



UNIVERSITI PUTRA MALAYSIA

**USABILITY STUDIES ON THE WEB PAGE DESIGN
FOR E-COMMERCE**

RAHMAH LOB YUSSOF

FSKTM 2000 11

**USABILITY STUDIES ON THE WEB PAGE DESIGN
FOR E-COMMERCE**

**RAHMAH LOB YUSSOF
MATRIC NO: GSO3688**

**A Dissertation submitted to Universiti Putra Malaysia in partial
fulfillment of requirement
For Master Science in Computer Science**

ACKNOWLEDGEMENTS

This paper is a product of many hours of enthusiastic discussions with many different people and lots of literature reviews. These friendly discourses, which sometimes occurred at the most inopportune moments – surfing the Internet, huddled around the kitchen table and my three kids proved invaluable when preparing this report.

I would like to take this opportunity to convey my sincere gratitude to my adviser, Puan Fatimah Khalid, whose constructive comments and unflagging enthusiasm were instrumental in making this paper what it is today.

I have a lot to be thankful to my parents, whose love and support kept me in good stead during these past one-and-a-half year of study. They have always been there for my children and me. And for that I am deeply grateful.

I would also like to thank my lecturers at Faculty of Computer Science and Information Technology at Universiti Putra Malaysia (UPM) for all their help. And to my friends and fellow course-mates at UPM. These three semesters of master program have been quite a ride! It is been a pleasure, absolutely. A special mention to Puan Rasimah, Puan Anidzan, Puan Nazariah and Puan Hasni who gave me some kind of motivation when I need it.

Lastly, but most importantly, I would like to thank my husband, Mohd Nawi Mohd Yusoff, for his patience, support and wonderful sense of humor. His desire for me to succeed saw me through the seemingly endless hours of wading through research

materials and sitting in front of the computer. We have had our fair share of fast food and ready-made meal, to be sure. This report is specially dedicated to him.

RAHMAH LOB YUSSOF

Mac 2000

ABSTRAK

Potensi World Wide Web di Internet sebagai media comersial dan pemasaran telah banyak diperkatakan di dalam pelbagai media. E-commerce adalah satu fenomena baru yang telah menukarkan cara kita melakukan perniagaan. Oleh yang demikian, penulis telah membuat satu projek untuk mengkaji usability rekabentuk laman Web untuk e-commerce. Bab pertama merupakan bab pengenalan ringkas mengenai projek. Ini termasuklah pernyataan masalah, penyelesaian masalah, objektif dan skop projek. Dalam bab kedua pula, penulis membuat ulasan penulisan mengenai projek. Di sini definisi World Wide Web, e-commerce dan usability dijelaskan. Sejarah e-commerce, senario e-commerce di Malaysia, masalah-masalah rekabentuk laman Web, penilaian heuristik pada e-commerce laman Web dan faktor-faktor yang mempengaruhi pembelian telah dibincangkan. Metodologi bagi merekabentuk laman Web dibincangkan dalam bab tiga. Bab empat pula telah membincangkan teknologi keselamatan bagi e-commerce. Di dalam bab lima penulis telah menerangkan sampel web page yang dibina berdasarkan metodologi daripada bab tiga. Akhirnya kesimpulan keseluruhan bagi projek ini dijelaskan pada bab enam.

ABSTRACT

The potential of the World Wide Web on the Internet as a commercial medium and market has been widely documented in a variety of media. E-commerce is a new phenomenon that changes the way people do business. Therefore, in this report the writer will explore the usability studies on the web page design for e-commerce. The first chapter is the introduction where overview of the project includes the problem statement, problem solving, objectives and scope of the project is discussed. The role and definition of WWW, E-Commerce and its history is discussed in chapter two. Further, in the same chapter the writer continues examine problems with the web page design (e-commerce) and factors affecting the decision to purchase. In the third chapter, the methodology of the web page design is spell out. In chapter four, security technology, which can pose significant threats to web page for e-commerce, is mentioned. Chapter five includes a comparison is done to find out web page design for e-commerce in Malaysia and other countries, and sample web page design based on the usability studies discussed in the above chapters is done. Finally findings and conclusion for this project is mentioned in chapter six.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
ABSTRAK	iii
ABSTRACT	iv
CHAPTER1: INTRODUCTION	1
1.1. Introduction	1
1.2. Problem Statement	1
1.3. Problem solving	2
1.4. Objectives	2
1.5. Scope	2
1.6. Conclusion	3
CHAPTER 2: LITERATURE REVIEW	4
2.1. Introduction	4
2.2. Definition	4
2.3. History of E-Commerce	5
2.4. Scenario of E-Commerce in Malaysia	6
2.5. The strength and weaknesses of the web design for e-commerce.	8
2.5.1. Design problems with the e-commerce sites.	8
2.6. Heuristic Evaluation of E-commerce Web Sites	16
2.7. Factors Affecting the Decision to Purchase	18
2.8. Conclusion	20
CHAPTER 3: METHODOLOGY	22
3.1. Introduction	22
3.2. Methodology for Designing Web Sites – E-commerce	22
3.2.1. Planning	23
3.2.2. Analysis	25
3.2.3. Design and Development	30
3.2.4. Usability Testing	53
3.2.5. Implementation	57
3.2.6. Maintenance	58
3.3. Method use for sample web page (Liquidation company)	60
3.4. Web Page Design Guidelines	63
3.5. Conclusion	66

CHAPTER 1

INTRODUCTION

(OVERVIEW OF THE PROJECT PAPER)

1.1. Introduction

The tremendous growth of the Internet, and particularly the World Wide Web, has led to a critical mass of consumers and firms participating in a global online marketplace or so called e-commerce. E-commerce is new enough that many consumers may marvel at the simple existence of Web sites that allow them to get product information, buy things online and arrange for them to be sent with just the click of a mouse.

1.2. Problem Statement

- 1.2.1. the sites did not effectively communicate where and how to add an item to the shopping list (the list of items the user plans to buy)
- 1.2.2. the sites did not provide effective feedback when items were and were not saved in the shopping list
- 1.2.3. the sites did not effectively communicate if and when users needed to register or log in to order
- 1.2.4. E-commerce is one of the focus areas in borderless marketing of Multimedia Super Corridor (MSC) flagships application. This area is new and at early stages in Malaysia. The e-commerce implementation needs a lot of consideration especially in terms of security, payment methods, legal and public acceptance. Therefore usability studies of the e-

commerce approach should cover all of these particular in order to gain advantages from e-commerce implementation

1.3. Problem solving

1.3.1. Build a sample web page for Liquidation Company, which take into consideration all problem statements mentioned above. Refer to chapter three which discuss in detail about this.

1.4. Objectives

1.4.1. Do some comparison between Malaysia and other countries (Japan, EU and US) web page design for e-commerce.

1.4.2. Identify the strength and weaknesses of the current web design for e-commerce.

1.4.3. State and explain the general design consideration for web page design (Web authoring) – e-commerce.

1.4.4. Give sample web page design to the client (Liquidation Company) base on the literature review and also the pros and cons of the web pages.

1.5. Scope

1.5.1. This project concentrates on the study of web page design. The target audience for this project are the web page develops and designers.

1.5.2. The initial study will do at five e-commerce sites (both Malaysia and other countries (as mentioned above).

1.5.3. The study also will be based on heuristic evaluation of the web page.

1.5.4. English is the only language use in the sample web page.

1.5.5. Sample web page is design to the Liquidation Company.

1.6. Conclusion

This study helps web developers apply knowledge on information of the strength and weaknesses of the current web design for e-commerce and further helps designers create more effective web sites for achieving their marketing objectives. By completing the project, the web developers or designers can have tips of the dos and don'ts of web page design.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

Chapter two starts with a brief history of e-commerce continue which begins in the 1970s up to 1990s. The discussion continues with the scenario of e-commerce in Malaysia, the strength and weaknesses of the current web design for e-commerce, heuristic evaluation of e-commerce web sites, and finally some factors affecting the decision to purchase are focus.

2.2. Definition

Before writing further, it is better to define important terms stated in the topic.

Usable is something that is useful in a suitable state to be used.

Study- (Usage) is to watch and examine something carefully over a period of time in order to find out more about it.

Web Page. The most exciting commercial developments are occurring on portion of Internet known as the World Wide Web (WWW). In 1991, software was developed in Europe that made the Internet easier to use. Tim Berners-Lee, a programmer working at the European Particle Physics Laboratory (CERN) in Geneva, Switzerland, released a program that allowed you to create a document called a Web page that had built-in links to other related documents. These links called hyperlinks, allowed you to move quickly from one document to another, regardless of whether the documents were located on the

same computer or on different computers in different countries. The collection of hyperlink documents accessible on the Internet has become known as the World Wide Web or WWW or W3 or simply the Web.

E-Commerce has different definitions from different views. ¹

From a communications perspective, e-commerce is the delivery of information, products/services, or payments via telephone lines, computer networks, or any other means.

From a business process perspective, e-commerce is the application of technology toward the automation of business transactions and workflow.

From a service perspective, e-commerce is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service delivery.

While from an online perspective, e-commerce provides the capability of buying and selling products and information on the Internet and other online services

2.3. History of E-Commerce

The necessity of e-commerce develop from the demand within business and government to make better use of computing and to better apply computer technology to improve customer interaction, business processes, and information exchange both within a company and across companies.

In the 1970's, the introduction of electronic funds transfer (EFT) between banks over secure private networks changed financial markets. Electronic funds transfer optimizes electronic payments with electronically provided remittance information.

During the late 1970s and early 1980s, electronic commerce became diversify within companies in the form of electronic messaging technologies. Business exchanges traditionally conducted with paper, such as checks, purchase orders, and shipping documents, are conducted electronically.

In the late 1980s and early 1990s electronic messaging technologies became an integral part of workflow or collaborative computing systems (groupware). GroupWare focused primarily on taking existing nonelectronic methods and grafting them onto an electronic platform for improved business process efficiency.

In the mid 1980s, e-commerce technology continue spread among consumers in the form of online services that provided a new form of social interaction (chat rooms and inter-relay chat [IRC]) and knowledge sharing (news groups and File Transfer Programs). By using the global Internet, people can communicate with others around the world at decreasing costs.

In the 1990s, the advent of the World Wide Web on the Internet represents a turning point in electronic commerce by providing an easy-to-use technology solution to the problem of information publishing and dissemination. The Web made e-commerce a cheaper way of doing business and enabled small businesses to compete on a more equal technological footing with resource-rich multinational companies.

2.4. Scenario of E-Commerce in Malaysia

E-commerce is one of the focus areas in borderless marketing of Multimedia Super Corridor (MSC) flagships application. This area is new and at early stages in Malaysia. ²

An example of e-commerce implementation is buying the flight ticket using the Mayban autoteller machine (Mayban ATM). The ATM slip will be as prove of purchasing and Mayban will deduct the amount from the customer account. However this implementation is not widely applied and only available at specific Mayban outlet.

Information is an important element for companies to keep tract of recent technology and market to maintain their competitive edge. On the other hand customer also demand for update information about products and services in the market place. Currently company using the Web for promoting their products and services. Some of them set up their own Web site with their own server so that any changes for the online information can be change straight away by the administrator.

However some companies grab this opportunity to built up their own business by providing services to other company. They provide services such as web hosting, promoting product and service online, network infrastructure, messaging infrastructure and information infrastructure. Examples of companies that offer such services include the Malaysian Online (MOL) and Klang Valley Online.

The digital broadcasting application offer the digital broadcasting services with its highest quality and sophisticated technology. The digital technology is the key in ensuring broadcast quality and wide ranging services and features. Malaysia is serious in

implementing the digital broadcasting technology. One of the big steps towards this implementation is the launching of MEASAT 1 and MEASAT 2 satellite to the orbit of Asia Pacific. These satellite systems are created especially for broadcasting and communication purposes. It also provides the needed infrastructure and digital engine growth for the nation to realize its industrialization and multimedia ambitions. ASTRO is the MEASAT broadcast trademark that currently offers twenty-four television channels and eight radio services in digital format.

The e-commerce, and the Internet, is not a fad because of its widespread effects. There will be new types of interfaces (browsers and protocols) and new (privatized) networks but what the WWW represents is our march toward the digital economy and knowledge-based society. Technologies, the web and other processes are but a means of achieving that goal. The e-commerce implementation needs a lot of consideration especially in terms of security, payment methods, legal and public acceptance. Therefore usability studies of the web page design for e-commerce approach should cover these entire particular in order to gain advantages from e-commerce implementation.

2.5. The strength and weaknesses of the web design for e-commerce.

In the summary of the findings from the eight survey³ conducted by researchers at Georgia Institute of Technology, reported that “electronic commerce is taking off both in terms of the number of users shopping as well as the total amount of people are spending via Internet based transactions.” Over half of the 10,000 respondents’ report having purchased items online. The most cited reason for using the web for personal shopping

was convenience (65%), followed by availability of vendor information (60%), no pressure from sales people (55%), and saving time (53%).⁴

2.5.1. Design problems with the e-commerce sites.

The IBM Ease of Use Group has begun a series of studies to assist customers and all professionals in creating easy-to-use e-commerce sites (two sites that sold clothing, and two sites that sold computer products). The purpose of the study was to find out factors that affect the usability of e-commerce sites.

After this clothing site A is refer to this address <http://www.llbean.com> and clothing site B is at this address <http://www.eddiebauer.com>.

2.5.1.1.Designing sites that contain hundreds of items of merchandise can be very challenging. The sites did not effectively communicate where and how to add an item to the shopping list (the list of items the user plans to buy)⁵. Participants in the study generally liked the simple menu list at Clothing site B more than they liked the dropdown menus at Clothing Site A (see appendix 1 for both clothing sites). The problems with the dropdown menus at Clothing Site A are the items in each menu are initially hidden from the user, it is not clear what users must do to see the item, and requires three separate clicks to go to the page that contains information about the item.

2.5.1.2. Simplify the path to products. This is concern with the number of clicks required for navigating to the merchandise at the sites. If the main purpose of a web site is to sell products online, then designers need to enable participants to accomplish that task simply and easily. Participants (see appendix 2) commented that purchasing an item at Clothing Site A seemed to take longer than Clothing Site B, they had to go through so many levels of information.

- a) Obviousness of order buttons/links: The challenge to designers is to provide these extra features without creating confusion. The problem was that nine out of sixteen participants mistook the wish list (a list of items that you would like for other people to give you on special occasion) for a place to save items that they themselves were planning to buy. The labeling of the buttons contributed to the problem. The button or link small and atypical, and its placement almost always required participants to scroll past pictures and a block of text to find it. The graphics does not look like an HTML link, nor does it look like a button.
- b) Dissatisfaction with recurring security messages: Security messages at e-commerce sites can impede the progress that participants are making toward purchasing an item. Seven

participants out of sixteen indicated confusion or annoyance at the recurring security messages at Clothing Site A.

- c) A good user interface provides users with the knowledge that will allow them to accomplish their tasks quickly and with confidence. In the study of e-commerce sites, some participants expressed uncertainty concerning whether or not they needed to log in or become a member to order. The Wish list registration from at Clothing Site B caused some confusion. When participants clicked on “Add to WISH LIST,” they arrived at page with nothing except for the words “log in”. Participants had no idea what this log in was for.
- d) The sites did not provide effective feedback when items were and were not saved in the shopping list. At least nine expressed uncertainties as to when and how items were saved in their shopping cart. Five participants continued shopping thinking they had added items to the list when they hadn’t added any items at one of the e-commerce site in the study.
- e) Clothing Site A did not show the shopping list after each item was added. Showing the list after each item is added helps confirm the “task” is complete, but this feedback does not inform when the “task” is not complete.

Five participants out of sixteen wanted to see a running total on the shopping cart. One participant was offended by Clothing Site A not displaying a total cost on the shopping cart for the items he had selected.

2.5.1.3. The sites did not effectively communicate if and when users needed to register or log in to order.

Versatility of the ordering process: Computer Site A (<http://www.compusa.com>;) required participants to click on a link to get information about a particular product before they could order it (see appendix 3). Four out of sixteen users indicated confusion about where to go to order an item that appeared in this list. The link did not clearly indicate that it would take them to the page for ordering the item. Requiring users to read information before ordering, moreover, may not always meet their needs and expectations. Participants in most circumstances wanted to read about a product before purchasing it, but not always. One Participant wanted the ability to add the item to the cart from any screen that discusses the item.

2.5.1.4. The sites did not facilitate easy navigation from the shopping list to other parts of the site.

Clothing Site B did not clearly indicate how to continue shopping. As the screen capture shows there was no “Continue Shopping” button below the shopping list. Four participants expressed

uncertainty about how to continue shopping, and another person was worried that the shopping list would not be saved if he used one of the links on the left.

a) Versatility for customers who want to continue shopping:

Purchasing multiple items at an e-commerce site can be very inefficient if the site's links must be navigated in a prescribed. After users save an item in their shopping list, Clothing Site A provides a link to the top of the hierarchy, but to nowhere else in the site. The experience is analogous to picking up an item in a department store, walking all the way to the cash register, then returning to the front of the store, then going to some other place in the store to pick up another item, going back to the cash register with the second item, returning the front of the store, and so on and so on. The process sends users in cumbersome loops.

b) Four participants at Clothing Site B wanted an easy way to get back to the product list they had just used to add an item to their shopping list.

2.5.1.5. The distortions of color⁶. There isn't a universal color standard on the web, so that lovely teal sweater on-line can turn out to be a less lovely shade when it arrives in the mail. A deep blue shirt may turn

out to be sky blue or a pink stripe on a blouse could turn out to be purple.

2.5.1.6. It's hard to locate your Web site. Just because it's there doesn't mean anyone can find it. Accumulated industry experience and anecdotal evidence strongly support the contention that the primary barrier to customer adoption of the Web as a commercial medium is ease of access. In the context of the Web, ease of access is a multidimensional construct and includes high-speed access (the bandwidth problem), ease of finding a service provider, and the diffusion of the computer hardware, software, modem bundle into the home⁷. Register on search engines and develop relationships with people of similar sites that will link you to theirs (and vice versa).⁸

2.5.1.7. You have the wrong stuff on your Web site. It includes information about you and your company, instead of information the customer can use. Your first page presentation is critical to keeping someone interested enough to go inside.

2.5.1.8. Your stuff is interesting to you but boring to everyone else. All your employees and sales team love the site, but there's no value to the prospect, therefore no interest (reason) to buy anything.

2.5.1.9. It's hard to navigate or understand the purpose of your site. It has an illogical layout, hidden stuff that only you can find but no

Stated objectives, teasers, questions or obvious benefits to the surfer.

2.5.1.10. It has self-defeating graphics, which take too long to load, graphics that don't tie in a message, graphics that just sit there (no animation or movement). Use all the technology you can to get your site to load fast, mean something and move around.

2.5.1.11. It has only one-way communication. Most sites have no immediate ability to send someone an e-mail message or ask a question.

2.5.1.12. There is no reason to visit the site more than once. Change parts of site often. Most sales are not made on the first call. You must get three or four exposures to break down the barriers of resistance and lower the risk of purchase. Give value incentive to visit your site often, and you'll start to make sales.

2.5.1.13. It has no daily changes. Have a daily message, fact, quote or info-bit to keep people coming back until they like you enough to buy.

2.5.1.14. No real long-term Web plan or Web master. You must have a five-year Web plan and hire (appoint) a Web master, or don't bother. Reactionary Web sites doesn't have the same impact as proactively planned ones.

2.5.1.15. Among the e-commerce option currently in use is business-to-business sites, including catalogs, order entry, customer tracking, reporting, inventory control, fulfillment and customer services. Payment can be via credit card or electronic fund transfer. But these new opportunities come with a price. They pose new and previously unconsidered risks to companies and other organizations. Among the new risks are damage to data centers, transmission network and power sources, data tempering or corruption, unauthorized access, disclosure or theft, or the introduction of viruses, intellectual property theft, patent, trademark, copyright and domain name infringement.⁹

- a) Users are frustrated, because of an inability to find the information sought, disorganized pages and confusing information, pages under construction and disconnected links, the lack of navigation support.

2.5.1.16. Exploration is discouraged, because of barriers imposed by the poorly designed interface and users' lack of trust in the site.

2.5.1.17. Time is wasted, because of disorganized pages, misleading link names, long pages, and long download times.

2.6. Heuristic Evaluation of E-commerce Web Sites

Another study was conducted on twenty e-commerce sites. The twenty sites were randomly selected for the study. The selected sites were of a heterogeneous business nature (book publishing companies, a carmaker, a pet shop, a communications company, entertainment companies, specialty stores, food stores, a money-transferring company, an electronic magazine, and computer shopping companies). None of the sites had previously been visited by any of the three evaluators who participated in the study. The heuristic evaluation was based on the usability heuristics developed by Jakob Nielsen as follows.¹⁰

- *Aesthetic and minimalist design*: Dialogues should not contain irrelevant or rarely needed information. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
- *Match between system and the real world*: The system should speak users' language, with words, phrases, and concepts familiar to users, rather than use system-oriented terms. By following real-world conventions, information appears in a natural and logical order.
- *Consistency and standards*: Users should not have to wonder whether different words, situations, or actions mean the same thing. Platform conventions should be followed.

In general, the pages of the commercial sites made more use of artistic images and were more attractive than the pages of the college sites. In terms of usability problems,