Chapter 1

Introduction

Chapter Objective

This chapter introduces the essential features of a web system. The evolution of web quality as a system is discussed. Further this chapter provides in-depth information regarding the role of web system quality in success of an online venture. The chapter also provides organization of the thesis.

1.1 Background

Invention of web may be regarded as one of the most important discoveries of the world in the sense that its impact can be felt all over the world and in all walks of life either directly or indirectly. Rather, web is fast emerging as an integral part of our life. With the advent of internet and dissemination of information via this media, the last two decades have seen a plethora of changes in the contemporary world. The advancement in information technology provided platform towards growth of information seekers. The gathering in information ultimately led to knowledge formation. The spreading of knowledge resulted in quick decisions on various aspects of a manufactured product or service. The consumer can now accept or reject a product or service on the basis of the knowledge gained through web rather than experiencing it first. The quality era thus arrived in real sense. Manufacturing, which used to be a primary driver in any nation's economy, has begun to play a secondary role to services, which now has assumed a major role in every economy (Kozicki, 1997). One of the major beneficiaries of this growth has been witnessed by software product and internet business. The necessity of internet services is more evident with organizations communicating within and with each other through internet for all their day-to-day work. Internet has begun to become the primary media of communications among organizations and within organizations as well.

The World Wide Web (WWW) began in 1989. It is "a huge, ever-growing collection of hyperlinked documents created by independent authors, stored on computers known as web servers, and made accessible to anyone over the Internet via software applications called browsers and various search engines accessible through browsers"
as described in Forsythe et al. (1998). Browsers provide an interface for the user to interact with the internet to obtain information. Interaction on the web has become the primary mode for commerce between organizations as well as for performing all functions within organizations. This in turn has made the design of a website and a web interface very important and an integral part of contemporary commerce.

Published research on web quality is relatively sparse mainly because of short span of its evolution. It can be argued that a necessary condition for success of a website is that the site satisfies the expectation of its intended users by maintaining the required quality. Published studies have generally divided website quality into two areas, namely, information quality and interaction quality. Further, it can be argued that for a site to be of required quality, the design process and the development process of the website has to be sound. While the design process may be 'an art', and defy productization, it is believed that a number of unique features of the internet environment warrant some productization of the design process. Unique features of the internet include very easy access to competition (competitor is just one click away), quicker life cycle times (this is more a function of technology, although the internet has further compressed the process), continuous availability (seven days at 24 hours per day) and global access. These make it imperative that the design process and the construction of the site be commensurate with the current day demands of the internet. Research on critical quality aspects of the web design and development process of websites is practically non existent. The drive for this dissertation has come out of this paucity.

The success of an online venture purely depends on the quality of its website. The factors affecting website quality has to be dealt in most suitable manner so as to provide optimum performance of the website. To extract optimum performance from an online venture, an organization needs to identify website quality factors and work towards excelling in each of the identified factor. Lee and Kozar (2006) successfully employed Delone and Mclean’s IS success model (2003) in AHP technique to explain the role of web quality in success of an e-business.

Google, one of the most popular search engines, has published guidelines for webmasters under three headings as Design and Content Guidelines, Technical Guidelines and Quality Guidelines. They also insist to pay more attention to the ‘Quality Guidelines’ compared to others (http://www.google.com, 2011).
The performance of website as perceived by its intended user varies with the degree of meeting the requisite standards set by them. The veracity is further compounded by the fact that intended users profile varies on the basis of geographic location, education, friendliness to computers and other related factors.

1.2 Web Quality

Defining web quality needs understanding website and quality separately. A website, simply referred to as web, is a collection of related web pages containing images, videos or other digital assets. A website is hosted on at least one web server, accessible via a network such as the internet or a private local area network through an internet address known as a Uniform Resource Locator. All publicly accessible websites collectively constitute the World Wide Web.

To understand and define ‘Quality’ its various facets need to be understood. Quality being a subjective phenomenon, it is the emergent emotion resulting from the combination of perception and expectation. The feeling of high quality occurs when perception exceeds expectation; the feeling of low quality occurs when perception does not meet expectation. When perception and expectation match the sensation is satisfaction which represents neutral quality. Thus, quality is the function of a product or service that defines its degree of excellence.

Web quality is the degree of excellence of a website from the perspective of designer, developer and the target user. Website must be designed and developed to meet the expectation of target user leading to user’s satisfaction. According to Lilburne (2004), website quality could be measured from two perspectives: programmers, and end-users. The aspects of website quality from programmers focus on the degree of maintainability, security, functionality, etc. whilst the end-users are paying more attentions to usability, efficiency, creditability, etc.

Expanding these concepts, the usages of website quality may depend on

1. Task-related factors that affect end users such as presentation quality and contrast.
2. Performance-related factors that affect the efficiency for end users and the technologies of websites, for example, response time, transaction output and reliability.
3. Development-related factors that affect developers and maintainers of a website. For instance code complexity, code readability, portability and modifiability.
A concept (quality model) will be the leading factor in achieving website success and will apply to the majority of current live websites. From previous research, the quality of website has originated from quality of software. Weinberg (1997) defined that the quality of software is inherently subjective and different people will experience different quality even in the same software.

The ISO 9126 (2001) definition of quality for software products is:

“The totality of features and characteristics of a software product that bear on its ability to satisfy stated or implied needs”.

Attributes of software may include a very large list of properties, possibly at the different levels of detail. Some attributes are internal (i.e. can be measured by examining the product, separate from its behavior); others are external (i.e. can be measured only with respect to how the product relates to its environment). For example, size is an internal attribute, whilst the user error rate is external.

A website may be treated like software (i.e. it applies to some entity, or some prototype, or its information architecture) defined in terms of a system of attributes. An assessment of the attributes of the system will let understand the system in totality. These aspects taken together are called the Quality Model.

Generally the website quality is prone to subjective interpretations unless it is quantified by a web quality model. A web quality model needs to define website quality requirements which are identified by a set of measurable attributes and meet the users’ expectations. In other words, to evaluate the quality of website, the appropriate metrics have to be defined.

1.3 Web Quality as a System

The web being an evolving medium, factors affecting its quality also kept evolving with passing time.

ISO 9126 (2001) was a major attempt towards defining the software quality system along with its attributes. Taking a cue from the metrics defined within ISO 9126 model and its similarity to the metrics needed to define a website quality system, various authors extended the ISO model to include other metrics.

Mich et.al (2003), introduced a website quality model which shows an approach to the definition and measurement of website quality. It describes the trade-off between the
user’s needs to be well-established and flexible functions to permit the web application with diverse content.

Ramler et al. (2003) presented the idea of a three dimensional quality model with quality aspects, features and phases of website considered as three dimensions of web quality system.

The three dimensional web quality model presented by Ramler et al. (2003) was modified by Ruiz et al. (2003) to include quality characteristics, features and lifecycle processes as three dimensions of web quality system.

Calero et al. (2005) used the three dimensions of the model presented by Ruiz et al. (2003) but modified the underlying factors and sub-factors.

In the mean time Web 2.0 term was coined to present the next phase of world wide web evolution, although the term only reflects the way web developers and end-users use the web rather than any technological change. The term Web 2.0 is associated with web applications that facilitate participatory information sharing, interoperability, user-centered design and collaboration on the World Wide Web. Examples of Web 2.0 include social networking sites (facebook.com, twitter.com), blogs (blogger.com, weblogsinc.com), bookmarking (digg.com, delicious.com), wikis (wikipedia.org, littlewiki.com) and video sharing sites (youtube.com, metacafe.com).

Olsina et al. (2009) presented a web quality model for web 2.0 which only extended the ISO 9126 model to include ‘content quality’ as its seventh quality characteristic.

Though some other web quality models were also presented in due course, the three dimensional model by Calero remained the best bet.

To continue with the pace of advancement in web technology, the need arose to assimilate critical web quality factors into a web quality system.

1.4 Objectives of the Study

The research work was started with main objective being assessment and quantification of various quality metrics of websites by developing web quality system using available tools and techniques. To achieve this main objective a series of other objectives needed attention. Following is a list of objectives attained during research work:

a) Web quality key factors identification through pilot and main survey.
b) Utilization of TOPSIS for ranking and mean value of web quality key factors for extraction of factors for modelling.

c) Study & analysis of existing Web Quality Models.

d) Formation of Web Quality Model.

e) Use of developed Web Quality Model in AHP technique for ranking of websites.

f) Use of ISM to identify the order of preference for dimensions of web quality.

g) To express the effectiveness of system in terms of numerical index using Graph Theoretic Approach.

1.5 Organization of the Thesis

The thesis is arranged in eight chapters. The salient features of each chapter are discussed as under:

First chapter highlights the essential features of web and the importance of web quality system in ensuring the quality of a website. The chapter discusses the objectives of the proposed study. At the end, it provides the organization of the thesis.

Second chapter deals with the review of literature in the field of web quality. The literature review served the purpose of gaining an insight towards progress related to web quality. It also helped in identification of web quality factors.

Third Chapter reviews the literature on web quality models. The existing web quality models were critically analyzed to understand the evolution of models. Subsequently identified factors need categorization and modelling in order to be applied to a website.

Fourth Chapter deals with identification of factors affecting the web quality using survey instrument. The collected data is then subjected to validity and reliability analysis to consolidate the factors. A new web quality model is developed based on identified factors.

Fifth Chapter evaluates the develop web quality model using Analytic Hierarchy Process (AHP). Process of evaluating different websites based on developed AHP model is discussed. Expert Choice software is used for sensitivity analysis.
Sixth Chapter evaluates WQKF (Web Quality Key Factors) using ISM (Interpretive Structural Modelling) technique. The Interpretive Structural Modelling (ISM) methodology help understand the mutual influences among the web quality key factors thereby identifying the crucial factors in an orderly manner.

Seventh Chapter aims to develop digraph of factors of developed web quality model showing interactions with each other. The digraph may then be used to develop matrix in order to quantify the model. Graph theory may thus be utilized for quantification of proposed model.

Eighth Chapter aims at presenting the application of developed web quality model in e-manufacturing sector. E-manufacturing is the next big step in manufacturing development history. Web services being an integral part of e-manufacturing, it needs careful examination towards integration.

Ninth Chapter concludes the salient features and implications of the study. It reinforces the need of system based model and highlights the advantages of exploring website quality model at subsystem level. It also discusses the implication of the study as a result of application of the systematic methodology. It explores the possibilities of future research based on proposed approach.