E-COMMERCE WEBSITE USABILITY AND ITS INFLUENCE ON BUSINESS CONTINUITY

استخدام مواقع التجارة الالكترونية وتاثيرها على استمرارية العمل

This Thesis was submitted in partial fulfillment of the requirements for the Master's Degree in COMPUTING from the Faculty of Information Technology

Prepared By

Imad AwadAllah Al-Rimawi

Supervisor

Dr.Derar Eleyan

Committee Members

Dr.Derar Eleyan

Dr.Samah Abu Assab

Dr.Rasheed Jayousis

May, 2013

Table of Contents

List of Figures

List of Tables

List of Abbreviations

- **EUCS: End User Computer Satisfaction Instruments.**
- **E-SEQUAL: Electronic Service Quality.**
- **WOM: Word of Mouth.**
- **QUIM: Quality in Use Integrated Map.**
- **CLD: Causal Loop Diagram.**
- **UROI: Usability Return on Investment.**
- **ROI: Return on Investment.**
- **WWW: World Wide Web.**

Acknowledgment

A special thanks to my supervisor Dr. Derar Eleyan, Dr. Samah Abu Assab, Dr. Rasheed Jayousis and Dr. Hussein Al-rimmawi for proof reading this thesis as well as to all those who helped me conduct this research.

I appreciate my wife and children, and my family for their support and patient.

ملخص

منذ أواخر التسعينيات، بدأت العديد من الشركات بالانتباه والتركيز على مجال الانترنت لجذب الزبائن الى مواقعهم الالكترونية. لكن المشكلة التي واجهت الشركات هي كيفية وضع الاساليب والاستراتيجيات المناسبة من أجل حث الزبائن على زيارة مواقعهم الالكترونية للمتسوقين عبر الإنترنت أو الزبائن، كل شيء يتم فقط بعملية نقر واحدة ، وهذا يؤكد على أهمية مفهوم Usability، ولهذا يتحتم على الشركات ان تقوم ببناء مواقع انترنت تكون سهلة الاستخدام بالنسبة للمستخدم/الزبون من اجل الحفاظ على هؤلاء المستخدمين وحثهم على العودة مرة اخرى الى موقع الانترنت الخاص بالشركة والشراء اكثر واكثر.

يهدف هذا البحث الى تقليل وتقليص الفجوة الموجودة حاليا بين رضا الزبائن عن موقع الانترنت و سهولة استخدام موقع الانترنت والذي من خلاله نقوم بتحقيق رضا الزبائن عن الموقع . المنهجية التي سوف تستخدم وتطبق في هذا البحث هو نظام (System dynamics) التي تكشف كيفية تفاعل العوامل المؤثرة على سهولة استخدام موقع الانترنت مع بعضها البعض للحصول على رضا العملاء.

وقد تم اختيار موقعين من مواقع الانترنت لاختبار النموذج المقترح والذي تم بناؤه لقياس مدى سهولة استخدام موقع الانترنت وتاثيره على رضا الزبائن ، لكل موقع انترنت كان هنالك اثنين من السيناريوهات، السيناريو الأول هو عندما يكون هناك إهمال في عوامل سهولة استخدام مواقع الانترنت وما هو تاثيرها على رضا الزبائن وتاثيرها على الربح واستمرارية عمل الشركة ، والسيناريو الثاني عندما يحدث هناك زيادة في العوامل المؤدية الى سهولة استخدام موقع الانترنت الذي تم اختياره لتطبيق هذا النموذج ومدى تاثيرها على رضا الزبائن وبالتالي تحقيق أقصى قدر من الربح وضمان استمرارية العمل.

Abstract

Since late 1990s, many organizations started utilizing the internet great potential to attract customers into their sites. However, the problem that still faces organizations is what are the most appropriate tactics and methods to encourage customers visit their online websites. For online shoppers or customers, everything could be done by just one mouse click, so this remarks the importance of usability, so organizations must have a usable website in order to keep customers loyal and to let them return to website and purchase more and more.

This research aims to fill the current existing gap between customers' satisfaction about introducing usable e-commerce website and the easiness of using those websites which will lead to customer's satisfaction. The methodology that the researcher will use and apply in this thesis is the system dynamics methodology (system thinking) that reveals how the usability of factors and sub factors interacts with each other to gain the customers' satisfaction about the internet websites.

Two case studies have been chosen to test the proposed model, each case study consists of two scenarios, the first scenario is when there is negligence in usability factors, and the second scenario is that when enhancement occurs in usability factors. The result shows that when there is a great usability of the websites, there will be a great customers' satisfaction and hence this maximize the profit and business continuity.

1 Introduction

1.1 Motivation

As the internet unleashed and the association of dot.com business became engaged, companies started utilizing their great potential by building electronic front stores to electronically sell their products. Therefore, E-commerce has rapidly grown faster (Reibstein, 2002, p.465).

With this evolution, an important question emerges which requires an efficient answer on how could the organization attract customers into its electronic front store and then purchase from it. On other occasions they come back to the site and keep purchase again and again (making them loyal to E-commerce website). This question leads to the concept of customer satisfaction. A customer must be satisfied in order to purchase an item or more (Reibstein, 2002, p.465; Cheung et al., 2005, p.2). The concept of customer satisfaction is a major issue in private and public sectors; many organizations consider customer satisfaction at the top of their important objectives. Customers' satisfaction research literature reveals that higher customer satisfaction leads to increase in customer retention and maximizing profit (King, 2000, p.1). Also previous customer satisfaction studies reveal that there is a positive relationship between customer satisfactions, market share and hence profit (King et al., 2001, pp.1-2; King et al., 2005, pp.2-3).

Usability answers this question, since E-commerce website represents the online presence of companies. A low-usability website reflects a poor image of the company resulting in a lower customer's intention to return to the website. In addition, there is a strong evidence that customers who access the website to purchase some items leave that site due to the low of usability. Thus websites design with high usability rate that encourage purchasing and repeat visits to a website is an important goal for E-commerce website. In addition, website with high usability make customers continue to navigate in a website which leads to increase the chance of purchasing from it (Roshnak, 2009, pp.1-3; Huei Huang, 2005, p.7).

1.2 Background

Since late 1990s, many organizations via internet started utilizing their great potential to attract customers into their sites, but the problem that faces these organizations is "what are the most appropriate tactics to deploy in order to make customer visit their online stores". To solve this problem, organizations focus on the most effective feature that attracts customers, make them comeback, and purchase via the site (Reibstein, 2002, pp. 465,466).

In addition, internet reduces the cost of transaction, and making firms compete globally. E-commerce is not an optional matter anymore; it becomes mandatory for all firms. E-commerce maybe defined as an instant access to product anytime, anywhere (Safavi, 2009, pp.1-3; Reibstein, 2002, pp. 465-466). Studies indicate that one of the five top activities in the internet environment is shopping and purchasing online with 44.5% (Abdinnour et al., 2005, p.342).

According to the International Organization for Stockization, web usability is "the extent to which a site can be used by a specified group of users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specified context of use" (Bevan, 1995, pp. 2, 3). Olsson (2002) define it as the combination of the following attribute, learnability which means the site is easy to learn, efficiency means that the high levels of productivity achieved by usability, satisfaction means that users should be satisfied when using a website (Olsson, 2000, p. 3). The objective of this thesis is to add more attributes in order to achieve the best usability.

Usability is user and task dependent as well as it's being related to how well the user is able to accomplish what they set out to do, how efficiently the user can do this, and how satisfied the user is during and after the process. By a single click a customer may purchase an item through internet. So this highlights how much usability is important, so organizations must have a usable websites in order to keep customers loyal and keep customers retain to their websites and purchase more (Safavi, 2009, pp. 1, 2, 3).

Usability is used to measure how well computer system such as software program or website, make it easy to learn, and helps end users to keep remembering what they learn, and reduce customers and users making errors to be more efficient and

satisfied with the system they used. Usability intended to make system easy to use, easy to learn, and reduce its usage time. (Donahue et al. 1999)) Shows that usability can be a major issue of cost effectiveness in E-commerce field; therefore, it reduces software and E-commerce cost and improves its marketability (Donahue et al., 1999, p.2).

The relationship between customer satisfaction and profit is implied. However, there is a different meaning of customer satisfaction and profit from one study to another. In fact, past customer satisfaction and profit studies did not fully revealed the relationship between customer satisfaction and profit (King et al., 2001, pp.1-2). One of the objectives of this study is to employ other attributes to customer satisfaction and consequently will lead to more profit.

Because of the massive number of E-commerce websites unleashed in the internet, there is a need for some metrics to evaluate E-commerce website to achieve maximum satisfaction for customer and more comfortable usage and purchasing. These metrics will help organizations build more effective websites (Palmer, 2002, p.152). Therefore, usability is the first thing that comes to mind to evaluate the strength and weakness of E-commerce website. Another reason for the necessity of such metrics is the growing competition between businesses in E-commerce field since switching from site to another is just a single mouse click. Because of that, an organization could measure its' web usability based on customers' perception with competitors' website (Safavi, 2009, pp.1-3; Swaid, 2007, pp.2, 5; Wang et al., 2007, pp. 3-5).

Another reason for the mass need of such metrics is because measuring digital website cannot be done through traditional measurement factors such as profit or return on investment,. In fact, they need another scales o measurement (Wang et al., 2007, pp.3-5).Testing usability can be achieved by many ways such as performance test where, users use the system, and then the output of using such a system is to measure (Olsson, 2000, p.3).

Measuring of a website success varies from one site to another. One suggestion of website success be measured by the number of visitors, or by the sold number of items, others by the number of hits on the site. So success of a site is different based on the type of the site and the purpose of using it (Olsson, 2000, p.3).

1.3 Problem statement

At present, online shopping plays a major role in business firms profits. Most customers use online methods to sell or purchase goods, so business firms must give it more attention in order to increase profit and guarantee business continuity.

The question is, in what manner E-commerce could maximize business firms profit and guarantee customers satisfaction? Firms tried to make its E-commerce easy to use and attractive to customers. On the other hand, consumers prefer to use easy usable E-commerce websites.

Business continuity is an important issue for online stores, since it is very easy for customers to switch from one site to another. In addition, since competition is high, so any organization has to careful in order to guarantee profit, hence it will continue its business in the field of online stores, and so E-commerce websites must give a good attention to this point by looking at what attracts customers, and keep their purchasing behavior.

Customer satisfaction and usability is the key for successful online stores (Wobben, 2010) if those factors are highly available then the return in the profit, which is directly affecting the business continuity. Clearly if the sales increase (by online shopping) by making websites usable to satisfy customer, then the profit will also increase, which lead to increase in business continuity percentage for the organization into the online stores field.

“Business continuity for -online stores - depends on former factors, the relation between customer satisfaction and business continuity is fixed, customer satisfaction make the customers become loyal” (Safavi, 2009, p.2; Anderson et al., 1994, p.55), a loyal customer doesn't not only buy more from a website, but also stuck to it and recommends it, and that gives the E-commerce website a chance to compete strongly, maintain its position in the field of E-business and enhances the chances of business continuity.

The relationship between business continuity and usability is also strong. Researches show that 50% of new customers only browse the main page of the website, and less than 10% of customers revisit a website. This strongly affects business continuity for

the online stores (Search Pro System, NY). If few customers navigate no more than the main page this will affect the selling, and so profits will go down, which will lead to endanger business continuity. We tend to prevent all of that by making customers go deep into the website with efficient and easy way so that they can find what they are looking for, and this can be achieved by usability (Wobben, 2010).

If an E-commerce website is designed to be usable, then it may guarantee the profitability by decreasing the selling and production costs of a product, Consequently, profit and business will continue.

1.4 Aims and Objectives of this Research

The main idea of this research is to relate the concept of usability with the concept of customer's satisfaction and of how to minimize the gap between them.

Chapter 2 reviews literature that have tackled the concept of usability and customer satisfaction, how they are related to each other, defining the major factors that form usability and other factors that affect customer's satisfaction that is used in the representation.

Chapter 3 it discusses the used methodology to build up proposed representation and defines the concept of system dynamics.

As for Chapter 4, reveals the concept of system dynamic and it may be implemented with the factors of usability and customer satisfaction. In addition, it shows the way to measure those factors in business of website. This research will also handle the two major parts of system dynamic, the flow and the causal loop diagrams, and it will suggest new website usability and the suggested scenarios.

In Chapter 5, the results and scenarios will be discussed as well as comparisons of the scenarios are prepared.

Finally, Chapter 6, it concludes the research and proposed the future work.

This research is concerned with E-commerce websites usability, customer satisfaction and their influence on business continuity and maximizing profit by attracting new customers and retaining interested customers. The study aims to establish a model that will be supported by many attributes that tackle consumers' business firms' profit,

usability of E-commerce websites and customers' satisfaction. The objectives of this study are to:

1. To project a system dynamics model that will enhance the relationship between variables of profit, usability and customer satisfaction. The used methodology is the system thinking that reveals how the employed attributes interacts with each other in order to gain the usability that leads to customer satisfaction.

2. To bridge the gap between business firms' intentions of introducing usable E-commerce website and consumers preferences of using those websites. In fact, E-commerce websites varies in terms of functions. For example certain models advocate the usability of their website without mentioning consumers' satisfaction, and other models advocate their consumers' satisfaction without paying attention to their usability. Some researches tried to bridge the gap between website usability and consumers' satisfaction but such studies do not provide models with enough attributes (Wang et al., 2001, p.98; Kuan et al., 2005, pp.3, 4; Dawson et al., 2003, p.945; King, 2000, p.304).

2 Usability, Customer Satisfaction and Models View

2.1 Introduction

Usability is considered to be the key factor in the literature of Human Computer Interaction (HCI) (Olsson, 2000, p.2). At early stages of internet the usability concept wasn't taken into consideration, therefore, it became a critical issue when the World Wide Web (WWW) was created. The key behind usability is to create interface that the user can easily deal with (Faisal, 2012, pp.27-29).

Early days of deploying commerce via internet, firms which deploy their business electronically didn't focus on the concept of usability; this led to customers' dissatisfaction in the world of dotcom that will decrease the sales and profit. The issue is concerned with "how to make the visitors of a website as loyal customers", thus E-commerce website owners should concentrate on this idea if they want to increase the sales and thus increase profit. The chain of profit starts from usability, when the usability concept applied in E-commerce website, the customers become satisfied. This satisfaction leads customers to buy more from this website which also lead to increase in sales and thus high profit (Bahdor, 2008, pp.12,27).

Usability attributes defined as factors, those factors lead to usability if we apply them into the website, and each one of those factors has sub factors determines how each one of the factors is measured. Those sub factors also are determined based on usability literature. Table (2) shows the researches that focus on the usability factors and /or sub factors.

2.2 Usability

In this research, usability attributes are combined with each other based on past usability literature in order to come up with a comprehensive usability model and attributes. Table (1) shows some of the usability factors and the sub-factors and how each factor can be measured, and the rest of the factors that have no sub-factor listed below.

		Factors					
		Effectiveness	Learnability	Accessibility	Navigation	Trustfulness	Information
Sub factors	Task Time	X					
	Task quantity	X					
	Task Step		X	X			
	Guidance		X				
	Response Time			X			
	Flexibility			X			
	Searchability				X		
	Design				X		
	Uploading Time				X		
	Operability					X	
	Security					X	
	Privacy					X	
	Content						X
	Accuracy						X
	Format						X
	Updatability						X
	Relevance						X

Table 1: Own rpresentation, usability factors and subfactors

1. Effectiveness

Effectiveness means how much a website can allow users to accomplish specific task in an exact and complete way (Seffah et al., 2006, p.168). It contains the following criteria that determine if the site is effective or not:

- **Task Time**

It means how much time is needed to achieve a specific task (Seffah et al., 2006, p.171; Bevan, 1995, p. 11).

- **Task quantity**

It means how many tasks are performed in a specified given time.

TE=QN/QL*100 %.....(Equ.1) (Seffah et al., 2006, p.170; Bevan, 1995, p.11).

Where QN= is the time task and QL= is the achieved task.

2. Learnability

It is how easy and quickly the user can learn to start using the site (Safavi, 2009, p.3; Seffah et al., 2006, p.169). Each part of the system may have a different way to be

used in order to make the system learnable, it must have a common way of use to make the users easily work. otherwise users become dissatisfied with this website (Safavi, 2009, p.3). The following criteria determine if the site is learnable or not:

- **Task Step (Minimal Action)**

It can be defined as the capability of the site to make the users perform the tasks in a minimum number of steps. In order to increase satisfaction when browsing a website, the user must reach the desired goal in few steps; the website should reduce the steps as much as it could (Lin Han et al., 1997, p.271; Seffah et a.l, 2006, p.171).

- **Guidance**

It's a feature that determines whether the site interface provides help and feed back to a user when errors happen. A study suggested that there are a relation between user guidance and minimal action, if there are a strong guidance in the website, the users will learn quickly and reduce the steps in achieving the desired goal (Lin Han et al., 1997, p.271; Seffah et al., 2006, p.171).

3. Accessibility

It can be defined as the accessibility of the site whenever access is needed. Website must always be available to the users, if the users face problems to access the website seeking something; it will becomes annoyed (Seffah et al., 2006, p.169; Safavi, 2009, p.4; Cheung et al., 2005, p.9). The following criteria determine if the site is accessible or not:

- **Response Time**

It means how much time is needed to download a page. In a previous study about usability response time was one of the most critical points in a website design. A Customer will leave the site if the response time and download are weak. Websites which quickly respond to the users' orders indicate to a success of that website (Seffah et al., 2006, p.171; Cheung et al., 2005, p.9).

- **Task Step (Minimal Action)**

It is the capability of the website to make the users perform the tasks in a minimum number of steps. In order to increase satisfaction when using website, the user must reach the desired goal in few steps (Seffah et al., 2006, p.171).

- **Flexibility**

It means the ability of the user's interface of the site to meet the user's choices, and how much the user can modify the interface to make him feel comfortable (Seffah et al., 2006, p.171). Whenever the flexibility increases the usability also increases.

4. Navigation

It refers to easiness of browsing a website, and it concentrates on the sequencing of the page. Navigation is considered to be the most important issue that faces the user to navigate over the E-commerce website. Well designed navigation has a positive effect on the sales from the website because the sequence of the pages is connected and linked systematically. The following criteria determines if the site is navigable or not (Safavi, 2009, p.4; Seffah et al., 2006, p.171).

- **Search ability**

It means the availability of search function in a website and how easily the search operation for specific product and services is needed to be performed in a website. If the website doesn't respond efficiently then at negative point may be recorded against it. (Safavi, 2009, p.1).

- **Design**

It refers to the extent in which users believe that the website interface is reliable. The design of the website should make the navigation task easy for customers and users. Designing process is a major concept in usability field; a website with a strong design, makes customers more comfortable and loyal by using this site and thus gaining more profits. On the other hand, if the website has a bad design, it will be difficult for users to find what they are looking for, so they become dissatisfied and may never come back to it (Safavi, 2009, p.2).

Web designers conclude that there is a relation between design of the website and the searching for an information or product on it. The designer of the website should be aware of searching for information so that customers will find what they want easily and quickly (NetMechanic, 2004).

- **Uploading Page Time**

The time that is required to download the page and how much time does it need to be responded by the order of the user? Customer evaluate the quality of the website due to the loading time of the page. Some studies find out that uploading

time is the most determinate attribute for success of a website (Seffah et al., 2006, p.171).

5. Ease of Use

It can be defined as how the website could be used easily. In E-commerce field, customers measure a website based on how easily the website can be used in order to accomplish a specific task (Safavi, 2009, p.4).

6. Performance

It is defined as the outcome of the user's behaviour on a website in a given time and how completely the user accomplishes a task. It can be measured by the time required to accomplish tasks (Lee et al., 2010, p.330).

7. Trustfulness

It is defined as the ability of user to trust a website by revealing their personal or financial information. The importance of the trust arise from the increased use of technology especially in E-commerce field when the user must reveals some of personal and financial information (Seffah et al, 2006, p.169; Safavi, 2009, p.4). The following criteria determine if the site Trustful or not:

- **Operability**

An effort which is exerted by users to work in a website. (Seffah et al., 2006, p.171).

- **Security**

Ability of a website to protect user's information that is collected from e-transactions performed by users, this criterion is very important since it helps to maintain the trust and long-term relationship between customers and websites. (Seffah et al., 2006, p.171; Safavi, 2009, p.3).

- **Privacy**

It refers to the capacity of a website to protect user's personal information (Seffah et al., 2006, p.171). The most important type of privacy that users are interested in E-commerce is financial privacy. Different websites employ many techniques to ensure that their customer's privacy is protected (Safavi, 2009, p.3).

8. Information

Information is considered to be as the content of a site. The quality of this content plays a critical role in the decision making that user made and it determines whether the user is attracted to the site or if he is attracted to another one. The following criteria determine the information measurement (Cheung et al., 2005, p.6; Huei Huang et al., 2005, p.7):

- **Content**

  Content of information is defined as to what extent the site' information is complete. (Huei Huang et al., 2005, p.7). Previous studies (Jinling, 2005, p.56) concluded that content is considered to be one of the most important categories in the usability attributes. It suggests that the content of information is the primary factor that affects customer's decision about when to visit E-commerce website. A user does not read all information of the website; he only browses the information they need. Thus, content of information should be presented in a clear way and should be easy to find. (Cheung et al., 2005, p.6). Another suggestion is that the more the information is represented in details in a website the more the users can access the website.

- **Accuracy**

  Accuracy of information refers to the extent to which the information is accurate and correct. Previous studies acknowledged that whenever reliability and accuracy occur in web information, the best decision making can be achieved by users and lead to customer's satisfaction that determines his purchase (Cheung et al., 2005, p.6).

  In E-commerce world, customers don't always have full information about a specific product or service, thus they need additional information to distinguish between online goods and services (Huei Huang et al., 2005, p.7).

- **Format**

  Format of information can be defined as how the information is offered in a website. Searching activity is affected by the degree of complexity and how much time is needed to complete the search. So it is important to represent the information in a way that minimize searching time and maximize the

effectiveness of search activity. In media richness theory, the multimedia format provides abilities more than text making information is useful and attractive for the users. Some studies argued that intensiveness has an effect on the users' attitude to a website (Cheung et al., 2005, p.7).

There is a relation between arrangement and content, whenever the customers are using a website, they successfully understand the information as they provided. Also, it increases the richness of the information content existed in the website, one suggestion that the arrangement of information in a website should be chosen by customers (Horton, 2005, p.3).

Some studies concluded that 79% of users usually observe new page. But only 16% read each written word in a page. Customers/users spend about 12% from their time trying to set the required information on a page, so information should be presented in an efficient way to allow users and customers find it easy to shop (Nielsen, 1997).

- **Updatability**

It refers to frequent update of information. If a website is not updated, it will affect online sales because it may affect customers purchasing behaviour. It is important for companies to present the information in an appropriate manner to keep the customers satisfied (Safavi, 2009, p.3).

- **Relevance**

Relevance refers to clearness of a website's information and the degree of being understood by customers. Information should be offered in a clear way so that the customers find what they want (Chang, 2005, p.54; Microsoft Corporation, 2007; Web stocks & Best Practices, 2011).

9. Customization

It means the ability of users to customize and interact to a website border in a comfortable way (Kuan Huei Huang,2005,174).

10. Efficiency

"Efficiency can be defined as the level of effectiveness achieved to the expenses of resources", efficiency could be measured as (Bevan, 1995, p.12):

Effectiveness/Task Time…….. (Equ.2)

Efficiency evaluation and measurement can be used to compare the efficiency of similar products, when used by the same users for the same task, or for more than one type of users using the same product for the same reason or for more than one task performed by the same users on the same product (Bevan, 1995, p. 12).

Usability factors	Usability Sub-factors	Study
Effectiveness	Task Time Task quantity	(Seffah et al., 2006)(Bevan, 1995) (Kuan et al., 2005) (Safavi, 2009) (Lin Han et al., 1997)
Learnability	Task Step Guidance	(Safavi, 2009) (Seffah et al., 2006) (Lin Han et al., 1997) (Olsson, 2002)(Cheung et al., 2005)
Accessibility	Response Time Flexibility Task Step	(Safavi, 2009) (Seffah et al., 2006) (Cheung et al., 2005) (Zhang,2000) (Plamer,Jonathan,2002) (Scharl et al.,2004)
Navigation	Searchability Design Uploading Time	(Safavi, 2009) (Seffah et al., 2006) (Scharl et al.,2004) (Zhang,2000) (Benbunan-Fich,2001) (Tezza et.al, 2011) (davis et al., 2002) (NetMechanic, 2004) (Abd El-Aleem et.al,2005) (Plamer,Jonathan,2002)(Cheung et al., 2005)
Trustfulness	Operability Security Privacy	(Safavi, 2009) (Seffah et al., 2006) (Scharl et al.,2004) (Abd El-Aleem et.al,2005) (Cheung et al., 2005) (Kuan et al.,2005)
Information	Content Accuracy Format Updatability Relevance	(Cheung et al., 2005) (Huei Huang et al., 2005) (Jinling, 2005) (Cheung et al., 2005).(Plamer,Jonathan,2002)(Abd El-Aleem et.al,2005) (Benbunan-Fich,2001) (Tezza et.al, 2011) (Zhang,2000) (davis et al., 2002) (Horton, 2005) (Nielsen, 1997) (Safavi, 2009) (Microsoft Corporation, 2007) (Web stocks & Best Practices, 2011)
Ease of Use		(Safavi, 2009) (Davis, 1991)(Scharl et al., 2004) (Benbunan-Fich, 2001) (Adam et al., 2000)(Wang et al., 2001) (Cheung et al., 2005)
Performance		(Lee et al., 2010) (Abd El-Aleem et.al,2005) (Lenner et al., 2005) (Duquennou et al., 2009)
Customization		(Seffah et al, 2006) (Safavi, 2009) (Kuan ,2005) (Plamer,Jonathan,2002) (Scharl et al.,2004) (Wang et. al) (Benbunan-Fich,2001) (Cheung et al., 2005)
Efficiency		(Bevan, 1995) (Seffah et al, 2006) (Olsson,2002) (Nelson,2010) (Boralv et al.,1994)

Table 2: Own representation, usability factors and sub factors

The Benefits of deploying usability into a website is divided into two major parts: organization and user levels (Faisal, 2012, p.32):

1. **Organization level:**

- Cconversion rate is high.
- Resources are used efficiently and thus no resources will be wasted.

2. **User level:**

- User becomes comfortable by using the website.
- To find easily whatever they want.

2.3 Customer Satisfaction

There is more than one factor that affects customer's satisfaction as well as usability. In this research a detailed focus will be carried out on usability factor and how it affects customers' satisfaction in E-commerce website.

The first factor that has an effect on customer satisfaction is productivity. There is a strong concept in business that companies should follow customer satisfaction and productivity. If a company gains a customer satisfaction, then it decreases customer complaints or amends process. So it leads to lower cost of improving productivity. Some researches in this field argue that decreasing such recourses will increase the loyalty (hence customer satisfaction), and in turn customers with high loyalty will increase the productivity. Increasing the productivity is considered the most common source of profit in the organization (Anderson et al., 1997, p.131).

Some researchers in this field argued that increasing customer satisfaction will consequently increase productivity (Anderson et al., 1997, p.129). Also, they argued that the key dimension points is the effect of customization on productivity (Anderson et al., 1997, p.129).

Another factor that affects customer satisfaction is price. Many studies have hypothesized the role of price in the market and customer satisfaction. A customer who knows the price of a specific product, it helps helps him to decide to wether to purchase a product or not. On the contrary, the absence of such tools make the decision process difficult (Reibsten, 2002, p.466).

Previous studies showed that the effect of price in the digital market is less than its effect in traditional market. For example, there is no rent for stores to put the product (Reibsten, 2002, p.466).

In digital world, customers seek products that are sold in different sites as well as providing prices. As a result customers pick up a product. In general, the product with low price but enjoys quality will satisfy a customer and make him/her purchases it immediately. Some argued that the only attribute that makes a customer to ignore the power of price is the loyalty. When the customer is satisfied of a product, he becomes loyal and so he will buy from that site regardless of the price. To summarize, price will be the primary attribute in attracting customer to specific website.

Others argued that since there are many websites that sell same product, price becomes the major factor in comparing (Reibsten, 2002, p.466). When customers increase in number, the amount of money are willing to spend for goods also increases (Yong Cao et al., 2003, p.44). This leads to increase in customer satisfaction and decrease the value of the price.

In addition, the quality offered services and products has a major effect on customer satisfaction. A study which was carried out by Jakpar et al., 2012, p. 223) argued that there is a strong relationship between products quality and customer's satisfaction.

Anderson et al. (1993, p.125) states that higher customer satisfaction is said to be the best indicator for company's future profit. With customer satisfaction, there are different ways to increase profit, such as: loyalty which is the critical point for customer satisfaction. If a customer is satisfied then he/she will become loyal and purchases more and so the profit increases.

Another way is to provide products that meet the need of customers and increase their satisfaction. Satisfied customer enhances the reputation of the company, which also leads to increase the profit.

Increasing customer loyalty that is gained from satisfaction has a positive effect on a company's economic return because it guarantees future cash flow and consequently profit increment. That means that as long as the customers are satisfied, they will become loyal, and the longer they intend to buy from the same website a profit will increase (Anderson et al., 1994, p. 55).

Strategies and factors of increasing regular customer retention vary from one firm to another differ. Profit is a more effective example for customer retention than recruiting new customers (King et al., 2001, p.2; Reibsten, 2002, p.465).

If customer satisfaction is high, then the cost of transaction becomes less, and his customer satisfaction leads to customer retention. Companies are not obligated to spend great amount of its resources in order to retain customers. On other hand, the cost of attracting new customers become lower for an organization that achieve the customer satisfaction and word of mouth mechanism becomes a good way to recommend other people to buy from a certain site (Anderson et al., 1994, p.55).

2.4 Definitions Usability and Customer Satisfaction:

Web usability is defined as "the extent to which a site can be used by a specific group of users to achieve particular goals with effectiveness, efficiency, and satisfaction in a specified context of use" (Bevan, 1995, pp. 2, 3). But Olsson (2002) defined it as the combination of the following attributes of ability and efficiency. Usability and satisfaction means that users should be satisfied when using a website (Olsson, 2000, p. 3).

Customer satisfaction has to do with his previous experience and present and future expectations (Cisnero, 2008, p.3). Another definition of customer satisfaction is how the products and services meet the expectation formed by those customers (Jacques, 2 010).

Usability Return of Investment (UROI) is how much profit an organization gains from investing in usability. Investments in usability shows that the more invested in usability, the more benefits organization will gain (Wobben, 2010). Furthermore, customer retention rate determines the number of customers who are willing to return to the website (Lovell, 2011).

2.5 Usability and Customer Satisfaction

Since online shopping website or E-commerce website is said to be one of the most important interfaces between companies and customers, it becomes a vital challenge to make sure that customers are satisfied with their shopping via those sites. This

leads to an important fact which is a strategy to apply in order to attract customers and keep the existing ones (Yinh-Hueih et al., 2008, p.3).

Usability is the main factor for customer satisfaction in the context of E-commerce; customers use the internet for purchasing a product rather than traditional shopping manner due to the speed of purchasing process (Cisnero, 2008, p.3).

Usability and customer satisfaction are said to be related. A website having usability then customers' satisfaction is supposed to increase. There are several numbers of companies that measure customers' satisfaction in order to maximize profit. A Wobben (2010) reports that usability plays a critical role in increasing customer's satisfaction with a range of 40% when the system of a website meets users' expectation.

On other hand, usability has an effect of word of mouth which is considered to be one of the customer's satisfaction determinants. People may be influenced by others; a satisfied customer will share his experience with a specific site in an average of three friends. The website which has a good usability will reduce errors and lead to customer's satisfaction, which in turn leads to increase recommendation and WOM (Wobben, 2010; Casalo et al., 2008, pp.341, 344).

According to researchers, increasing in usability will lead to high productivity that leads to customer's satisfaction. A customer could gain the advantage from productivity when the most repeated tasks are done in less time (Rajanen, 2003, p.7).

E-commerce field also changes in the old habit of purchasing that customers usually followed when they want to purchase a product. Usability is a key determinant that shapes the buying intention and customers' satisfaction in the field of E-commerce (Sam et al., 2009, p.24).

2.6 Models Review

This section will discuss some of the models that tackled usability and customers' satisfaction. Table (1) summarizes all the models.

Anderson and Sullivan (1993) developed a model for customer's satisfaction. This model shows customer expectation before they use the products with a good quality. After using products, they interact with each other to achieve satisfaction and focus

on how satisfaction affects purchasing. This model is based on a model that developed by Oliver Richard (1980) but with more enhancements. In Anderson's and Sullivan's model in which were more than 22300 customers of 114 companies participated in evaluating this model on 16 products. The data was constructed from a computer aided telephone survey.

Additionally, Anderson and Sullivan (1993) added a new attribute which was intended to ease evaluating quality by dividing the expectation into two categories: positive and negative disconfirmation. They argued that negative expectation has greater effect than positive expectation, and high satisfaction reduces repurchase intention.

Participants who purchased products from any of the 114 companies were selected by having purchased or used products of companies. They were asked to assess the products they bought or used depending on the quality of the products in terms of the price, expectation of the product and the willingness to repurchase the product on a scale from 1-10.

Interviewed people (interviewees) had a positive attitude toward quality and their intentions showed to have a positive satisfaction for purchasing a product. The limitation of the model is that it does not show any association between usability and customer satisfaction (Anderson & Sullivan, 1993, pp.125-126).

Donahue, Weinschenk and Nowicki (1999) proposed a study of the usability and its effects on the market. They stated that usability slim down the cost of E-commerce websites which include training support, development , maintenance cost and after all it improves marketability hence it improves business continuity.

They stated (1999) that an organization will gain for every dollar spend over usability from 10-100 as benefit, by that it will guarantee the business continuity. In addition, websites with high usability will enhance the user/customer experience and will make them feel comfortable to stay longer browsing that site. They may increase their purchases, therefore profits of firms may also increase.

King Gerard (2000), revealed the relation between customer satisfaction and profitability and customer retention. He claims that most previous literature relayed

on linear model rather than the systematic approach such as the causal loop. The author found out a high correlation between customer satisfaction and profit .

King Gerard (2000) concluded that literature overview of customer satisfaction field does not fully explain the relationship between customer satisfaction and profit, since it is unidirectional from customer satisfaction, customer retention or profit. Therefore, he used the casual loop diagram to allow a feedback that enable development of systems and model. The issue discussed in this research concerned with other variables related to customer satisfaction, customer retention, profit, and the relationship between them. The first used model was used by King (2000) but it was a classic diagram and found out that the employed elements did not have a feedback.

The second model was the expectancy –disconfirmation diagram, which assumes that satisfaction depends on expectation, such a model operate as follow: before the customer purchases a specific product, he forms an expectation about it. After expectation customer purchases the item and use it, and then he assess the quality of that product. If the difference between expectation and perceived quality is small, then quality has to depend on the customers' expectation formed before the purchase either positively or negatively. As a result, satisfaction is developed and depends on the mentioned attributes.

King (2000) model discussed a factor that is the value. In the case of rise in price, the customer will reevaluate whether he/she will purchase a commodity regardless of his satisfaction. Another finding is that although the customers retain loyalty it does not mean that profit is secured.

One clear result from King Gerard (2000) model as well as the studied model of Anderson and Sullivan (1993) is that both are open loops that have no feedback. In addition, King Gerard (2000) model is more generic rather than individual, which means each an organization should develop its own model. Also, it provides the feedback between the elements of the model in other words it’s multidirectional rather than unidirectional.

Wang, Tang and Eddi-Tang (2001) developed a comprehensive model for measuring customer satisfaction of website digital market and services. The questionnaire was tested on 100 customers of how actually they use digital market in shopping process.

They were asked to use 13 different products categories. Participants were asked to buy from at least one product category in three weeks time.

The questionnaire has two parts. First part is concerned with demographic data and the second part was concerned with the website they had to purchase from. The author concluded a comprehensive model that led to customer's satisfaction. However, their model has its limitations. First, the attribute for measuring customer's satisfaction was not well defined. Moreover, there was no guidance of how to get the result. Second, although this paper tried to build a model to evaluate the customers' satisfaction, the attributes they used were carried out by other studies.

Kuan, Bock and Vathanophas (2005), built a model to provide a thrifty and unified view of usability. They claimed that there are many usability attributes that generated from previous usability studies, but there is no unified framework or model to classify these attributes. Because of many reasons as mentioned above there are no unified usability attributes that can be used in websites, since there are different goals and objectives for each site, another reason is that past studies treat conversion and retention the same which they considers wrong.

Kuan, Bock and Vathanophas (2005), model based on Delon and Mclean's model. It classified usability attribute into three main categories: (1) Perceived system quality, (2) information quality and (3) perceived service quality, for all of the attributes mentioned above, they made a rating on a seven-point scale to measure the attributes mentioned earlier.

The authors chose two sites as a case study, which are travelocity.com and Expedia.com and 51 students, were randomly assigned to use Travelocity.com and another 51 were also randomly assigned to use Expedia.com. They had not heard or used the target websites before the test.

The results revealed that the quality of system is more important for customer conversion whereas service quality is more important for customer retention. They concluded that when a company wants to increase conversion rate, it must improve its quality system while if it intends to increase customer retention it can focus on service quality (Huei Huang et al., 2005, p. 7, 8).

Abdinnour-Helm, Chaparro and Farmer (2005), conducted a study to re-evaluate End User Computer Satisfaction Instruments to measure the satisfaction of websites from usability viewpoint. About 176 students participated in this study, 47.2% males and 52.3% females. The experience of the respondents in using internet varied from little usage to 2-6 hours a week and 7-14 hours a week for varied tasks like browsing entertaining and education purposes. Participants were asked to use a specific website; and to perform five tasks within this website. They were asked to put 0 (zero) when the task failed or 1 when the task succeeded. They prepared a case study to evaluate the model they built. Three websites were taken into consideration and three different types of audiences participated in this case study.

EUCS (End User Computer Satisfaction Instruments) model has four key attributes: competitive environment, marketing environment, usage, and usability. Each attributes discusses an issue that arises from each environment attribute. They used this model to compare website design against the design for general mobile software application for mobile and game devices. In their study, they focused on web satisfaction from usability approach point of view.

Based on the experiment of participants the authors concluded that the proposed model they built is positively related to task success and negatively connected with the duration time of each task, and it positively associated with the attribute intention to return to this website.

The limitation in their research is that the attribute they used for EUCS was not comprehensive; there were many attributes that were not considered. Also, the targeted audiences had to use this limited model but there were another attributes which lead to customer satisfaction that were not mentioned in this model.

Gerard King and Gus Geursen (2001) developed a model to explore the relation between revenue and profit in consideration to customer satisfaction using new technique called the system dynamics methodology They developed a model for customer satisfaction and revenue, and they use some cases and simulate them to reveal the relationship they argued about.

In the first case, they simulated the value of (1) which is greater than the quality or expectation; they concluded that when quality is high, the disconfirmation reflected in

a positive way and hence increase the customer's satisfaction resulting in increasing customers' retention and firms net profit (King et al., 2005, p.7,8). The value of (2) was simulated in which quality variable is less than expectation. As customers began to use the product, the previewed quality decreased less than they it was expected. They concluded that the disconfirmation is influenced in a negative way hence the customer satisfaction decrease and caused customer retention and firms profit to decrease.

In third simulation a new attribute was added in order to gain customer satisfaction, The results of this case showed that when considering more attributes and factors, customer satisfaction will be achieved. The results are enhanced in this simulation in a comparison with case 2. In summary, the addition of the new attributes helps the organization to gain customer satisfaction, even if the quality is greater than expectations. The profit and customer's satisfaction will increase. This model highly focuses on the customer's satisfaction while there are no consideration to usability, so this model is not fully dealing with the issue that affects the customer's satisfaction in E-commerce (King et al., 2005, pp.13-14).

Gerard King and Gus Geursen (2005) continued the research about the system dynamic and customer satisfaction in which they carried out another study to adopt the system approach that recognizes the interaction, the constructs, other attributes and the casual loop diagram to develop a model relating customer satisfaction and profit.

By the developed model, they made some simulation about some scenarios to assess the model. They used thinking system or the system dynamics methodology to show how the constructs and attributes interact with each other to assist them in a building conceptual model (King et al., 2005, pp.7-18).

After conducting many simulations on the developed model, the results indicate that the revenue for organization increased in exponential manner. Another result of simulation is that if the expectation to gain made by the user is higher than the actual quality, it will decrease the satisfaction and hence the profit. Another scenario was made about the price. The result is that if the value of the product is high, then satisfaction will decrease and so the revenue and profits (King et al., 2005, pp.7-18).

The limitation of their study is that it did not include more attributes about customer satisfaction and the used attributes could not accurately measure customer satisfaction. In fact, their model was simple and generic, therefore it can't be used to measure customer satisfaction alone.

Minocha et. al. (2004) developed a model called E-SEQUAL to be as guidance to E-Businesses. It can be used to evaluate E-commerce environment and usability.

In the latter model, the authors focused on two factors which were considered as the key dimension in E-commerce: loyalty and customer retention. They stated that increasing the 5% loyalty of customers would increase the profitability of a firm by 30% or even 85%. and business continuity will increase as well (Minocha et al., 2004, p.1)

Casalo, Flavian, and Miguel (2008) built a model to show the role of customer's satisfaction and usability in developing loyalty and WOM[1]. They argued that satisfaction has two consequences: the loyalty and WOM. Loyalty has an effect on customer's purchasing intention. When a customer becomes loyal, he or she will be enthusiastic about a website and consequently purchase from it. As A result firms business will continue and its profit will go up. WOM is somehow a kind of communication (Luis et al., 2008, p.403).

They assumed some hypothesis and tried to prove them. They distributed a survey on participants, The analyzed data proved that (WOM) has a major effect on customer satisfaction and will use it to convince others to try purchasing a certain website items.

Seffah et al. (2006) developed a combined model of previous usability studies to measure usability through the concept of Quality in Use Integrated Map QUIM Model. They assumed that usability has 10 factors and each one has many criteria to assess. From the previous usability studies, they considered studying each model and combined the usability measurement models with each other to develop the QUIM model. They extracted a better model than others because of adding more usability attributes that affecting usability. However this model has its limitations since it was

[1] Word of mouth (WOM): is a communication process between two or more parties, where the information passes from one to another orally (Buttle,1998, p.242)

on its first stages and needs to be tested again and the only concern of this model was only the usability. Furthermore, there were many attributes that has an effect on customer satisfaction and were not included in this model (Seffah et al., 2006, p.176).

Sangwon, Richard (2010) conducted a study to show the relation between usability, task completion time and preferences for the customer and how website design affects the customer preferences in E-commerce website. They claimed that the user should be the main part in designing website; to do this, the company must understand the users mentality and how they make their preferences "choice of alternatives" since alternatives reflect feelings and attitude toward the site and later to decide whether the user should get back again to a specific site or not. Usability is considered to be the most important factor for making preferences (Lee, Koubek, 2010, p.329).

Lee and Koubek (2010) divided usability into two categories, the pre-use usability and the performance (degree of accomplishment of specific task). They stated that performance was the most important criteria for usability. High performance means high completion of task within time which leads to high usability (Lee et al., 2010, p.330).

There were five attribute that used in this study: content, visual, navigation, color and typography. They chose nine infamous book stores that users are not familiar with and asked the users to assess the pre-use usability. They gave each user 3 tasks to do in each website; users were asked to evaluate the mentioned attribute and were also asked to make the preference. The study has concluded that there were no relationship between usability and completion task time. However, there were relations between usability and preference than preference and task completion time. The content and outline have the most impact on user preferences (Lee, and Koubek, 2010, p. 338).

Researchers have also found out a disparity between pre-use usability and completion time for some participants because completion time was affected by many factors that differ from one user to another while pre-use usability was affected only by one factor that is the visual aspect.

The design attribute category was general and abstract, and did not represent all factors for website design. Another attributes was performance that was measured by task completion time. More factors were added to measure the performance like errors. In order to generalize the findings of this study, it was recommended that more studies have to be carried out using more samples (Lee, Koubek, 2010, p.339).

The model which was built in this research combined usability factors and sub factors that was mentioned in the above literature, the main difference was that the usability factors, sub-factors and customer satisfaction factors in that research were comprehensive. Most of the previous literature don't have sufficient factors in order to measure usability and customer satisfaction, but in this research a lot of factors are considered for usability and customer satisfaction in order to measure them accurately.

A little focus has been placed on web usability, for the following reasons (Olsson, 2000, p.425):

1. Web designers work too fast, in which they try to build many website as they can in a short or given time.
2. This medium is new, so there is a little guidance on how to design a website to meet the need of a large number of users.
3. Users of the web are not the same; they differ from each other in terms of purpose of using the website, consequently that makes feedback more difficult to reach in order to test the usability on websites.
4. The group of web designers are diverse, as they come from various backgrounds.

One of the most important reasons that make the user leave the website and never comeback is the usability aspects. If the user didn’t find what he or she wants in the website, he/she will never come back to it (Safavi, 2009, pp.2, 4). Table (3) summarizes the models.

Author	Year	Main Idea
Eugene Anderson & Mary Sullivan	1993	This model shows customer expectation before they use the product and quality. After using that product interacts with each other to achieve satisfaction and how satisfaction affects purchases.
George Donahue & Weinschenk Susan & Nowicki Julie	1999	proposed a study of the usability and how it affects the market, they stated that usability downsize the cost of E-commerce websites which include training support, development and maintenance cost and after all the improvements in marketability, consequently improve business continuity
King Gerard	2000	Revealed in this study the relation between customer satisfaction, profitability and customer retention. He claims that most previous literature relayed on linear model rather than the systematic approach such as causal loop. The author found out that the relation between customer satisfaction and profit is sometimes implied.
Tang Wang Wang & Tang Jeung-tai Eddie	2001	Developed a comprehensive model for measuring customer satisfaction of website digital market and services.
Huei Huang Kuan & Gee-Woo Bock & Vichita Vathanophas	2005	Provide a thrifty and unified view of usability based on a previous model built by Delon and Mclean. They classified usability attribute into three main category: Perceived a system quality, Information quality and Perceived service quality
Sue Abdinnour-Helm & Chaparro Barbara & Farmer Steven	2005	Conducted a study to re-evaluate End User Computer Satisfaction Instruments to measure the satisfaction of websites from usability viewpoint.
Gerard king & Gus Geursen	2001& 2005	They used thinking system or system dynamics methodology to show how the constructs and attributes interact with each other to assist them in building the conceptual model.
Minocha Shailey & Casalo Luis & Flavian Carlos& Guinaliu Miguel	2004	Developed a model called E-SEQUAL to be used as guidance to E-Businesses. It can be used as an assessment for evaluating the E-commerce environment and usability.
Ahmed seffah & Mohammad donyaee & Rex kline & Harikart padda	2006	Develop a united model from the previous usability studies to measure usability.
Luis Casalo & Carlos Flavian & Miguel Guinaliu	2008	Built a model to show the customer satisfaction and usability role in developing loyalty and WOM, they argued that satisfaction has two consequences: the loyalty and WOM.

Lee Sangwon & Koubek Richard	2010	Set a study to show the relation between usability and task completion time and preferences for the customer and how website design affects the customer preferences in E-commerce website. They claimed that the user should be the primary attribute in designing website, to do this, the company must understand the user and how they make their preferences "choice of alternatives"

Table 3: Summry of the models

3 System Dynamics Methodology

3.1 Introduction

This chapter discusses the concept of system dynamics, enlightening the tools that used inside it and how those tools interact with each other to build up the proposed model. In addition a brief discussed in brief the case studies that were chosen to test the model.

In this research, the author used a system called VENSEM PLE to build the Causal Loop Diagram (CLD) of the model. This system is a creation of Ventana System Corporation. In addition, he used ITHINK 8 system to convert the CLD diagram into a flow diagram. Also he only used the basic steps in this system to convert the CLD.

3.2 System Dynamics Basics

System dynamics was developed by Jay Forrester back in 1950s in order to help managers to enhance their understanding of industrial processes. Nowadays, its' used in both public and private sectors (System Dynamics, 1997). System dynamics is used to solve complicated problems with a large number of variables (Jafari et al, 2009, p.65).

System dynamics was first created for management and engineering sciences and later on it was evolved into a very useful tool to cover the analysis of many system environments (Martin, 1997, p.6) such as health. The importance of health care sector is that the environment of that sector must be understood and analyzed in an efficient way to improve health sector performance. For example, World Health Organization (WHO) established a model using system dynamics methodology to assess health care sector. This model has the ability to compare health system between countries and determine the social and economic system that are pertinent to health condition and this lead us to more genuine and specific country comparisons (Mcdonnell et al., 2004, pp.1, 9). Some studies concluded that system dynamics methodology is an appropriate method to handle complexity that identifies health sector problems (Homer et al., 2006, p.1).

Other area of system dynamic application is social environment. The model that was built in this field discussed population and global economy. The aim of this model was to examine the effects of population and economy as human expands his capacity on earth (King et al., 2005, p.6). The model showed a trend toward fall in the world socioeconomic system in the twenty-First century if no action has been done to solve this issue (System Dynamics, 1997).

Other important field that system dynamics methodology was applied into was management fields. In fact managers should be given the right information in order to take the right decision and that was the idea that dynamic methodology system tries to reveal and analyze management field. Several studies were carried out in order to investigate the importance of dynamics system in management (Cagliano et al., 2011,pp.1,6,22; Harris, Bill, 2000, pp.1,3,5,7).

The term system is defined as the group of elements that cooperate with each other to form an integrated and complete structure (Martin, 1997, p.6). The term dynamics means changing that takes place time. Based on the former, dynamic can be defined as a methodology that reveals and show how system changes over time (Martin, 1997, p.6).

The system dynamic consists of two main components. Firstly, the structure means the relationship between the elements and components of a system. Secondly, the behavior of the system is defined as how the components of the system assemble over time (Martin, 1997, p.10; Wu Minghui et al., 2009, p.1128). System dynamics is based on the idea that the actions of a system is caused and its components are assemble together (Wu Minghui et al., 2009, p. 1128).

One of the most interesting features of system dynamic is computer simulation. It allows analyzing and monitoring any business in an effective world helping to prevent the problems that might occur (Leslie, 1997, pp.8-9). A model of system dynamic is used to represent the system structure, whenever it sets are determined variables and conditions, the computer can run a simulation mode to show how those variables interact with each other over time.

Simulation gives the user an advantage to repeat the simulation several times and changes the conditions or variables. This could be helpful since it touches some parts

or aspects of real life. A part of real life cannot be repeated the moment it happens, but simulation can formulate the system dynamic model in any way to simulate a problem and run it as many time as researcher needs (Forrester, 1992, pp. 2-4).

One of the approaches that is applie1d in this thesis is the one that simulates dynamic relationships to find the cost of different amounts of contribution, timing, postponement and feedback (Williams et al., 2005, pp.2-3).

The tools in system dynamics are:

(1) Causal Loop Diagrams (CLD), this tool is mainly used to understand the relationship between the elements in the system; it represents the cause and effect relationship between those elements.

(2) The flow diagram tool; this tool converts the CLD into a model that can be simulated to generate a result.

Another feature of the system dynamics is the feedback since system dynamic is a closed system, output affects and influences the input; there are two types of feedback in the system dynamic, negative and positive feedbacks (System Dynamics, 1997). The positive feedback is called Exponential growth, in Figure (1) below, the increase in quality improvement rate will increase quality improvement, thus increasing in quality improvement will increase quality improvement rate which compounds the initial increase in quality improvement. In positive feedback and an increase in a stock will leads to more increasing in the same stock. Negative feedback in figure (2) shoes an increase in a stock that will lead to a decrease in the same stock, so the system will be stabilized rather than grow (Martin, 1997, pp.6).

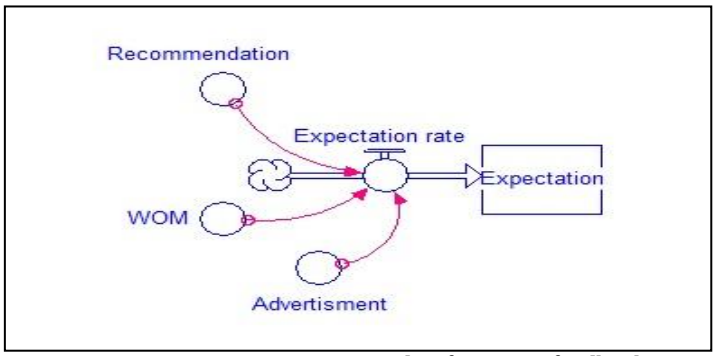

Figure 1: Own representation, example of positive feedback

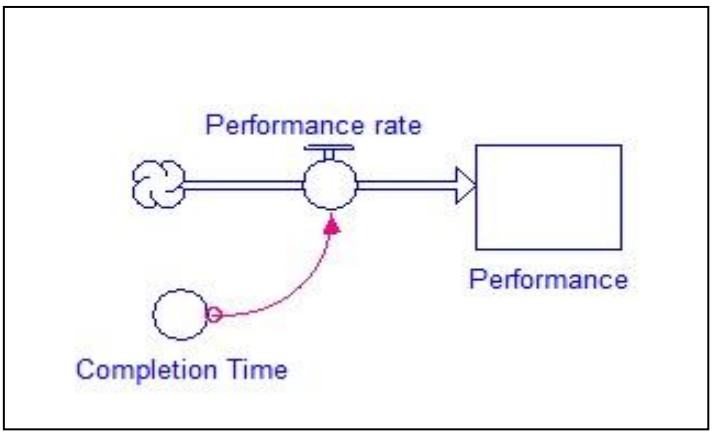

Figure 2: Own representation, example of negative feedback

In this research the system dynamic method is applied on two case studies:

(1) Jawwal Website Company, which is the leading company in cell phone communication in Palestine. Accordingly, website usability is tested to see if the usability is applied.

We built up a complete system consisting of factors, attributes and by the system dynamic methodology that reveals how elements interact and affected each other

(2) Amazon website, the leading virtual company selling and buying over internet. This company was chosen because it is a leading company in its field and usability to its website as a proof of its efficiency since it had a large customer base.

A complete system is built, consisting of factors and attributes and by the system dynamic methodology, the research reveals how those elements interact with each other and how they affected each other. For each one of the case studies, two scenarios are made one for the natural situation as it is the values for attributes that form the website itself and run the simulation. The second scenario is when usability is enhanced for the website, and then we compare the results generated from the simulation applied into the previous case studies.

Those E-commerce websites were chosen because the author believes that the usability factors that collected in earlier stages for this research will be efficient, effective and easy to be applied to those E-commerce websites. Also, author tries to make his model more inclusive, so he wanted to see what the results will be when

applying the model to different kind of E-commerce websites, and test whether this model is effective and helpful if more than one kind of E-commerce websites are taken into consideration.

There are four symbols that are used in stock and flow diagram, each one of them has a different effect when the model is simulated, those symbols are:

Stock: represented by a rectangle, it's something that accumulates with time, for example customer satisfaction accumulates over time (Martin, 1997, p.10).

Flow: it acts as a valve; it controls the amendments that occur on the stock (Martin, 1997, p.10).

Convertor: represented by a circle, convert input data to output, for example the price convertor affecting the rate of customer satisfaction (Martin, 1997, p.10).

Connector: represented by an arrow, it allows the information to move between convertor and flow (Martin, 1997, p.10).

4 Practical Part: Model Implementation

4.1 Introduction

This chapter deals with implementation process, how the model is built using the system dynamic tools. To start with, tools are introduced into more details, and then the built model will be discussed.

When simulating a model to validate its performance, accuracy and completeness, it should be better to consider all the relevant attributes rather than considering just few. Models mentioned in chapter two have a common limitation that is the considered attributes for usability are few. If the researcher wants to measure a model in an accurate and complete way, he must consider all its parts and aspects related to that model

Also the current model is focused in one side of the equation, even the usability or the customer satisfaction, there is no model that focus on both side, instead, it deeply focuses on the usability or on the customer satisfaction but no model focuses on those two factors and relate them with each other. For sure this will have an effect on measurement process of the model. This used model in this study focuses on the two main factors of the usability and customer's satisfaction, related them with each other and based on the cause and effect relation.

Another point that has to be addressed is that this model discussed model is static or doesn't use system dynamic methodology to evaluate and measure usability and customer satisfaction attributes, even there are few models that used this methodology but the attributes that were used are not still sufficient to measure usability and customer satisfaction attributes.

This research targeted an E-commerce website, so the researcher searched for usability attributes that are related to this type of a website. Attributes that were chosen in this research are based on the fact that those factors are the most common and all were discussed in chapter two. All factors were chosen to be the determinants and the measurement of usability in this research are a combination from all models discussed earlier, but not all of the attributes in the models are chosen, the researcher

chose only the, most frequent factors in all of the models. Because of the frequency of an attributes gives an indication that these attributes are a key determinant for usability.

4.2 System Dynamic Tools

4.2.1 Causal Loop Diagram (CLD)

Causal loop diagram is a process of mapping cause and effect or the relation between the attributes of the system (System Dynamics, 1997). Each attribute has an effect on another attribute in a negative or positive way and that effect has a cause and result. For example, an increase in usability will increase in customer satisfaction. Below is a simple diagram of CLD to briefly describe what CLD is.

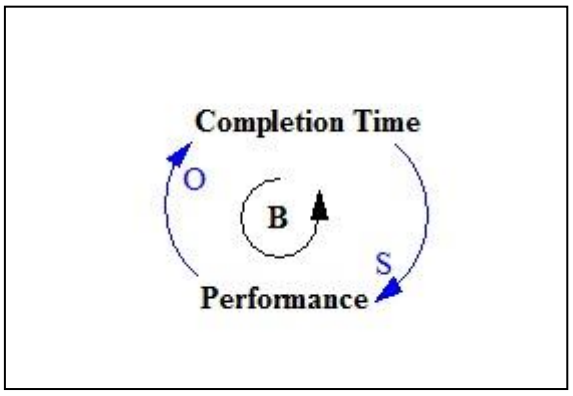

Figure 3: Simple CLD example from our model

Figure (3) above is a simple example for CLD from the model. The arrow between the attributes shows cause and effect relation that occurred between those attributes. The sign(O) indicates a negative (opposite) and sign (S) implies that the influence is positive (the influence in the same direction). The overall loop is B means it is a balancing CLD means the loop is balanced and there is no growth, this type of loops exists when there are an O sign and S sign in the same loop, sometimes the overall loop is R which means it is an exponential growth, this type of loops exists when there are only S sign between attributes.

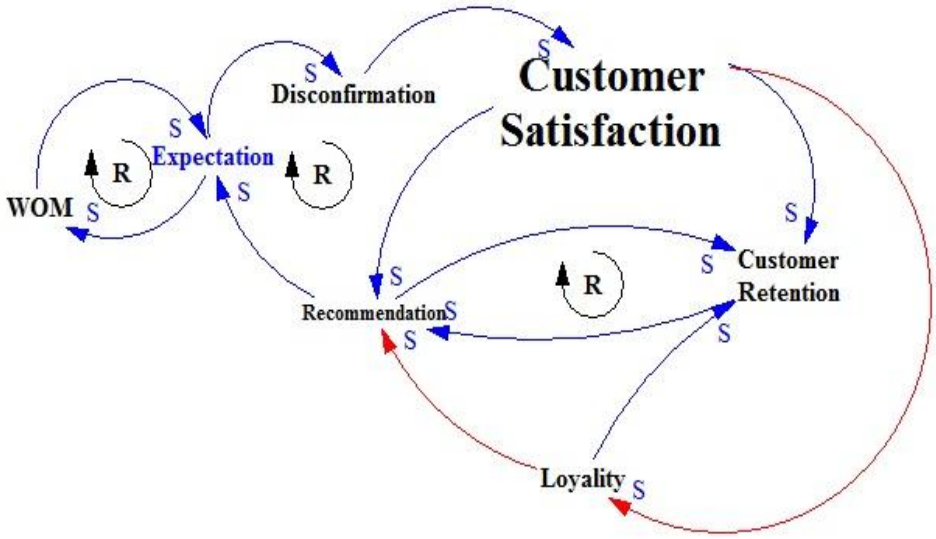

Figure 4: Own representation, Customer satisfaction and Expectation

In figure 4, the starting point for the causal loop is expectation; a customer before using the website forms an expectation about it. Expectations formed in many ways e.g. from recommendation, from other customers that have already purchased from a website and satisfied, from word of mouth (WOM). WOM has a strong effect on the consumer choice for products, so companies have a good opportunity to increase their market share by increasing positive WOM between customers (Luis et al., 2008, p.403). WOM from satisfied customer makes the cost of attracting new customers low and maintains reputation of an organization (Anderson et al., 1994, pp.129-145).

For example a person might tell others about this website, after using the website, this leads to the perceived quality, and how much the quality is good for the website and also for the product too. Then it's the disconfirmation factor that will determine how much the expectation is meeting the perceived quality. If so, then it will have an effect in a positive way (confirm) and leads to customer satisfaction and also it wiil expand the world of mouth (WOM). If Expectation doesn't meet the perceived quality, then it will have a negative way.

The expectation process is formed before actual us, the researcher set an expectation criteria in his mind before buying or using this product (Anderson et al., 1993, p.126; King, 2000, p.302)

Customer will form an expectation about a trusted website, if his expectations have been approved, then the customer feels satisfied with this website. As usability increases the customer trust also increases hence satisfaction and this leads to a greater attitude to purchase from this website and this implies that increasing of profit (Cisnero et al., 2008, p.2). If customer satisfaction is affected by the above factors in a positive way (S), then it will affect other attributes in a positive way, when customer satisfaction is influenced in a positive way, it leads to increase in customer retention which in turn leads to increase attracting new customers. All of this make the customer base grow. In addition, when customers' satisfaction increases, loyalty for that website will increase too. All of this will make a customer highly recommend the website to others. If recommendation is positive then it leads back to expectation.

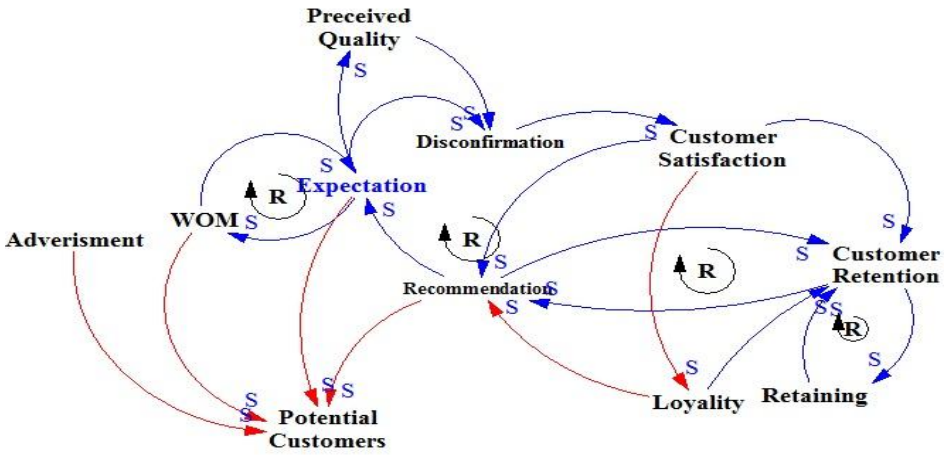

Figure 5: Own representation, Customer satisfaction, Expectation and Quality

Figure (5) shows the matter of after expectation phase. Customers buy a product, and start to use and consume it. this consumption reveals its' quality. This quality is influenced by the expectation of a customer drew before, if the difference between the expectation and perceived quality is diminutive, the influence is positive or negative way; the quality will confirm or disconfirm an expectation in a positive or negative way. Finally customer satisfaction is influenced by the mentioned above in positive way. Additionally, expectation affects customer satisfaction via quality and

disconfirmation only, there is no direct link between them, if organizations provide high level of quality they, will enjoy economic revenue and profit (Anderson et al., 1993, p.128; King, 2000, pp.2-3).

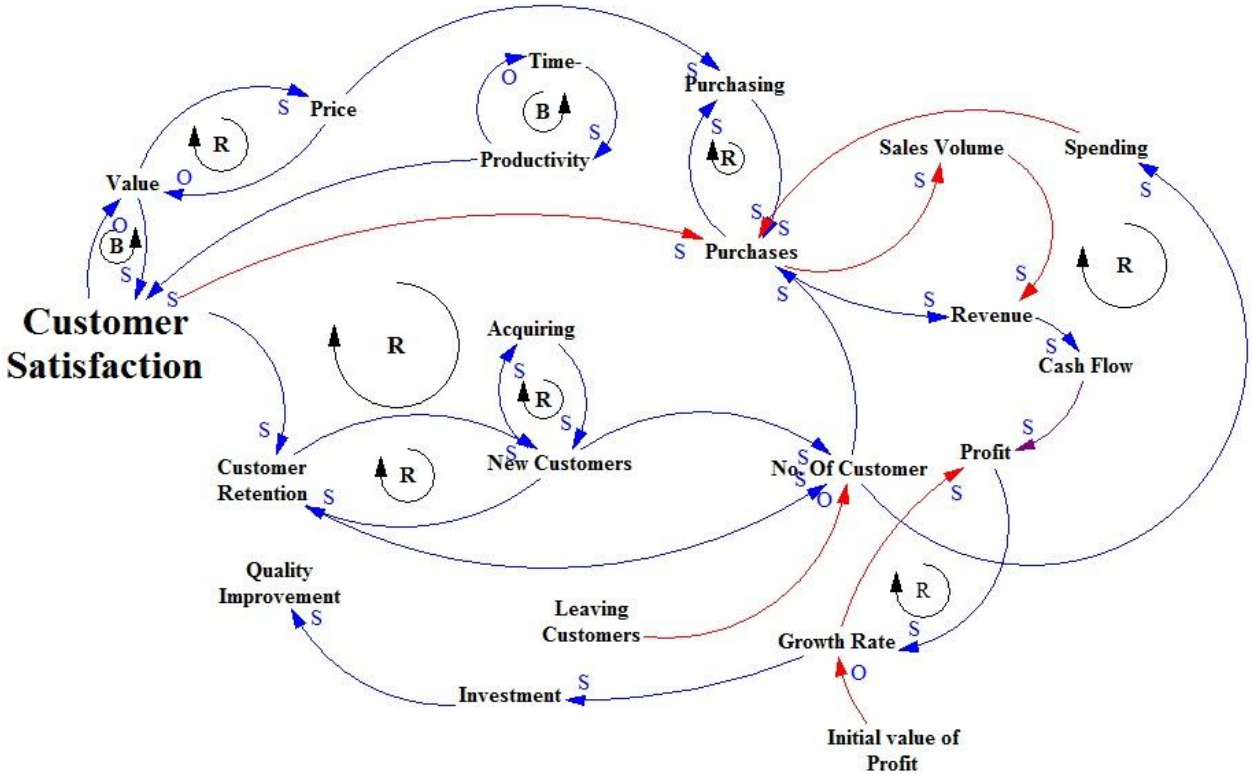

Figure 6: Own representation, customers' satisfaction, productivity, profitability and price

In Figure (6) above, when customer base grows (potential customer base) the spending rate for each customer will be affected in a positive way which leads purchase to increase too, this make the sales volume to increase and leads to an increase in the organization revenue. When revenue is increased this leads to an increase in cash flow for the organization, cash flow in turn will affect profit in a positive way that leads the growth rate of that organization to grow and expand.

When there is a good rate of growth, the organization will increase its investments by improve the quality of the products and this lead to increase the perceived quality which leads back to the fact that the customer will confirm the perceived quality. Another type of investment is investing in usability, by doing so the quality of the attributes that determines the usability is increased which allows usability rate of that website to grow.

In addition, when Customer's satisfaction is affected by the previous factors in a positive way (S), the price value of the product will be no longer the most important determinant for purchasing, so it will decrease (O), when this happens, the purchasing rate increases and allows the purchase rate to grow.

There are ten attributes that determine and measure usability rate in a website, these attributes have a positive influence on the usability rate. This means if those attributes are positive, the usability rate will be influenced in a positive way. There are also sub attributes that may affect it in a positive way or not, these sub attributes maybe measured by checking their accessibility in a website.

If an organization provides products that meet customers' needs, this will increase the profitability since those products satisfied customers. Organizations do not have to offer resources to handle the complaints, or faulty items, since those don't exist if the organization promises to offer products to achieve customer satisfaction. (Anderson et al, 1994, p.55).

A previous study it was argued that E-commerce website success depends on those customers who interact with website (Cisnero, 2008, p.3). Usability can be described as the attempts and efforts needed to use a website or software interface. Accordingly, there are many aspects that maybe considered such as charity of using and learning, efficiency of website design, degree of avoiding errors and general user satisfaction of customers, it is considered to be an indicator factor of using a website (Cisnero, 2008, p.3).

The Main benefit that gained from usability is customer satisfaction (Rajanen, 2003, p.4). When usability deployed well in a website, it leads to a satisfied customer. Increasing customer satisfaction will lead to more repeated browsing of a customer to the website and therefore his purchases will increase (Rajanen, 2003, p.6) and the implied profit.

For any business, trust is a critical assessment to be successful and to maintain a long relationship between an organization and customers, since they do not know each other. Some studies were carried out to understand trust and buying behavior of shoppers via online stores (Roy et al., 2001, pp. 4-5).

One of the rules in E-commerce context is: that if a customer cannot find a product, he will not be able to buy that product and his satisfaction may be affected (Nielsen, 2011, p.1), So information and content of information are elements of usability determent that leads to customer satisfaction. Quality of information plays a critical role in the decision made by the user, it determines whether the user is attracted to a site or if he navigates to another one (Huei Huang et al., 2005, p.4; Cheung et al., 2005, pp.6-7).

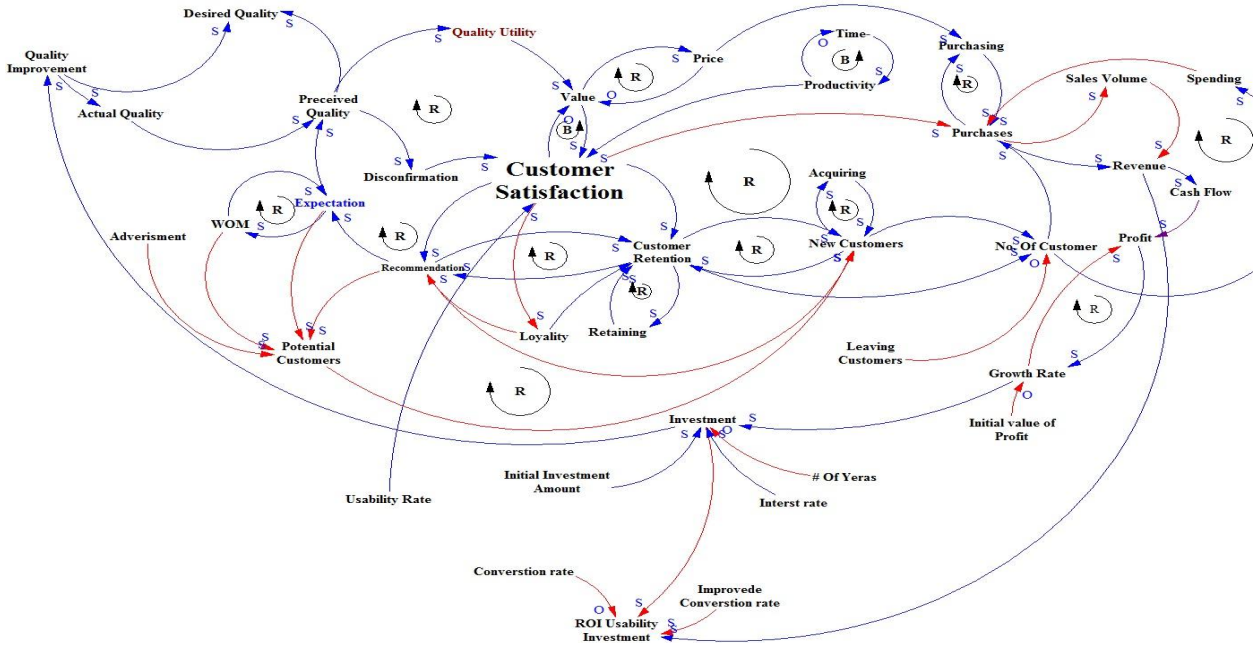

Figure 7: Own Representation, customers' satisfaction and its attributes.

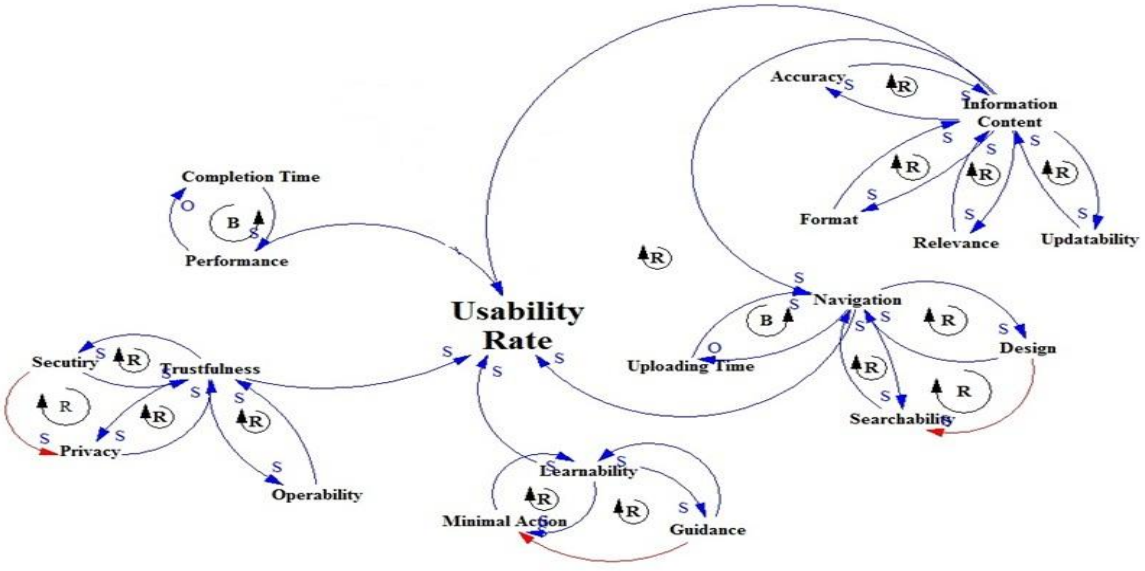

Figure 8: Own representation, some of usability attributes .

There are many usability attributes that were generated from past usability studies (Figures (8, 9)), but there was no unified framework or a model to classify

attributes (Huei Huang et al., 2005, pp.3-4). Those attributes will be discussed later in this chapter.

In order to measure the mentioned usability attributes on E-commerce website, scaling schedule is made from 1 to 5 giving each criteria that measure factor a number from 1-5 based on the availability of the criteria in a certain website. If the criteria is available in such a website, it will be given a point from 1-5. The rank is given to the criteria based on its importance, and the effects of availability of the criteria on usability rate.

1. **Accessibility**:

There are three factors that measure accessibility of a website, response time, flexibility of such a website and minimal action. A view user will first open URL of a site; if its' loading time is short then he will get a good indicator. Previous studies showed that four seconds are the best loading time for a user who will be interested in such an attractive site (Anderson, 2007). Furthermore, a user will spend less time in trafficking with a website and this will order a certain product, table 4 shows the measurement scale point arranged by the most important criteria. If the criteria is available on a website it will get a rank otherwise is given zero.

Criteria	Measurement scale (5)
response time	**5**
Flexibility	**3.5**
minimal action	**1.5**

Table 4: Own representation, the measurement of accessibility

2. **Information Content**

There are four factors that are used to measure information content, the most important one is information format, when the customer looks at a site for the same time, he will be is concerned with the way information is formatted, then the relevance of information whether is clear and or not. After this, comes accuracy of information and its updatability in a certain website. All of these factors are given a number from 1-5 in the scale based on their existence in a website. This factor also

affects others like navigation. If information content is available in a good ratio of the site, the navigation process in a website becomes more efficient Table (5).

Criteria	Measurement scale (5)
Formatting	3.5
Relevance	3.5
Accuracy	1.5
Updatability	1.5

Table 5: Own representation, the measurement of information content

3. Navigation

There are three factors that measure navigation which are uploading time. This is considered the most critical one since it is one of the determinants of a websit's success and it is also the first criteria that customer bear in mind. Search ability comes next, since customer's main concerns buying a product. An customer is not willing to spend too much time navigating in a website. This factor indicate to the importance of a website design and Search ability. Table (6).

Criteria	Measurement scale (5)
uploading time	2.5
search ability	1.5
Design	1.5

Table 6: Own representation the measurement of navigation

4. Trustfulness

There are three factors that are used to measure navigation. The first one is security, it is the most critical one, and it plays a major role in E-commerce websites, since there would be a financial transaction which will be performed by the customer, so customers are very concerned about security that the website offer. The second one is privacy, customers also prefer to maintain their information as a secret especially the financial ones. Finally, operability is in the site Table (7).

Criteria	Measurement scale (5)
Security	2
Privacy	2
Operability	1

Table 7: Own representation the measurement of trustfulness

5. Ease of use

This factor can be measured using structure criteria, which is how much the structure of the website is efficient, this factor affects the navigation process, whenever the ease of use is good, the navigation process will be enhanced Table (8).

Criteria	Measurement scale (5)
Structure	5

Table 8: Own representation, the measurement of ease of use

6. Learnability

There are two criteria that are used to measure Learn ability which are: minimal action and guidance, those criteria are considered to be at the same level when talking about learning ability. Table 9.

Criteria	Measurement scale (5)
Guidance	2.5
minimal action	2.5

Table 9: Own representation the measurement of learn ability

7. Performance

Completion time for each task that a customer needs to executes or performs in a website. Table 10.

Criteria	Measurement scale (5)
completion time (1-3) min.	2
completion time (3-5) min.	1.5
completion time >5 min.	1.5

Table 10: Own representation, the measurement of performance

8. Effectiveness

This factor could be measured by using the quantity of tasks and the time it takes to perform it. The equation would be (Bevan, 1995, p.11):

TE=Task Time/Task Quantity*100%

9. Efficiency

This factor can be measured as the following equation (Bevan, 1995, p. 8):

Efficiency =Effectiveness factor/Task Time.

10. Customization

This factor can be measured using the interactive criteria, in our scale, if this factor is available in a website then it will be marked, if not, it will take values which varies from 0 from 5 in a scale based on user's customization of the interface. Figure 10 illustrates the complete CLD diagram model.

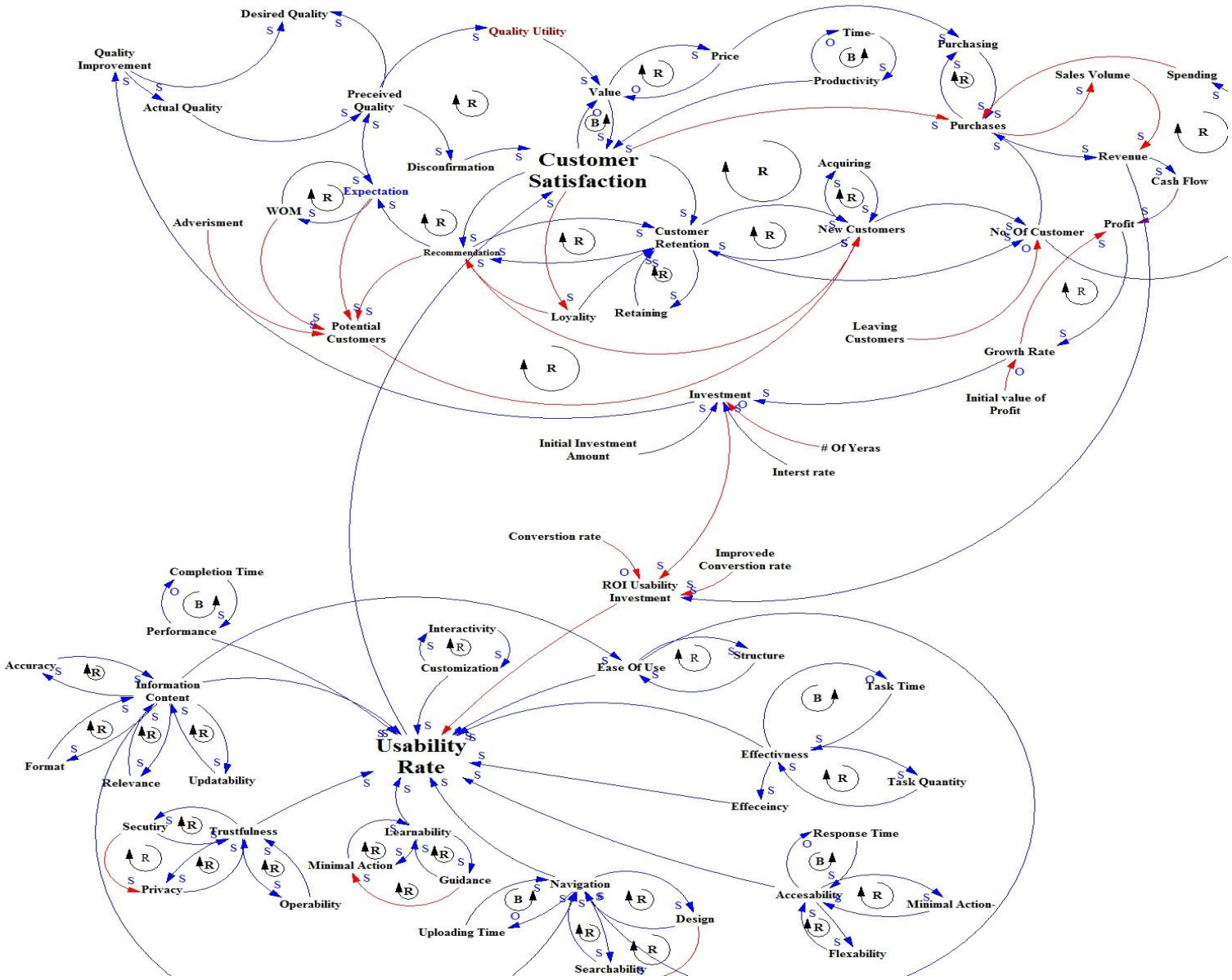

Figure 9: Own representation complete CLD diagram

4.2.2 Flow Diagram

The first level of simulating a model is to convert the Causal loop diagram CLD into stocks and flow diagram (Roberts et al., 1983, p.223)

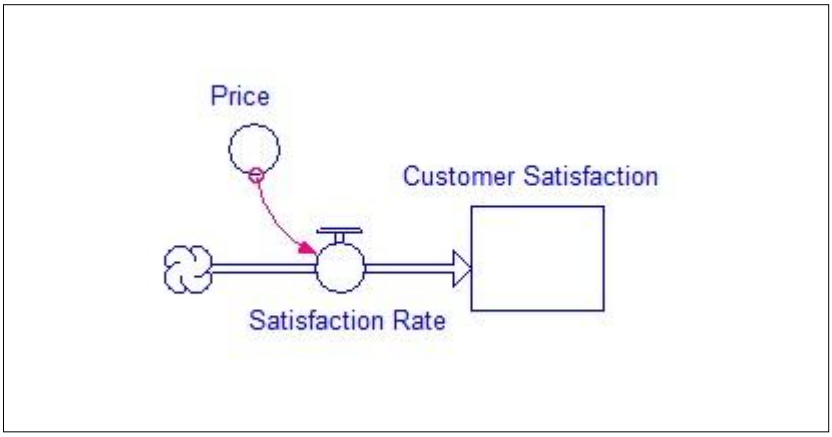

Figure 10: Own representation, simple example of stock and flow

In figure (10) illustrates increasing stocks of customer's satisfaction and is controlled by his satisfaction rate, which is also affected by the price. If the price is too high then the rate of customer satisfaction will be decreased causing the customer satisfaction stocks to be decreased too.

The cloud represents the source. It is used to indicate that the border line of the system that we do not care about it, since we are concerned only with our model inside (Roberts et al., 1983, p.226).

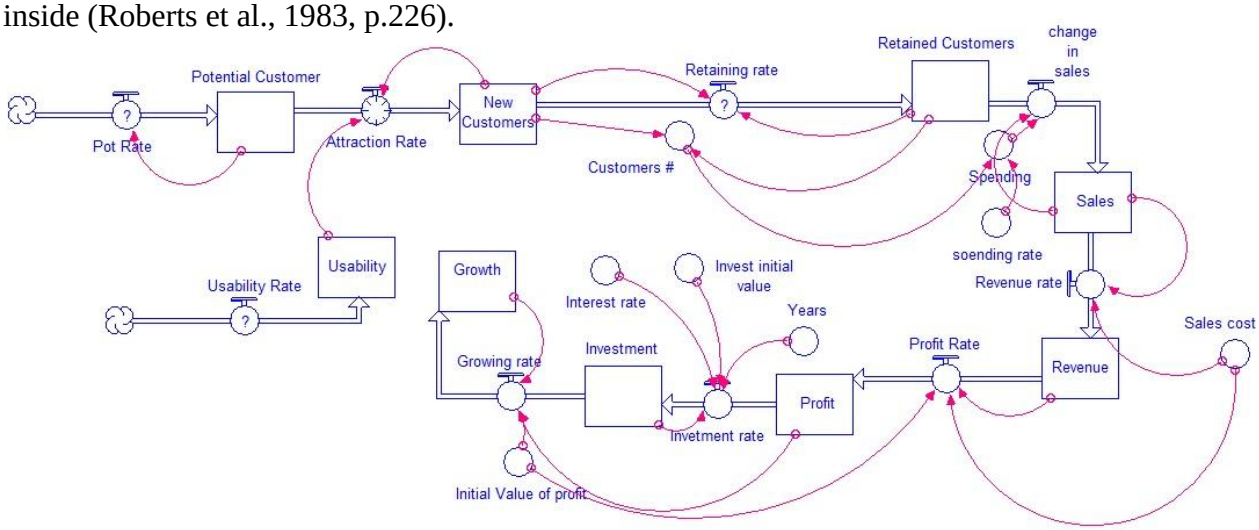

Figure 11: Own representation, model basic flow

Figure (11) shows the basic flow for the model, it represents the path (that must pass through from potential customer stocks to stock growth in order to measure the usability and the rate of satisfaction in a website.

Figure (12) illustrates the stocks of customers' satisfaction and the factors that affect it. Those stocks are merged with the stocks in Figure (11) producing a complete flow for the customers satisfaction Figure (14).

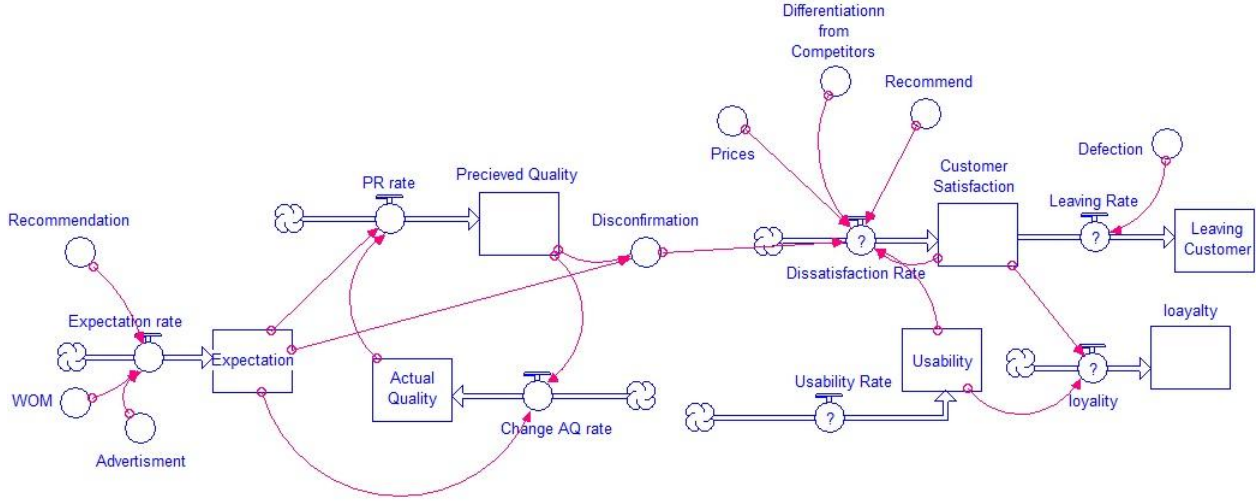

Figure 12: Own representation, customers' satisfaction

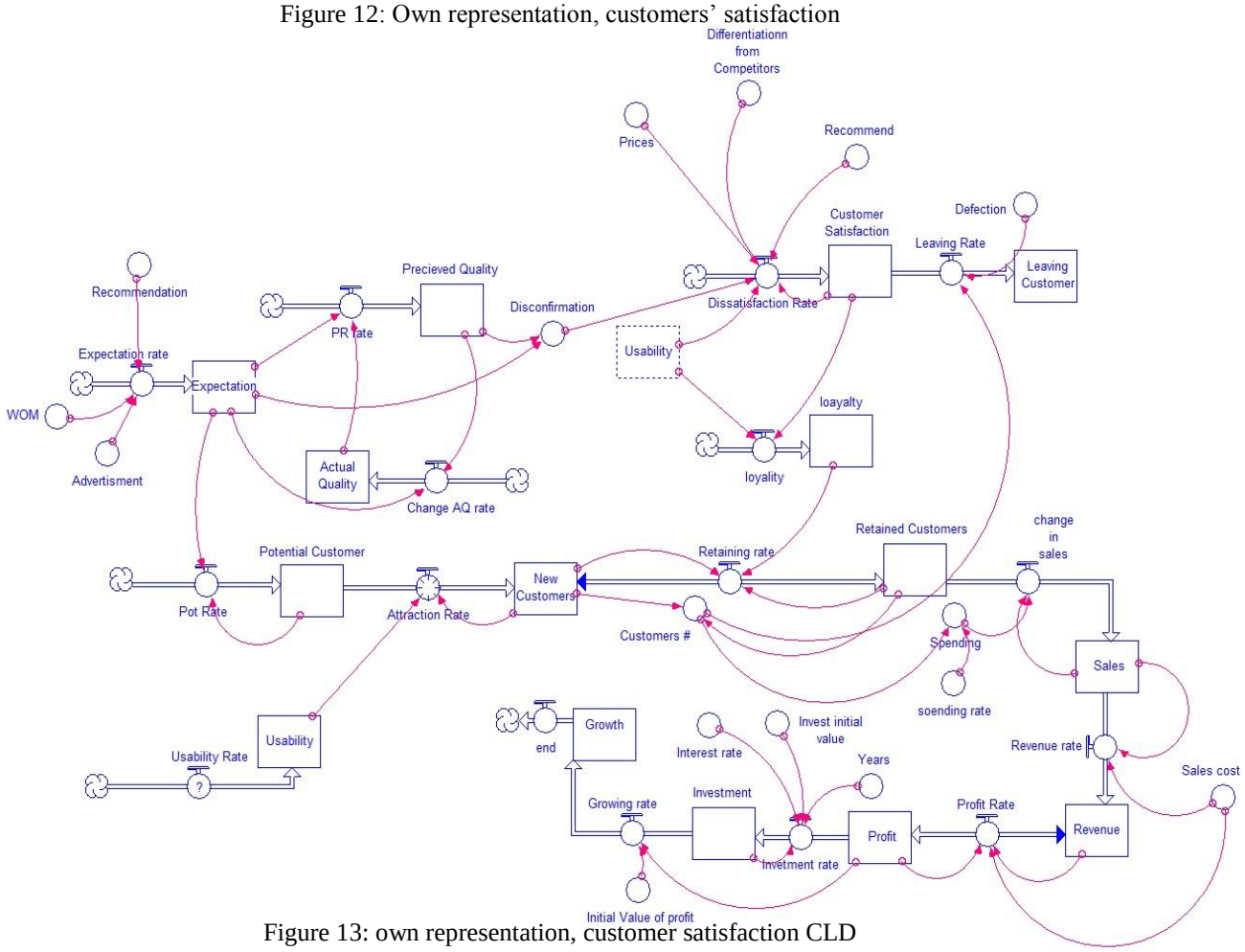

Figure 13: own representation, customer satisfaction CLD

Figure (13) illustrates the conversion of the factor of customer satisfaction and its attribute into a flow diagram, each one of those attribute has a value which will be inserted based on the collected data for the scenarios. Each attribute affects the next

one. Simulation started from the expectation and ends at growth attribute. The performance of the simulation happens in chronological way. The results will be discussed later. In this figure, we added the stocks that affect customer satisfaction and it was merged into the basic flow from figure (12).

Figure (15) below, it illustrates the conversion of usability factor and its attribute into a flow diagram, each one of those attribute has a value, a value will be inserted based on the collected data for the scenarios. Each attribute will affect the next one, the simulation started from the expectation and ends at growth attribute. The performance of the simulation happens in a chronological way, the results will be discussed later.

.

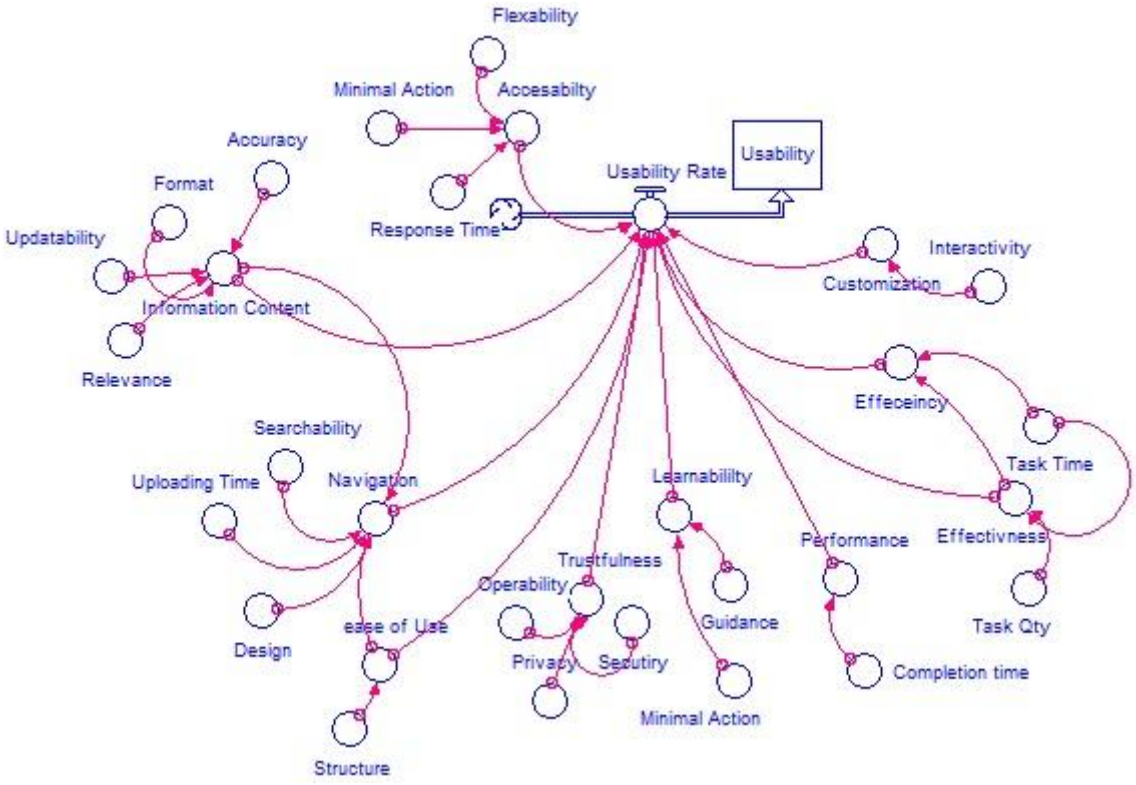

Figure 14: Own representation, usability CLD

Figure (14), is the conversion of CLD diagram into flow diagram, it illustrates the flow diagram that will measure the usability rate and other factors in CLD. Each factor is given a value for usability attributes. A value is based on measurement scale and other attributes are given initial values. Aferwards a model is simulated and the performance of the system is observed based on an different Scenarios.

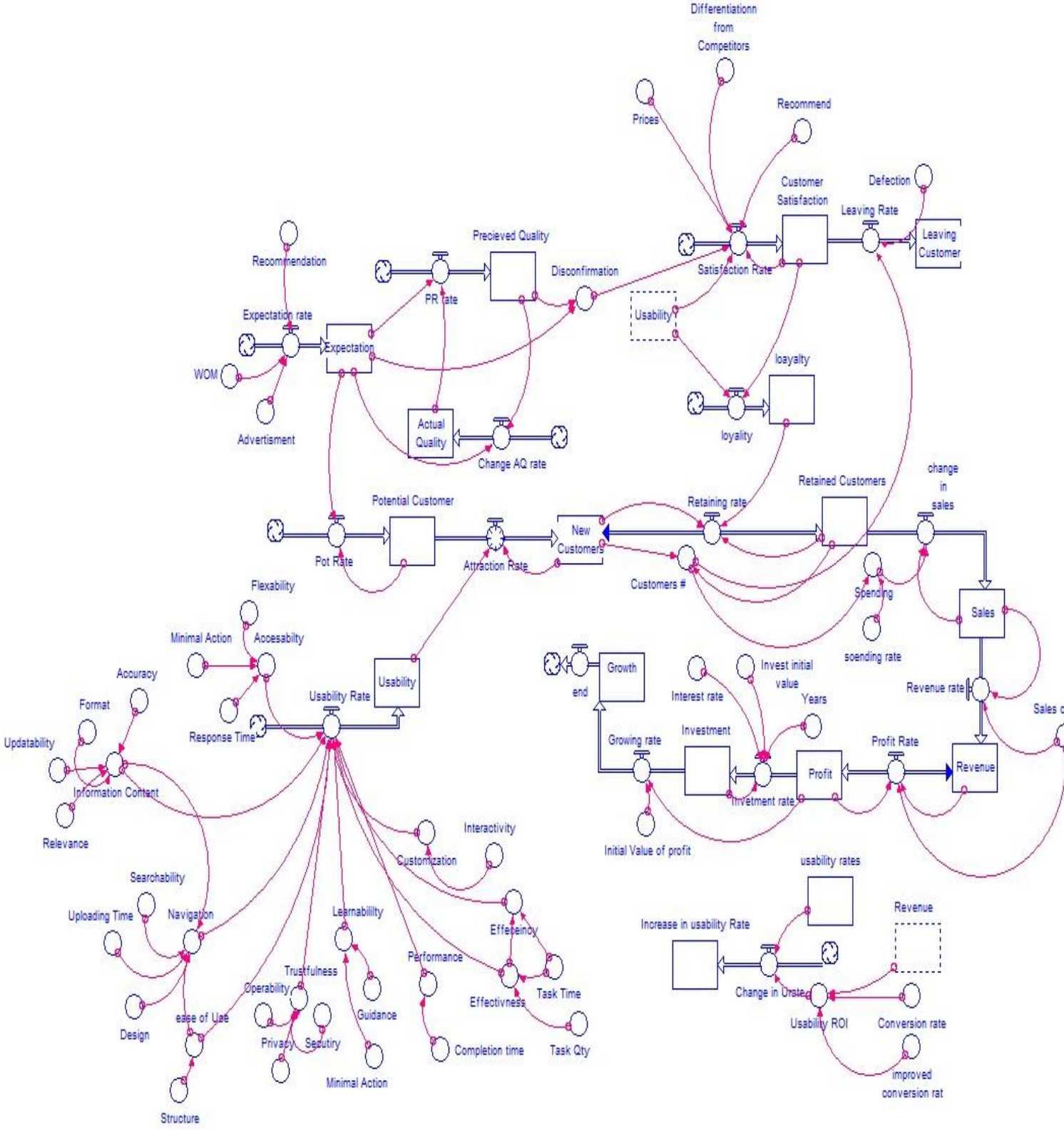

Figure 15: Own representation, flow diagram of the Model

5 Result & Discussion

5.1 Introduction

In this chapter, two cases of simulated scenarios of Jawwal and Amazon are involved, and their findings are presented. For Jawwal case studies, the collected data gained from the information offered on Jawwal website and the values for the usability attributes, the researcher checked the availability for each attribute and gave a mark on the above mentioned scale.

For Amazon case studies, the collected data gained from the provided information in Amazon website and the values for the usability attributes, the researcher checked the availability for each attribute and gave it a mark on the on the above mentioned scale.

The case studies start by discussing Amazon scenarios, the first scenario is said to be the normal case scenario. The second scenario discussed what if we enhance some of usability attribute and what are the new effects based on the enhancement.

5.2 Amazon Scenarios

5.2.1 First Scenario

Amazon usability is in a moderate range, based on the results of the model generated from the first scenario it started with 69%, and there are some usability factors that Amazon should take care of like minimal action. But in general, the usability factors in Amazon website are said to be considered more. Another problem that Amazon faced is that the customers interactivity are low. The available customization of customer to modify their own webpage is limited. The structure should be more simplified and has effective factors, the results are shown in table (11) and figure (16):

Months	Profit	Revenue	Sales	Retained Customers	Usability ROI
1	$0.00	$881.79	$6,075.45	53,457	$176
2	$54,599.09	$502,484.78	$1,589,751.76	374,956	$100,497
3	$319,705.32	$971,504.51	$980,364.21	46,696	$194,301
4	$234,327.16	$550,395.89	$364,377.02	4,423	$110,079
5	$101,505.90	$216,866.42	$120,957.52	192	$43,373
6	$36,123.48	$74,786.03	$39,036.39	0	$14,957
7	$11,868.66	$24,880.25	$13,034.95	0	$4,976
8	$3,794.62	$8,601.09	$4,807.93	0	$1,720
9	$1,203.84	$3,408.60	$2,204.85	0	$682
10	$381.15	$1,762.37	$1,381.22	0	$352
11	$120.62	$1,241.24	$1,120.62	0	$248
$12	$38	$1,076	$1,038	0	$215

Table 11: Own representation, the result for the first scenario

Table (11) shows that the usability is low, the value of growth rate started at 0% then it gradually grew up to become 7%. The reason for this was the varies of profit. For the first two months, profit has increased but it did fell again and caused a decrease in sales. Furthermore, the revenue decreased and the usability return on investment (UROI) decreased too until it reached 215$.

Business continuity will be slightly affected, although changes in usability strategy must be kept in mind, To secure growth of any company's continuity should remains. The effects were observed in Amazon but not as same as Jawwal. The reason for this difference is usability.

Figure 16: Own representation, result for the first scenario

5.2.2 Second Scenario

This scenario includes effects of usability factors when it has a good rate than the first scenario. In other words Amazon has enhanced the usability factors better than the previous ones in the website. Table (12) shows the changes in the model when usability factors become high.

Month	Profit	Revenue	Sales	Retained Customers	Usability ROI	NEW UR
1	0	542	1,775	310	$542.25	77.39%
2	57	1,514	2,826	1,174	$1,513.71	86.06%
3	536	3,637	9,743	7,624	$3,637.27	100.0%
4	3,078	18,616	74,230	7,934	$18,615.79	100.0%
5	29,651	196,355	974,305	12,528	$196,354.76	100.0%
6	450,780	3,345,376	19,350,901	28,776	$3,345,375.65	100.0%

Month	Profit	Revenue	Sales	Retained Customers	Usability ROI	NEW UR
7	10,189,238	83,871,737	551,736,052	92,969	$83,871,736.94	100.0%
8	328,278,135	2,965,199,245	21,836,913,100	410,875	$2,965,199,244.81	100.0%
9	14,592,621,728	143,394,678,539	1,168,092,824,695	2,426,257	$143,394,678,538.91	100.0%
10	871,729,423,988	9,253,599,169,610	82,583,386,782,103	18,762,378	$9,253,599,169,609.53	100.0%
11	68,463,967,983,251	780,490,260,712,995	7,571,225,527,813,400	186,721,334	7.80E+14	100.0%
12	6,938,657,814,097,770	84,525,399,492,593,300	885,400,887,050,272,000	235,518,929	84,525,399,492,593,300	100.0%

Table 12: Own representation, the result for the Second scenario

Table (12), reveals good effects when usability is high, the value of growth rate is 59% at the first months then it increases ascendant to reach 100% after four months since the profit increase. The sales also increase so that the revenue will increase since it depends on the sales, the usability return on investment (UROI) will increase also since the revenue increased.

Also, customer's satisfaction increased causing leaving rate to decrease (started from .0012% and began to decrease to reach almost (0%). It started from 29% to reach 157% at the first seven months. This leads to the fact that the usability is a major factor that leads to customer satisfaction and that what Amazon believes was based on these results of this scenario.

By increments customers returned in ascendant manner back after the enhancement which was carried out in usability factor. In fact, the key of business continuity is revenue, which is increased. A part of expenditures were invested in usability, so that the usability factors enhanced and developed (that is usability ROI). When UROI increases the usability rate increases too, by doing so it has an effect on almost all attributes in the model, table (12), figure (17) and figure (18) show that the initial value of usability rate is 76% and it increased until it reaches 100%.

To summarize, when low usability factors are enhanced in the first scenario, a major change occurred in the model and the situation was converted from loss to major gain. Business continuity will remain and even grow.

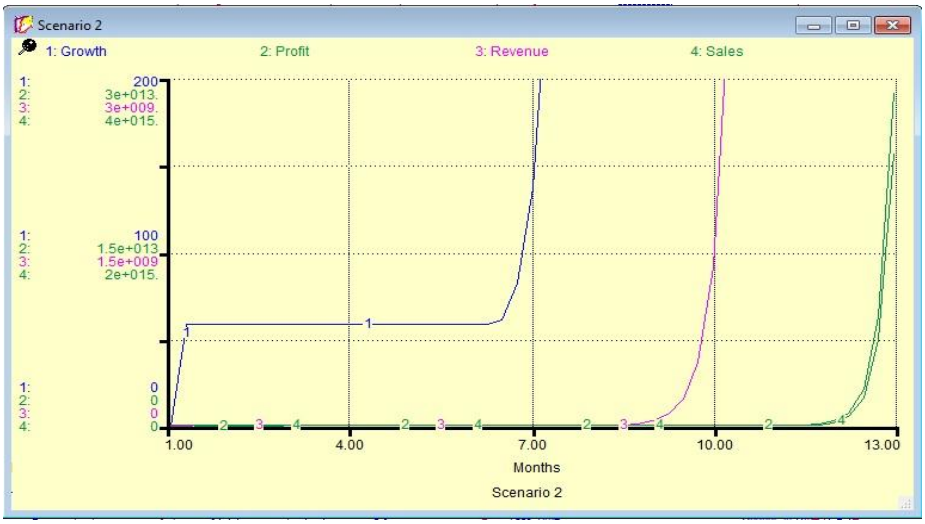

Figure 17: Own representation, result for the Second scenario

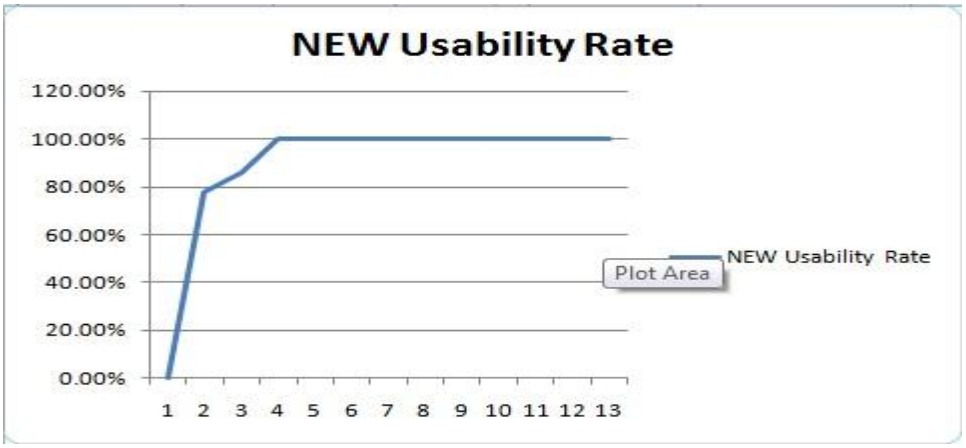

Figure 18: Own representation, result for the Second scenario

5.3 Jawwal Scenarios

5.3.1 First Scenario

Usability for Jawwal site is low since it starts from 38%. For example Jawal faces a problem in updateability. There is no interactivity for the users who cannot customize their own page, also there are no guidance tips for users to help them, the effectiveness is low too because there are little tasks done in a

long time. The customer has low expectation from the site since few customers recommended it and word of mouth is also low since few customers just access the webpage in order to browse some services or product. Table (13) and figure (19) reveals the result:

Months	Profit	Revenue	Sales	Retained Customers	Usability ROI
1	$0.00	$878.36	$2,405.15	482	$176
2	$231.80	$1,873.73	$2,130.36	86	$375
3	$252.88	$1,620.70	$1,421.23	0	$324
4	$116.08	$1,246.03	$1,133.28	0	$249
5	$40.68	$1,082.64	$1,042.17	0	$217
6	$13.22	$1,026.55	$1,013.34	0	$205
7	$4.21	$1,008.43	$1,004.22	0	$202
8	$1.34	$1,002.67	$1,001.34	0	$201
9	$0.42	$1,000.85	$1,000.42	0	$200
10	$0.13	$1,000.27	$1,000.13	0	$200
11	$0.04	$1,000.08	$1,000.04	0	$200
$12	$0	$1,000	$1,000	$0	$200

Table 13: Own representation, the result for the first scenario

Table (13) reveals what are the consequences in the case that the usability is low. the value of growth rate becomes 0% since the profit decreases. Sales also decrease so that the revenue will decrease since it depends on sales. Usability returns on investment (UROI) will decreases until it reached to 200$ since the revenue decreased, the profit decreased since the revenue decreased. This will lead to major loss for Jawwal if it continues that way.

Growth rate for this scenario is 0% and this result tells us that there are no growing rate. dDissatisfaction rate in this scenario is increased since the disconfirmation is decreased too, It starts form 54% then increased to reache 93% when there are no retained customer (the value of retained customer reached 0). The retained customer

decreased quickly in first months until it reached zero. This will have an effect to leaving rate which also increased very quickly since there are no satisfaction.

Figure 19: Own representation, result for the first scenario

5.3.2 Second Scenario

Table (14) show what happened when the usability factors have a good rate in the website, this table shows changes which happens in the model when usability factors become high.

Months	Profit	Revenue	Sales	Retained Customers	Usability ROI	NEW UR
1	$0.00	$534.42	$1,669.45	158	$106.88	47.28%
2	$7.43	$1,184.94	$1,658.52	186	$236.99	48.85%
3	$140.87	$1,499.45	$1,869.21	348	$299.89	51.52%
4	$230.86	$1,852.51	$2,818.63	989	$370.50	54.72%
5	$519.98	$3,221.55	$6,979.83	4,093	$644.31	59.16%
6	$1,848.90	$9,982.44	$30,040.65	23,750	$1,996.49	68.96%
7	$9,768.07	$53,812.97	$199,009.00	187,411	$10,762.59	109.08%

8	$72,550.61	$431,387.55	$183,089.99	196,271	$86,277.51	109.08%
9	$729,911.35	$470,542.06	$223,326.39	267,341	$94,108.41	109.08%
10	$968,277.20	$673,001.86	$352,495.77	465,528	$134,600.37	109.08%
11	$1,658,131.52	$1,235,355.70	$707,302.80	1,020,940	$247,071.14	109.08%
12	3601730.738	2862015.465	1777624.197	2783055.961	572403.093	109.08%

Table 14: Own representation, the result for the Second scenario

Table (14) reveals that there are the good effects in case that the usability is high, the value of growth rate is 58% at first months. Then it increases in ascendant manner to reach 94% after six months since the profit increase. The sales increase so that the revenue will increase. Furthermore, usability returns on investment (UROI) will increased also since the revenue increases. The profit Increased since the revenue increased too. Also the customer satisfaction increased leading to a decrease in leaving rate. (started from 2.4% to almost 0%). It starts from 28% to reach 81% at the first six months. All of this will lead to major gain for Jawwal if it enhances the usability factors.

Table (14) shows that retained customers after enhancement that was made in usability factors has increased in ascendant manner. The retained customer increases quickly. In fact, the key of the business continuity which is an increasing revenue. A part of revenue may be invested in usability so that the usability factors enhances and develops (that is usability ROI). When UROI increases, the usability rate increases. by doing so the effect will be applied to almost all attributes in the model. The initial value of usability rate was 47%, and increased to reach 109% (see Figure 20 and 21). To summarize if the low usability factors which were low in first scenario are enhanced a major change occurred to the model and the situation is converted from loss to major gain. The business continuity when will remain still and even grow.

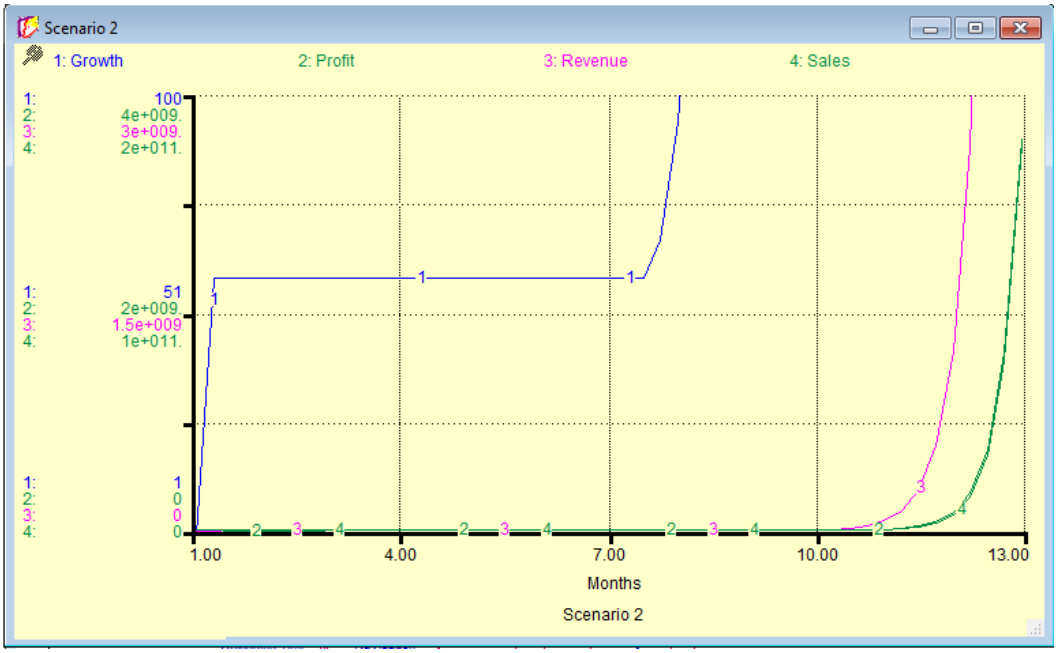

Figure 20: Own representation, result of the second scenario

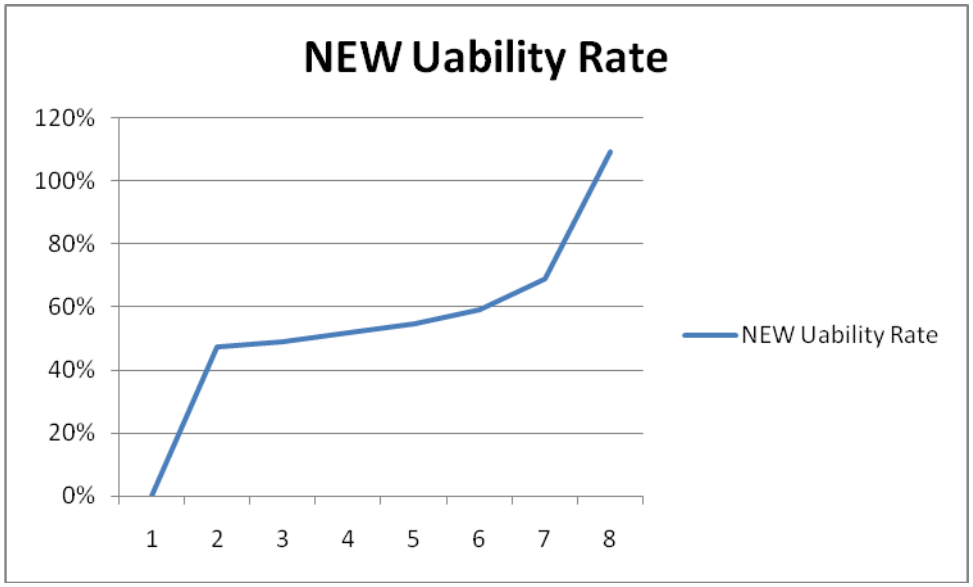

Figure 21: Own representation, result of the second scenario

5.4 Comparison and Recommendation

Comparing the two websites of Jawwal and Amazon are compared in terms of usability. A high usability rate in the first scenario which we considered as the initial condition was used in Amazon rather than in Jawwal. This is of course because of the lack attention given to usability factor. In first scenario, the difference between Jawwal and Amazon is that Amazon considers usability factor in its website, so even

though the first scenario represents the worst case, it's rate in Amazon website is high.

The factors that makes Amazon differ from Jawwal is interactivity. The interactivity for the customer is low, and the available customization for the customer to modify his or her own page is limited, but in Jawwal, it is not available at all.

In the first scenario, business continuity will be affected but not as much in case of Amazon. Despite that changes in usability strategy must be kept in mind. Continuity of the company remains but it rather and grow up. The effects that happened in Amazon are not as the same as Jawwal for one main reason that is usability which is better Amazon than in Jawwal. In fact there are some on Amazon but it does not damage it all all.

It is recommended that Jawwal must take care of usability factors so that business continuity doesn't get damaged and remain in existence, one of the usability factors that Jawwal should pay attention to is interactivity in which customers consider customization as an important issue. They need to customize their own page the way they feel comfortable, so changes must take place in Jawwal website so customers can customize their own page.

Another factor that Jawwal must take it into consideration is updatability. It is noticed in Jawwal's website that not all the content are updated, and there is a need to update and to add the latest information too. When the customer needs some information, sometimes he/she may feel surprised about the updated information; quite old information and this will affect customer's intentions and makes him/ her confused.

In addition, effectiveness should be taken into consideration. There are some tasks that may take a long time to be accomplished. This also confuses the customers and some of them may never return to the site. Thus it is better for Jawwal to organize and structure its site well so that the customer can accomplish more tasks in short time.

According to the mentioned factors, Amazon must take care of them and try to enhance them as well as the structure and usability rate of the website.

6 Conclusion & Future Work

This research tackled the problem of the usability in E-commerce website and how it affects customer satisfaction and its consequences of business continuity by demonstrating and combining the most common factors that determine usability. All added together to come up with a comprehensive model that measures the usability and its effects on business continuity.

The researcher has built a model to measure the usability and its' effects on profit, sale, growth rate, and business continuity. The author did it by system thinking methodology. Firstly, the researcher built a Causal loop diagram, then he changed it into a flow diagram and made some scenarios about Amazon and Jawwal websites in order to test the performance of the model based on a given input in the scenarios.

Based on the scenarios and case studies it was found that Amazon website's has a higher usability rate than Jawwal. The reason is that Amazon took the usability attributes into consideration more than Jawwal. It is recommended that Jawwal needs to do some improvements on website usability to get more benefits.

The researcher concluded that the importance of this research is that it combined the most important and common usability attributes. In addition the study built a stock measurement of usability by the suggested model. Furthermore, the author's model is more comprehensive one than the previous ones. The future work may tackle the spreading and developing the model so it can include more than those two website.

Future Work

Since there is little attention given to the usability, customer satisfaction and how they are related to each other especially in Palestine is recommended. Other studies may also tackle more websites either those for business and those who are not E-commerce. The application of the system dynamic methodology is being used much more in different fields because it is characterized with efficiency and effectiveness.

References

Anderson, Eugene; Fronell, Claes; Donhald, Lehman (1994): Customer satisfaction, market share, and profitability: findings from Sweden. The Journal of Marketing, 53-66.

Anderson, Eugene; Fronell, Claes; Rust, Roland (1997): Customer satisfaction, productivity, and profit: differences between goods and services. Marketing Science, 16(2), 129-145.

Anderson, Eugene; Sullivan, Mary (1993): The antecedents and consequences of customer satisfaction for firms. Marketing science, 12(2), 125-143.

Anderson, Shaun (2007): Keep Page Download Speed Times Fast (How Fast? 4 Seconds!), URL:http://www.hobo-web.co.uk/keep-page-download-speed-times-fast-how-fast-4-seconds/ 12/9/2011

Bevan, Nigel (1995): Measuring usability as quality of use. Software Quality Journal, 4(2), 1-20.

Brodie, Carolyn; Karat, Clare-Marie; Karat, John; Feng, Jinjuan (2005): Usable security and privacy: a case study of developing privacy management tools. In Proceedings of the 2005 symposium on Usable privacy and security ACM. 35-43.

Buttle, Francis (1998): Word of mouth: understanding and managing referral marketing. Journal of strategic marketing, 6(3), 243-244.

Casalo, Luis; Flavian Carlos; Guinaliu, Miguel (2008): The role of satisfaction and website usability in developing customer loyalty and positive word-of-mouth in the e-banking services. International Journal of Bank Marketing, 26(6), 399-417.

Chang, Jinling (2005): Usability evaluation of B2C E-Commerce website in china. Journal of the China Society for Scientific and Technical Information, 24, 53-59.

Cheung, Christy; Lee, Matthew (2005): Consumer satisfaction with internet shopping: a research framework and propositions for future research. InACM International Conference Proceeding Series, 113, 1-17.

Dawson, Lisan; Minocha, Shailey; Petre, Marian (2003): Exploring the total customer experience in e-commerce environments, In Proceedings of the IADIS International Conference e-Society, 945-948.

Faisal, Mohammad (2012): Practical Approach in Web Design and Usability Issues, 1-84.

Forrester, Jay (1992): System Dynamics, Systems Thinking, and Soft OR System Dynamics Review, 10(2-3), 245-256.

George, Donahue; Weinschenk, Susan; Nowicki, Julie (1999): Usability is good business.

Harris, Bill. (2000). Applying System Dynamics to business: An expense management example. Facilitated Systems.

Homer, J. B. ; Hirsch, G. B. (2006). System dynamics modeling for public health: background and opportunities. Journal Information, 96(3).

Horton, Sarah (2005): Separate content and presentation, URL: http://universalusability.com/access_by_design/document_structure/separate.html, 20/9/2011

International Organization for Stockization (ISO) (1998),Ergonomics of Human System Interactions: Guidance on Usability (Part 11), ISO, Geneva.

Jacques, Eric (2010): Definition of Customer Satisfaction, URL: http://ericjacques.org/2010/07/14/definition-of-customer-satisfaction/, 29/3/2013.

Jafari, Mostafa; Amiri, Roozbeh; Bourouni, Atieh (2009): A system dynamics model for analyzing researchers' behavior in fee-based online knowledge markets, International Business Research, 2(3), 64.

Jakpar, Shaharudin, Angelyn Goh Sze Na, Anita Johari, and Khin Than Myint. 2012. Examining the Product Quality Attributes That Influences Customer Satisfaction Most When the Price Was Discounted: A Case Study in Kuching Sarawak. International Journal of Business and Social Science. 3(23), pp. 221- 236.

Jamshidi, Bahdor (2008): Web Usability in B2B Websites, Users' Perspective. Unpublished master's thesis

Jesus, Cisnero; Carlos, Flavian; Miguel, Guinaliu (2008): An empirical analysis of the relationship between usability and online advertising effectiveness through the online consumer trust, satisfaction and purchase intentions' levels, 1-10.

King, Gerard; Geursen, Gus (2001): System dynamic investigation of the linkage between customer satisfaction and firm profitability, 1-8.

King, Gerard (2000): Casual loop diagramming of the relationship among customer satisfaction ,customer retention and profitability, In International Conference on System Thinking in Management, 300-305.

King, Gerard; Geursen, Gus (2005): The use of system dynamic to examine the relationship amongst quality, value, price and profitability, 1-23.

Kuan, Huei Huang; G.W, Bock; Vichita, Vathanophas (2005): Comparing the effects of usability on customer conversion and retention at e-commerce website, Proceedings of the 38th Annual Hawaii International Conference on IEEE, 3-16.

Lee, Sangwon; Koubek, Richard (2010): The effect of usability and web design attributes on user preferences, Computers in industry, 61(4), 329-341.

Leslie, Martin (1997): System dynamic The First Step: MIT System Dynamics in Education Project, 1-59.

Lin, Han; Choong, Yee-Yin; gavriel, salvendy (1997): A proposed index of usability: a method for comparing the relative usability of different software systems, Behaviour & Information Technology, 16(4-5), 267-277.

Lovell, Nicolas (2011): Retention rate, churn and duration,URL: http://www.gamesbrief.com/2011/11/retention-rate-churn-and-duration/ , 6/4/2013.

Marie-Christine, Roy; Olivier, Dewit; Benoit, Aubert (2001): The impact of interface quality on trust in web retailers, 1-18.

McDonnell, G., Heffernan, M., & Faulkner, A. (2004). Using system dynamics to analyze health system performance within the WHO framework. In22nd International Conference of the System Dynamics Society, pp. 25-29.

Microsoft Corporation (2007): Improving Web Site Usability and Appeal,URL: http://msdn.microsoft.com/en-us/library/cc889361(v=office.11).aspx, 12/09/2011

Minocha, Shailey; Liisa, Dawson; Dave, Roberts; Marian, Petre (2004): E-SEQUAL: A Customer-Centred Approach to Providing Value in E-Commerce Environments.Department of Computing Faculty of Mathematics and Computing. The Open University Walton Hall, United Kingdom. 1-8.

Nancy, David; Ralph, Michael; Shaffer, William (1983): Introduction to computer simulation system dynamics modeling approach, first edition, Addison-Wesley, Boston, Massachusetts.

Net Mechanic (2004): Design Tip: Web Site Usability Checklist, URL: http://www.netmechanic.com/news/vol7/design_no4.htm, 15/09/2011

Nielsen, Jakob (1997): How Users Read on the Web, URL: http://www.useit.com/alertbox/ecommerce.html, 12/09/2011

Nielsen, Jakob (2011): E-Commerce Usability, URL: http://www.useit.com/alertbox/ecommerce.html, 12/09/2011

Olsson, Charlotte (2000): To measure or not to measure, why web usability different from traditional usability, In WebNet World Conference on the WWW and Internet, 2000(1), 425-430).

Palmer, Jonathan (2002): Website usability design and performance metrics. Information systems research, 13(2), 151-167.

Powell, Thomas(2002):Web design: the complete reference. berkeley, CA:Osborne/McGraw-Hill, 477-504.

Rajanen, Mikko (2003): Usability cost-benefit models – different approaches to usability benefit analysis, Proceedings of 26th Information Systems Research Seminar in Scandinavia (IRIS26), Haikko, Finland, 1-11.

Reibstein, David (2002): What attracts customers to online stores, and what keeps them coming back?, Journal of the academy of Marketing Science, 30(4), 465-473.

Safavi, Roshanak (2009): Human/social factors influencing usability of E-commerce websites and systems, In Application of Information and Communication Technologies, International Conference on IEEE, 1-5.

Sam, Mohammad Fazli Mohammad; Tahir, Mohammad (2009): Website quality and consumer online purchase intention of air ticket. International Journal of Basic & Applied Sciences IJBAS, 9(10), 20-25.

Seffah, Ahmad; Donyaee, Mohammad; Kiline, Rex; Padda, Harkirat (2006): Usability measurement and metrics: A consolidate model, Software Quality Journal, 14(2), 159-178.

Search Pro System:Web Usability, URL:http://www.searchprosystems.com/seo-services/web-usability, 13/09/2011.

Sue, Abdinnour-Helm; Chaparro, Barbara; Farmer, Steven (2005): An Using the End-User Computing Satisfaction (EUCS) instrument to measure satisfaction with a web Site, Decision Sciences, 36(2), 341-364.

Swaid, Samar (2007): Key dimensions of e-commerce service quality and its relationships to satisfaction and loyalty, In Proceedings of the 20th Bled e-Conference e-Mergence: Merging and Emerging Technologies, Processes and Institutions, 1-15.

System Dynamic (1997): Introduction to System Dynamics, URL: http://www.systemdynamics.org/DL-IntroSysDyn/feed.htm, 2/12/2011

System Dynamic (1997): Introduction to System Dynamics, URL: http://www.systemdynamics.org/DL-IntroSysDyn/start.htm, 2/12/2011

Wang, Jianfeng ; Senecal Sylvain (2007): Measuring perceived website usability. Journal of Internet Commerce, 6(4), 97-112.

Wang, Yi-Shun; Tang, Tzung-I; Tang, Jeung-tai Eddie (2001): An instrument for measuring customer satisfaction toward web sites that market digital products and services, Journal of Electronic Commerce Research, 2(3), 89-102.

Williams, Bob; Harris, Bill (2005): System dynamics methodology, 2-16.

Wobben, Stefan (2010): Return on investment of usability, URL: http://www.stefanwobben.com/usability/return-on-investment-of-usability/20//9/2011

Wu, Minghui; Yan, Hui (2009): Simulation in software engineering with system dynamics: a case study, Journal of Software, 4(10), 1127-1135.

Yinh-Hueih, Chen; Ching-Yi, Tsao; Chia-Chen, Lin (2008): A conjoint study of the relationship between website attributes and consumer purchase intentions, 1-12.

Yong, Cao; Gruca, Thomas; Klemz, Bruce (2003): Internet pricing, price satisfaction, and customer satisfaction. International Journal of Electronic Commerce, 8(2), 31-50.