



***PERCEPTION OF DAYLIGHTING IN MALAYSIAN MOSQUES BY
WORSHIPPERS***

MOSTAFA FOROUGHMAND

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

February 2015

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SPECIAL DEDICATION

THIS WORK IS DEDICATED TO MY LOVELY PARENTS

AND

MY BELOVED WIFE

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

PERCEPTION OF DAYLIGHTING IN MALAYSIAN MOSQUES BY WORSHIPPERS

By

MOSTAFA FOROUGHMAND

February 2015

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In the world of mankind, designing buildings is considered as architect's task, which should be proportional with human factors. Using daylighting appropriately as an architectural elements it can evoke emotions in people and transfer the sense of the place to the users in improving the interior space design.

According to contemporary interior design there is a lack of psychological aspect in mosque daylighting, and within this respect, the current research aims to achieve objectives which are trying to develop daylighting in mosque's prayer hall. This research has been carried out to investigate value and effect of daylighting on people's perception from. This research also tried to find out the acceptable opening design from the worshippers interest.

This study employed quantitative method for data collection. Process of data collection was implicated in four selected mosques with different daylighting by using different instruments to measure variables for determined objectives. Considering objectives of this research, to evaluate daylighting, it was required to measure daylight intensity via lux meter in order to evaluate and compare daylight intensity and daylighting among the selected cases, photographs were used to record the situations of openings and measurable questionnaires based survey was employed to obtain the worshippers emotional and interest from natural lighting during daytime in prayer hall of selected mosques.

Findings from this research indicated, daylight intensity can affect the environmental perception of users. In addition it was found that; daylighting can psychologically influence users' perception from daylighting. The results revealed that, it will be more interesting and acceptable if the daylight float from under the dome and focused in middle of prayer hall and mihrab. It was understand that almost all of respondents preferred openings to be located higher than eye level, on the ceiling and under the dome.

Therefore, the recommendations will assist architects to provide effective and sustainable daylighting with broader aspects of human needs in interior design of

Malaysian mosques. In fact, this research gathered worshippers' preferences on daylighting design aspect in prayer hall and significantly provided a recommendation on Malaysian mosque design in future.



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

PERSEPSI PENCAHAYAN SIANG DALAM MASJID MALAYSIA OLEH PARA PENYEMBAH

Oleh

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Dalam dunia masa kini, reka bentuk bangunan merupakan tugas para arkitek di mana ianya harus seimbang dengan faktor-faktor kemanusiaan. Pencahayaan siang hari bukan sahaja merangkumi aspek kesihatan serta visual, tetapi yang lebih utama ialah bagaimana ia mampu merangsang emosi di dalam naluri manusia untuk mengubah reka bentuk dalaman sesuatu ruang.

Menurut reka bentuk dalaman kontemporari, terdapat kekurangan dari segi emosi berkaitan aspek pencahayaan. Oleh sebab itu, kajian ini tertumpu untuk mencapai objektif memperluaskan kualiti pencahayaan siang hari di dalam ruang masjid-masjid di Malaysia, terutamanya di bahagian dewan solat. Kajiselidik telah dilakukan untuk menilai kesan pencahayaan siang di atas faktor-faktor ketenangan serta keselesaan.

Dalam kajian ini, kaedah kuantitatif telah digunakan untuk pengumpulan data. Proses ini melibatkan empat buah masjid yang telah dipilih berdasarkan pencahayaan siang hari yang berbeza untuk mengkaji pencahayaan melalui pengukuran lux, pengambilan gambar serta soalan kaji selidik yang telah diberikan kepada orang ramai. Pengukuran lux dan pengambilan gambar telah digunakan untuk mengira faktor siang atau untuk membandingkan keamatan serta pencahayaan siang bagi kes-kes yang telah dipilih. Soalan kaji selidik digunakan untuk mendapatkan kesan emosi serta minat orang ramai mengenai pencahayaan siang hari semasa menunaikan solat di dewan solat masjid-masjid yang terpilih.

Seterusnya, berdasarkan keputusan kajian ini, pencahayaan siang hari di ruang dewan solat akan lebih menarik dan berkesan sekiranya cahaya siang itu timbul dari bahagian bawah kubah dan tertumpu ke bahagian tengah dewan solat serta mihrab. Menurut data lagi, hampir kesemua yang menjawab soal kaji selidik bersependapat pembukaan cahaya mesti lebih tinggi dari paras mata, di atas siling atau pun di bawah kubah.

Oleh sebab itu, cadangan yang telah dikemukakan akan membantu para arkitek dalam menyediakan pencahayaan yang lebih berkesan dan mampan dengan aspek-aspek yang melibatkan keperluan kemanusiaan dalam reka bentuk ruang dalaman masjid-masjid di Malaysia. Melalui pengumpulan maklumat yang telah dilakukan, pendapat orang ramai

mengenai reka bentuk dalaman dewan solat ini juga akan membuka jalan bagi reka bentuk masjid yang akan lebih menerapkan aspek-aspek tersebut pada masa hadapan.



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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

DI	Daylight Intensity
PO	Percentage of Openings
VQ	Visual Quality
SPSS	Statistical Package for Social Science



CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter includes topics such as; an overview to daylighting in mosque then followed by the problem statement, research question, research aims and objectives. Then it explains the scope and limitation of study, benefits and knowledge contribution of outcomes and in the end it concludes thesis structure.

1.2 An Overview to Daylight and Mosque

Light, a visible immaterial element, which can play an important role with its beauty and power for creating a sacred place, demonstrate great meanings and effects, depending upon on how it is scattered into the designed space. The appropriate building design with mixture of daylighting techniques can significantly help in improving the interior space design. When the graded flowing daylight penetrating into the interior space from openings, it reduces the hardness and coldness of the place which makes a shelter for attendants spirit (Hutt & Harrow, 1977; Philips, 2004) by articulating the pattern of light and shade to lead the eye forward (Philips, 2004). Light is like the soul for a solid structure and was known as appearance of divine, so architects used it in the religious places as miraculous substances (Plummer, 1997). Daylighting was defined as interplay of natural light and building form to provide a visually stimulating, healthful and productive interior environment (Galasiu & Reinhart, 2007; Reinhart, Mardaljevic, & Rogers, 2006). Daylight is a most closely light source which matches the human visual response and provides a more pleasant and attractive element for indoor environment (Alrubaih et al., 2013). Daylight is an element with direct effect on human's mood and perception resulting by stimulating nervous system which gives a special ability to this element for designing an emotional environment.

Since early eras, architects in civilized nations tried to create and build places for worshipping God by gathering all their experiences, knowledge, findings considering their identity for designing their religious buildings (believed that they are working for God), reflecting the fundamental ideas about universe and concerning God. Those places were known as sacred places and were especially significant to its followers. The most important building in Islamic architecture is mosque, a place known as house of God, a building that human likely feel presence of God (Ardalan, Bakhtiar, & Haider, 1973) and having congregation pray inside. As (Nasr, 1991) declares daylight is one of Islamic architecture significant elements which is masterfully incorporated with other elements into the mosque and serves both practical and aesthetic purposes. Skilled Islamic architects tried to use sign, simile and metaphor to remind audience presence of Allah and concentrate on their pray by getting separated from concerns of everyday routine life as they entered the mosque, for this reason architects used epitome of his epiphany, light. Architects used light reflection legislations with mirrors in corridors and ceiling to let more light enter to the depth of building. The role of materials in this world is to reflect the light, but light is the only immaterial element

that can be seen by eyes and eyes are the only visual connection between human and environment.

In Quran, Allah introduces himself as light of lights (Verse 35, Surah 24), light beyond all lights (Verse 35, Surah 24); and also says be aware that, with remembrance of Allah, hearts will find tranquillity (Verse 28, Surah 13), as it could be seen light is a sacred element with great meaning in Islamic philosophy and beliefs.

Malaysia gained its independence from the British government on 31 August 1957 and major development programs in area of architecture were actively implemented in line with the new government. The programs were to portray new progressive culture and achieved democracy. During this period, new mosques were started to build and these contemporary mosques in Malaysia were influenced from famous mosques from all over the Islamic world, especially Middle East which had different culture and climate with Malaysia.

1.3 Problem Statement

In this era using sustainable elements seems very necessary. One of these elements is daylight which is a live lighting which moves on the surface and its brightness and intensity changes during the day and makes the space soulful. Light can facilitate the visual task whereas has ability augments and contributes to be look at from other different points of view such as aesthetic and human psychology. Spatial cognition can be made by stimulating visual nerve system in the human body which is the gate to its mental. Therefore light can be considered as an architectural element to create a pleasant visual environment.

Architect's mission is to design a space with respect to its function, proportional with human ergonomics, culture, psychology, transferring sense via using maximum capability of elements to reach the purposes and objectives considered for specific space. In field of architecture there is a need of knowledge sources and studies to give background for design process, but unfortunately it's rarely possible to find direct, origin study sources accomplished by architects needs related to required knowledge, therefore architects are depended to other branches and fields of science and need to recourse to other sources.

Scrutiny most of recent available literatures and researches in field of daylighting are focused on energy efficiency using simulator software and models; latest observations has inspired the researcher to evaluate the daylighting with psychological aspect in mosques as a sacred and emotional space for Muslims. In order to enhance the experiential quality in Malaysian mosque's prayer hall, there is a lack of knowledge for arranging daylighting and its elements in proportion with people's perception within the prayer hall.

1.4 Research Question

This study is conducted to determine the relationship between daylighting and perception in sacred place. The considered statement for this study is: utilizing daylight in order to enhance mosque's prayer hall environmental perception between worshippers. Thus, according to the problem statement following research question rises "How can daylighting of mosque's prayer hall affect people's perception?"

1.5 Research Aims and Objectives

The main aim of this study is to investigate how daylighting effect users' perception in prayer hall, and estimate acceptable daylighting for Malaysian mosques by studying four different cases. This is expected to enhance the sense of serenity and sacredness of the place by using natural daylighting in mosque prayer hall. To achieve this goal, the following objectives are determined for this study:

- I. To evaluate current daylighting in four different implicated mosques.
- II. To document the effect of different daylighting and daylight intensity on users' perception in prayer hall.
- III. To propose effective daylighting by considering daylight intensity and perception of people in prayer hall.
- IV. To find the daylighting elements that is more acceptable for the users'.

1.6 Research Framework

The framework and procedure considered for this study to answer the research question and achieving the research goals has been shown in Figure 1-1. This process designed into three stages as follows:

I. Stage One: Establishing Background Study and Designing Research Structure

In this stage, basics of study will be established and following issues will be designed; problem statement, research question, research objectives, research framework.

II. Stage Two: Reviewing Literature, Research Method and Data Collection

Second stage of this process focused on methodology and data collection. The investigations should incorporate different kinds of evidence and data.

III. Stage Three: Interpreting and Analyzing Data, Reporting Results, Conclusion and Recommendation for Future Researches

In stage three, collected data from stage two will be synthesized, analyzed and discussed by considering aims and objectives from stage one to find out answers to the research problem and research question. Finally findings of the research will be summarized and be presented in a conclusion.

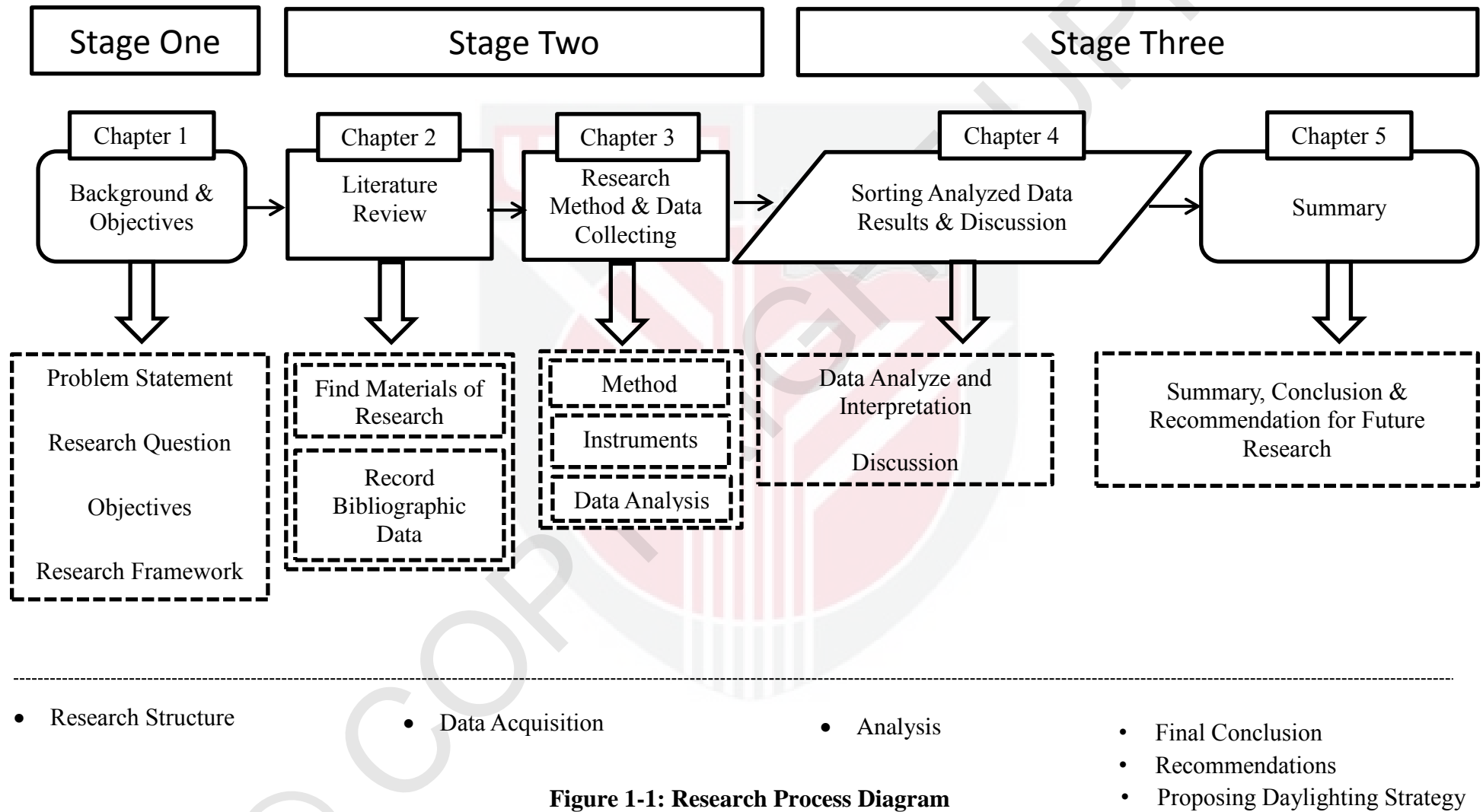


Figure 1-1: Research Process Diagram

1.7 Scope and Limitation of Study

As it was mentioned earlier, focus of this study is on daylighting effect on worshippers' perception, evaluated in four different Malaysian mosques. In this research no assessment will be carried out on others facilities such as; artificial lighting, building structure, daylight factor, uniformity, and glare. The locations for data collection in this study are limited to four different mosques as shown in Chapter Three (Table 3-1). The main focus in this study is on the analysis of daylighting evaluation considering daylight intensity, location and shape of daylight openings in the prayer hall and human visual perception.

There are some difficulties in marking the location of each respondent to match with the situation of daylight intensity and that's because of the distribution of volunteers are not equal for each measured point.

1.8 Benefits and Knowledge Contribution from Outcome of Study

This study tries to provide a theoretical foundation to improve and optimize effective natural lighting in interior space design and enhance serenity and comfort in mosque prayer hall by evoking emotion with respect to human cognition. This research would like to evaluate the effect of natural light in mosque's prayer hall and try to illustrate significant of natural lighting position on interior design in mosque and propose how it can be controlled to become an important factor that contributes towards enhancing emotion in worshippers.

The findings of this research are expected to assist professionals such as architects and interior designers to improve and optimize daylighting as an important architectural element in mosque's prayer hall design with psychological aspect. This study will also benefit the architects and by providing them proper references and guidelines in daylighting design.

This study contributes in establishing explicit knowledge on daylighting to form a sacred space in mosque's prayer hall. It has benefits such as utilizing daylight as an important interior architectural element with psychological effect in mosque as a holly place. This research is in line with the lighting agenda, and it will have a psychological aspect view to light as an architectural element. Apart from that, in future this research will assist all professionals who involved in interior design and architecture to increase sense of serenity in prayers and others who attend to the mosque. The significance of this study is the results are from public's evaluation of daylighting in prayer hall. By outcomes of this research, it's expected to find information about differences between daylight intensity and quality in lighting of four different mosque styles, understand the effect of daylight intensity and quality in daylighting on people's perception in prayer hall, propose daylighting guidelines for making people psychologically more satisfied and more attracted to be in the prayer hall based on research results. It is expected from this research to improve the daylighting design with aspect of creating sacred space by using daylight element.

1.9 Thesis Structure

This thesis is organized totally in five chapters and each chapter contains as follow:

Chapter one introduces the issue, motivation of the research followed by problem statement, research question, research aims and objectives, scopes of study, research outcomes, significant and benefits of the study, knowledge contribution.

Chapter two covers the literature review, in which main theories and approaches form related books and articles are extracted and explains. It is divided into three parts and includes the relationship between the three parts with a critical analysis at relevant literatures used in this research.

Chapter three discusses the research materials and methods for this study. It sets up the research design, sampling procedure, instruments for data collection, data validation, measurement of variables, pilot study, reliability of questionnaire, data collection process, data analysis, conclusion.

Chapter four includes the results and discussion. This chapter relies on reported results of descriptive statistics, which have been analysed by SPSS and discussed. This chapter includes tables, graphs and figures of findings.

Chapter five provides the summary, conclusion and recommendation for future research. This chapter also summarizes the results and conclusions of the study and gives the recommendations for future studies.

1.10 Summary

This chapter contains a general explanation about the process of the research. This chapter clarifies an overview to daylight design and also mosque, problem statement, research question, research aim and objectives, scope and limitation of study, benefits and knowledge contribution from outcome of study, thesis structure. The next chapter will discuss about the literature review related to the objectives of the study.

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