

# A Novel Website Quality and Usability Evaluation Framework for Online Shopping Websites

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## Abstract

**Objectives:** The purpose of this research paper is aimed to determine the effect of subjective measures website quality and usability on its objective measures. A checklist of high level quality factors and sub factors, factors driving the customer to shop online is proposed and a new website quality and usability evaluation framework is developed to evaluate the quality and usability of online shopping websites from the user's perspective. **Methods:** Structural equation modeling was applied to determine the subjective measures with the highest and lowest contributing factors for website quality and usability. A survey with 400 respondents was conducted to validate the proposed model. **Findings:** The Study has identified the important quality factors of the case study website Flipkart which makes it usable and successful. The results of the study can be used for designing websites with improved quality and usability. The study has significance impact on the economic and societal perspectives as the results will help the online shopping sites to improve their websites to improve the degree of user satisfaction and attract more customers to shop online.

**Keywords:** Quality Factors, Usability, Website quality

## 1. Introduction

Electronic shopping or online shopping was first started in 1994 (Chua et al.2006). This has become a new channel alongside traditional shopping with the intrusion of internet and advancements in Technology which have diminished trade boundaries also. Despite the statistics and success stories of many big online retailers, many of the small businesses in India are still apprehensive about online businesses. The main reason behind this may be though there are advancements in internet usage, there are no tried and tested quality model for the businesses to follow while designing their websites to attract customers.

Quality is a significant factor to be discovered. Now-a-days launch of websites are getting multiplied. As per<sup>3</sup> quality depicts the whim of degree which means it is an uncertain one. It defines the state meant or required and the state achieved differences. Hence the design with poor quality is always fails to attract customers. These make it necessary to analyze the quality characteristic and usabil-

ity of a website and improve accordingly to increase the number of customers.

Quality builds a website with availability, usability and accessibility characteristics and also it puts up practicable and authentic information, providing good design, visual appearance and attractiveness to meet the users' needs and requirements. There are many factors which are to be considered during the evaluation of any particular website and a study is to be made out of which the concepts which are said to have an impact over the ultimate measure of the website quality<sup>4</sup>.

This paper is engineered into following sections. Section 2 is the Literature Review in which some of the quality models are analyzed. Section 3 is the proposed website quality and usability evaluation framework is discussed with a case study of Flipkart's Website. Section 4 consists of the results and discussions for validating the proposed model using statistical techniques. Section 5 is the conclusions and future work.

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## 2. Literature Review

A Quality Model (QM) is a “defined set of characteristics, with relationships between them, thereby provides a framework to specifying quality requirements for quality evaluation”.

### 2.1 Software Quality and Website Quality

Software quality is defined in two different ways<sup>2</sup> conformance to requirements and meeting user needs-defines quality of software based on its capability to satisfy sets of requirements and specifications set by the designers and developers at the beginning of the software development.

Meeting customer needs-defines the quality of a software product based on the capability of the software to meet intended users' needs and expectations.

Generally, the quality of a software product is measured by its effectiveness to satisfy its user's requirements and the intrinsic product quality, which is characterized by the rate of defects in the product and its reliability. Web quality, similar to the broad definition of quality, it is largely an undefined concept. Several research works in web quality explain web quality in a descriptive way without defining its key characteristics or providing a tested measurement scale.

The following related literature enables us to understand the various evaluation models for website quality and usability based on the existing quality models.

Author in<sup>3</sup> highlights a usability evaluation model and associated survey tool in the context of academic libraries. This study also proposed a practical survey tool tailored to be used in the evaluation of academic library websites. Author in<sup>4</sup> presented the important relationship between the website characteristics namely usability and visual attractiveness with the trust of end users. The results stated that the contribution of website design characteristics to the success of the company is significant, which in turn affects the usability of the website.

Author in<sup>5</sup> conducted a study in Malaysia in 2010; the instrument used was questionnaire survey using seven Likert scale. Data collection method used was a snowball effect for 102 respondents. Through regression and correlation analysis, it was found that perceived value, perceived ease of use, perceived usefulness, firm's reputation, privacy, trust, reliability and functionality have a significant linear relationship to online repurchase intentions.

A study on 35 respondents who carried out by<sup>6</sup> showed that online consumers are more concerned with the quality attributes associated with the resulting quality and customer service rather than the attributes associated with web transactions. There are six perceptions of the quality perceived by customers as follows: 1. Information ease of use; 2 Quality; 3. Consumer service; 4. Websites design; 5. Process controllability; and 6. Outcome quality. A study of factors in<sup>7</sup> affecting the intention to search for information online and online shopping intention in Korea. From the literature review, it can be concluded that research on web quality is fragmented and differs from one paper to another. Some authors have considered only three or four factors where as others have considered 11 factors<sup>8</sup>. It can be further concluded that existing literature is undertaken in a general context not in a specialized form and factors can vary from one website to another due to different aims of each site in different sectors. Hence a new website quality and usability evaluation model for evaluating online shopping websites is proposed in this paper based on the literature studies mentioned in this section.

## 3. Proposed Website Quality and Usability Evaluation Framework

**Table 1.** Comparison of quality factors and sub factors in ISO9126-1 model and the proposed model

High level quality factors	Sub-factors
Functionality	Learnability
	Portability
	Performance
	Speed
	Inter-operability
	Understandability
Reliability	Availability
	Credibility(Trust, value and comfort)
	Fault tolerance(19)
	Error Handling
Efficiency	Ease of use
	Response
Security	Safety in payment modes
	Privacy
	Site Authentication
Navigation	Links

	Ease of use of navigation tools and search engines
Information Quality	Content Utility
	Completeness
	Timeliness and accuracy
Visual Interface	User Interface
	Readability
	Multimedia: Usage of images and Graphics
	Multi language support
Interactivity	Responsiveness(Communication tools, Recommender systems)
	Personalization(Uniqueness)
	Purchase mechanism
Presentation	Layout
	Product Information
	Product presentation and price comparison
	Promotion

The usability and success of an online shopping website is measured by website quality and the customer's intention to shop online. The framework has taken common quality characteristics specified in ISO 9126-1 quality model and from website quality models.

The grayed cells indicate the factors which are not considered in ISO 9126-1 Model but introduced in the proposed quality and usability evaluation Model. Apart from these factors, 2 factors which drive the customers to shop online are satisfaction and trust.

The questionnaire was divided into 2 parts. Part 1 collected demographical details of the customers whereas the part 2 of the questionnaire consist of 67 questions related to the evaluation of high level quality factors, sub factors, satisfaction and trust of customers.

## 4. Results and Discussions

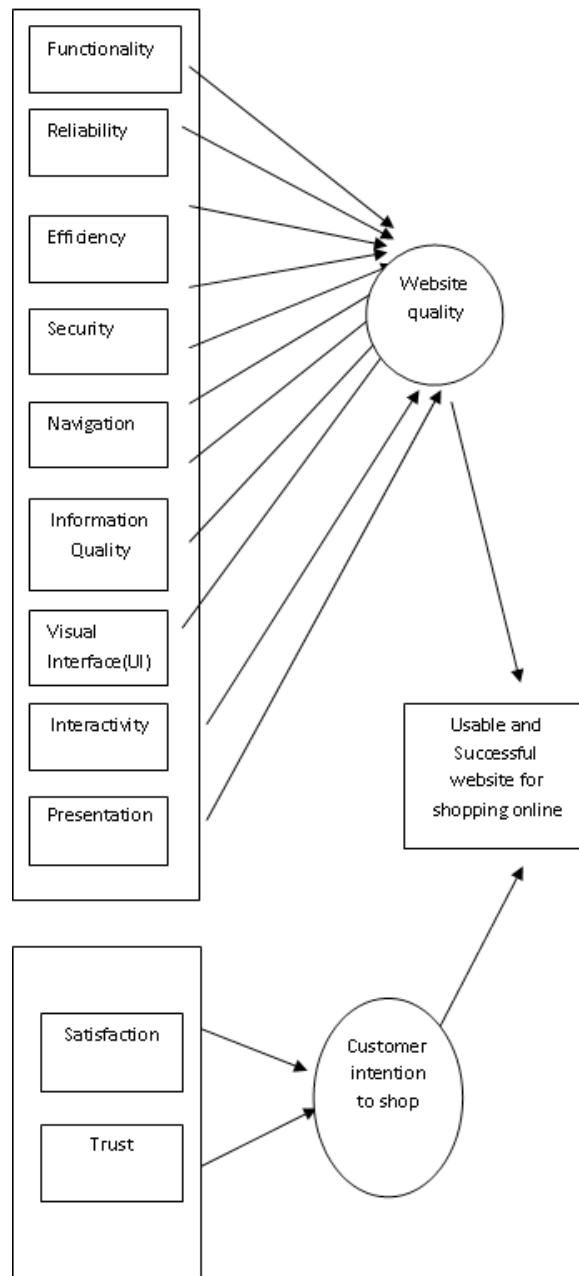
Structural Equation Modeling (SEM) technique was used to model flipkart's usability based on the proposed model.

The structural equation model was constructed with the following:

### Observed, endogenous variables

- Functionality.
- Reliability.
- Efficiency.

- Security.
- Navigation.
- Information quality.
- Visual Interface.
- Interactivity.
- Presentation.
- Satisfaction.
- Trust.
- Web usability



**Figure 1.** The proposed website quality and usability evaluation framework.

**Unobserved, exogenous variables**

- e1: Error term for Functionality.
- e2: Error term for Reliability.
- e3: Error term for Efficiency.
- e4: Error term for Security.
- e5: Error term for Navigation.
- e6: Error term for Information Quality.
- e7: Error term for Visual Interface.
- e8: Error term for Interactivity.
- e9: Error term for Presentation.
- e10: Error term for Satisfaction.
- e11: Error term for Trust.
- e12: Error term for Flipkart web usability.
- Website quality.
- Customer intention to shop.

The number of variables used in the SEM is

No. of variables in this model	26.
No. of observed variables	12.
No. of unobserved variables	14.
No. of exogenous variables	14.

**Table 2.** Variables in the structural equation model of Flipkart

Variables		Unstand - arised co-efficient	P value
Functionality	<---	WQ	1.030
Reliability	<---	WQ	0.984
Efficiency	<---	WQ	0.603
Security	<---	WQ	0.548
Navigation	<---	WQ	0.746
Information quality	<---	WQ	0.590
Visual Interface	<---	WQ	0.945
Interactivity	<---	WQ	0.986
Presentation	<---	WQ	1.000
Satisfaction	<---	CI	1.142
Trust	<---	CI	1.000
Web usability	<---	WQ	0.162
Web usability	<---	CI	0.781

Note: \*\* denotes significant at 1% level.

The coefficient of Functionality of Flipkart's website is 1.030 represents the partial effect of functionality towards website quality, The positive sign implies that such effect is positive that website quality of Flipkart would increase

by 1.030 for every unit increase in functionality towards Website quality and this coefficient value is significant at 1% level. The coefficient of Reliability of Flipkart's website is 0.984 represents the partial effect of reliability towards website quality. The positive sign implies that such effect is positive that website quality would increase by 0.984 for every unit increase in reliability towards Website quality and this coefficient value is significant at 1% level.

The coefficient of Efficiency of Flipkart's website is 0.603 represents the partial effect of efficiency of the website towards website quality. The positive sign implies that such effect is positive that website quality of Flipkart would increase by 0.603 for every unit increase in efficiency towards Website quality and this coefficient value is significant at 1% level. The coefficient of Security of Flipkart's website is 0.548 represents the partial effect of security towards website quality. The positive sign implies that such effect is positive that Flipkart's website quality would increase by 0.548 for every unit increase in security towards Website quality and this coefficient value is significant at 1% level.

The coefficient of Navigation of Flipkart's website is 0.746 represents the partial effect of navigation of Flipkart's website towards website quality, holding the other variables as constant. The estimated positive sign implies that such effect is positive that website quality of Flipkart would increase by 0.746 for every unit increase in navigation towards Website quality and this coefficient value is significant at 1% level. The coefficient of Information quality is 0.590 represents the partial effect of information quality towards Flipkart's website quality, holding the other variables as constant. The estimated positive sign implies that such effect is positive that website quality of Flipkart would increase by 0.590 for every unit increase in Information quality towards Website quality and this coefficient value is significant at 1% level.

The coefficient of Visual Interface of Flipkart's website is 0.945 represents the partial effect of visual interface towards Flipkart's website quality. The positive sign implies that such effect is positive that Flipkart's website quality would increase by 0.945 for every unit increase in visual interface towards Website quality and this coefficient value is significant at 1% level. The coefficient of Interactivity of Flipkart's website is 0.986 represents the partial effect of interactivity towards website quality. The positive sign implies that such effect is positive that website quality of Flipkart would increase by 0.986 for every

unit increase in Interactivity towards Website quality and this coefficient value is significant at 1% level.

Here the coefficient of presentation of Flipkart's website is 1.000 represents the partial effect of presentation towards website quality. The ed positive sign implies that such effect is positive that website quality would increase by 1.000 for every unit increase in presentation towards Website quality and this coefficient value is significant at 1% level.

The coefficient of satisfaction of customers towards Flipkart's website is 1.142 represents the partial effect of satisfaction towards Customer intention to shop online on Flipkart's website. The positive sign implies that such effect is positive that Customer intention to shop online in Flipkart's website would increase by 1.142 for every unit increase in trust towards Customer intention to shop online and this coefficient value is significant at 1% level.

The coefficient of Trust of customers is 1.000 represents the partial effect of trust towards Customer intention to shop online on Flipkart's website. The positive sign implies that such effect is positive that Customer intention to shop online would increase by 1.000 for every unit increase in trust towards Customer intention to shop online and this coefficient value is significant at 1% level.

Here the coefficient of Web usability of Flipkart's website is 0.162 represents the partial effect of web usability towards website quality. The estimated positive sign implies that such effect is positive that website quality of Flipkart would increase by 0.162 for every unit increase in web usability towards Website quality and this coefficient value is significant at 1% level. The coefficient of Web usability of Flipkart's website is 0.781 represents the partial effect of web usability towards customer intention to shop online. The positive sign implies that such effect is positive that customer intention to shop online on Flipkart's website would increase by 0.781 for every unit increase in web usability towards customer intention to shop online and this coefficient value is significant at 1% level.

The standardized co-efficient values of various factors in the above table depicts, the most important quality factors the most important website quality factors for Flipkart's website are Visual Interface (0.859), Interactivity (0.775), Presentation (0.755) and Efficiency (0.752) features and Satisfaction (0.924) factor is very important for customer intention to shop online on Flipkart's website. The table also depicts that web usability of Flipkart's web-

site is highly influenced by Customer's intention to shop online on Flipkart's website.

**Table 3.** Model fit summary

Indices	Value	Suggested value
Chi-square value	95.868	-
DF	41	-
Chi-square/DF	2.338	< 5.00 ( Hair et al., 1998)
GFI	0.963	>0.90 (Hu and Bentler, 1999)
AGFI	0.930	>0.90 ( Hair et al. 2006)
CFI	0.980	> 0.90 (Daire et al., 2008)
NFI	0.966	> 0.90 (Daire et al., 2008)
RMSEA	0.058	< 0.08 ( Hair et al. 2006)

The model-fit indices for the structural model provided the evidence of a good model fit. The above table depicts that the Chi-square/df is less than 5 which indicates perfectly fit. The GFI (Goodness of Fit Index) value and AGFI (Adjusted Goodness of Fit Index) value is greater than 0.9 which represents the proposed model is a good fit. The calculated CFI (Comparative Fit Index) value is 1 which means that it is a perfect fit and also it is found that NFI (Normed Fit Index) value is 0.966 and RMSEA (Root Mean Square Error of Approximation) value is 0.058 which is less than 0.10 which indicated it is perfectly fit. The Proposed website quality model satisfies the values suggested by the above indices.

Hence the proposed website quality and usability evaluation model was found to be a perfect fit for Flipkart's website quality evaluation.

**Table 4.** Important Factors for Flipkart's website quality and customer intention to shop online

Important Factors for website quality and Customer intention to shop online				
Visual Interface	Interactivity	Presentation	Efficiency	Satisfaction

The important factors for flipkart's usability and success are found to be Visual interface, Interactivity, Presentation, Efficiency and satisfaction.

Friedman's test was used to rank the various quality factors of the online shopping websites.

The factors with the highest mean value gets the first rank of all the other factors. Information quality of

Flipkart is ranked first followed by visual interface, satisfaction and presentation factors in the second, third and fourth ranks respectively.

**Table 5.** Ranking of quality factors of Flipkart

Quality Factors	Flipkart
	Mean Rank
Functionality	6.48(7)
Reliability	6.28(9)
Efficiency	6.39(8)
Security	6.56(5)
Navigation	6.45(10)
Information Quality	7.01(1)
Visual Interface	6.82(2)
Interactivity	6.56(5)
Presentation	6.62(4)
Satisfaction	6.68(3)
Trust	6.53(6)
Web usability	5.64(11)
Chi-Square Value	39.145
P-Value	<0.001**

Note: The values inside the brackets indicate the ranks of the quality factors.

## 5. Conclusions and Future Work

In this research paper a new website quality and usability evaluation framework was constructed after a detailed study of various related software and website quality models. ISO 9126-1 model was chosen as a base model for the construction of the framework and the model was validated by applying it on a case study online shopping website, flipkart. In the future the model will be applied and tested on other popular online shopping websites such as Amazon, Jabong, Myntra and Snapdeal and the online shopping sites will be ranked based on various quality and sub quality factors to find out the most usable and successful online shopping website. The limitation of this paper is the study was carried out with particular reference to Chennai region. Hence can be applied to any other geographical location and the results may vary as

the factors influencing the customer's intention shall vary from place to place.

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