Tasks and User Performance Improvement for UUM Online Payment Using Key Stroke Level Model

A Thesis submitted to college Arts & Sciences in partial Fulfillment of the requirement for the degree master (Information Technology)

University Utara Malaysia

By

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ABSTRACT

Online payment is one of the components in postgraduate website in University Utara Malaysia (UUM). Not a lot of Student prefers to use this task , this research will focus a weakness points in the current payment model interface and strength points in proposed new online payment model by using Keystroke-Level Model (KLM) technique and improve weakness points in the current payment model interface.. The study will be guided by a research question which was formulated as Follows. What is the efficiency problem of online payment that effect user to use the system? .How can the recommended online payment Model achieve efficiency of system and user aim? What is the user performance of current online payment Model to achieve the tasks? The population for this study will be the (undergraduate and postgraduate) students and staff in the University Utara Malaysia (UUM), The quantitative research approach was used since the researcher aimed to explore the important of(KLM) technique to enhance the current online payment model, and increases the acceptance level of the system

ACKNOWLEDGEMENT

"In The Name Of Allah The Most Gracious And Most Merciful"

My gratefulness to my supportive and helpful supervisor, Dr. Haslina Mohd for assisting and guiding me in the completion of this research. With all truthfulness, without her, the project would not have been a complete one. Dr. Haslina Mohd has always been my source of motivation and guidance. I am truly grateful for her continual support and cooperation in assisting me all the way through the semester.

I would like to present my special thanks to my husband "sultan" and to my father, my mother and all my family who has always been with me . Finally, I would like to express my appreciations to all my friends, colleagues, other staff, and everyone who has helped me in this journey.

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CHAPTER ONE

INTRODUCTION

1.1. Introduction

This chapter provides a general idea about the background of the study, problem statement, objectives, expected scope, significance of the study, and structure of thesis.

Performance analysis of large-scale scientific applications poses the challenge of significant interpretation of a large amount of performance data, A glut of factors influence the performance of a parallel application, like the hardware platform, the system software, and the programming model. Poor performance will generally be suitable to a complex interaction of many components. This requires that many different metrics are calculated, attributed to different components and compared to each other. The type of metrics and components will depend on the compute system, the programming paradigm and even the type of application. This requires a high degree of flexibility within a performance analysis system to gather performance data, calculate metrics, and permit for mapping of these metrics onto specific entities, such as subroutine calls or program counters (Jost, Mazurov and Mey , 2008)

Task analysis (TA) for instructional design is a process of analyzing and articulating the type of learning that you guess the learners to know how to achieve (Jonassen, Tessmer, & Hannum, 1999, p.3).

The process of task analysis emerged from the behaviorist time in an effort to illustrate the elemental behaviors involved in performing a task or job. Nevertheless, different methods of task analysis have really followed the paradigm shifts to cognitive psychology and onto constructivism. Ultimately, each methodology of instruction commands its have method of analysis, yet regardless of methodology, a task analysis is needed for an in-depth understanding of the learning that's to obtain place (Jonassen, et al., 1999).

Hierarchical task analysis (HTA) is one of the most common methods used for task analysis. The outputs of HTA are a hierarchy of tasks and subtasks and also plans describing in what order and under what conditions subtasks are performed.

Hierarchical Task Analysis (HTA) is used to explain the practice of a software system (Dix,Gregory & Beale, 2004). When HTA combined with a Keystroke Level Model (KLM) they can make a decision comparative task efficiency (Card and Moran ,1983, Kieras ,2001). Software was developed to let the graphical representation of systems as a series of tasks which are decomposed into elemental components of operation (HTA).

Cognitive descriptions of the task using KLM strings are then imbedded to supply a relative timing for each elemental task. These times are then combined with the

related plans of the HTA to provide an overall task efficiency rating (Bockus and Ryan 2008)

This study discusses and explains how to evaluate the online payment task by using Task analysis, HTA and KLM, and observes functionality the online payment website for University Utara Malaysia (UUM).

1.2. Payment Online

The idea of online payment or also called as electronic payment is not a new one. Early 1980s, David Chaum first presented the concept of using blind digital signatures for implementing untraceable electronic payments. Since then, there has always been much attention in electronic payment systems.

The most frequent form of online payment implemented today is to send the user's credit card number over a Secure Socket Layer (SSL) or Transport Level Security (TLS) enabled web browser to a merchant server. (Asokan,et al,1997) explain There are two reasons for this widespread usage:

- From a merchant point of view it is very easy to receive and process these payments.
- All known "secure payment systems" are classified as too complex to implement. Analyzing a typical, simple online payment scenario, this is explained in Figure 1.1 , one can ask why should the merchant (service provider) know the user's credit card number, and why should the bank know about the goods or services the user has bought?

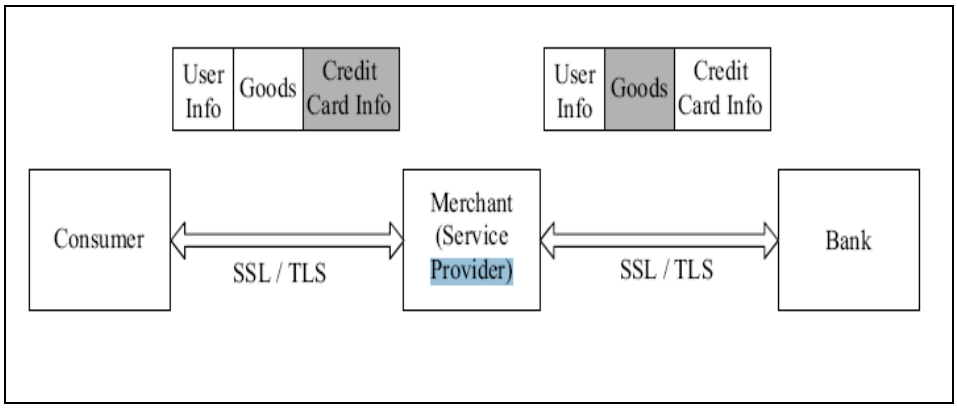

Figure 1.1 :Simple Internet payment scenario

In a real case Internet payment transaction there will be a set of messages traveling from three parties involved, but in simplified form the request movements from the consumer to the merchant (service provider) and to the bank. The request contains consumer information, information about goods or services bought and payment details, like credit card number for the bank to pay the merchant, preferably, all parties involved in a payment transaction should be authenticated against each other, and a secure communication path should span form the consumer to the bank.

In other simple detail the figure 1.2 present what the process of payment online:

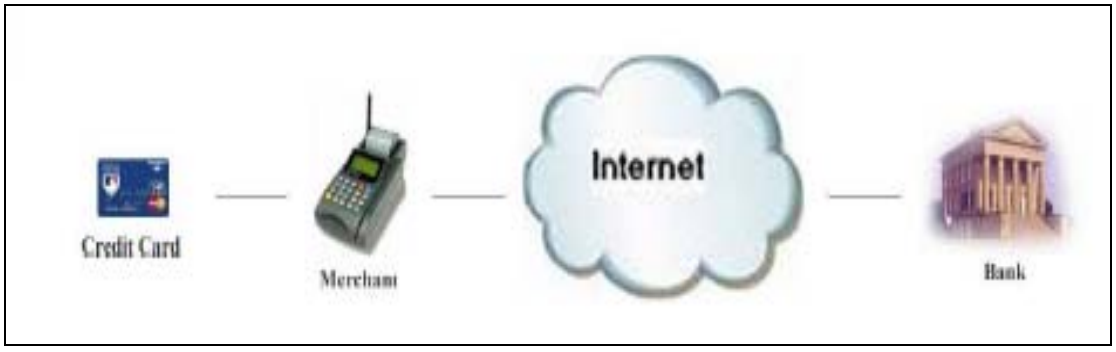

Figure1.2: Online Payment process

The user enters all relevant card details (i.e., card number, expiry date, name on the card) and then provides. This information is transmitted (via a POS device or web page) by the Merchant over the web. Payment goes ahead if the all information is verified as being legitimate. Notification is then transmitted back to the Merchant via the web.

1.3. Problem Statement

Website of University Utara Malaysia (UUM) is very important to postgraduate students and also staffs because this website provide data and facility and all information to the students and staffs which they need it .

One of the tasks which the website provide it to the (user) students and staffs is online payment which can user open it from through UUM Portal (www.umis.uum.edu.my) .

From the table1.1 and the figure1.3 in the following they explain and show how many students and staffs in University Utara Malaysia (UUM) and when compare between there numbers and the percentage to use the online and manual payment fond in this task there are small percentage of user (students and staffs) use the payment online

Table 1.1:Total of students and staff in University Utara Malaysia (UUM)

ITEM	TOTAL
Staffs	**3,500**
Postgraduate Students	**3,000**
Total	**6,500**

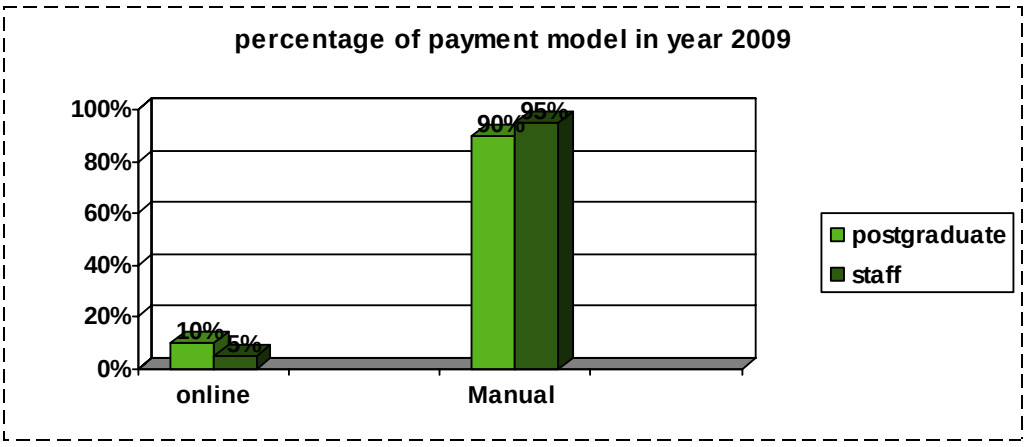

Figure 1.3 :percentage of payment model in year 2009

Therefore that show there are weakness of the user interface design and that's explain also from my observation and the interview which made it with sample of users :postgraduate students and staffs in University Utara Malaysia (UUM) and this also supported by the information which gave it from computer center and bursar department

1.4.Research Questions

These are the research questions for this research:

1. What is user performance of the existing online payment Model to perform the online payment tasks?

2. *What is the proposed task analysis to enhance the existing task performance?*

3. How the proposed task analysis able to enhance the existing task performance?

1.5. Research Objective

The main objective of this research is to recommend the enhancement of task analysis for UUM online payment to improve the user performance and the efficiency in University Utara Malaysia (UUM).

The specific objectives:

i. *to identify the user performance of the existing online payment model to perform the online payment tasks.*
ii. *to improve the task analysis of the existing online payment.*
iii. *to evaluate the user performance of the proposed task analysis improvement.*

1.6. Scope Of Research

University Utara Malaysia (UUM) online payment website is very important to all students to do any transaction related to UUM fees payment and so forth. Therefore this study will focus on University Utara Malaysia (UUM) online payment website specifically related to Payment Via Credit Card page's

1.7. Significance Of Research

This study will provide a guideline to UUM system developer to enhance the UUM Online Payment System. The method used in this research is useful and important to evaluate the user performance based on the tasks description of the observed system application.

1.8. Structure Of Thesis

The chapters in this thesis are arranged as follows:

Chapter Two

Presents a literature review related to this study.

Chapter Three

The research methodology which is adopted in this study is a deductive approach and it is used during the development of the model. It discusses the steps of the methodology, and how they help researcher to accomplish the goals of the thesis.

Chapter Four

This chapter focused on the result and data analysis. Also presents in detail the task flow and task scenario of the existing and the proposed tasks description for the UUM Online Payment System.

Chapter Five

This chapter explains the evaluation procedure, followed by the recommendation of the UUM Online Payment user interface layout, and present some of the discussion, recommendation and conclusion.

Chapter Six

This chapter provides the proposed system discussion and evaluation using the questionnaire to measure the user acceptance.

Chapter Seven

The final chapter gives the conclusion of the study. Recommendations and directions of future work are discussed**,** and conclude the findings of this research**.**

1.9. Conclusion

This chapter gives an insight of the project by describing the background of the study, the problem statement and the motivation factors that lead to the selection of the area studied. It also explains the objectives of conducting the study, as well as its contribution to the real world situation, scope, and research framework. These elements are important as it ignites the implementation of the project.

In addition There are two results shown in specific of this research as following :

1. This research recommended a simple payment online model to increase the user performance of the system to achieve the user satisfaction.

2. This research identifies the usability problems which focus on user performance and efficiency of the system that exists in the current payment online model, this is achieved by the comparison between execution time of current and proposed model of payment online.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a highlight on the literature review according to the area of project. It conceptually gives an insight or reviews on the previous and existing works that have been conducted on the same area, and this chapter focus the main issue related to the user performance and the methods which used to identified to evaluate and estimate the user performance of online payment model like Human Computer Interaction (HCI) and User Interface (UI) Design, Task Analysis(TA) ,Hierarchical Task Analysis (HTA),GOMS, and Keystroke Level Model (KLM) .

2.2 User Performance

According to Cairns (2007), many usability tests and studies tacitly suppose that user performance, specially, time to achieve a task, is perfectly represented by a normal distribution. This can be seen by the predominance of t-tests and ANOVA to analyze the differences in task times between different interfaces or in different conditions**.**

In addition many usability tests focus on average performance where the mean task time across participant is compared for different designs. Noticeably improvements in means should substantially affect any user but the total reduction

in task times could be quite small and may not associate to improvements in user experience, that's mean user performance, Cairns and Schiller (2008)

For the sprawling, faraway users, improvement in plan could result in a twofold improvement in performance. That is, there is room to substantially develop the happiness of a few individuals while having only a small impact on the performance of the a lot. This certainly must be something that human-computer interaction (HCI) should believe.

HCI is already considering such factors with the ideas of openness and universal access but by considering them as special cases rather than features of a general population of users ,Cairns and Schiller (2008)

2.3 Online Payment

According to Goldman (2007), In 1980s David Chaum presented the concept of using blind digital signatures for implementing untraceable electronic payments .

(Rexha ,2005) explains the main process of online payment which it apply today is to send the user's number of credit card over a Secure Socket Layer (SSL) or Transport Level Security (TLS) enabled web browser to a merchant server.

In a real case Internet payment transaction there will be a set of messages traveling from three parties involved, but in simplified form the request movements from the consumer to the merchant (service provider) and to the bank. The request contains consumer information, information about goods or services bought and payment details, like credit card number for the bank to pay the

merchant, preferably, all parties involved in a payment transaction should be authenticated against each other, and a secure communication path should span form the consumer to the bank (Asokan,et al,1997) .

2.4 Human Computer Interaction (HCI) and User Interface (UI) Design

According to Shaw (1991), software engineer and interface designer and system developer seem to be unaware to the user needs and information seeking behavior during system development before 1970s**.**

User interface is an interaction between the computer and the user (chalmer,2003).

Hansen (1982) explains the designing user interface should follow the three area of principle such as place users in control of the interface and reduce user's memory load and make the user interface consistent.

The Figure 2.1 shows the development process in human computer interaction(Preece, 1994).

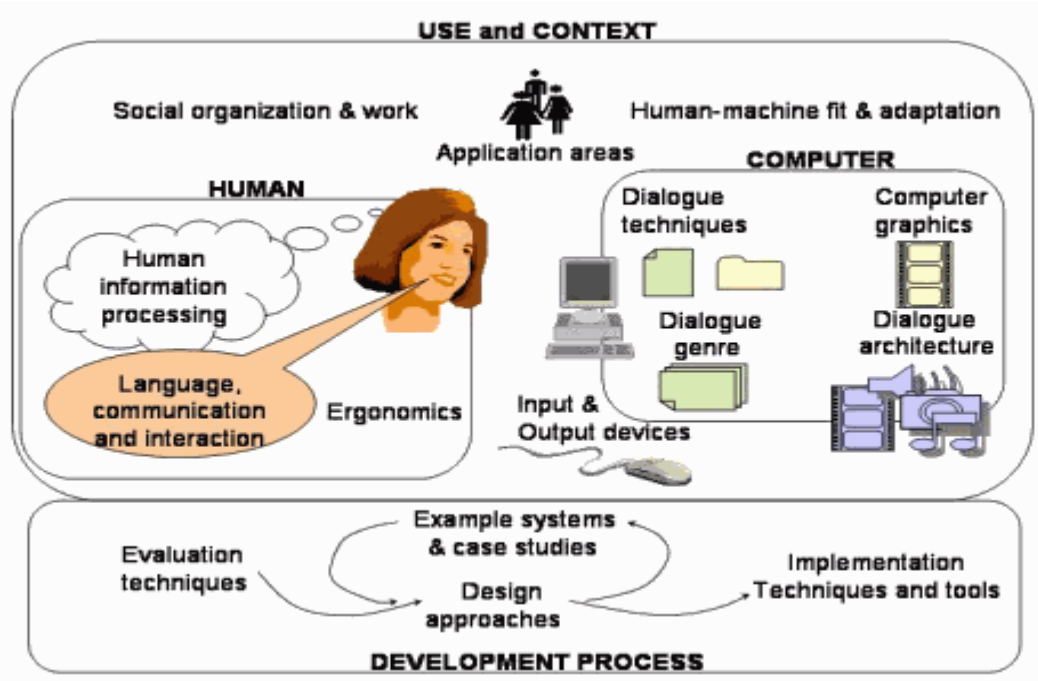

Figure 2.1: Human-Computer Interaction

According to Jonassen ,et al .(1999) it is important to the system designer to understand of how users perform a particular task and decompose it into the most natural way.

Task analysis is crucial in designing user interface to categorize the task that be taken by users to accomplish their task purpose (Mohd.& Syed Mohamad,2005).

2.5 Task analysis (TA)

Task Analysis (TA) is method to analyze a task procedure or action that a user should be taken to accomplish a task objective (Mohd & Syed Mohamad , 2005).

According to Van Cott and Kincaid (1972) the idea of task analysis, originally formulated by Frederick Taylor (1911) became a common requirement for systems development and operators training.

In total system design task analysis is used on several hierarchical levels:

1. Organizational to aid allocation of functions between personnel and machinery and to match the work to be done with kinds of people who will do it (Bailey, 1982)
2. Individual operator to provide requirements for selection and training of Personnel.
2. Technical components and their elements to provide technical specifications for human/machine interface (Woodson and Conover, 1966).

Although through many years of massive effort several approaches to task analysis were developed, systemic task analysis is still more a requirement than reality even in traditional areas of repetitive physical tasks.

(McCormick, 1976) explain The state of the art presents a fairly dismal impression, highlighted with only few bright spots here and there task analysis is still more in domain of the arts than of the sciences ; and the science of job and task analysis is by no means here or around the corner.

2.6 Hierarchical Task Analysis (HTA)

Hierarchical Task Analysis (HTA) was introduced by Annett and Duncan (1967) to evaluate an organization's training needs. The underlying technique, hierarchical decomposition (Annett, Duncan, Stammers and Gray, 1971), analyzes and represents the behavioral aspects of complex tasks such as planning, diagnosis and decision making (Annett and Stanton, 2000).

HTA breaks tasks into subtasks and operations or actions. These task components are then graphically represented using a structure chart. HTA entails identifying tasks, categorizing them, identifying the subtasks, and checking the overall accuracy of the model.

HTA is useful for interface designers because it provides a model for task execution, enabling designers to envision the goals, tasks, subtasks, operations, and plans essential to users' activities. HTA is useful for decomposing complex tasks, but has a narrow view of the task, and normally is used in conjunction with other methods of task analysis to increase its effectiveness. HTA serves as both an analytical framework and a practical tool for designers.

According to Shepherd (2001), HTA recognizes the responsibility of the operator (user) to plan the use of available resources to attain a given goal, but it treats the operator's cognitive processes as a black box: "how behavior is actually organized is a question for cognitive psychology , But as has long been apparent in HCI it is crucial to understand the structure of human cognition in order to appropriately support cognitively intensive tasks.

Moreover, compartmentalizing cognition in this way is limiting. Cognition is intimately connected to sociocultural processes (Hollan, et al., 2000), but HTA provides no systematic way for dealing with the rich social and physical context in which activities are embedded. Similarly, HTA fails to support the components needed to analyze system flows and dynamics. These limitations

necessitate the use of additional theoretical structures to develop a more complete understanding of human activity.

2.7 GOMS Task Analysis Techniques

According to John & Kieras (1996), one of the most widely known theoretical concepts in HCI is GOMS analysis, The GOMS concept is useful to analyze knowledge of how to do a task in terms of **G**oals, **O**perators, **M**ethods, and **S**election rules, provided the motivation for much research that verifies and extends the original work

According to (chuah et.al.,1994) GOMS and HTA are similar in delivering task description where HTA express on high – level activity and GOMS focus on keystroke level..

GOMS has four different versions (KLM, CMN-GOMS, NGOMSI, CPM-GOMS) which based on GOMS concept (Hochstein ,2002).

GOMS versions

- The Keystroke-Level Model(KLM) :

  KLM is the simplest GOMS technique to estimate execution time for a task, the analyst lists the sequence of operators and then totals the execution times for the individual operators (Card et al. 1983).

- Card, Moran, and Newell GOMS (CMN-GOMS):

  CMN-GOMS has a exacting goal hierarchy. Methods are represented in an unofficial program form that can include sub methods and conditionals. A

CMN-GOMS model given a particular task situation, can as a result predict both operator sequence and execution time (Card et al. 1983).

- Natural GOMS Language (NGOMSL) :

NGOMSL is a prepared natural-language notation for representing GOMS models and a procedure for constructing them , An NGOMSL model is in program structure and Provides , predictions of operator series, execution time, and time to learn the Methods and clearly represent the goal structure, and so they can represent high-level goals (Kieras 1996).

- Cognitive-Perceptual-Motor GOMS (CPM-GOMS):

CPM-GOMS model, predicts execution time based on an analysis of component activities and uses the critical path in a schedule chart (PERT chart), to provides the prediction of total task time(John & Kieras ,1996)

(Hochstein ,2002) explain the most GOMS family during the task can predict the execution time to accomplish the task by expert user and with condition and without mistake

2.8 Keystroke-Level Model (KLM)

(Card, Moran and Newell,1980) explain The Keystroke-Level Model (KLM) is used to estimate execution time for a task.

The keystroke-level model in human-computer interaction (Card, Moran and Newell 1983) resents a set of rules to decide how long a task will take.

Times are given for mouse clicks, moving the hand from mouse to keyboard, keystrokes, and the essential Mental Operator. The Mental Operator can be

attention of as a mental chunking function **(**Thomas, Karahasanovic And Kennedy,2005)

While the Keystroke-Level Model was introduced in 1980, researchers have useful it to many areas such as text editing, spreadsheets, learning, telephone operator call handling and highly interactive tasks in video games (John, B.E. & Vera,1992)

According to Luo and John (2005), the possibility of the KLM is limited to skilled users performing error-free task using a detailed method on a given interface design. The central idea of KLM is to list the sequence of keystroke-level actions that the user must perform to realize a task, and total the time required by each action. The KLM describes the task execution in terms of four physical-motor operators: **K** (key-stroking), **P** (pointing), **H** (homing), and **D** (drawing), one user mental operator **M**, and a system response operator **R**(*t*). K, P, H and D are determined by the actions necessary to accomplish the task.

(Kieras, 2001) clarify ,traditional KLM has seven classes of operation and this standard operators and there estimated times for each operator are shown in the Table 2.

Table 2.1: Operators And Estimated Times Used In KLM

Operators Name	Explanation	Times(Sec)
K	**Keystroke**(pressing a key or button on the Keyboard): Expert typist (90 wpm)	.12 sec .20 sec

	Average skilled typist (55 wpm) Average non secretarial typist (40 wpm) Worst typist (unfamiliar with keyboard)	.28 sec 1.2 sec
P	Point with mouse to a target on the display	1.1 sec
B	Press or release mouse button	.1 sec
BB	Click mouse button	.2 sec
H	Home hands to keyboard or mouse	.4 sec
M	Mental act of routine thinking or perception	1.2 sec
W(t)	Waiting for the system to respond	(time *t* must be determined

The scenario in **APPENDIX (A)** shows the calculation used to estimate time of keystroke and mouse movement by user to complete deleting file task if the trash can is hidden (Kieras, 2001) :

2.8 Usability

According to Hartson (1998) the expression usability is used to refer to that a design is "good" from a HCI point of view.

A designer or a design group can use rule, heuristics or rules as aids in the design procedure to ensure good usability. On the other hand designers should estimate their design with users in observe to see if the usability is at the beloved or required level. For the evaluation with users checklists or sets of ergonomic criteria and heuristics exist. The problem of all these lists, rules and criteria is that it is ambiguous how they are related and why one list may be more useful than others (Welie, Veerand Anton Eliëns, 1999).

Making computer-based products (and services) more usable is a smart business. Usability increases customer satisfaction and productivity, leads to customer trust and loyalty, and inevitably results in tangible cost savings and profitability. Because user-interface (UI) development is part of a product's development cost anyway, it pays to do it right.(Marcus, 2002)

User interface events (UI events) are generated as natural products of the normal operation of window-based user interface systems such as those provided by the Macintosh Operating System (Lewis and Stone 1999), for the reason that such actions can be automatically captured and because they show user behavior with reverence to an application's user interface, they have long been regarded as a potentially rich source of information regarding application usage and usability. However, because user interface events are naturally voluminous and rich in detail, automated support is generally required to take out information at a level of abstraction that is useful to investigators involved in analyzing application usage or evaluating usability (Hilbert And Redmiles,2001)

The current goal in the design of user centered software is to generate a system that not only has efficacy, but also usability. A program that wholly actualizes both of these factors gives grow to a system that is easy to learn and use, increases user acceptance and operation, increases user efficiency and satisfaction, and decreases user frustration , decreases user errors, and decreases teaching requirements. Unfortunately, due to appreciable time and financial constraints, system developers are not for all time able to believe all of the

attributes that are critical in the design of functional and usable interfaces (Johnson and Zhang, 1999).

(Bonebright ,et al ,2001) explain the usability issue is no longer an choice but rather a requirement for signification techniques and applications. For the estimation, user testing is typically carried out at the stage when working prototype is available. Nevertheless, the implementation to get to this phase is expensive and slow. At the same time, most of existing usability examination or discount techniques are more focusing on the inspection of Graphical User Interface (GUI) designs and not suitable for significance Applications.

According to Chipman, et al. (2001), Task analyses are too difficult to perform, and when they are performed they are too complex to understand and use, It remains unclear how to marry increasingly sophisticated models of human cognition and action with simpler, practitioner-friendly techniques. Still, it should be possible to develop new lightweight or "discount" task analysis techniques that are both easy to use and informative. Usability engineers before now rely on simple techniques such as cognitive walkthroughs and heuristic assessment, but these approach sacrifice the richness of correct task analysis. Otherwise, task analysis software could be developed to support systems analysts and designers by given that a clear framework and automating routine aspects of analysis (Crystal and Ellington, 2004)

2.10 Usability Testing

Usability tests can be accepted at different points in the plan and improvement process (Nielsen, 1993; Preece, 1993; Rubin, 1994; Smith & Mayes,

1996).usability testing is most great and useful and also effective when implemented as part of a product development process (Rubin, 1994).

Liu (2oo8) explains ,the usability testing describes the activity of performing usability tests in a laboratory with group of users and recording the result for further analysis ,the usability testing is the next appropriate step to get feedback on how easy or difficult it is to understand and use a specific system.

According to jonassen ,et al (1999) the key to perform the usability test is to measure the product

2.11 Conclusion

The introduction and the main features presented in this chapter to provide the reader with the highlight on the aim of this research, otherwise this chapter discussed related literature review to the issue of the user performance and the methods which used to identified to evaluate and estimate the user performance of online payment model

The research methodology which is adapted in my study is the deductive methodology to achieve the objective is discussed in the next chapter. This methodology has been carefully chosen to make sure that it is suitable for developing the proposed model.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction:

Research Methodology is more than just collections of method to perform a research project; it is a systematic way to solve the research problem. The research methods refer to the methods and techniques used by the researcher in performing the research. This chapter will give a highlight on the methodology applied for this project; otherwise this chapter gives an overview of the methodology phases that used in this study.

3.2 Research Methodology Explanation:

The Methodology which I choose is deductive. It is used during the development of model where theory and concept of system quality are derived from literature and empirical finding before the model is applied and tested in the real case study. This methodology involves four phases that interact with eachother:

1. **Theoretical Study:**
2. **Empirical Study**
3. **Framework Development**
4. **Design and Development**:

These phases are explained in Figure3.1 below:

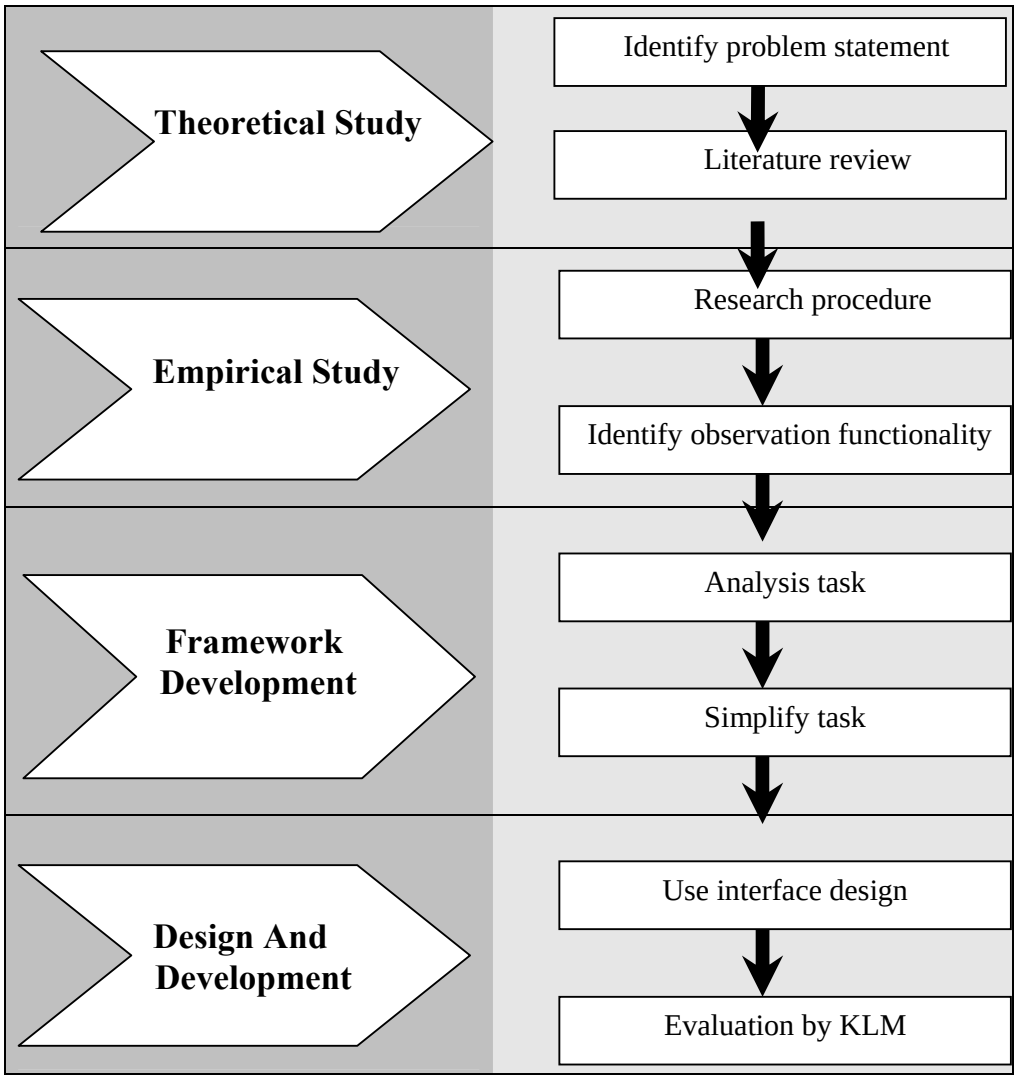

Figure 3.1 : Description Research Methodology

3.2.1 Theoretical Study:

This phase involves identifying the problem statement which was explain it in specific in chapter one and literature review I was explain it in chapter two.

3.2.2 Empirical Study

This phase involve the:

a) Research Procedure

Contains all method and techniques which used to collect data for evaluation and this method is interview and observation. researcher have been selected a sample from postgraduate students and staffs to support in this study.

1. Questionnaire:

The Questionnaire involves nine questions which show in detail in appendix (B) ,These questions about online payment model and this questions asked to the sample from students (postgraduate) and staffs in University Utara Malaysia (UUM).

2. Observation:

During observation, the users explained the processes which they use in their daily activities and gave a comment which is about the online payment model to the researcher and then recorder this comments in the research.

b) Identify Observation Functionality:

There are some screens which choose and identify to use for Evaluation. These functionality will be discussed specifically in chapter four.

3.2.3. Framework Development

This phase involves two steps:

a. Analysis Task :

In this step the researcher analyzes a list of tasks to accomplish the task goal, it involved looking in depth to the task and actions which taken with all information and knowledge which is needed to achieve the goal.

The main aim of this step is to evaluate the design of current system and to development a new system.

When finished from this step then transformed to Hierarchal Task Analysis (HTA) and this step will be explain in the following

b. Simplify Task:

By using hierarchical task analysis (HTA) to identify and simplify the complex flow of task in the current design.

The simplified HTA was transformed into scenario statement to compare between the current and new scenario.

3.2.4. Design and development:

This phase involve two steps:

a. User Interface Design:

In this step the simplified HTA is transformed into mock-up user interface design plan that represented that would be developed by developer .

b. Evaluation by using keystroke level model (KLM):

In this step the keystroke level model (KLM) is used to compare and evaluated the scenario statements of current design and new design to identify the efficiency design and to predict the estimation time for both scenario which is taken by user to achieve task.

The tool which is used to calculate the execution time of current design and new design is keystroke level model (KLM) calculator : (KlmCalc).

3.3 Conclusion

In this chapter, present the research methodology which used it in the study and present each step of this methodology in specific way.

The observation and questionnaire are the method which are used to collect data and the (KLM) calculator (KlmCalc) used to calculate the execution time of current and new design.

The evaluation which used is not need a real user and even does not need a prototype .

In chapter four, researcher will discuss the analysis and result of the online payment model to show the usability and user performance of it.

CHAPTER FOUR

ANALYSIS ONLINE PAYMENT MODEL BY USING KEYSTROKE LEVEL MODEL (KLM)

4.1 Introduction:

This chapter presents the functionality which is use to develop in current design of online payment model and analysis it by using Hierarchical Task Analysis (HTA) to show specifically the detail activities that has to be taken by user to accomplish certain procedure in the function .

After using Hierarchical Task Analysis (HTA), this function is evaluate by using keystroke level model (KLM) to predict and estimate the execution time and present and analysis of usability and user performance for the online payment model.

The result from the evaluation gives the response time to perform the task and show the efficiency of the observed online payment model functionalities.

The model seeks to predict efficiency by breaking down the users behavior into sequence of the six primitive operators, the standard operator and time estimation of keystrokes in Table 4.1 which provided by KLM analysis.

:

Table 4.1 Standard Operator And Time Estimation Of The Keystrokes

Standard Operators Name	Explanation	Estimated Times(Sec)
K	Average typist (40 wpm)	.28 sec
T	Type a sequence of n character on a keyboard	(*n**K) *n* is the number of typing characters
P	Point with mouse or other device to a target on the display	1.1 sec
B	Press or release mouse button	.1 sec
BB	Pushing and releasing the mouse button rapidly ,as in a selection click	.2 sec
H	Home hands to keyboard or mouse	.4 sec
M	Mentally prepare to do something	1.35 sec
R(t)	System response time	*T*

4.2 Payment Online

4.2.1 User Interface Design

The user begin to pay by using online payment from UUM portal and THEN do the following steps **:**

1. Choose Student Account Link .
2. Choose Student Account Statement Link.
3. Click UUM E-Com Button.
4. Choose Payment Mode
5. user fill the following information:
    - Insert Name

- Insert IC/Passport No
- Insert Metric/Staff No this field option
- Choose Payment For by using list
- Write Description: this field option
- Insert Amount
- Click "Pay" Button

5. Confirmation Information which is Entered
6. Click" Pay Now" Button
7. Select Preferred Payment Method (VISA /MasterCard)
8. Entered Card Details, in this step the user fill the following information:
    - Insert Card Number
    - Insert Security Code
    - Insert Expiry Date ,this field content the Insert Month and insert year
9. Click "Pay" Button then the online payment is successful.

All the steps in above show as a figure as the following:

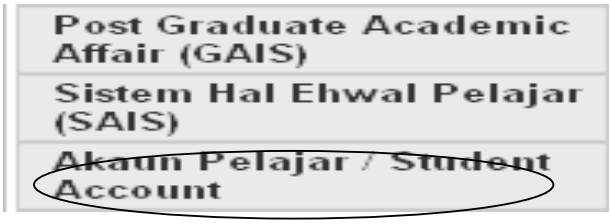

Figure 4.1(a): **Choose Student Account**

Figure 4.1(b): **Choose Student Account Statement**

Figure 4.1(c): UUM E-Com Button

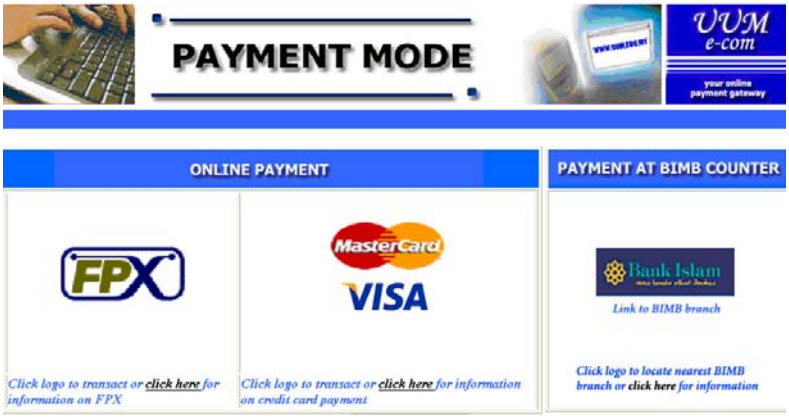

Figure 4.1(d): Choose Payment Mode

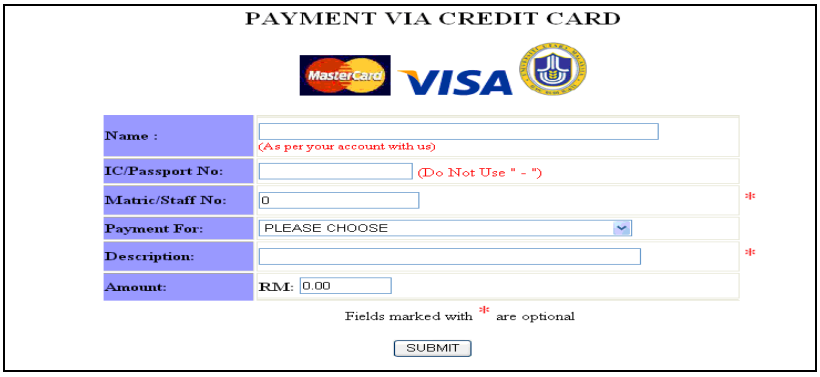

Figure 4.1(e): Fill The Informations

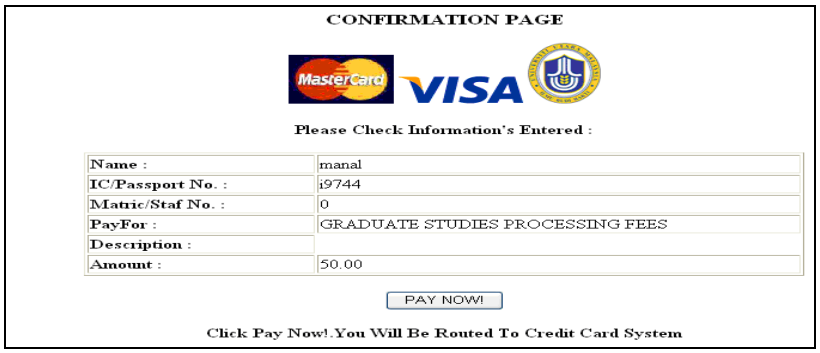

Figure 4.1(f): Confirmation Information Which Entered

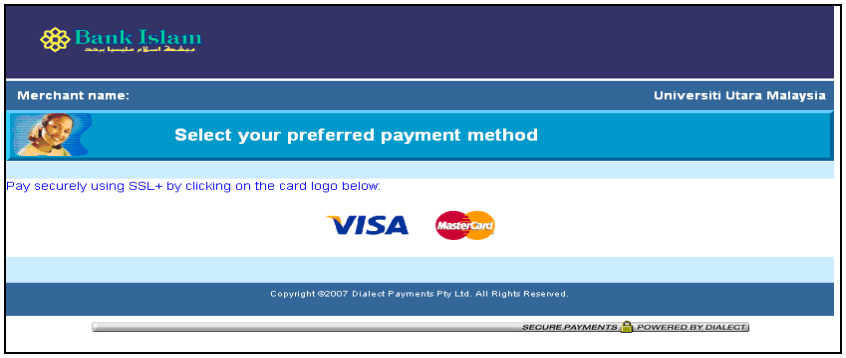

Figure 4.1(g): Select Preferred Payment Method(VISA /MasterCard)

Figure 4.1(h): Insert Card Details

4.2.2 Hierarchical Task Analysis (HTA)

Task analysis represented by using HTA as shown in Figure 4.2. This figure shows the detail activities that have to be taken by user in order to achieve certain procedure in the function; by using HTA diagram the task analysis will look very clear and more understanding.

Figure 4.2 content eight (8) steps to complete or perform the task without any errors. The numbers which show near the box are the steps numbers in the task .

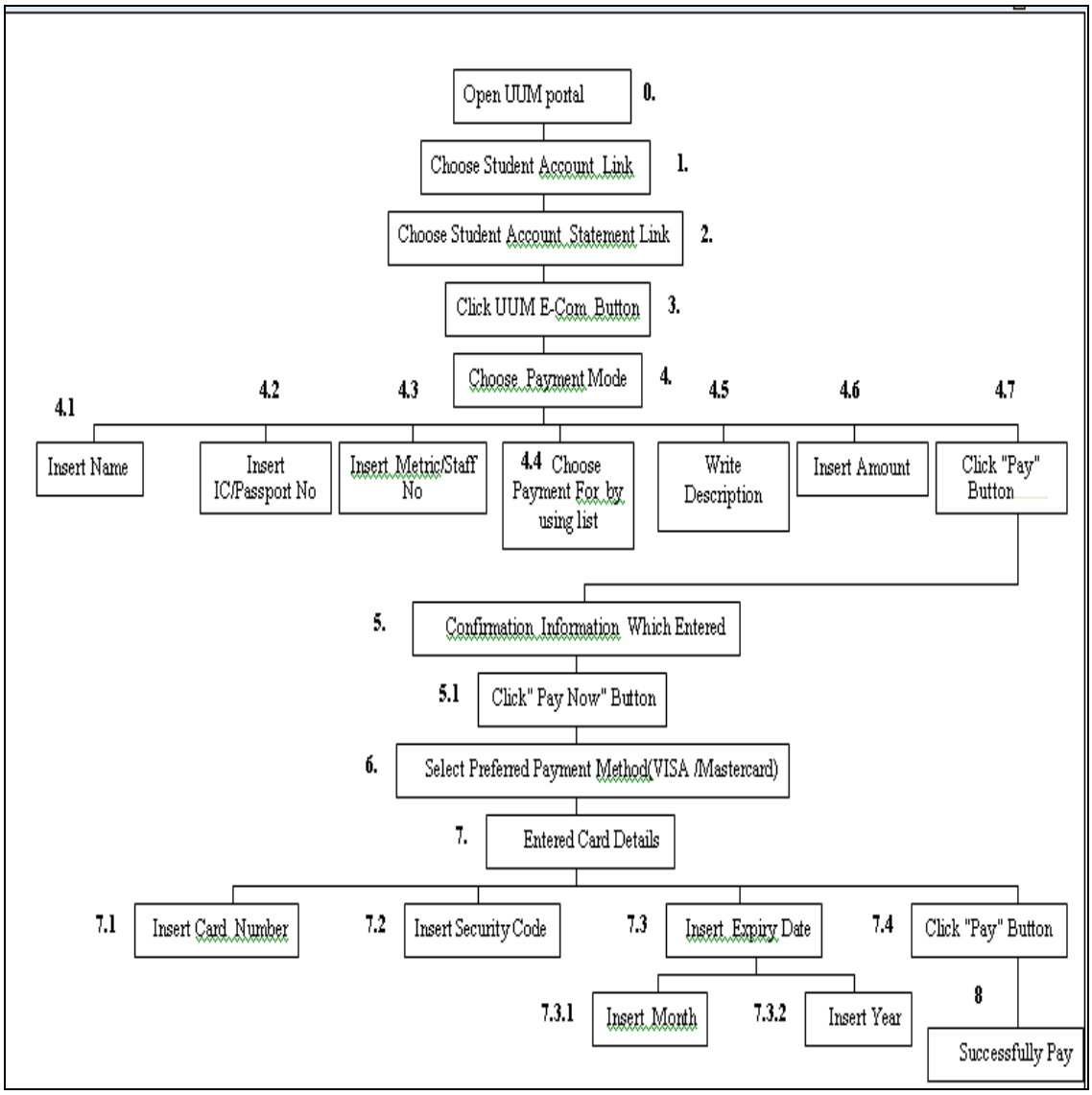

Figure 4.2: Online Payment HTA

4.2.4 Evaluate And Result

Table 4.2 show the scenario statements and the estimation time of online payment process . the estimation time is calculated with assumption no errors during the task.

There are 68 scenario involved in the process to achieve the objective of the task . the result shows the estimation time to carry out the task is about **66.05 +9.84 *n* seconds** where n is the number of characters.

Table 4.2 : Keystroke Estimation Time For The current Online Payment Process

Scenario statement	Operator name	Time(sec)
1.Initiate to choose UUM portal	**M**	**1.35**
2.Choose And Point To UUM Portal	**M,P**	**2.45**
3.Click Mouse Button	**BB**	**,2**
4.Choose And Point To Student Account Link	**M,P**	**2.45**
5.Click Mouse Button	**BB**	**,2**
6.Choose And Point To Student Account Statement Link	**M,P**	**2.45**
7.Click Mouse Button	**BB**	**,2**
8.Choose And Point To UUM – Ecom Button	**M,P**	**2.45**
9.Click Mouse Button	**BB**	**,2**
10.Choose And Point To Payment Mode	**M,P**	**2.45**
11.CLICK Mouse Button	**BB**	**,2**
12.Choose And Point To Insert Name	**M,P**	**2.45**
13.Move Hand From Mouse To Keyboard	**H**	**,4**
14.Type Name	**T**	***n* x K***
15.Move Hand From Mouse To Keyboard	**H**	**,4**
16.Choose And Point To Insert IC/Passport No	**M,P**	**2.45**
17.Move Hand From Mouse To Keyboard	**H**	**,4**
18.Type IC/Passport No	**T**	***n* x K***
19.Move Hand From Mouse To Keyboard	**H**	**,4**
20.Choose And Point To Insert Metric/ Staff No	**M,P**	**2.45**

21.Move Hand From Mouse To Keyboard	**H**	**,4**
22.Type Metric/Staff No	**T**	***n* x K***
23.Move Hand From Keyboard To Mouse	**H**	**,4**
24.Point The Mouse To Payment For	**P**	**1,1**
25.Click Mouse Button	**BB**	**,2**
26.Point the mouse to scroll bar	**P**	**1.1**
27.Click and hold on the scroll bar	**B**	**.1**
28.Drag the scroll bar	**P**	**1.1**
29.Release the button	**B**	**.1**
30.Point the mouse to correct choose	**P**	**1.1**
31.Click on the correct choose	**B**	**.1**
32.Move mouse hand back to keyboard	**H**	**,4**
33.Choose And Point To description	**M,P**	**2.45**
34.Move Hand From Mouse To Keyboard	**H**	**,4**
35.Type description	**T**	***n* x K***
36.Move Hand From Keyboard to Mouse	**H**	**,4**
37.Choose And Point To amount	**M,P**	**2.45**
38.Move Hand From Mouse To Keyboard	**H**	**,4**
39.Type amount	**T**	***n* x K***
40.Move Hand From Keyboard to Mouse	**H**	**,4**
41.Choose And Point To " Submit " Button	**M,P**	**2.45**
42.Click Mouse Button	**BB**	**,2**
43.Initiate to check the Information Which Entered" Name, IC/Passport No, Metric	**M**	**1.35**

/Staff No, Payment For, Description, Amount		
44.Choose And Point To " Pay Now" button	**M,P**	**2.45**
45.Click Mouse Button	**BB**	**,2**
46.Initiate to Select Preferred Payment Method(VISA /MasterCard)	**M**	**1.35**
47.Choose And Point To Payment Method(VISA /MasterCard)	**M,P**	**2.45**
48.Click Mouse Button	**BB**	**,2**
49.Initiate to Entered Card Details	**M**	**1.35**
50.Choose And Point To Card Number	**M,P**	**2.45**
51.Move Hand From Mouse To Keyboard	**H**	**,4**
52.Type Card Number	**T**	***n* x K***
53.Move Hand From Keyboard to Mouse	**H**	**,4**
54.Choose And Point To Security Code	**M,P**	**2.45**
55.Move Hand From Mouse To Keyboard	**H**	**,4**
56.Type Security Code	**T**	***n* x K***
57.Move Hand From Keyboard to Mouse	**H**	**,4**
58.Choose And Point To Expiry Date	**M,P**	**2.45**
59.Choose And Point To Month	**M,P**	**2.45**
60.Move Hand From Mouse To Keyboard	**H**	**,4**
61.Type month date	**T**	***n* x K***
62.Move Hand From Keyboard to Mouse	**H**	**,4**
63.Choose And Point To year	**M,P**	**2.45**
64.Move Hand From Mouse To Keyboard	**H**	**,4**
65.Type year date	**T**	***n* x K***

66.Move Hand From Keyboard to Mouse	**H**	**,4**
67.Choose And Point To "Pay" Button	**M,P**	**2.45**
68.Click Mouse Button	**BB**	**,2**
Total Estimation Time Of Online Payment Process	**66.05 +9.84 *n***	

n* x K where is n the number typing of characters**.**

4.2.4 Problems Of Online Payment Process

According to the users, the difficulty of the process is that user has to type the Metric/Staff number and also choose the correct reason to payment for by using the list, sometime the user make mistake when he/she choose the reason the payment for by using list, and also there is not good arrangement in order or steps of the online payment process.

4.3 Conclusion

From the observation and Questionnaire, the researcher found the usability problems of online payment are related to user acceptance, user satisfaction and ease of use. As a result, if online payment model is easy to use, the system is more likely to be accepted by the user.

The evaluation and result shows that the time which is taken by the user to achieve the task. This shows that online payment model is not efficient enough and needs to be redesigned to guarantee the efficiency and effectiveness of the system.

In chapter Five new user interface that proposed by researcher will increase the user performance of online payment, user satisfaction and increase the usability of the system.

CHAPTER FIVE

ONLINE PAYMENT AND PROTOTYPE

5.1 Introduction

This chapter presents the new proposed Online Payment Model, which is used to develop the current design of online payment model and analyze it by using task analysis (TA) and Hierarchical Task Analysis (HTA) and use keystroke level model (KLM) to predict and estimate the execution time.

The comparison between current and new online payment model is also discussed by using charts.

The development of the proposed online payment model was based on the usability problem of current online payment model that is readily available in University Utara Malaysia (UUM)

5.2 Proposed Online Payment Model

5.2.1 User Interface Design

The user begins to pay by using online payment from UUM portal and then does the following steps **:**

5 Choose Student Account Link .

6 Choose Student Account Statement Link.

7 Click UUM E-Com Button.

8 Select Preferred Payment Method(VISA /MasterCard)

9 the user fills the following information:

- Insert Name
- Insert IC/Passport No
- Choose Payment For by using check box in this step there are three main chooses which are the most uses by user(graduate studies processing fees, pace processing fees, Hea processing fees) ,these chooses taken from existing online payment model .
- Write Description: this field option
- Insert Amount
- Click "Pay" Button

6. Confirmation Information which is Entered

7 . Entered Card details, in this step the user fills the following information:

- Insert Card Number
- Insert Security Code
- Insert Expiry Date ,this field content : Insert Month and insert year

9. Click "Pay" Button then the online payment is successfully

All the steps in above show as a figure as the following

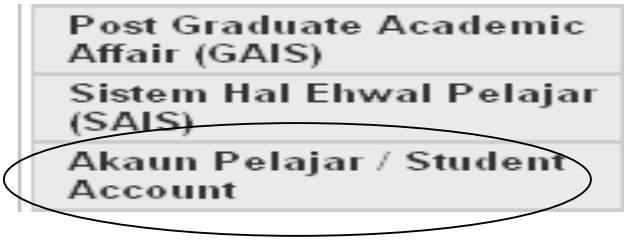

Figure 5.1(a): **Choose Student Account**

Figure 5.1(b): **Choose Student Account Statement**

Figure 5.1(c): **UUM E-Com Button**

:

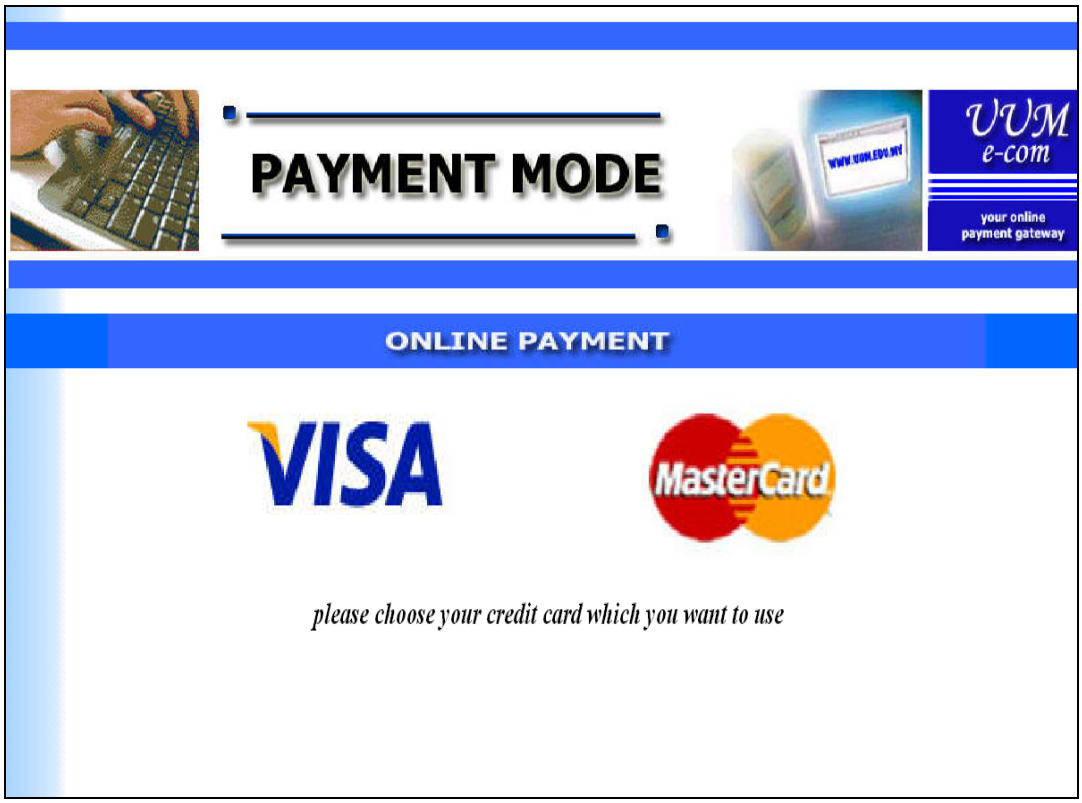

Figure 5.1(d) :Select Preferred Payment Method

Figure 5.1(e): Fill The Information

Figure 5.1(f) :Confirmation And Filling The Credit Card Details

Figure 5.1(g) : Successful Process

5.2.2 Hierarchical Task Analysis (HTA)

Task analysis represented by using HTA as shown in Figure 5.2 this figure show the detail activities that has to be taken by user in order to achieve certain procedure in the function , by using HTA diagram the task analysis will look very clear and more understanding.

Figure 5.2 content six (6) steps to complete or perform the task without any errors. The numbers which show near the box are the steps numbers in the task

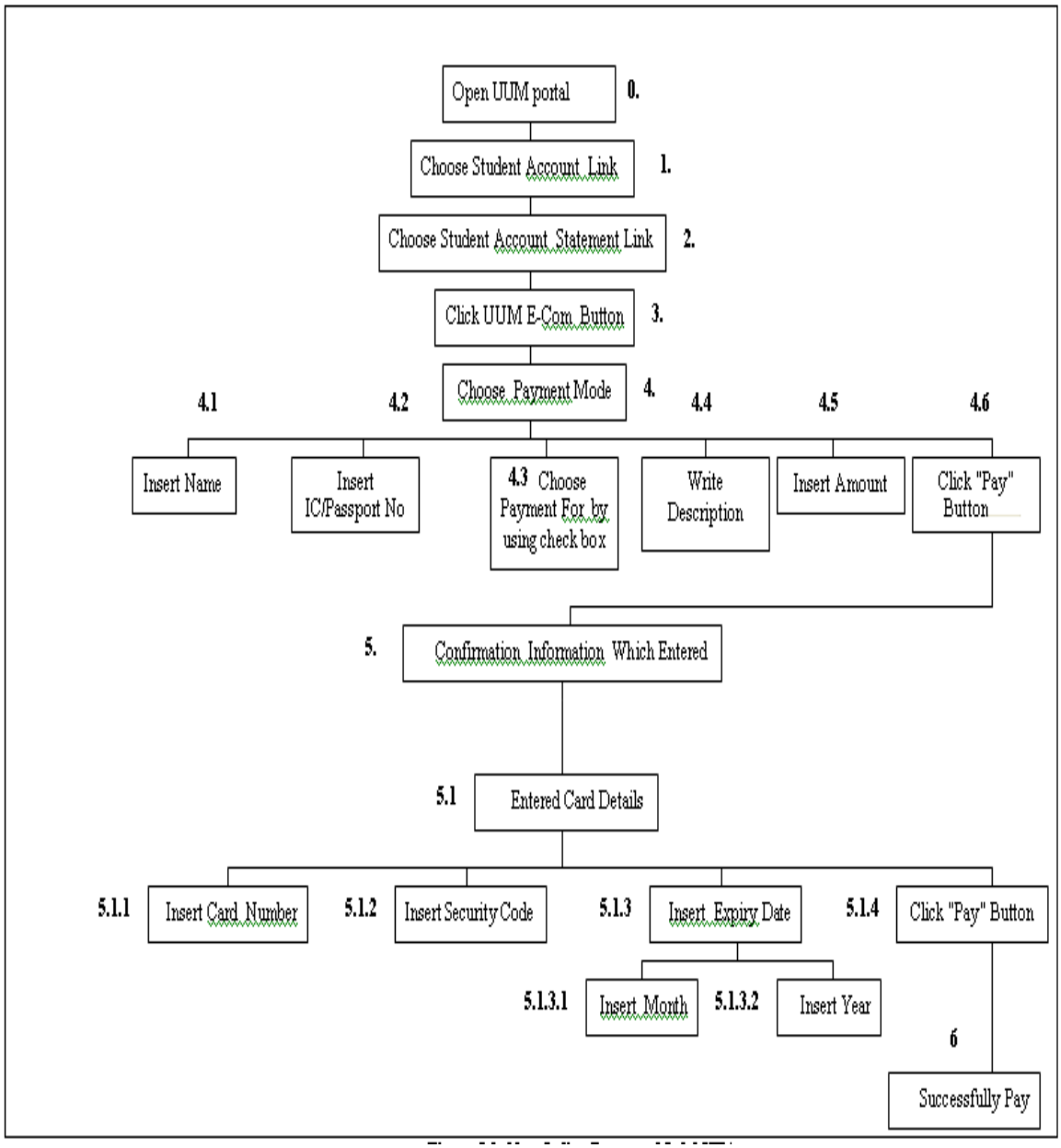

Figure 5.2: New Online Payment Model HTA

5.2.4 Prototype Evaluate And Result

Table 4.2 shows the scenario statements and the estimation time of online payment process. The estimation time is calculated with assumption no errors during the task.

There are 50 scenario involved in the process to achieve the objective of the task. The result shows the estimation time to carry out the task is about **51,7 + 8,72 *n* seconds** where n is the number of characters.

Table 5.1 : Keystroke Estimation Time For The new Online Payment Process

Scenario statement	Operator name	Time(sec)
1.Initiate to choose UUM portal	**M**	**1.35**
2.Choose And Point To UUM Portal	**M,P**	**2.45**
3.Click Mouse Button	**BB**	**,2**
4.Choose And Point To Student Account Link	**M,P**	**2.45**
5.Click Mouse Button	**BB**	**,2**
6.Choose And Point To Student Account Statement Link	**M,P**	**2.45**
7.Click Mouse Button	**BB**	**,2**
8.Choose And Point To UUM – Ecom Button	**M,P**	**2.45**
9.Click Mouse Button	**BB**	**,2**
10.Choose And Point To Payment Mode (VISA /MasterCard)	**M,P**	**2.45**
11.CLICK Mouse Button	**BB**	**,2**
12.Choose And Point To Insert Name	**M,P**	**2.45**

13.Move Hand From Mouse To Keyboard	**H**	**,4**
14.Type Name	**T**	***n* x K***
15.Move Hand From Mouse To Keyboard	**H**	**,4**
16.Choose And Point To Insert IC/Passport No	**M,P**	**2.45**
17.Move Hand From Mouse To Keyboard	**H**	**,4**
18.Type IC/Passport No	**T**	***n* x K***
19.Choose And Point To Insert IC/Passport Number	**M,P**	**2.45**
20.CLICK Mouse Button	**BB**	**,2**
21.Choose And Point To description	**M,P**	**2.45**
22.Move Hand From Mouse To Keyboard	**H**	**,4**
23.Type description	**T**	***n* x K***
24.Move Hand From Keyboard to Mouse	**H**	**,4**
25.Choose And Point To amount	**M,P**	**2.45**
26.Move Hand From Mouse To Keyboard	**H**	**,4**
27.Type amount	**T**	***n* x K***
28.Move Hand From Keyboard to Mouse	**H**	**,4**
29.Choose And Point To "Submit" Button	**M,P**	**2.45**
30.Click Mouse Button	**BB**	**,2**
31.Initiate to check the Information Which Entered" Name, IC/Passport No, Metric /Staff No, Payment For, Description, Amount	**M**	**1.35**
32.Choose And Point To Card Number	**M,P**	**2.45**
33.Move Hand From Mouse To Keyboard	**H**	**,4**
34.Type Card Number	**T**	***n* x K***
35.Move Hand From Keyboard to Mouse	**H**	**,4**

36.Choose And Point To Security Code	**M,P**	**2.45**
37.Move Hand From Mouse To Keyboard	**H**	**,4**
38.Type Security Code	**T**	***n* x K***
39.Move Hand From Keyboard to Mouse	**H**	**,4**
40.Choose And Point To Expiry Date	**M,P**	**2.45**
41.Choose And Point To Month	**M,P**	**2.45**
42.Move Hand From Mouse To Keyboard	**H**	**,4**
43.Type month date	**T**	***n* x K***
44.Move Hand From Keyboard to Mouse	**H**	**,4**
45.Choose And Point To year	**M,P**	**2.45**
46.Move Hand From Mouse To Keyboard	**H**	**,4**
47.Type year date	**T**	***n* x K***
48.Move Hand From Keyboard to Mouse	**H**	**,4**
49.Choose And Point To "Pay" Button	**M,P**	**2.45**
50.Click Mouse Button	**BB**	**,2**
Total estimation time of online payment process	**51,7 + 8,72 *n***	

5.3 Conclusion

In this chapter the researcher finds the execution time of the current online payment model which was 66.05 +9.84 n and also in chapter four find the execution time of proposed online payment model which was 51.7 + 8.72 n, when compare between both model the redesign saves the user about 14.35 seconds (*exclude 1.12n the number of character*) to achieve the objective of online payment.

Table 5.2 and Figure 5.2 show the comparison between current and new online payment model.

Table 5.2 : Comparison Between Current And New Online Payment Model .

Current Online Payment Model .	New Online Payment Model .	Time Saved
66.05 +9.84 n	51.7 + 8.72 n	14.35 +*1.12n*

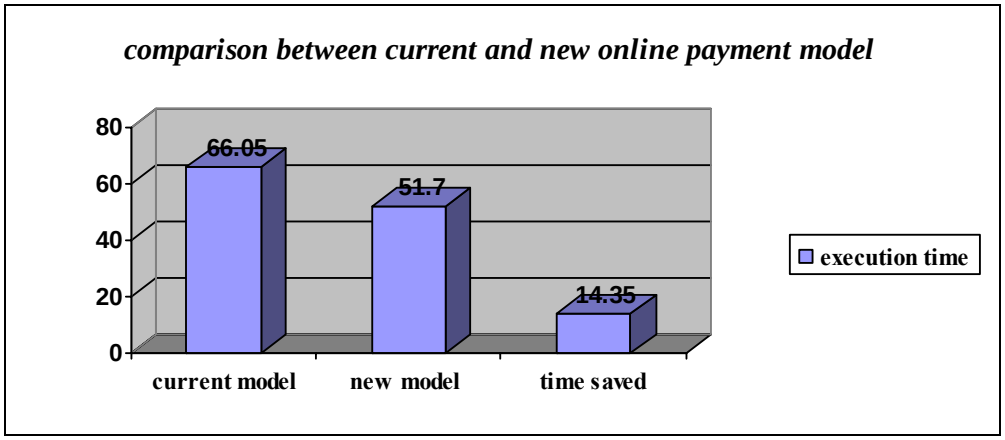

Figure 5.3: Comparison Between Current And New Online Payment Model

In chapter six the evaluation of new online payment model by using (SPSS) to analyze the questionnaire will be discuss.

CHAPTER SIX

DISCUSSION AND EVALUATION

6.1 Introduction

According to Nielson (2000) the evaluation uses usability testing based on the standard tests followed by the interview in a closed environment with video equipment. Testing with potential users can obtain as efficient feedback as possible in a short time frame and with the available resources. It is also irrelevant to ask people in a focus group to predict whether they would like something they have not tried, so the only way to get valid data is to let users experience the technology before opinions are sought (Nielson, 1998).

The system evaluation measures the system usability that achieved the proposed objective which is:

- *to identify the user performance of the existing online payment model to perform the online payment tasks.*
- *to improve the task analysis of the existing online payment.*
- *to evaluate the user performance of the proposed task analysis improvement*

Referring to (**Appendix B**) of the questionnaire. The User Evaluation section functions as mechanism to collect data on user's opinion regarding the evaluation of the eight questions which are related to usability testing.

The Statistical Package for Social Sciences (SPSS) version 12 was used to perform descriptive statistics analysis for the collected data

Table 6.1: Descriptive Statistic for new online payment model in UUM

Question	***N***	***Minimum***	***Maximum***	***Mean***	**Std. Deviation**
Question 1	60	1	5	3.90	1.252
Question 2	60	2	5	3.85	0.988
Question 3	60	3	5	3.86	0.768
Question 4	60	2	5	3.85	0.988
Question 5	60	3	5	4.10	0.641
Question 6	60	2	5	3.60	0.995
Question 7	60	3	5	4.45	0.605
Question 8	60	3	5	4.00	0.562
Valid N (list wise)	60				

According to the table above that shown the main schema (Minimum, Maximum and the Mean) the system evaluation measures the usability of using the new online payment model in UUM. The illustrated result from analyzed the questionnaire showed the acceptance from the different respondents (under graduate students, postgraduate students, staff). However, the higher agreement was the easy to provide the information which was (mean= 4.45 from Q7).The most questions that presented the high agreement are (Q5, Q7 and Q8)

Q5: I do not require any explanations to use the new online payment model

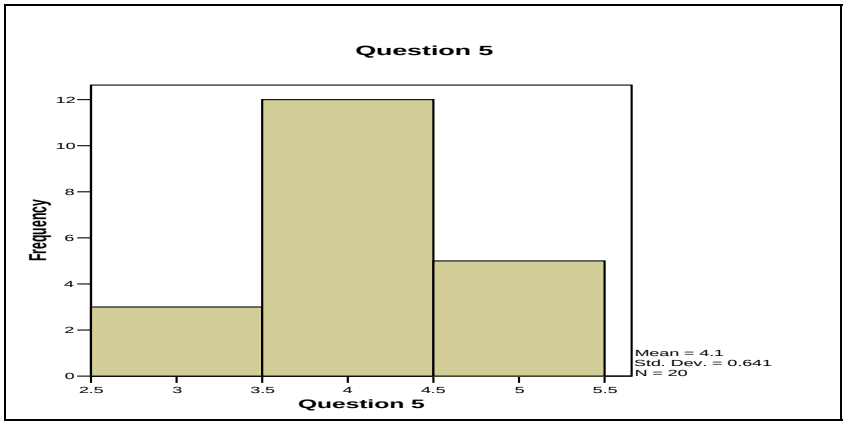

Figure 6.1: Question Five Analysis Diagram

Q7: I am satisfied with how easy it is to use new online payment model

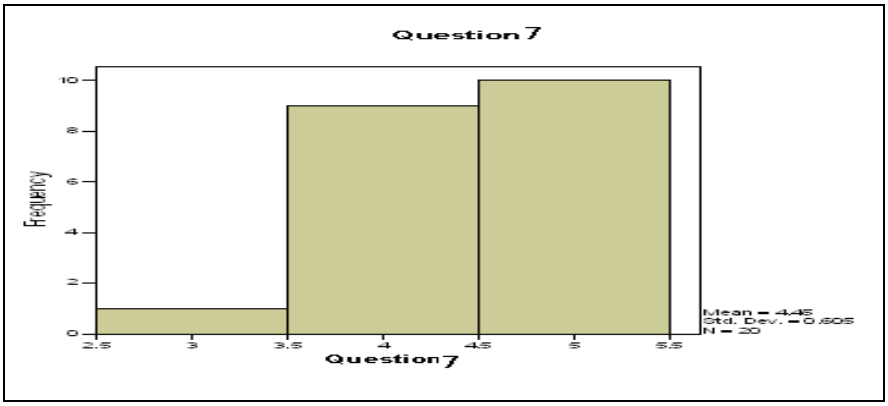

Figure 6.2: Question Seven Analysis Diagram

Q8: I feel comfortable when I use new online payment model

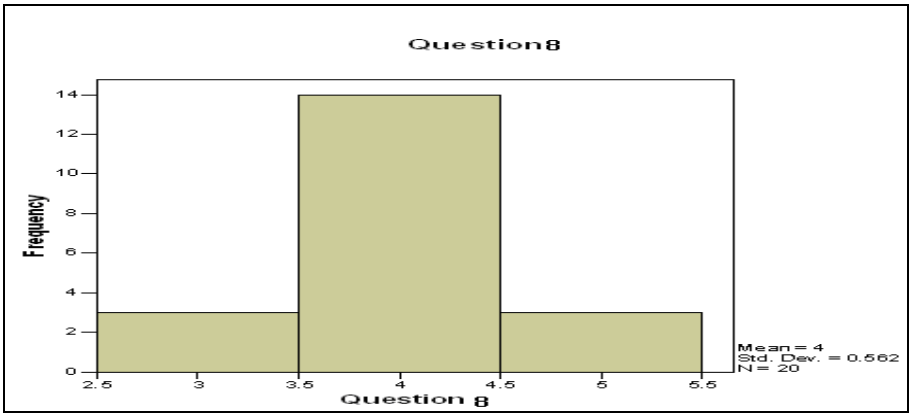

Figure 6.3: Question Eight Analysis Diagram

6.2 Conclusion

The evaluation phase of new online payment model during this phase by carrying out the descriptive statistics for the eight questions which is shown in (**Appendix B**), Moreover, this chapter presented the mean diagram for these questions. Among others, developing of new online payment model will be increase the user acceptance level of this model addition of increase number of user who can use this model .

CHAPTER SEVEN

CONCLUSION

7.1 Introduction

This chapter focuses on the conclusion and recommendation of the study of applying keystroke level model (KLM) analysis to facilitate the user interface of online payment at University Utara Malaysia (UUM). The Conclusion will explain how this study achieved the goals, according to the objectives and problem statements of this study. Finally, brief recommendations are given as contributions to future enhancements also discussed

.

7.2 Discussion

Task Analysis (TA) And Hierarchical Task Analysis (HTA) are used to identify the complexity of the task, Task analysis (TA) was transformed to Hierarchical Task Analysis (HTA) to identify the task description and action perform by users to ensure the necessary tasks of the user interface design of new online payment so the complexity of the user interface design and time of performing certain task will be reduce. As the result the acceptance and retention level of new online payment is increased.

Keystroke level model (KLM) helps the system designer to identify the predictable execution time of observed functionality in online payment.

The execution time of existing and new online model was estimated by listing the sequence operators and then summing the time of the individual operators, as the result the evaluation found that the execution time for new online payment is faster than the existing online payment.

System developer can improve the user interface design of the system by using the redesign of the online payment and also the task description of scenario statement to provide useful resources to integrate the necessary task into the new design and determine the weaknesses of the system.

7.3 Contribution

This study provides a guideline to software application developer to evaluate the existing observed system application and to propose the improvement of the observed system.

Through this study ,the usability problem of online payment which caused user to reject to use the system was identified and the problems are related to user acceptance and user satisfaction and also easy to learn and use and efficiency, the usability problem which is determined in this study is a useful recourse to improve online payment and also other development system. The weaknesses point of the user interface design of online payment can be overcome through this study.

In addition this study introduces keystroke level model (KLM) that is used to predict efficiency by breaking down the users behavior into a sequence of the five primitive operators to accomplish a given task with a given interface, KLM is useful for system developer to compare the efficiency of different user interface design or different methods using the same design.

New online payment model which proposed in this study by the researcher is useful to redesign the existing online payment to improve the system and increase the user acceptance level of online model and also is important to measure the efficiency of online payment.

7.4 Limitations

There are some of the limitation which are found in this study should be explained in specific**:**

- KLM assumes that all actions are serialized, even that it involves different hands e.g: pressing down the shift key.
- KLM does not take into account novice user who are just learning the system, or intermediate users who make occasional errors ,therefore ,researcher has to select sample of expert users of online payment in different department in University Utara Malaysia**.**
- Predictions only valid for expert users who does not make any errors or mistake and focus on efficiency only but in real life these also can make mistakes**.**
- KLM does not have a fine- grained model of mental operation.

- There are different factor can effect of the time and error rate as planning, problem solving different level of working memory load ,but KLM lumps them into the M (mental) operator.

7.5 Future Work Recommendations

Based on the result and discussion from chapter five, this study had achieved the main objective, and an improvement still can be done to improve more on the system.

There are some suggestions for future work that can be done to improvements as following :

- Use CogTool, a suite of software tools to facilitate system to quickly produce correct KLM, this tool allows the system designer and system developer to mock up an interface as HTML storyboard and demonstrate a task on the storyboard by using Netscape web browser.

- Study the KLM on other novel interfaces including speech , gesture, and eye moment.

- This project may be can extending in future to mobile application technology evaluation and users can use mobile application to payment.

7.6 Conclusion

This research uses three method Task Analysis (TA) And Hierarchical Task Analysis (HTA) and Keystroke level model (KLM) as a systematic approach to improve system usability, these method can have important benefits toward user acceptance and user performance and use of a program.

Keystroke level model (KLM) technique can predict the performance of new and current online payment model Therefore, this technique will facilitate user interface designer to make a comparison, identify and categorize the usability problems of the existing online payment, and justify the strength of the proposed new model. The KLM provides quantitative evidence to the user interface designer in the direction of justifying the weaknesses of the existing online payment, and the strengths of the proposed new model. As a result, the method used in this study can be used as a guideline to help the user interface designer to improve the existing user interface design about online payment model

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APPENDIX (A)

Assumptions.: delete file when the trush is hidden

One file is to be deleted
File icon is visible and can be pointed to
Trash can icon is visible and can be pointed to
Cursor must end up in the original window that the file icon was in
Hand starts and ends on mouse
User is average non-secretary typist (40 wpm)

Current design:

Action sequence:

1. point to file icon
2. click mouse button
3. point to file menu
4. press and hold mouse button
5. point to DELETE item
6. release mouse button
7. point to original window

Operator sequence:

1. point to file icon **P**
2. click mouse button **BB**
3. point to file menu **P**
4. press and hold mouse button **B**
5. point to DELETE item **P**
6. release mouse button **B**
7. point to original window **P**

Total time = 5P + 4B = 5*1.1 + 4*.1 = 5.9 sec

New design:

Operator sequence:

1. point to the title bar of window B **P**
2. hold down the mouse button **B**
3. drag the window to another place **P**
4. release the mouse button **B**
5. point to file icon **P**
6. press and hold mouse button **B**
7. drag file icon to trash can icon **P**
8. release mouse button **B**
9. point to original window **P**

Total time = 4P + 4B = 4*1.1 + 4*.1 = 4.8 sec

Summary :

Current design: Total time = 4.8 sec

New design: Total time = 5.9 sec

From above scenario and the result of the execution time shown the new design is faster than the current design and there 11 sec was saving

APPENDIX (B)

User Performance Evaluation Using Keystroke Level Model (KLM): Case Study Of online payment component

This study aims to recommended the enhancement task analysis for UUM online payment to improve the user performance and the efficiency in University Utara Malaysia (UUM).

Our system basically is an user interface design of online payment that allow UUM students and staff to pay by using new online payment model And Compare between the existing online payment model and proposed online payment.

The objective of this study can be:

- *to identify the user performance of the existing online payment model to perform the online payment tasks.*
- *to improve the task analysis of the existing online payment.*
- *to evaluate the user performance of the proposed task analysis improvement.*

Thank you very much for your time cooperation.

Please put (√) your answers to the given statements.

- What is your Gender?

  [ ] Male [ ] Female

- What is your Age?

  [ ] 18-25 Years old [ ] 26-34 Years old

  [ ] 35-44 Years old [ ] 45-54 Years old

  [ ] Above 55 Years old

- What is your Race?

  [ ] Malay [ ] Muslim

  [ ] Indian [ ] Other

- Marital Status

  [ ] Married [ ] Single

Usability Testing

Please circle on the appropriate answer.

This section contains eight questions to assess e-commerce mobile application usability.

Strongly Agree Agree Neutral Disagree Strongly Disagree

1 **2** **3** **4** **5**

	Statements					
(1)	Dealing with the new online payment model is easy to learn	1	2	3	4	5
(2)	The new online payment model offers useful advice on its use	1	2	3	4	5
(3)	The new online payment model is well-structured	1	2	3	4	5
(4)	The design helps in the use of the new online payment model	1	2	3	4	5
(5)	I do not require any explanations to use the new online payment model	1	2	3	4	5
(6)	the interface of new online payment model is pleasant	1	2	3	4	5
(7)	I satisfied with how easy it is to use new online payment model .	1	2	3	4	5
(8)	I feel comfortable when I use new online payment model	1	2	3	4	5

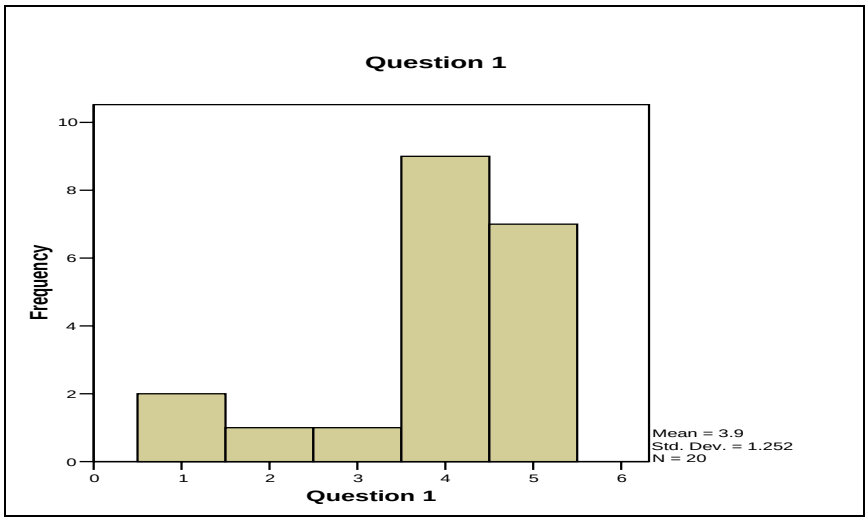
APPENDIX (C) DESCRIPTIVE STATISTICS

Table 6.1: Descriptive Statistic for new online payment model in UUM

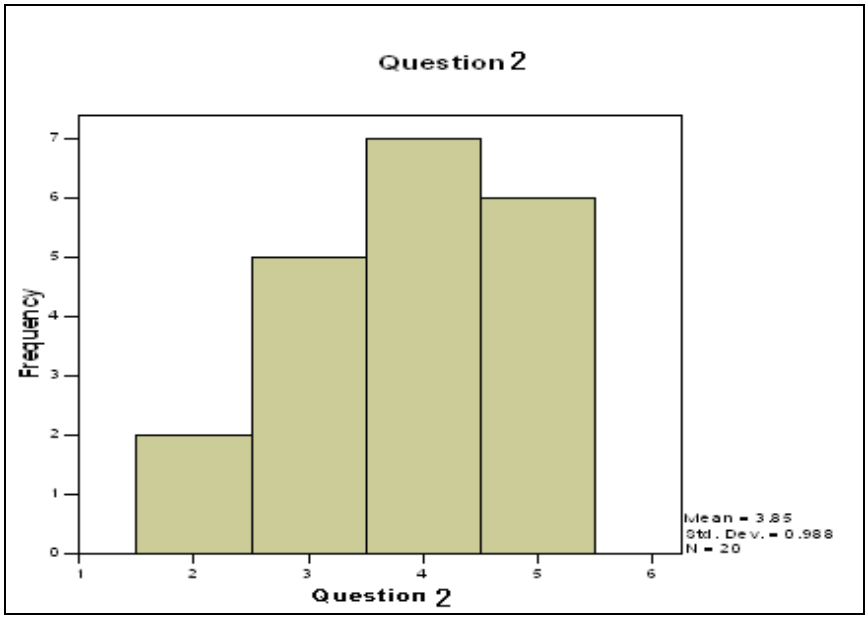
Question	***N***	***Minimum***	***Maximum***	***Mean***	**Std. Deviation**
Question 1	60	1	5	3.90	1.252
Question 2	60	2	5	3.85	0.988
Question 3	60	3	5	3.86	0.768
Question 4	60	2	5	3.85	0.988
Question 5	60	3	5	4.10	0.641
Question 6	60	2	5	3.60	0.995
Question 7	60	3	5	4.45	0.605
Question 8	60	3	5	4.00	0.562
Valid N (list wise)	60				

APPENDIX (D) EVALUATION DIAGRAMS

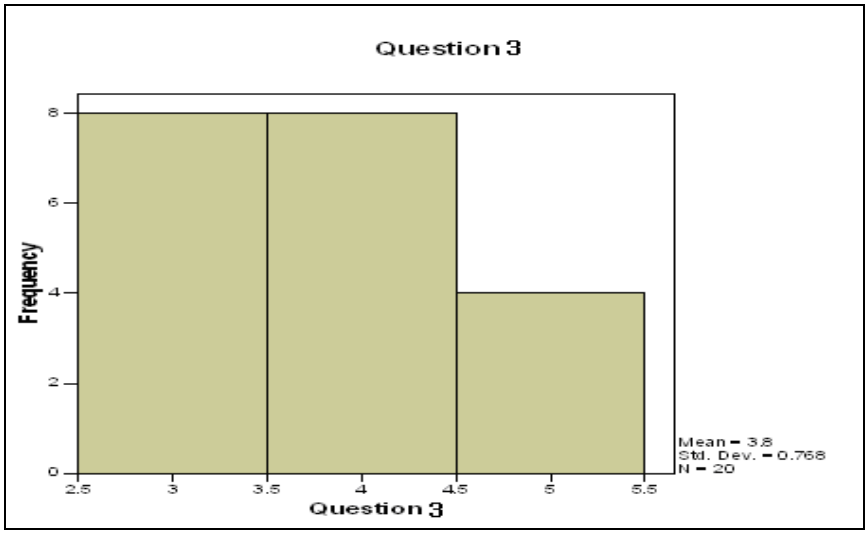
Q1: Dealing with the new online payment model is easy to learn



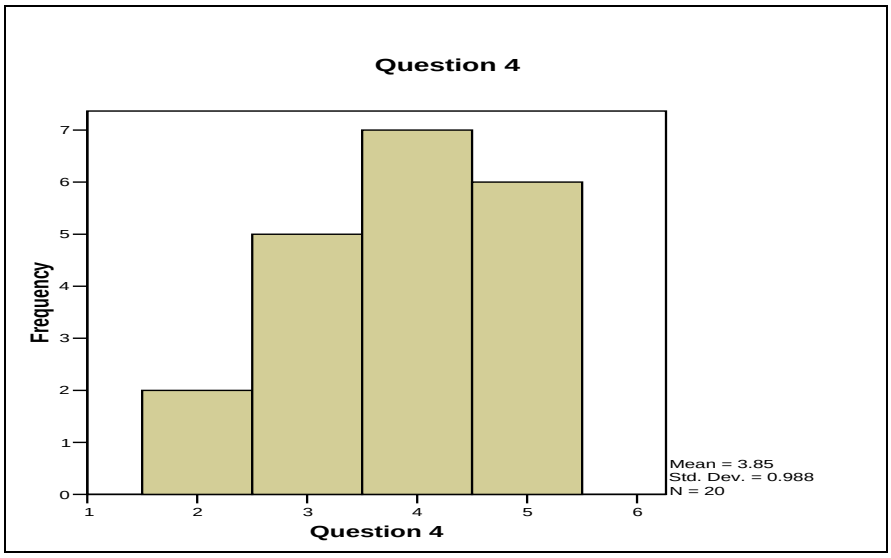
Q2: The new online payment model offers useful advice on its use



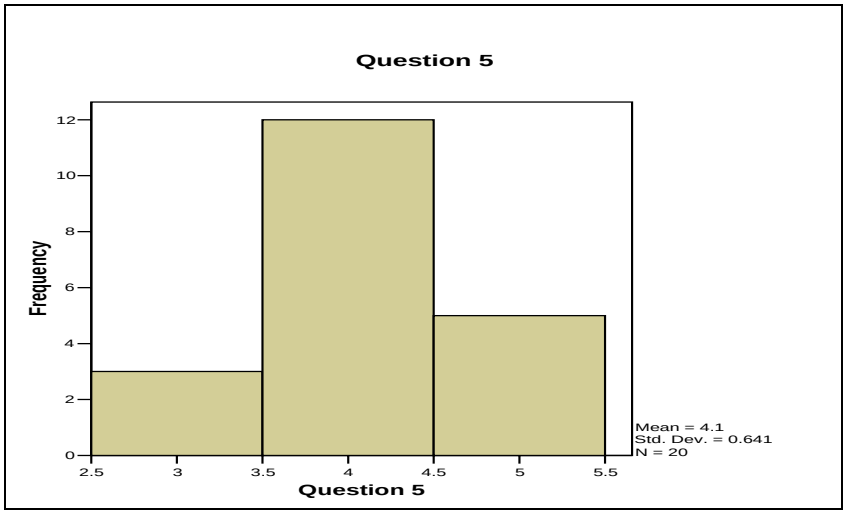
Q3: The new online payment model is well-structured



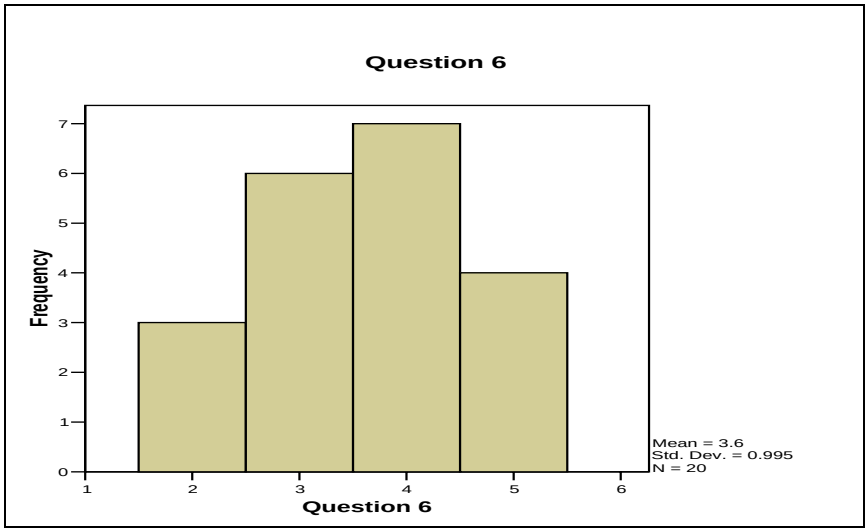
Q4: The design helps in the use of the new online payment model



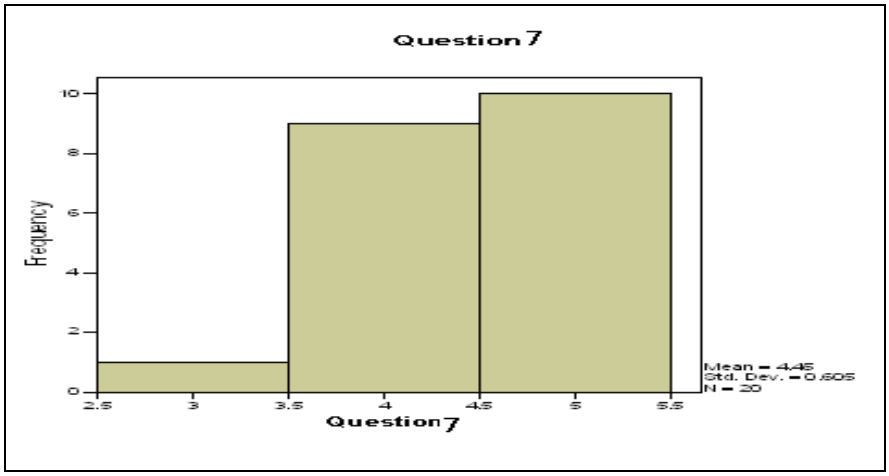
Q5: I do not require any explanations to use the new online payment model



Q6: the interface of new online payment model is pleasant



Q7: I satisfied with how easy it is to use new online payment model



Q8: I feel comfortable when I use new online payment model