: LIST OF QUESTIONS (CONSUMER CHARACTERISTICS)

Demographic Questions
1. Gender
2. Age
3. Material Status
4. Number of Kids in Family
5. Education Background
6. Occupation
7. Income
8. Type of Residence
9. Residence Ownership
10. Number of Residents
Psychographic Questions
11. I always value myself.
12. I have enough saving to buy luxury things.
13. I feel uncomfortable when talking to strangers.
14. The surrounding of my house is lively.
15. I feel good to join activities with others.
16. I seek for the success in my life.
17. I always try my best for everything I do.
18. I love to do things with many people.
19. I like others to approach me first.
20. I like to stay home on my holiday.
21. I love excitement.
22. I decorate my house as I like.
23. I love to use brandname goods.
24. I want people to recognize me.
25. My house is different from others.
26. I believe using brandname goods, make people more superior.
27. I always call friends to catch things up.
28. My friend said my house looks like house in the magazine.
29. My friend noticed that I always use brandname goods.
30. My friend said I am reliable.
31. I always follow the fashion trends.
32. I always have friends visiting.
33. I am a good consultant for my friends.
34. I am the first who buy the latest product launch.
35. I buy things follow the person I admire.
36. I buy things on emotion rather than reasons.
37. I love to see things around and buy when I find it right.
38. I don't hesitate to buy things that represent myself.
39. I study and compare all options before I buy.
40. I always have my shopping list before going out.

## 2) Questions on Consumer Motives and Buying Behavior

The questions in consumer motives and buying behavior part were developed from 58 literature reviews on consumer decision model, consumer behavior, and key success factors in product launching. The consumer motives consisted of 23 marketing stimuli that affected decision making on buying sofa. All questions were evaluated according to the importance of stimuli on consumers by applying Likert 5 scale (Least Important – Most Important). The buying behavior composed of 7 questions asking about consumer behavior in the purchasing of furniture. All questions were reviewed and scored by five marketing experts from the furniture industry in Thailand also by applying “Item Objective Congruence Index” (IOC) in order to evaluate the content validity. After the content validity was conducted, 30 units of pre-test questionnaire were distributed to sample group to verify the reliability of the questionnaire. The sample group was furniture consumers who live in Bangkok with age between 26-40 years. As the population was unknown, therefore, we applied W.G. Cochran theory by allowing 95% confidential level, 5% deviation and 0.2 of population portion, in order to finalize the sample size of 300 subjects. The Cronbach reliability test was applied in order to validate the reliability of these questions by 30 subjects [30,31]. Table III illustrated the lists of questions from consumer motives and buying behavior part.

TABLE III: LIST OF QUESTIONS (CONSUMER MOTIVES & BUYING BEHAVIOR)

Consumer Motives
1. Product form / Design
2. Size / Dimension
3. Quality
4. Maintenance
5. Brandname
6. Quality Certificate
7. Product Presenter
8. After-Sale Service
9. Appropriate Price relative to Quality
10. Appropriate Price relative to Product Design
11. Appropriate Price relative to Competitors
12. Convenient Location
13. Display looks like home
14. Clean and Nice Display Setting
15. Clear Product Description at Point of Sale
16. Informative Salesperson
17. Discount
18. Free Gift
19. Collected Stamp
20. Rewards
21. Membership
22. Credit card 0% Installment
23. Credit card Promotion
Buying Behaviors
24. What are the reasons you buy sofa?
25. Why do you use sofa?
26. How long does it take for you to decide to buy sofa?
27. What are sources of information before buying sofa?
28. What is your budget for one sofa?
29. Who are the most influencers on your decision on sofa purchase?
30. Where is the place you think of when you want to buy a sofa?

## 3) Questions on Consumer Perception by Kansei Engineering

The questions on consumer perceptions by Kansei engineering were developed from 48 literature review on Kansei engineering. The questions consisted of 10 pairs of bi-polar adjectives and 10 sofa images, subjects were asked to rate their responses with semantic differential 5 scales. Thereafter, the relationship between the consumer perceptions toward product’s form and the products’ form was derived and the selection of sofa images and adjectives were evaluated. The results were described below.

### a) Sofa Images

This study employed sofa images as the object of the study. One hundred sofa images were collected from the period of 2010 – 2011 from 5 leading furniture and decoration magazines in Thailand. The paper cards of the selected sofa images were made into A4 size cards with gray color scale in order to avoid color deception. Three furniture designers, with more than 5 years experience in furniture design, were invited to evaluate the sofa image cards, comparison in terms similarities and differences of external appearance were carried out, and at the end they were asked to select 10 sofa images to be implemented in this study. The final set of the sofa images was show in figure 2.



Figure 2. Ten Selected Sofa Images

### b) Adjectives

The consumer responses toward product’s form were evaluated by the matching of images and adjectives. In this study, ten pairs of bi-polar adjectives were created in order to allow the subjects to communicate their responses to the sofa images. Semantic differential method with Likert five scale was applied in order to measure the degree of emotion/feeling toward product’s form. To derive with appropriate adjectives that could clearly signify the consumer response the previous team of designers that selected sofa images participated in selecting the adjectives together with 3 salespersons, with more than five years experience in sales and marketing of sofa. All of them were invited to participate in brainstorming sessions. In The first session of brainstorming, each participant was shown the photo of sofa images and was asked to give corresponding adjectives that match with each sofa. At the end of the first session, there were a total of 127 corresponding adjectives. In The second session of the brainstorming, all participants were gathered together in a room and were then asked to condense the number of adjectives by categorizing adjective with similar meaning in to group. The groups of adjectives were developed and designated with the best matched adjective in that category. As a result, the ten pairs of

bi-polar adjectives were selected as the measurement scale of this study. The list of ten selected adjectives was shown in figure 3.

Ugly – Beautiful	Old Fashion - Modern
Uncomfortable – comfortable	Formal - Casual
Hard – Soft	Fragile - Durable
Bulky – Slim	Worthless - Valuable
Unrefined – Elegant	Dislike - Like

Figure 3. Ten Selected Sofa Adjectives

After the sofa images and adjectives were selected, the sofa image and adjectives were listed together in order to allow subjects to rate each sofa images according to their responses perception toward the products' form. Figure 4 illustrated the questionnaire developed for Kansei engineering part. 30 units of pre-test questionnaire were distributed to sample group to validate the reliability of the questionnaire. The sample group was furniture consumers who live in Bangkok with age between 26-40 years. As the population was unknown, therefore, we applied W.G. Cochran theory by allowing 95% confidential level, 5% deviation and 0.2 of population portion, in order to finalize the sample size of 300 subjects. The Cronbach reliability test was administered in order to verify the reliability of these questions [30,31].



Ugly	1	2	3	4	5	Beautiful
Uncomfortable	1	2	3	4	5	Comfortable
Hard	1	2	3	4	5	Soft
Bulky	1	2	3	4	5	Slim
Unrefined	1	2	3	4	5	Elegant
Old Fashion	1	2	3	4	5	Modern
Formal	1	2	3	4	5	Casual
Fragile	1	2	3	4	5	Durable
Worthless	1	2	3	4	5	Valuable
Extremely Dislike	1	2	3	4	5	Extremely Like

Figure 4. Ten Selected Sofa Adjectives

#### IV. RESULTS AND DISCUSSIONS

At the end, the three parts were integrated, the pre-test questionnaires were conducted and launched to 30 subjects in order to evaluate their representativeness of consumer characteristics, consumer behavior, and consumer perception. The result shown that the questionnaire was acceptable as the Cronbach reliability test result was equal to 0.72. The questionnaire was therefore deemed validated and was ready to be applied for further actual data collection.

#### V. CONCLUSION

This study aimed to propose a new methodology that integrates two disciplines together. The semantic questionnaire eliminated the impracticality in conducting multi-disciplinary research that incorporated emotion-related engineering and consumer behavior. However, this paper aims to study only in the furniture development domain, particularly in sofa design process. The questions, which were developed in this paper, were resulted from a particular product context. It should therefore be considered as proposed methodology or tool to be utilized in multi-disciplinary researches that integrate data about consumer behavior and emotion-related engineering.

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