Master's Thesis

Exploring and evaluating factors affecting success of Iranian e-commerce web sites using fuzzy analytic hierarchy process: a web master perspective

Supervisors:
Dr. M.R. Amin-Naseri (TMU)
Prof. D. Nel (LTU)

Prepared by:
Issar Akbari

Tarbiat Modares University Faculty of Engineering
Department of Industrial Engineering
Lulea University of Technology
Division of Industrial Marketing and E-Commerce

Abstract

Conducting business on the Web is an electronic marketing activity. The importance of the use of Web technology for electronic commerce (EC) activities has been discussed widely. Many researchers have identified various factors influencing web site success. This research aims to explore and evaluate factors affecting success of Iranian e-commerce web sites. This research starts with a background of electronic markets and the use of web sites in this specific area then, measuring tools of a successful web site will be discussed. Models which discuss factors effecting web site quality will be introduced afterwards. Furthermore, the methodology used in this research is introduced and the findings and final results will be presented afterwards. A structured questionnaire based on pair wise comparisons was designed, pre-tested, modified, and used to capture data on e-commerce web sites in Iran. Web masters of Iranian e-commerce web sites were chosen to take part in this research's survey. Fuzzy analytic hierarchy process was used to analyze the questionnaires. The explored factors include quality of information and service, system use, playfulness, system design quality and trustworthiness. Each of these factors consists of several sub-factors. By using FAHP the final ranking of these sub-factors in regard to their level of importance is presented. The findings show that providing relevant, accurate and up-to-date information plays the most important role in Iranian e-commerce web sites and the web merchant's benevolence has the least importance in Iranian online market. The final ranking of factors affecting web site success gives the Iranian online companies a roadmap to reach customer satisfaction and profitability.

Keywords: Electronic commerce, Web site success measurement, Web site success factors, Fuzzy analytic hierarchy process

Table of Contents

List of Figures

Chapter One

Introduction

1. Chapter One: Introduction

In this chapter electronic marketing and web environment is defined then the use of web sites in electronic commerce will be discussed. At the end of chapter, problem definition and motivation of research can be viewed.

Over the past century, many technologies such as the telephone, television, the automobile, the airplane, and the computer have changed how we live and how we work. What is significantly different about new

technologies is the exponential rather than linear effect of merging single technologies; not only is there a greater impact, but perhaps also a different kind of effect on the society (Tabatabai and Shore, 2005).

By analyzing and using information of customers, companies have opened up new opportunities not only to preserve their current customers, but also to get in touch with new customers. One of the well-known methods to enter cyber markets has been to launch a home page or Web site on the Internet. Almost two-thirds of Fortune 500 companies maintained home pages on the Web in 1997. Interest in the Internet and, more specifically, the World Wide Web (or Web) has risen recently. Initially, the Internet was developed and used by the U.S. government, educational and non-commercial research institutions. Since 1991, however, this usage trend has profoundly changed. Today the Web has become the fastest growing mechanism for electronic markets because it offers a variety of techniques with which to communicate and provides substantial market potential (Liu et al., 1997). The most accepted communication technique and the one that has caught the public attention is the use of home pages on the Web (Fox, 1995). There are generally four types of business revenue models on the Web:

- Direct selling or marketing a company's products or services
- Selling advertising space
- Charging fees for the actual content on a Web site, and
- Charging fees for on-line transactions or links.

The Internet is fast becoming the way of the future where consumers can obtain nearly everything on the ''net'', from supermarket shopping to booking accommodations. Understanding and addressing the consumers' online purchase concerns can encourage them to make the ''purchase click'' (Fam et al. 2004).

The Internet is becoming an integral part of marketing communications in the digital economy. Along with the World Wide Web (WWW), the Internet is a prime example of technology that facilitates exchanges between buyers and sellers. However, the possibilities and specific

characteristics of the Internet form as a whole a completely new communication situation and pose a special challenge to companies wishing to communicate with their customers. The central issue for Internet is the transition of information power from the company to the consumer. Anderson (1996, p.155) (cited by Fam et al., 2004) called this transition a ''shift in activeness''. For instance, with the Internet it is no longer the company that decides what topics will have an effect on the consumers, through which medium (or which part of the medium) and at which point in time. The consumers are the one who now decide what topics should be included and through which medium (Hoffman et al., 1995). At present, the scientific discussion around the determinants of a successful customer relationship is concentrated on three constructs—customer satisfaction, trust and commitment. These three variables can be interpreted as dimensions of the so-called relationship quality (Weitz & Bradford, 1999).

When organizations start their business on the Web and conduct on-line electronic marketing activities it results in new opportunities. These electronic markets are in some cases the buying and selling of goods and services where all or at least part of the transaction takes place over an electronic medium (Young, 1995).

1.1. Electronic Markets

Conducting business on the Web is an instance of electronic market activity. For this reason, concepts of electronic markets should be related to business practices on the Web. Malone et al. (1989) suggest that exchanging product and service information through the electronic medium could lead to three major effects: electronic communication, electronic brokerage, and electronic integration. The first allows more information to be communicated in the same amount of time or the same amount in less time. At the same time, it also results in a decrease in the cost of this communication. An electronic market can act as a broker to match potential buyers and sellers. Thus, the second effect will increase the number of alternatives that can be considered; increase the quality of the alternative eventually selected, and

decreases the cost of the entire selection process. The electronic-integration effect tightly couples the buyers and sellers through the electronic markets. So innovations in information technologies, especially in communications and information processing, tremendously reduce the costs of market coordination and make this coordination more efficient (Liu et al. 1997).

Bakos (1991) proposed that the electronic marketplace would reduce seller profits and increase buyer welfare. He analyzed the electronic marketplace based on economic models and concluded that reducing the search costs played a major role in determining the implications of electronic markets for market efficiency and competitive behavior. He concluded that customers are better informed about the availability of products from electronic marketplaces, which in turn enables them to locate suppliers that better match their needs. On the other hand, sellers may benefit from the electronic marketplace by gaining revenues through directly and indirectly charging customers. Bakos (1991) predicted that sellers will use electronic marketplaces to emphasize product differentiation rather than to provide pricing information. Further, he suggested that electronic market systems will eventually become a strategic necessity and part of an industry's infrastructure.

Sprague and McNurlin (1993) (cited by Liu et al., 1997) described the objectives of electronic markets to reduce the search costs of buyers and to make it easier for them to compare offerings. More importantly, electronic markets can create a mass to connect a large number of organizations so that they can all receive benefits. However, they predicted that electronic markets would threaten the monopolistic power of suppliers because buyers can compare offerings more easily. Therefore, electronic markets should promote price competition as well as product differentiation. Several papers note that the Web is an excellent mechanism for carrying out electronic markets.

1.2. Web Environment

Chi and Glaser (1985) (cited by Tabatabai and Shore, 2005) note that every problem has three components: initial state, goal state, and a path that

connects these two. Problem solving occurs when the current state of information is less than desired and there are barriers between the initial state and goal state. Most problems can be classified into categories of well-defined and ill-defined problems. In a well-defined problem, the goal is clear, there is only one correct answer and all the information needed to solve the problem is present. In an ill-defined problem, any or all of the three components may be vague and unclear. Similarly, most domains can be classified into either well- or ill-structured domains. In a well-structured domain (e.g., mathematics), most of the tasks are well defined; in an ill-structured domain (e.g., education or law), most of the tasks are ill defined. Based on Chi and Glaser's problem definition, information seeking on the Web is an ill-defined problem-solving task due to the fact that, in searching on the Web, at least two of the three components, namely the path and goal state, are changing: many different routes can be taken and there is more than one right Web site. The Web is an ill-structured learning environment that presents multiple perspectives on the content, is complex and ill-defined, and emphasizes the construction of knowledge by the learner. Little is known about the strategies, attributes, and problem-solving skills of experts in ill-structured environments. Specifically, it is not known whether the expertise, strategies, and attributes of experts in traditional environments can be successfully applied to problem solving in the Web (Spiro et al., 1992 cited by Tabatabai and Shore, 2005).

While the exact number of online users is difficult to estimate, the Internet population is large and expanding. This growing Internet population offers great online business opportunities. But without strategic development of online features to entice users and engage them at the web site, Internet marketers will soon lose potential customers to competitors (Chen & Yen, 2004). Research has shown the importance of combining traditional mass media with this new communication medium: many brick-and-mortar businesses are beginning to include their web addresses and online offerings into their TV commercials. (Romei, 1997)

1.3. Web sites and electronic markets

Web sites are being widely deployed throughout industry, education, government, and other institutions. In practice, the importance of the use of Web technology for electronic commerce (EC) activities has been discussed widely. EC is a way of conducting business by companies and their customers performing electronic transactions through computer networks. EC can help business organizations cut costs, interact directly with customers, run more smoothly and in a timelier manner, and even better, it can help an organization outperform its competition. As the dependency on Web technology increases, so does the need to assess factors associated with Web site success (Liu and Arnett, 2000).

While there should be a considerable number and variety of factors associated with Web sites success, little knowledge exists above the combination of these factors. In addition, the preponderance of studies focuses on building security for on-line transactions on the Web (Messmer, 1995). The general definition of IS success is: the extent to which a system achieves the goals for which it was designed (farhoomand and drury 1996). In the context of EC, the functions and features provided by companies' Web sites can be classified into three phases of marketing: pre, on-line, and after sales. Any EC activity fits within these three classifications. The pre-sales phase includes a company's efforts to attract customers by advertising, public relations, new product or service announcements, and other related activities. Customers' electronic purchasing activities occur in the on-line sales where orders and charges are placed electronically through Web facilities. The after-sales phase includes customer service, problem resolution etc. This phase should generate or obtain customer satisfaction by meeting demand and pleasing customers (Liu and Arnett, 2000).

The salience of the Internet, together with the e-commerce and digital government it enables, has made website design increasingly critical. The analysis, design, modeling, and evaluation of website design have received considerable attention from researchers and practitioners. In general,

designing a website may be more challenging than designing a conventional information system (Yen et al., 2007).

In e-commerce, the current challenge is determining how to design responsive Web site infrastructure that provides a sustainable competitive advantage through a better understanding of target customers. The quality of an e-commerce site depends on interrelated factors such as site architecture, network capacity, Web services, and the unpredictability of e-customer behavior (Kwan et al., 2005).

1.4. Problem Definition and research questions

Companies have been starting to transform their current businesses to electronic activities. Most of them are moving toward conducting their business through web sites. Conducting business through web sites can have advantages such as cost reduction, direct interaction with customers, more efficient business processes and accessing wider range of market. Companies in Iran invest huge amounts of money on implementing and development of electronic infrastructures, but no significant improvement in organizational performance has been recognized. Besides issues such as technology knowledge, inter-organizational administration, hardware quality and amount of monetary investment, identifying factors influencing success of web-based processes regarding organizations' customers seems to be vital. It is obvious that success in the context of web-based processes for the organizations from customer-oriented perspective is satisfaction of customers using organization's services in trustful environment which will increase commitment of users. Commitment, satisfaction and trust directly influence organizational financial and non-financial performance. Therefore, exploring factors associated with success of the web sites dealing with customers seems to be necessary. Accordingly, the problem mentioned leads us to the following research questions:

- What are the key success factors of Iranian e-commerce web sites?
- How are these success factors ranked based on their level of importance in comparison to each other?

1.5. Research motivation

While there should be a considerable number and variety of factors associated with Web sites success, little knowledge exists above the combination of these factors. In addition, the preponderance of studies focuses on building security for on-line transactions on the Web. Due to the fact that factors such as culture, level of education, behavioral pattern and knowledge about this topic differs based on the geographical regions, effect of each factor mentioned in the literature is different around the world. This is the reason I decided to find out which factors affect web site success in Iran and how much effect each of them have on success of a web site. By exploring the relationship between these factors and combining them, companies can reach a conceptual framework for implementing a successful electronic commerce web site.

1.6. Acronyms & Abbreviations

AHP	Analytic Hierarchy Process
B2C	Business to Customer
CMC	Computer-Mediated Communication
e.g.	Exempli Gratia
e-business	Electronic Business
EC	Electronic Commerce
e-commerce	Electronic Commerce
Email	Electronic Mail
FAHP	Fuzzy Analytic Hierarchy Process
FAQ	Frequently Asked Questions
FTC	Federal Trade Commission
HCI	Human Computer Interaction
i.d.	Id Est
IS	Information System(s)
U.S.	United States
WWW	World Wide Web

Chapter Two

# Literature Review

2. Chapter Two: Literature Review

In this chapter models for web site success measurement and factors effecting web site success will be presented.

During decades of research many experts tried to identify measures to evaluate web sites' success. If we classify web sites into three marketing phases, we can define success in each phase separately (Liu and Arnett, 2000).

2.1. Web Site Success Measurement

Many researchers have tried to identify measures determining success of a web site. Among these practitioners, Liu and Arnett (2000) Classified web sites in three categories and defined success in each category separately. The authors implied that web sites work in three phases: pre-sales, online and after-sales. In the pre-sales phase the success can be attracting visitors to our web site successfully. In the online phase the success is to make the customers feel they are buying from a trustworthy, dependable and reliable web site. In the final phase, the after-sales, the key success factor is to please customers and meet their demand. If any of these activities lead to customer satisfaction then we have accomplished a successful web site. In contrast, a successful Web site, in the context of EC, is one that attracts customers, makes them feel the site is trustworthy, dependable, and reliable and generates customer satisfaction. As EC on the Web deals with both IS and marketing activities, literature from both areas is appropriate in the research context (Webb and Webb, 2004). Concepts such as consumer information search strategies and measuring service quality can be considered in the field of marketing and IS management and end-user computing can be used in the field of IS.

As shown in figure 2-1, Liu and Arnett (2000) mentioned the following characteristics for a successful web site: Attractive, Dependable, Reliable, Trustworthy, Meeting demand and pleasant to customers.
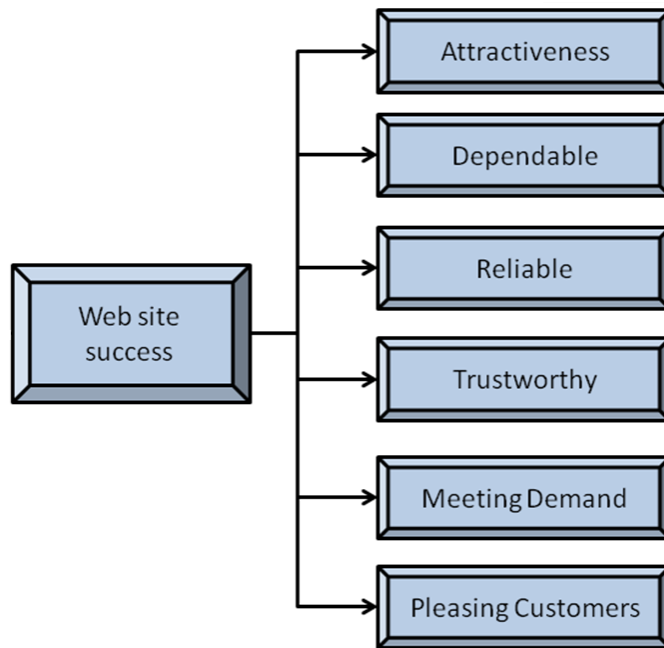
Figure 2–1: Measuring web site success through attractiveness, dependability, reliability, trustworthiness,   meeting demand and pleasing customers

Source: (Liu & Arnett 2000)

Another research by De Wulf et al. (2006) has identified three important factors for measuring an EC web site. They implied that web site success is a multidimensional construct with satisfaction, commitment, and trust as its key factors (See figure 2-2). Hoffman et al. (1999) also found trust as an outcome variable in online environments and was found to be essential for the effective functioning of firms in electronic commerce. They found that customers who do not trust the web merchant will mostly give false demographic information to web sites. Consequently, marketers working on consumer data will reach false results in analyzing the information.

End-user satisfaction is important in IS research, as it is considered a significant factor in measuring IS success and use. Muylle et al. (2004) defined satisfaction as the attitude toward the web site by a hands-on user of the site. It is important to know that satisfaction itself effects on customer commitment and customer trust.

19