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EMBEDMENT OF EMPATHIC APPROACH USING TOUCH POINT TOOL IN
CONCEPT GENERATION PHASE OF DESIGN PROCESS

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DEDICATION

This thesis is dedicated to my father, who taught me that the best kind of knowledge to have is that which is learned for its own sake. It is also dedicated to my mother, who taught me that even the largest task can be accomplished if it is done one step at a time.

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ABSTRACT

Empathic tools such as Persona, Ethnography, and Touchpoint have been used widely by designers in the early phase of design process to understand the users' needs. Among the three tools, touchpoint has several advantages over the persona and ethnography such as ability to monitor user's activities in a discrete way, focus a wide range of users, and reduces the reliability of a design practitioner on human expert activities. However, this tool has not been used in solving engineering problems. The aim of this study was to select an empathic tool to discover the significance and to embed the tool in the early phase of conventional design process. A design experiment was conducted by having two groups, which were using touchpoint and conventional design method in the early of design process. Both groups were given a design task that was related to agricultural. The outcomes of the experiment were design concepts. These design concepts were evaluated by design experts based on the criteria such as originality, technical feasibility and user benefit. A questionnaire was designed to ease the evaluation process. The expert scores for the design concepts were analyzed using Mann-Whitney U -test, where the P-value was set at 0.05. It was found that technical feasibility for both touchpoint and conventional design methods were not significantly different, meaning they have same capability. For the originality criterion, conventional design method was shown significant as compared to touchpoint tool. In opposite, the touchpoint tool exhibited significant result on the user benefit criterion. From these results, the touchpoint tool is more effective in analyzing and capturing the users' needs before undergoing the ideation process than the conventional method.

ABSTRAK

Teknik empati seperti *Persona*, *Ethnography* dan *Touchpoint* digunakan secara meluas oleh pereka pada awal fasa proses reka bentuk untuk memahami kehendak pengguna. *Touchpoint* mempunyai beberapa kelebihan berbanding kaedah *Persona* dan *Ethnography*. Di antara ketiga-tiga teknik, *Touchpoint* mempunyai keupayaan untuk memantau aktiviti pengguna secara terperinci, fokus kepada lingkungan pengguna yang meluas dan kurangnya kebergantungan pengamal reka bentuk terhadap aktiviti pakar manusia. Walau bagaimanapun, teknik ini tidak pernah digunakan untuk penyelesaian masalah kejuruteraan. Objektif kajian ini adalah untuk memilih sebuah teknik empati untuk mengetahui kepentingannya serta menggunakannya dalam fasa awal proses reka bentuk konvensional. Sebuah eksperimen reka bentuk dibuat dengan menyediakan dua kumpulan, yang mana satu kumpulan menggunakan kaedah reka bentuk *Touchpoint* dan satu lagi menggunakan kaedah konvensional pada fasa awal proses reka bentuk. Kedua-dua kumpulan diberi tugas reka bentuk yang berkaitan dengan pertanian. Hasil eksperimen adalah konsep reka bentuk. Konsep reka bentuk ini dinilai oleh pakar reka bentuk melalui kriteria keaslian, kebolegunaan teknikal dan faedah pengguna. Satu soal selidik telah dibangunkan untuk memudahkan proses penilaian. Markah yang dinilai oleh pakar terhadap konsep reka bentuk dianalisa menggunakan kaedah *Mann-Whitney U-test* yang mana nilai P ditetapkan pada 0.05. Kebolegunaan teknikal pada kaedah *Touchpoint* dan kaedah reka bentuk konvensional didapati tidak berbeza sama sekali, yang mana bermaksud kedua-dua teknik mempunyai keupayaan yang sama. Kaedah reka bentuk konvensional didapati lebih signifikan berbanding teknik *Touchpoint* berdasarkan kriteria keaslian. Sebaliknya, teknik *Touchpoint* menunjukkan keputusan yang lebih signifikan terhadap kriteria faedah pengguna. Dengan keputusan ini, dapat disimpulkan bahawa teknik *Touchpoint* lebih efektif dalam menganalisa dan mengekstrak keperluan pengguna sebelum menjalani proses pengeluaran idea berbanding kaedah reka bentuk konvensional.

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LIST OF ABBREVIATIONS

DeMo	-	Design for Motivation
DE	-	Design Ethnography
DT	-	Design Thinking
F2P	-	Free to Play
HCD	-	Human-Computer Design
HCI	-	Human-Computer Interface
IDEO	-	Innovation Design Engineering Organization
PDS	-	Product Design Specification
QFD	-	Quality Function Deployment
TP	-	Touchpoint

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CHAPTER 1

INTRODUCTION

1.1 Background Study

Product design is an important subject in maintaining or developing countries' economies. After some decades, the transformation of the user needs changes from time to time. The product is developed to fulfil the users' satisfaction. However, some products do not seem to match the user's needs. Why does the 'user needs' are important in the product development process? Many methods are used to develop products for the user. But, the best product that can be developed is by using an approach that prioritizes the users' experience in the process. Empathy is one of the methods to derive the users' needs from the user experience

The user is one of the main factors in the product development process. About 61% of the decision making is done in the first phase of the design process [1]. When the user needs are not understood properly, the design outcome would be catastrophic. Besides, the ill-defined problem mostly cannot be solved by the design engineer due to a lack of understanding of the user's problem. Based on a survey, the user is central to the organization. The product quality can drop if the user is dissatisfied. This will affect the organization's reputation. Hence, there are several tools to understand the user's problem to solve the problem as mentioned earlier. For instance, storyboards, persona, customer journey map, touchpoint tool. Therefore, this study discovers some research gaps in furthering the study.

1.2 Problem Background

The study investigated the opportunities and challenges faced by the user and design practitioner while undergoing the early phase of the design process. Some

research explained the importance of the user in the design process. As it contributes about 80% of the decision making for the entire design process [2]. Another study also emphasized the importance of the user needs and refined the percentage of decision making to 61%. However, the real issue is the relationship between the user and the design practitioner [3]. **The reason for this issue is due to the lack of having an appropriate tool for user needs in the existing design approaches before design synthesis.** The dialogue with the end-user should be done at the beginning of the design process. The term dialogue is known as empathy, which is an important factor to understand the user's problem in the early phase of design process [4]. **This study aimed to study empathic tool that help to record and analyse the user's needs to help the design practitioner to feel the user while undergoing the product development process.** This is very important for the current trend, as the customer needs changes with the global needs and environment.

In fact, the transformation in technology provides a challenging phase for the designer. As technology changes, configurations, and resources changes according to the users' demand or needs. The innovations mainly come with this trend, either smartphone, home appliances, or automotive industry implementation of IoT in their inventions. In this complex reality, customer experience becomes a challenge to the designer [5]. Thus, a proper user understanding tool must be used to extract the user needs by the design practitioner. Many tools are reviewed in this study and these tools are integrated into the early phase of design thinking. For instance, tools that understand users are the touchpoint tool, ethnographic design, persona, and other related tools. However, **the empathic tool are implemented in various field compared to engineering field.** This study looks forward to implement an empathic tool that can be very effective in the early phase of conventional design process. Therefore, these issues are aimed to be solved in this study.

1.3 Research Objectives

The aim was to embed the empathic approach in the early phase of the traditional design process to understand the user's needs. There were two main objectives to be achieved, to fulfil the aim. The objectives of the study were as follows

- (a) To investigate the validity of the touchpoint as an empathic tool which identifies the user needs before engaging into the ideation stage of the conventional design process
- (b) To determine the effectiveness touchpoint tool by evaluating the originality, feasibility and user benefit.

1.4 Research Questions

Some research questions were constructed for this study based on the reviewed problem. This helps the study to have a good start and direction in developing methodology and discover the finding of this research.

The first research question is about finding the appropriate tool to understand the users' needs before the designer moves into the ideation process. This is a very important question because a proper user needs gathering tool will produce a good outcome of the design idea. Besides, the second research question is about the findings of the research. The study wants to discover the effects of using the tool towards the creativity and benefits of the user.

- (a) How to design an experiment to test the touchpoint tool with conventional design process in the early phase?
- (b) How to evaluate the design outcome with originality, feasibility and user benefit?

1.5 Scopes of the Study

- (a) The study was focused on the early stage of the design process
- (b) Data collection was conducted by participating in the 4th year Mechanical Engineering students, UTM, Johor Bahru.
- (c) The engineering students were given the same theme for solving the design problem. The design task location was an agriculture farm.
- (d) The evaluation was conducted by seven design lecturers in the design field before engaging into statistical analysis.
- (e) The evaluation of creativity is only on up to originality and feasibility of design concept features.
- (f) The results were analysed using SPSS statistical tool.

1.6 Significance of Study

Understanding user needs is emphasized in this study. The first phase of the design process is best to implement the empathic approach to understand the users' problems and to solve the design problem. Besides, this study proves the touchpoint tool is more likely to be significant in the early phase of the design process. Many issues such as ergonomic and customer satisfaction can be solved by implementing this empathic approach tool in the early phase of the design process. The design practitioner can have a holistic mind in engaging into the design process. Finally, the touchpoint tool must be developed, as it gives many advantages in solving an ill-defined problem and avoid the design practitioner from falling into the narcissist trap while brainstorming ideas.

1.7 Thesis Structure

This thesis consists of five chapters:

Chapter 1 – Introduction

This chapter gives an overview of the research work presented in this thesis. It describes the background and explains the motivation for pursuing this work. Also, it provides an approach to take as well as the finding results. Finally it introduces the structure of the thesis.

Chapter 2 – Literature Review

This chapter discusses the literature review of the study. It consists of the general background, the taxonomy of design research, knowledge type in a design, design models, tools to understand user needs, design synthesis, and previous study.

Chapter 3 – Research Methodology

This chapter elaborates on the execution of the study. It discusses the research framework, research design, design task, experimental and controlled method, design concept evaluation process, data processing, and finally ends with a summary.

Chapter 4 – Results & Discussion

This chapter elaborates on the results obtained from both experimental and controlled method. It consists of the example of functional analysis and customer journey map. The result to study the significance between both groups is also presented. Finally, this chapter ends with a summary.

Chapter 5 – Conclusion

This chapter summarized all the content in this study. The recommendation that is been suggested in this chapter is for improvement and further study in the future for better results.

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