



UNIVERSITI PUTRA MALAYSIA

***INCLUSION OF UNIVERSAL DESIGN TOWARDS USER-CENTRIC
INTERIOR DESIGN PROCESS IN MALAYSIA***

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**INCLUSION OF UNIVERSAL DESIGN TOWARDS USER-CENTRIC
INTERIOR DESIGN PROCESS IN MALAYSIA**

By

NORANITA BINTI MANSOR

**Thesis Submitted to the School of Graduate Studies, University Putra
Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of
Philosophy**

April 2017

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DEDICATION

To All Users Who Use and Access the Interior Design in Malaysia.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

INCLUSION OF UNIVERSAL DESIGN TOWARDS USER-CENTRIC INTERIOR DESIGN PROCESS IN MALAYSIA

By

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April 2017

Chairman : Prof. Rahinah Ibrahim, PhD
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Misinterpretation on the “real user” in interior design becomes a fundamental issue that prohibits interior designers to include new design thinking in the interior design process. The purpose of this research is to strategize on how to include Universal Design (UD) as a common practice in interior design process towards users centric in Malaysia. This study uses literature survey to comprehend UD theories and practice. The results from the literature survey assist this research in generating a theoretical proposition. In order to answer the main research question, this research employs case study research methodology in two phases. The first phase is to examine the compliances of Malaysia standard 1184:2014 (UD and accessibility in the built environment-code of practice (second revision) in built environment in Malaysia. The second phase is to document the current interior design process practices in Malaysia. The results from the first phase established that most of the selected building samples in this study moderately comply the MS 1184:2014. The findings give an evidence for this study to strategize for included UD in the interior design process. As a final, the second phase of data collection on documentation of the current interior design process in Malaysia has been performed. The results had been streamlined into twelve best interior design task descriptions. The streamlining design tasks contribute for this study to propose a potential stage for include UD in the interior design process. There are seven potential stages for UD inclusion in Interior design process. Then, this study recommends the inclusion of UD in the interior design process through the theoretical model in demonstrating the theoretical proposition of this study which posits “designers can successfully include UD by introducing empathic comprehension about all users have restricted capabilities during the conventional design process”. The recommendations are expected to be benefits for interior designers to stay relevant in design practice especially in designing toward users centric and to support demographic change issue related to interior design in Malaysia.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**MEMASUKAN REKA BENTUK UNIVERSAL DALAM PROSES REKA
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Salah tafsir mengenai pengguna di dalam rekabentuk dalaman menghasilkan masalah dasar yang membataskan pereka dalaman untuk memasukkan pemikiran rekabentuk baru di dalam proses rekabentuk dalaman. Kajian ini bertujuan untuk mencari strategi bagi memasukkan rekabentuk sejagat sebagai amalan kebiasaan di dalam proses rekabentuk dalaman menjurus kepada tumpuan berfokuskan pengguna. Kajian ini menggunakan tinjauan literature dalam memahami teori dan praktik rekabentuk sejagat. Hasil kajian dari tinjauan literature membantu kajian ini menghasilkan teori usul. Bagi menjawab soalan utama kajian ini, kes kajian telah digunapakai dalam dua fasa. Fasa pertama adalah untuk memeriksa kepatuhan Piawai Malaysia MS 1184:2014 (Rekabentuk sejagat dan kebolehcapaian dalam persekitaran binaan kod-amalan (versi kedua) dalam persekitaran binaan di Malaysia. Fasa kedua adalah untuk mendokumentasi proses semasa rekabentuk dalaman di Malaysia. Hasil kajian dari fasa pertama menunjukkan kebanyakan bangunan yang di pilih di dalam kajian ini mencapai kepatuhan yang sangat sederhana kepada MS 1184:2014. Hasil penemuan kajian memberi bukti yang kukuh kepada kajian ini bagi melaksanakan strategi untuk memasukan rekabentuk sejagat di dalam proses rekabentuk dalaman. Akhir sekali, pengumpulan data untuk fasa kedua telah dijalankan untuk mendokumentasi proses semasa rekabentuk dalaman di Malaysia. Hasil kajian telah menyelaraskan dua belas huraian terbaik tugas rekabentuk dalaman. Hasil dari penyelarasan tugas rekabentuk dalaman telah menyumbang kepada kajian ini untuk mencadangkan kemasukan rekabentuk sejagat di peringkat yang bersesuaian di dalam proses rekabentuk dalaman. Kajian ini telah mencadangkan tujuh tempat yang berpotensi untuk memasukkan rekabentuk sejagat di dalam proses rekabentuk dalaman. Selepas itu, kajian telah mengesyorkan kemasukan rekabentuk sejagat di dalam proses rekabentuk dalaman melalui model teori bagi menunjukkan teore usul kajian ini yang menegaskan bahawa "para pereka akan berjaya memasukkan rekabentuk sejagat dengan memperkenalkan pemahaman empati bahawasanya semua pengguna

mempunyai keupayaan yang terhad semasa proses rekabentuk konvensional. Cadangan kajian ini diharap memberi manfaat kepada perekabentuk dalaman untuk kekal layak di dalam amalan rekabentuk terutamanya dalam menjurus rekabentuk kepada tumpuan berfokuskan pengguna dan menyokong masalah perubahan demografik berkaitan dengan rekabentuk dalaman di Malaysia.



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I certify that an Examination Committee has met on 6 April 2017 to conduct the final examination of Noranita Mansor her thesis entitled “Inclusion of Universal Design towards User-Centric Interior Design Process in Malaysia” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A)106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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CHAPTER 1

INTRODUCTION AND CONTEXT OF THE STUDY

1.1 Introduction

This chapter discusses the context and background of the study. An explanation is provided on the inclusion of universal design (UD) in the interior design process for user centric in Malaysia. The statement of the problems as detailed in the study is also explained and established the research goal and objective of the study. This chapter also details the justification of the study, the scope and limitation, the definition of terms and the organisation of the thesis.

1.2 Context and background of the study

To the public, the phrase of "interior design" (ID) is synonyms with glamorous of home-finishing and makeover shows that dominated on daytime television. However, in reality, the tasks of interior designers are beyond decoration and glam. In fact, the task of an interior designer today is extremely complex and required multi-disciplinary and cross boundaries of the profession for instance in architecture, construction, art and craft, technology, product design, environmental science, human psychology and much more. Despite from that, ID also required considering communication skill in order to translate a message from user's needs related to daily live activity into the respective design of the environment.

Hence, throughout the year, with the evolution of human activity, the tasks of ID becoming more challenge. With the world demographic changes rapidly, the demand for living environments, facilities, and products to be usable and accessible to all people start to become a new key indicator in designing. For that reason, the issue has motivated this study to do further research on how to support the new challenge in ID that makes the profession relevant to the society. As a result, this study foresees that ID profession needs to expand their expertise from "design service provided" to "responsive design services" by recognising who are the "real users" in the ID through a new way of design thinking.

1.3 Fundamental overview of Universal Design in Malaysia

A new shift of design thinking related to usable of built environment for all people was known as universal design (UD). UD can be traced pioneering by Ron Mace (1941-1998), an architect who had responded to the lack of adequate barrier-free architecture to meet the needs of the physically handicapped. UD is best to be described as design thinking that drives by demographic trends that emerged from barrier-free design, accessible design, and assistive technology to a design for all and inclusive design. The main idea of UD is to address the usability issues for a wide range of users as possible rather than focusing on the specific target group of users.

Therefore, UD was developed to reduce the physical and attitudinal barriers between people with and without disabilities in built environments. However, UD is still a new design concept among interior designers in Malaysia. The movement of UD in Malaysia is interconnected with the progression of new nation development after the country gained independence 1957. As a newly independent nation, Malaysia had not utilised UD in first hand because the primary focus of the country at that time was on the development of basic facilities and infrastructure, for instance on education, agriculture, economy, and housing for the citizen.

As far as this research concern, in the early development of the nation, most of the buildings in Malaysia were built far below the standards of building code compliance which at that time there is no well-established code in the building construction sector. This is because the country is still struggling to sustain and maintain the economic growth which less consideration was made for humanity and public welfare. Hence, in the late 1980s, Malaysia began addressing the needs of people with different abilities (PWD) in the built environment.

The movement toward the accessible environment is increased the time by time. The latest high-level meeting related to accessibility is the Incheon strategy (2012) that the theme of the meeting is to “make the right real” for a person with disabilities in Asia and the Pacific. The meeting goal is to enable Asian country including Malaysia and Pacific region to track progress towards improving the quality of life and fulfilment of the rights. The Incheon strategy meeting concluded that the contribution of social society through continuous awareness may rise of the right of persons with diverse abilities and give an opportunity for innovation of good practices including the use of new technology in enhancing the accessibility of physical environment for the public.

From the Incheon strategy meeting, UD began to be recognized by a government body in Malaysia such as Malaysian department of Standard (DSM) through the development of Malaysia Standard. Yet with the progress of the accessible movement, this study found the education system, especially in architecture and interior designs, are still far behind the issue. Most of the

design school in Malaysia treat this issue as a special subject or topic and not part of the curriculum.

As a result, those professional in design industry today did not well furnish with knowledge on human environmental needs. However, credit to Kulliyyah of Architecture and Environmental Design (KAED) for its initiative in promoting the term of UD in the Malaysian. As a result, UD starts to be spread among professionals in built environment through international conferences, symposiums, workshops, and hosts product competitions. From this, it is evident that there is a positive movement UD in Malaysia. On the other hand, although abundant initiatives have been begun to increase the awareness of UD in among professional in Malaysia, yet UD is still making slow progress. The major reason for the slow pace of implementation of UD as stated by Yusof & Jones, (2014) is the misconceptions of the UD terminology itself. Most professionals and practitioners in the design industry perceive UD as having the same aims and intent as Barrier-Free Design and Accessible Design which label as a special design requirement.

For that reason, this study foresees that professional interior designers are required to have a shift of thinking from providing accessibility for people with different abilities to the bigger context which providing accessibility towards user centric.

1.4 Current issues in interior design

Integrating the needs of everyone in design has been discussed worldwide (Steinfeld & Maisel 2012). For that reason, accommodating diverse users (including older people, children, and variously disabled people) under one roof is a new challenge for interior designers in Malaysia. The World Health Organisation (WHO, 2010) estimated that the world's population will have more than one billion people who are aged 60 and over by the year 2025 and it applicable to Malaysia too. Through literature, this study found that many people are being reported to have unnecessarily excluded from using the interior spaces, products, and services in their daily activity (N.Mansor, 2008). This study has faith in it that the exclusion of a certain group of users in interior design arises because of many of designer does not aware about the demographic change and how it is related to the interior design.

This study presumes that there is a no bigger picture to include everybody in interior design due to misconceptions of an accessible design idea. In general understanding, accessibility in design is referring to the special need for special people. Therefore, the word "special" in design often refer to exclusive design which synonyms with a high cost. With that kind of perception, many interior designers are reluctant to integrate it into their design practice, unless there is a mandate or regulation from authority to be followed.

According to Story (2001), this scenario happens because designers are trained to design for a mythical "average" group of people. However, the fact is that "average people" do not exist because every individual is unique and the human species is diverse. Therefore, this study believes the lack of understanding and misinterpreted on who is "the real users" in interior design becomes the most offender issue in interior design. For that reason, this study foresees, the issue on comprehending "the real users" in interior design is pertinent in designing toward user centric.

1.5 Statement of problem

The consensus view in designing for accessible environment toward user centric as stated by Stainfield (2007) becomes a new challenge in the design industry. Along similar lines, Keates and Clarkson (2003) argue that in design practice today, many people are being unnecessarily excluded from using products, services, and environments. Such exclusion, as reported by Keates and Clarkson (2003), often arises from designers taking inadequate account of the demographic change and the end-user's functional capabilities when making design decisions in the design process.

However, in this researcher's opinion, there are two major reasons that accessible design in Malaysia is less considered. The first reason is that there is less sensitive responsiveness related to a global issue such as demographic change related to design. According to Department of statistic (2012), Malaysia has completed its demographic transition in less than four decades with decreasing in fertility and increasing mortality rates that led to the long life expectancy of the population which has to result in Malaysia as an ageing nation. With that demographic change as stated by Yusuf and Buja (2013), the working age or the active age population in the society would be diverse with the increasing number of older population. As a result, it is wake up alarmed to Malaysia that experiencing an increase of the ageing population in the society, the demand of built environment to be accessible.

The second factor is the traditional perception of users as being divided into two categories. They are the 'average users' and the 'special group of people' which include older people and different able people. This traditional design practice has been passed down from generation to generation. With the demographic change globally, the practice of categories users in design is no longer sufficient to merely provide access and facilities for persons with different abilities only.

Therefore, this study speculates there is a need to have a shift of design thinking among interior designers in order to support diverse users in the built environment.

Moreover, the rationale of including all users in interior design is to give an overview that the users in design are not homogenous. This can be explained by Harrison and Parker's (2003) past research which showed that most of the end-users might grow to be impracticable when they became less able, through natural ageing or an impairment or disability due to accidents. Hence, the study will be cautious about making the wrong assumptions about the needs of end-users based on traditional ways of thinking in interior design that it is aware may create an unintended design barrier to others in a population.

In addition, despite two major reasons above, this study foresees many of the professionals in built environments are not ready to take the challenge to include accessible design in their practices due to the absence of personal concern and interest in designing towards users centric and lack of awareness of demographic change knowledge. The crucial part based on researcher observation shows that many of the professionals and the public tend to view accessible design as new regulations and standards that resulted in added costs to the project which means for PwDs only.

1.6 Research objectives

The main objective of this study is, to include UD in interior design process towards user centric in Malaysia. To achieve this, this study formulated three sub research objectives to support the main research objective. The sub-objectives are illustrated below:

- Sub-RO1 : To analyse the UD theory and practice in supporting diverse users in built environments;
- Sub-RO2 : To examine the accessible level in interior design; and
- Sub-RO3 : To document current interior design in Malaysia; and
- Sub-RO4 : To recommend the inclusion of UD in the interior design process in Malaysia.

1.7 Research questions

It is worthwhile to comprehend UD and its principles towards users centric in built environments. According to Steinfeld, Duncan, and Cardell (1977), the application of UD at the preliminary stages of a design process helps to keep down high production costs while, at the same time, enabling users to successfully engage in social interaction and meaningful activities. In view of that, this research thus seeks to answer a research question as follows:

The main research question in this study is:

RQ: How can Universal Design be included in the interior design process towards users centric in Malaysia?

The main research question is followed by four sub research questions:

SRQ1: What are the UD theories and practice that could support diverse users in built environments?

SRQ2: What is the standard use in interior design in supporting the diverse population in Malaysia?

SRQ3: What is the current interior design process that is being practiced by interior designers in Malaysia?

SRQ4: How can UD be included into the interior design process toward users centric in Malaysia?

Below is the Eagle table adopted from Ibrahim (2011) to summarise the research framework:

Table 1.1: Summarise of research framework adopted from Eagle table (Ibrahim, 2011)

DESCRIPTION OF CONSTRUCT	SUB-RQ	RESEARCH OBJECTIVE	STRATEGY OF INQUIRY
Universal Design	S1: What are the theories and practice on how UD could support diverse users in built environments?	RO1: To analyse the UD theory and practice in supporting diverse users in built environments	Literature review
Interior design	SRQ2: What is the standard use in interior design in supporting the diverse population in Malaysia?	RO2: To examine the accessible level in interior design	Access survey checklist
Interior design process	SRQ3: What is the current design process that is being practiced by interior designers in Malaysia?	RO3: To document the current design process in Malaysia	In-depth Interview
Users centric design in Malaysia	SRQ4: How can UD be included into the interior design process toward users centric in Malaysia?	RO3: To recommend the inclusion of UD in the interior design process in Malaysia.	

1.8 Case study inquiry strategy

This study proposes to look at the interior design process in Malaysia and attempt to focus on accessibility issue in interior design. Consequently, there is a need for a more precise in auditing accessible interior design and the interior design process in Malaysia. Therefore, this study intends to investigate fundamental issues in interior design related to accessibility and the workflow of the interior design process in documenting the cognitive design tasks for better understanding in developing innovative design thinking for interior design.

In this study, the researcher employs Case Study research methodology as the general approach. The selecting of a case study for this research follows the criteria established by Yin (2003) that indicated that if the main research question starts with "HOW" or "WHY" and researcher does not have control over the situation and the research issue is a contemporary phenomenon. Therefore, case study research methodology is an appropriate technique to use in this research, where the main research question in this study starts with "How" and the researcher seeks the answers from contemporary events over which the researcher has little or no control.

For the development of the research framework, this researcher utilized Yin's (2003) case study design components which are illustrated as follows:

1. Main Research Question

The main research question in this study is:

How can Universal Design be integrated into the interior design process to for diverse users in Malaysia?

From the formulation of the research question above, it is shown that the main research question of this study starts with the question "how" which complies with the first criteria of Yin's (2003) study. According to Yin (2003), most main research questions that start with "how" are usually answered by using case study strategy.

2. Theoretical Proposition of the Study

By synthesising the literature review (presented in Chapter 2), this researcher developed a theoretical proposition below:

Designers can successfully include universal design by introducing empathic comprehension that all users have restricted capabilities during the conventional design process.

3. Unit of Analysis

According to Yin (2003), the unit of analysis can vary from a place or object to a person or an individual and is subject to the content and topic of the research. Therefore, in this study "Interior Design Process" is the unit of analysis because this researcher intends to review and to investigate the current interior design process in order to find out how to UD can be included into the interior design process for diverse users in Malaysia.

4. Linking Data to Proposition

According to Yin (2003), each proposition should be directly linked to the subject in order to be examined within the scope of the study. Thus this research seeks to investigate how UD can be included in the interior design process towards users centric in Malaysia. To illustrate the linking of data to the proposition, the researcher tabulated the research activities process linking to the expected findings. To summarise of the research activities are related to linking data to the proposition of the study, which can be explained as follows: the linking of research sub-question to sources of data leads the researcher to program the data collection and analysis in anticipation of the research outcome. The sequence of the research activities listed above represents the linking of data to the research proposition.

5. Criteria for Interpreting the Finding

The definite criterion in interpreting the finding in this study is the affirmation on the percentage of including UD in the interior design process. The criterion for interpreting is based on how many phases UD can be included in ID design process. For that reason, this study agreed with a minimum of five potential phases in ID design process, UD can consider as successful common practice.

With the minimal success in including UD in ID, design process may encourage novices and professional to design for users centric. As a result, this study anticipates by including UD at minimal phases in ID design process justified the validation of the theoretical proposition in this study. In summary, in agreement with Yin (2003), Creswell (2003) also they suggested case study methodology is an appropriate technique for investigating the actual situation and workflow processes, activities and events. The case study approach has the potential to uncover new perspectives on the interior design process and allows the

researcher to generate a theoretical contribution, based on data in strategising the design tasks during the design process.

1.9 Expected finding

The main finding of this research is based on the current documentation of interior design process in Malaysia support by the compliances of general design consideration on an accessible interior design from the purposive sample. The inclusion of UD in the interior design process is expected to be a thinking instrument for interior designers to design towards users centric.

1.10 Justification of the study

The significance of this research is based on several studies that raised the possibility of designing toward user centric in built environments. In general, many developed countries have gone through the process of recognising users as being diverse rather than as stereotypes. Moreover, the demographics worldwide show that the composition of the world's population is changing; older people are living longer and the person with a different ability (PWD) are professionals and active in society. Therefore, this study is significant as a proactive research that supports the changing demands of users in interior design.

Moreover, it is essential for the interior design or built environment to consider the relationship between usable and sustainable design. The sustainable issue is a central concern worldwide. As a result, current interior designers are not discussing only on the quality of air and material in interior design, yet they are beginning to look at how interior design can sustain and support users to live or work independently in their chosen environments throughout their lifespan.

Furthermore, the 20th century brought major social changes with respect to civil and human rights. Medical advances during this period resulted in the number of people who survived an injury or illness is far greater than in the past. Many people were living longer and the average life expectancy of people with severe impairments was also increasing. Therefore, the governments in many developed countries responded to this issue by introducing equal rights and anti-discrimination legislation to support the changing demands of people, especially in built environments (Centre for Excellence in UD, 2008).

Generally, the enforcement on accessibility is starting after the Second World War in supporting those injured with a temporary and permanent disability. In Malaysia, the increase in the population of people with different abilities (PwD) has resulted in a demand for the provision of access and facilities in and outside the building. Therefore, many developed countries and also some

developing country like Malaysia is also heading toward accessibility environment. With this point of view, many rules and regulation on the accessible built environment in Malaysia start to be developed.

Several of it is the National Policy for PWD that was developed to supports equal right and chances to complete participation in the society for PWD. Followed by, The Persons with Disabilities Act (2008) in December 2007, which becomes the first complete law about the welfare of PWDS in Malaysia. Furthermore, Malaysian department of Standard (DSM) has initiated the publications of various Malaysian Standards (DSM, 1990, 2002, 2003, 2006a, 2006b) as the guidelines for designers, architect, landscape architects, city planners, interior designers, and other people involved in the building of physical development.

Recently on June 3, 2014, the most comprehension standard was published and focusing on Universal design and accessibility in the built environment. This revision of Malaysian Standard MS 1184:2014 is joint with current standard (MS 1331 and MS 1184) and also section 34A of the Uniform Building By-Laws (1984). These standards are among the most attainable and updated regulation in Malaysia that enacted to increase accessibility of built environment in Malaysia.

With the bundles of the comprehensive standard and regulation developed in this country, this study believes that the competence of interior designers to strategises to include the standard and regulation at the early stage of designing especially throughout the design process is pertinent. In view of the above, the significant in transforming the interior design practice indicates that interior design profession is aimed at a long-term care and services for the users rather than at short-term attempts in prime years of a user's lifespan.

Therefore, this study strongly believes that this research is very important and significant especially in preparing for current and future demand towards user centric rather wait for the problem to occur or to encounter the difficulty later year.

1.11 Scope and limitation

The research is limited in analysing the cognitive design tasks in the current interior design process in Malaysia. The documentation of cognitive design tasks of the streamlined interior design process as the baseline for design process as practiced in Malaysia. This research is restricted to the interior design process supporting toward user centric related to basic activities in the use of and access to interior design. The focus of the study limited to common shared activities of the users related to access and use the interior design and design features. Even though this research addresses diverse population;

users of extreme ill and severe disabilities are not intended as a consideration for this study.

The limitation of a diverse population in this study is referring to all active users regardless of their age and ability that can use and access the interior design independently. Moreover, the proposed theoretical model is not applicable for testing in the real industry due to inadequate financial resources, time and real project risk to the interior designer firms participating in this research.

1.12 Expected contributions

This study makes a significant contribution to both theory and design practice. From the research problem statement, it showed that many scholars address users' needs and requirements as a fundamental consideration in designing. In this study, however, posits that addressing users' needs and requirements in design is something that has no ending story, because of the fact that all users have their own preferred way of dealing with design.

For that reason, this study establishes that by investigating different needs and requirement of the users in design, it is better to celebrate and complement their different through innovative design decision. Apart from that, this study also agreed with Convington and Hanna (1997), that the more designers try to understand and tailor their designs to the user's needs and requirements, the more the design becomes exclusive. Therefore, the most significant contribution in this research is to ensure the interior designers are more sensitive and responsive related to the social issue in designing the space, design features, material finishes in interior design. From the expected results and output presented earlier, this study concluded that there are four new knowledge claims in this research, which can be portrayed as follows:

- i- This research claims that knowledge on comprehending all users have restricted capabilities to use and access the interior design is the key indicator in designing for diverse users.
- ii- This research posits that through designing towards user centric in the interior design process, the inclusion of Universal Design may be instinctively achieved.
- iii- This research contributes thinking instruments in shifting the design thinking in interior design among profession and novice to respond to the challenge on current design issues specifically on demographic change in population.
- iv- Finally, this study establishes that the interior design field is not as an exclusive profession rather as an inclusive design consultancy for everyone regardless the cost of the project.

1.13 Definition of terms

This section presents keywords and concepts used in this thesis. It helps researchers to provide the appropriate meanings so as to avoid confusion in terminology. The clarification of the relevant words gives a better insight to the reader as well as to facilitate any unforeseen subsequent argument or discussion. The following terminology is used within the body of this study:

Universal Design (UD): A design paradigm with broad-spectrum ideas for producing buildings, products, and environments that are as inherently usable and accessible as possible in design entity in order to broaden the range of users by adhering to seven principles that respect human diversity.

Interior design: The art and science of designing the interior spaces or a room or building for a total creative solution for a specific intended purpose or use of the built environment.

Built environment: A Man-made surroundings created by humans to be used for the human activity.

Interior designer: a profession that involves an understanding of human behavior in creating functional spaces within the structures that architects design. (American Society of Interior Designers ASID 1975)

Diverse users: various groups of people in the population including young, older people, different able people, children, teenager, woman, man, and others.

Real users: all people or users that require design in their life.

Design process: a methodical series of design task that designers use in developing a practical design entity.

Restricted capability: The physical proficiency level in carrying out general tasks or life activity in design entity

Cognitive design task: a task based on knowledge carried out by interior designers in doing design

Design thinking: a complex mental mechanism that stores memory which can be evaluated and manipulated as an integral part of the process in the form of getting ideas and innovation

Design paradigm: a new way/method/approach of beliefs, rules or knowledge underlying system of ideas that causes a range of solutions to be common or visible in design practice

Design entity: the existence of the end product in design creation.

Empathy comprehension: A wide range of experiences, emotion, feeling and thinking the ability to understand other people's actions related to particular situation or issue.

Person With Different Ability (PWD): Description of the human physical with limited ability.

1.14 Organisation of thesis

This study is structured into six chapters. The chapters can be concisely explained as follows:

Chapter One: Introduction

This chapter presents the introduction of the research, the background of the study, research objective, and research question, the significance of the study, the benefit of the study, knowledge contribution, anticipated results and definitions of the term.

Chapter Two: Literature review

This chapter presents the literature survey on the main body of knowledge in this study. The main body of knowledge is discussed and critically reviewed in this chapter and is divided into three parts. Part One discusses Universal Design when related to accommodating diverse users in built environments. Part Two includes interior design issues while Part Three emphasizes the design process. From the process of reviewing the main body of knowledge, this chapter then explains the theoretical framework for the whole study.

Chapter Three: Research methodology

This chapter explains the selected research methodology and procedure used in this study. This study adopted a case study as a general approach based on Yin's (2003) research. This chapter explains the research design, unit analysis, interview technique and strategies, data collection and procedure.

Chapter Four: Result and analysis from Site Access Observation

This chapter presents the site access observation on compliance to MS 1184:2014 in three purposive building samples.

Chapter Five: Development of inclusion UD in ID design process

This chapter explains how results and data analysis of the interior design process developed into a theoretical model.

Chapter Six: Discussion and Conclusion

This chapter summarises and discusses the major findings and results related to design toward user centric in interior design. This chapter presents the discussion, knowledge contributions, impact of the study and recommendations for further research.

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