



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

USER INTERFACE ASSESSMENT OF CAR DASHBOARDS

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Management) (Hons.)

by

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DECLARATION

I hereby, declared this report entitled
“User Interface Assessment of Car Dashboards”
is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Management) (Hons.). The supervisory is as follow:

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ABSTRAK

Hari ini kebanyakan pengguna kereta bukan hanya menilai kereta itu pada luaran tetapi juga dalaman kereta terutama papan pemuka pada timbunan pusat dimana fungsinya terdiri daripada radio, penyelarasan penyaman udara dan juga reka bentuk yang terdapat pada timbunan pusat tersebut. Mengikut kajian yang terdahulu kebanyakan pengkaji akan mengkaji pada timbunan pusat secara keseluruhan terutama pada bahagian pemandu antaranya adalah meter kelajuan, reka bentuk pada timbunan pusat secara keseluruhan dan juga paparan panel kereta termasuk saiz tulisan dan simbol dengan menggunakan kejuruteraan kansei. Kebanyakan pengguna kereta akan meluahkan perasaan dan emosi mereka pada gerak-geri badan, wajah dan juga percakapan ketika pengguna mencuba samada pada kereta baru atau yang lama. Maka kajian yang dijalankan dalam projek ini adalah lebih fokus dalam menilai perasaan dan emosi pengguna kereta dari segmen-B. Perkataan kansei di pilih menjurus kebawah dan analisis menggunakan separa kurang kuasa. PLS adalah untuk mengenal pasti hubungan diantara tindak balas dan ramalan. Untuk mencapai pemilihan tersebut, kriteria-kriteria penting dan ramalan yang sesuai dengan perkataan mempunyai dua peringkat untuk mencarinya. Keputusan ditunjukkan dimana nilai pekali terhasil dan terdapat dua nilai dalam bentuk positif dan negatif untuk setiap ramalan. Nilai pekali ialah dapat ditentukan dimana ramalan akan dipilih dalam jenis perkataan kansei yang terbaik. Pembelajaran ini juga menunjukkan data untuk setiap perkataan kansei dimana ramalan hampir sama dan hanya dibezakan melalui nilai. Tambahan lagi ramalan jua menunjukkan semua ramalan boleh di kenal pasti tetapi mengikut perasaan sendiri. Kesimpulannya perkataan kansei sebenarnya boleh ditentukan diri sendiri, ini kerana ramalan dalam pembelajaran ini tidak menunjukkan ketepatan perkataan kansei yang sesuai dan hampir sama untuk setiap ramalan dan pengguna boleh memilih perkataan kansei mengikut dari citarasa sendiri.

ABSTRACT

Today most of car users not only evaluate the car on the exterior but also the interior of the car especially on the dashboard center stack functions which consists of radio, air conditioning coordinator and also there are designs on the center stack. According to previous studies most researchers will study the whole center stack, especially at the drivers of which are speed meter, the design of the center stack as a whole and also the display panel including a car and a symbol font using Kansei engineering. Most car users will express their passions and emotions in body language, facial and conversation when users try either on new or old car. This study was carried out in the project is more focused on assessing the feelings and emotions of the users of B-segment cars. A few selected words called Kansei words were narrowed down and analyzed using Partial Least Squares (PLS). The PLS is to identify the correlation between the response and predictors. To achieve that is choose a few main attributes and predictors suitable with the kansei words and the results show that have a value coefficient in positive and negative values for each predictors. The values coefficient is for to determined which one the best predictors to desite what kind of for kansei words. This study shows the data for each kansei word which is the predictors almost the same and only the values are different between each others. In additions, the predictors also show for all the predictors can be identified the kansei word but followed own feeling. As conclusion the kansei word actually can be determined based on feeling, this is because the predictors in this study almost the same and the users can be choosing the kansei word followed by own feels.

TABLE OF CONTENT

Abstrak	i
Abstract	ii
Table of Content	iii
List of Table	vii
List of Figure	viii
CHAPTER 1: INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	2
1.3 Objective of the study	4
1.4 Scope of the study	4
CHAPTER 2: LITERATURE REVIEW	5
2.1 User Interface Design (UI)	5
2.2 Problems Related to User Interface Design	6
2.2.1 Human Limitations	7
2.3 Usability and User Experience	9
2.3.1 Comparison Between Usability and User Experience	9
2.3.2 These is Definition of ISO standard ISO 9241-11	11

2.4 Interface Development	12
2.4.1 Usability Testing	13
2.4.2 Characteristic of Usability Testing	13
2.5 Automotive (dashboard) Interface Design	14
2.6 Affective Design / Kansei Engineering	15
2.6.1 Introduction	15
2.6.2 Kansei Engineering (KE)	17
2.6.3 The Method Used of Kansei Engineering	18
2.6.3.1 The Types are briefly described as the following	18
2.6.5 Application in Kansei Engineering (KE)	24
2.7 History of Semantic Differential	25
2.7.1 Statistical Method and Tools Used in Kansei Engineering (KE)	26
CHAPTER 3: METHODOLOGY	27
3.1 Introduction	27
3.2 Planning of The Study	27
3.2.1 Primary Data Collection	28
3.2.2 Secondary Data Collection	29
3.3 Detail of Primary Information Collection	29
3.3.1 Definition of Product	29

3.3.2 Kansei Word	31
3.3.3 Surveys Method	32
3.3.4 User Sample Size	32
3.3.5 Semantic Differential Tools	33
3.3.6 Minitab Software	33
3.4 Detail of Secondary Information Collection	33
CHAPTER 4: RESULT & DISCUSSION	35
4.1 Demographic Background	
4.1.1 Gender	35
4.1.2 The age distribution	37
4.1.3 The favorite cars	38
4.2 Narrowing down the Kansei words	40
4.3 Car Center Stack Design Elements	41
4.4 Data analysis	43
4.4.1 Style	43
4.4.2 Exclusive	47
4.4.3 Elegant	50
4.4.4 High- Technology	54
4.4.5 Sporty	58
4.4.6 Functional	61

4.4.7 Simple	64
4.4.8 Formal	68
4.5 The Kansei words with predictors	71
4.6 Average Ratings for Car Center Stack Designs	72
CHAPTER 5: CONCLUSION	76
5.1 Conclusion	76
5.2 Recommendation	78
REFERENCE	79
APPENDICE	

LIST OF TABLE

3.1	List of B-segments car	30
3.2	Type of kansei word good and bad use in this study	31
4.1	The information form questionnaire	36
4.2	Age Distribution	37
4.3	The favourite cars of the respondents	38
4.4	The total kansei word use in questionnaire (before selected)	40
4.5	The variable design element with description	42
4.6	Positive values with predictors for style	44
4.7	Negative values with predictors for style	45
4.8	Positive values with predictors for exclusive	48
4.9	Negative values with predictors for exclusive	49
4.10	Positive values with predictors for elegant	51
4.11	Negative values with predictors for elegant	52
4.12	Positive values with predictors for high-technology	55
4.13	Negative values with predictors for high-technology	56

4.14	Positive values with predictors for sporty	59
4.15	Negative values with predictors for style	59
4.16	Positive values with predictors for functional	62
4.17	Negative values with predictors for functional	62
4.18	Positive values with predictors for simple	65
4.19	Negative values with predictors for simple	66
4.20	Positive values with predictors for formal	68
4.21	Negative values with predictors for formal	69
4.22	Kansei word with their attributes and predictors	71
4.23	Kansei word with their attributes and predictors	71
4.24	Average of 11 samples from questionnaire	72

LIST OF FIGURE

2.1	Coffee machine interface (Darnell, 2010)	6
2.2	Usability as parts of the user experience: (Source : Neospot Website)	10
2.3	Framework of usability (ISO-9241-11,1998)	11
2.4	The process of kansei (Lokman & Nagamachi, 2009)	16
2.5	Kansei Gateways (Lokman & Nagamachi, 2009)	16
2.6	The kansei engineering system (Nagamachi, 1995)	18
2.7	The process tree of KE type 1 (Nagamachi, 2001)	19
2.8	The principal KE system of type II (adapted from Nagamachi, 1997))	20
2.9	The principal KES Backward (adapted from Nagamachi , 1997)	21
2.10	Hybrid Kansei Engineering System (adapt from Nagamachi, 1995)	21
2.11	A proposal how IKDS could appear (adapted of Nishino et al., 1999)	23
3.1	The flow-chart of primary information	28
3.2	The flow chart of second information	29
3.3	Several center stack a Malaysia (Source: Perodua& Nissan website)	30
4.1	the bar graph for gender	36

4.2	Non-national compact sedan (source: www.cbt.com.my)	39
4.3	Result from Minitab software (Style)	43
4.4	Examples the color three schemes in style (Source : www.dixietoyota.com)	45
4.5	Level predictors (style)	46
4.6	Result from Minitab software (Exclusive)	47
4.7	Level predictors (exclusive)	50
4.8	Result from Minitab software (Elegant)	51
4.9	Level predictors (elegant)	53
4.10	Value affective designs from researcher	54
4.11	Result from Minitab software (high technology)	55
4.12	Level predictors (high technology)	57
4.13	Result from Minitab software (sporty)	58
4.14	Level predictors (sporty)	61
4.15	Result from Minitab software (Functional)	61
4.16	The Level predictors (functional)	64
4.17	Result from Minitab software (simple)	65
4.18	Level predictors (simple)	67
4.19	Result from Minitab software (formal)	68
4.20	Level predictors (simple)	70
4.21	Average users like from questionnaire	73

CHAPTER 1

INTRODUCTION

1.1 Background

Interface is an interaction between man and machine. Hence this interaction, as indicated by the different combinations of users. This interface also actually occurs anywhere where there is a human machine and the machine there interfaces. Between user interactions it is considered that the application is used as electronic devices, home equipment, and others. In addition to the display this interface the user can find out whether it works or easy to use. Actually interface actually has long been studied; its purpose is to recognize how the interaction is occurring. So at these time studies will be performed on the vehicle interface of the car, because the car is very important in human life to move the desired place then the interaction between machines or display will be more frequently used. Among studies that examine the car's interior is like the emotions and feelings while in a car, and that there is also a panel where humans regularly interact.

Researcher which is Jindo and Kiyomi (1997) have studied in connection with the car interior speedometer symbols where they study about whether the user comfortable. Their study of the review is the design layout. In addition the study the researchers found several important elements for evaluation. The scale type, lettering, shape indicator and also starting point of evaluation test being run by Jindo and Kiyomi (1997). Study of this interface makes car manufacturers especially from Japan like Mazda, Nissan; Honda also has applications in the study of interface (Schutte, 2002). Besides, researched done as well as examinations of car interior led project which distinguish between Europe and Japan Kansei in 1998 (Schutte, 2002).

Hence this study has shown that the study of this interface has been done since time immemorial and it is very important especially on car manufacturers to ensure that products produced are followed according to consumer tastes and ages.

1.2 Problem Statement

Now the variety of car brands in Malaysia includes the Proton, Toyota, Produa, Nissan and not forgetting the prestigious brands such as Mercedes, Volkswagen and also BMW. car also have a variety segment of the segment A to MPV levels, at the present time users prefer to use a car from the segment B, as most car manufacturers produce cars with more stylish and technology to achieve the youthful features while users use it. At this time most of the customers is not only focus on the external design of cars, but consumers are more focused on interior design including the center stack. center stack has a variety of beautiful designs in order to attract further users find the center stack provides a more comfortable feeling to the user when it is in the car. Besides the functions contained in the center stack also need to understand how to use them to prevent users experience difficulties when using it and cause users discomfort along in the car.

In a previous study shows many researchers made some researches about the interior part of car. From their research, obviously mentioned the interior part of car is most important in car production and also for clients need. Unfortunately, most of clients are still not satisfied with the results of the existing designs in the market now. Therefore a country of Japan has established rules or principles which they respect or sense of touch is called Kansei. Kansei expression cannot be seen clearly because the only known such as hearing, taste, feeling, and also environmental conditions (Nagamachi, 2001).

For example, if a buyer wants to buy a car, they will feel the chemistry with the car when are person are in the car and try to interact with the functions of the car, especially in the center stack of the dashboard.

Hence this study was to determine the center stack which is more attractive to most consumers, especially in Malaysia. However, the research is also the producer of the center stack can produce more innovative and stylish according to consumer preferences. By having this study the production of cars will also be more active and competitive in the car market. if this study was not done in the growth in the car market will become sluggish and can cause a downturn in the market is not buying the car, but also the producer will suffer a loss in terms of car sales and thus produce a car that is not liked by the users.

1.3 Objective of the Study

The main objectives of this study are:

- a) To identify the affective design attributes for center stack of cars.

- b) To relate the design preferences with affective design attributes.

1.4 Scope of the Study

The study of this time will be focused on the B segment cars. B Segment cars are popular among the young and the elderly drivers in Malaysia. This study would be carried out using several methods such as semantic differential and Partial Least Squares (PLS) method. Then by performing the method we can find the characteristics found in each sample, and thus can determine the ideal characteristics that are needed by the user.

CHAPTER 2

LITERATURE REVIEW

The study of car interior design has been done by many researchers. Mostly researchers in Japan, however the Europeans also have made plenty of research about the interior design. Unfortunately there not make a complete research but focus on a certain component such as a speedometer, a steering wheel, seats, switches and so on.

2.1 User interface design (UI)

User interface is a communication that end-user can interact with a system. There is a point in the system where in human being interact with the computer so that called it a Human Computer Interaction (HCI). There are many areas covered by interface design such a computer, hand phone, which focus on psychology, ergonomic, engineering and graphic design. In daily life, people are in constant contact with interfaces, for example when go the shop then want to buy something, then carry to cashier counter for pay

item, the cashier will interact with cash machine. So when users interact with computer system the can called via user interface (UI). A good user interface must be designed in a manner that facilitates easy usage. Hence the poor user or the functionality interface design can be invite the problem example of the computer software, which their software cannot to proceed next step because the user do not know how to use a properly.

2.2 Problems related to user interface design

Poor labeling of menu items make the users confusing. Hence this can cause user's frustration during usage of the items. Mostly the user will commit mistakes during performing task for example of the radio function in car, the user want to change the channel FM, they need to press such as press 1,2 or 3 but if user's the press others button perhaps can get similar function. So the examples below show about the user's interface (UI) with confusing problem.



Figure 2.1: Coffee machine interface (Darnell, 2010)

The coffee dispenser in Figure 2.1 does not show any sign that consumers should provide cups. Then the user who will use it only will continue to press on the buttons without thinking to provide cups before that. Finally the coffee would spill on the floor. This is because the display interface is poor instruction; because of the coffee dispenser machine interaction with humans cannot be properly interpreted by users. Furthermore example for size cups not show more detail what kind of the cups should use suitable with coffee machine produce follow the level.

2.2.1 Human Limitations

Several human limitations are described below:

- *Limited short-term Memory*

The user normally can remember what they do when repeating a task. However the user also has limited capacity to remember. Humans have a capacity to remember seven plus or minus two items at a time (Miller, 1956). This capacity is enhanced when the items are familiar to the person. According of Miller (1956) has many factors to influence the human capacity such as receiving, processing, and remembering in short terms. Several specific information related to human information processing is:

- a) Absolutely judgment is to determine the ability and accuracy with difference items in one dimension one or more characteristic (Miller,1956).

- b) Immediate memory which the capacity memory will judgment for later use (Miller, 1956).
- c) Recoding is the ability of the mind to decrease item with complex data which make more good arranged data. Mostly users will remember things only in the short term even simple things.

- *People make mistake*

That means normally the user conform do task same mistake even the mistake a little or much. Examples the user make a mistake on the system and cause wrong function. Then the mistake will produce inappropriate alarm and message. Actually if the user make a mistake then produce warning or alarm, there produce stress on the user then more influence for user make more mistake. Some the user have health problems such as nervousness then this would be more likely to make mistakes with more. So to reduce the people make a mistake, the designers need to define what the user's need.

- *People are different*

Mostly the user has different physical capabilities. Users have a variety of the physical abilities, therefore it is important to match the physical abilities of users. If the designers do not meet the physical ability will cause the user is not satisfied and has a variety of complaints.

- *People have different interaction preference*

Like picture or like text. The consumers would like to indicators that variety of shapes and colors. Mostly the customer preferred color. This is because the color is important and easy to remember than symbols. Color also has a variety of colors to divide each function to.

2.3 Usability And User experience

The usability was created past 10 years ago to change the term “use friendly” (Bevan et al., 1991). According definition in ISO FDIS 9241-210, usability can be defined as effectiveness, efficiency and satisfaction related to the usage of interface or product (Bevan, 1991). Whereas for user experience approach of ISO FDS 9241-210 which a perception and responses of person and that result from the use and/or expected use of a product, system or service (Bevan, 1991). However both of definition actually can be measured during or after use of product, system or service (Bevan, 1991). Actually a ‘perceptions and responses’ of user experience are the same concepts of satisfaction in usability (Bevan, 1991). However the usability and user experience have a weakness which there are not be to clear concerned with time (Bevan, 1991).

2.3.1 Comparison between Usability and User Experience

Most people cannot tell the difference between usability and user experience (UX). Besides that mostly think that the user experience is not enough to describe something that can be used (weather good or bad, it still experiences), and superior usability is user experience. However, have a new concept to refer to the user experience as the next greater perspective of usability as user's (Nilsson, 2010). The diagram below shows the usability as parts of the user experience:

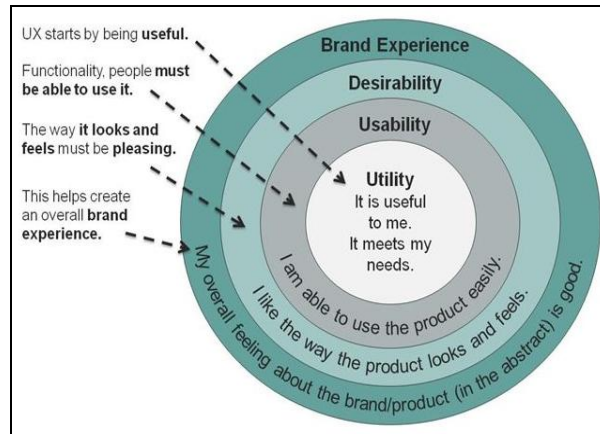


Figure 2.2: The usability as parts of the user experience: (Source: Neospot Website)

According to the diagram above shows that the outermost target based on the user experience as it taken from the feeling during use, then it can make sense of it as an experience. This refers to the brand experience. Then the second level is the same as the outer targets, but it is more to having to use it, for example someone buys iphone will increase to get the newer version. This is because the benefits and advantages of using the product. When referring to the outermost layer, the brand experience is enhanced by good usability and desirability. According definition of user experience in ISO FDIS 9241-210 show usability is part of user experience (UX). “User experience (UX) have includes all the user’s preferences, emotions, perceptions, physical and psychological responses, behaviors and accomplishment that occurs, current and after use” so it can be includes the user’s effectiveness and efficiency (Bevan, 1991).

The below figure show is framework of usability:

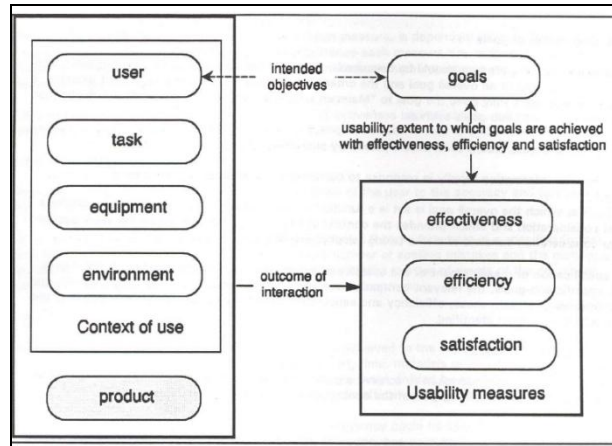


Figure 2.3: Framework of usability (ISO-9241-11, 1998)

This framework is for relation between each others. Hence the route of how usability impacts of each item can be used. Starting from the interaction with a product and then get out of the usability of the product and will be measured. The measurement of usability, there has three main elements of satisfaction, effectiveness and efficiency. The elements should be able to determine a product's in terms of quality or not. After usability that measured, and the objective be achieved with certain specifications then several user will be granted to use it.

2.3.2 ISO definitions of usability

- a) **Usability:** The potential to be reviewed by products that can be used by specific user's to achieve three main things is Effectiveness, efficiency and satisfactions in the context specified in the user's (ISO 9241-11, 1998).
- b) **Effectiveness:** The accuracy and completeness of user's achieve specified goals (ISO 9241-11, 1998).