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# An Investigation into Usability Aspects of E-Commerce Websites Using Users' Preferences

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## Abstract

We investigate the usability problems of e-commerce online shopping websites from user's preferences and determine the relative importance of factors such as navigability, content, design, ease of use, and structure through user survey. The main intent of this ranking of web site characteristics is that a designer can relatively give higher efforts on designing features that may lead to higher merit and better usability. As such, our research work help us capture the data by involving user testing (usability testing) and open source automated tools such as Camtasia. Hence, the outcomes of the above approach show the *navigation, content, design* were the first, second, and third priority for evaluating the usability of e-commerce websites whereas ease of use and structure were the fourth and fifth features from the overall usability value calculation. There is a significant statistical difference between novice and expert users only for navigation feature. The maximum number of users feels satisfied with navigation, content, and design features whereas they are dissatisfied with *ease of use* and *structural* features of the websites.

*Keywords: Navigation, Design, Content, Ease of use, Structure, E-Commerce, Usability Problem*

## 1. Introduction

Usability is one of the most important attributes for any user interface, which measures how easily a user can use the interface. In fact, *usability* is very important for any software while interacting with a product such as a website, a mobile commerce application, a software program, and a user-used-device based on a user's experience. In the recent past, a number of web usability methods have been developed and deployed. However, in order to increase the usability of a website it is necessary to improve certain specific areas that may be needed by the user for an instant result-oriented interaction. For this, the usability-evaluation methods can be divided into three general categories based on usability-problems identified.

The methods are User testing method, Heuristic testing (Evaluator based evaluation) and Tool based testing method.

**The user testing method** includes the set of parameters that involves different types of users (novice and expert) for finding the different types of usability problems, aims to capture the users' performance through different types of observation and satisfaction (interviews and questionnaire) of the user while they are tested the interfaces.

**Heuristic testing** is a usability engineering method for finding and assessing usability problems in a user interface design as part of an iterative design process. It involves having a small set of evaluators examining the interface and using recognized usability principles (the "heuristics") [1].

**Tool based testing** includes using various types of software tools for finding different types of usability problems. Under this method, the tools automatically assess whether the website follows a set of commonly accepted principles. Many of these tools focus on finding whether HTML scripts follow specific guidelines.

Kantner et al. [2] addressed that user testing and heuristic testing are the most common methods for evaluating the usability of a website. It was also observed that if the website has less number of errors (no broken links, no misleading links, and no deep structure etc.); the user has a favorable disposition towards the interface [3, 4].

Furthermore, researchers have suggested that addressing the usability of e-commerce websites are helpful for the user or customer to carry out a transaction effortlessly and encourage them to visit the particular site more frequently [5].

In this context, our work on the usability of e-commerce websites shall help explore an untouched new horizon in the literature [6,7] on which a few available studies are found to have dealt with the content and architecture aspects i.e. The areas of entertainment, search engine, banking, and bookstore [8], medical, government, education, airlines [9] from the users' perspectives. Our work seeks to focus on *evaluating e-commerce websites and identifying the features that are most important to user friendliness*. In other words, we have focused on design features for the usability of e-commerce websites from the user aspects for which we have also conducted a user testing approach to identify the usability problem areas based on the case studies applied on ten online shopping websites that are critical to the success of an online business.

The rest of this paper is organized as follows:
Section 2 discusses the related work: review on user-testing methodologies, which are used in evaluating usability of websites in different domain. Section 3 provides the aims and objectives for evaluating the e-commerce websites. Section 4 discusses the usability evaluation methodology in the context of 10 e-commerce websites as case studies through a collection of evaluated data, their features of usability. The calculation of usability value of the websites, user-testing results followed by statistical analysis in Section 5. Section 6 deals with the analysis of websites, their strengths, and weaknesses of design usability features. Section 7 focuses on the comparative studies of the findings. Section 8 concludes the paper with an analysis and interpretation of the works done. Finally, we have discussed the possible future extensions of our work in the same area.

## 2. Literature Survey

Claudio and Antonio [10], developed a model by adapting the Technology Acceptance Model (TAM) to identify the design characteristics of CD e-retailing websites that would influence a user's intention to buy from these sites. Other studies comprised a set of design issues and used them to investigate which were preferable for users. The websites that were investigated included chocolate websites [11], food and drink websites [12], clothing and product websites [13], and supermarket websites [14]. Although the studies

identified above investigated different types of e-commerce website, there were a number of common design features preferred by users for inclusion in the sites. Examples of the common features included: Ease of use, ease of navigation and finding products [10, 13, 14], Simple and successful search facilities [11, 13, 14], Customer service or help functions [11, 13], Secure sites [11, 13], Site supports and personalization/customization [11, 12], interesting sites [10, 11], Attractive/innovative sites [11, 12]. Furthermore, additional design issues were identified uniquely by each study. Some of these issues related to the ability to purchase without registering with the site [13], the availability of multilingual options; the clear provision of error messages on pages providing feedback on users' input [11], and the need for a fun, useful, clear, concise and informative design [12].

## 3. Aims and Objective of Our Research

We aim to investigate the design features that affect the usability aspects of e-commerce websites the most. This investigation is based on user preferences and perceptions of ten popular e-commerce websites and based on this broad objective; we identify the following as the objectives of our research:

- To develop important evaluation features for assessing the usability of e-commerce websites.
- To investigate appropriateness to the developed usability features.
- To determine if novice and expert users have different perceptions in judging usability features.
- To study a number of e-commerce websites on the usability features.
- To identify the relative importance of the web sites features in usability.

## 4. Evaluation Methodologies Adopted

We have adopted the method derived by Agarwal and Venkatesh's [3] that includes the assessment of usability by rating and weights. As such, we have conducted two surveys:

1. The first survey includes the weights given to the different features, sub features in aspects of usability by the users on the 100 points-parameters on the all five features.
2. The second survey includes the ratings given by users to each e-commerce websites.

Here, it is worth mentioning the facts that the help of Alexa.com (one of the major popular international ranking e-commerce websites, mostly used by the customers) has been taken whose survey method significantly varies from our methods of survey since its

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rank calculation uses a 'combination' of the estimated average daily unique visitors to the site and the estimated number of page views on the site over the past 3 months and the data is collected from a subset of internet users using one of 25,000 browser extensions for Google Chrome, Firefox and/or Internet Explorer.

However, taking the support of Alexa rank calculation serves two purposes i.e:
1. Hopefully it helps minimize some of the biases and take a quick peek at for a very rough idea of how popular a website is.
2. In spite of its lack of credibility, it can provide preliminary level information as well as scopes to go for evolving some alternative reliable methods to measure the user friendliness of a website.

As such, in order to select ten e-commerce websites selected by Alexa.com for the year of 2013, have been used to study the samples for this research. These selected ten highest-ranking websites as shown in Table 1 shown below:

Table 1: The Alexa.com for the year of 2013 rank information of Indian e-commerce websites

| SI.No | E-commerce websites | Symbol |
|-------|--------------------|--------|
| 1 | www.flipkart.com | W1 |
| 2 | www.snapdeal.com | W2 |
| 3 | www.ebay.com | W3 |
| 4 | www.homshop18.com | W4 |
| 5 | www.quikr.com | W5 |
| 6 | www.jabong.com | W6 |
| 7 | www.myntra.com | W7 |
| 8 | www.futurebazzar.com | W8 |
| 9 | www.naaptol.com | W9 |
| 10 | www.yepme.com | W10 |

## 4.1 Features and the sub features of the methods

In this section, we first discuss user-testing method followed by usability method and its sub features.

### 4.1.1 User Testing Method

The method of collecting data for user testing involves using various types of observations by using Camtasia software to capture the performance data. In addition to it, some applicable tasks cum questionnaires were also used to assess user's satisfaction with the tested sites. For this purpose initially, a pilot test, being an essential step to practice the test with a view to discover and refine any bugs in the testing process, was conducted before the main test for testing the users' testing methods. Afterwards a two week evaluation procedure

(during May 2013) was adopted to welcome the users and introduce the research for which necessary formal written consent along with the user agreement to participate in the testing and observation process through the testing session was developed. A task scenario was then developed for each of the ten studied websites, which includes the tasks for the ten e-commerce websites to represent the actual use of the corresponding websites. Further, in order to collect the preference information from the users regarding the tested websites, ten post-test questionnaires were also developed. Accordingly, each user responded to the appropriate post-test questionnaire after having subjective interactions with each website that could lead to filling up of a post evaluation questionnaire in the context in the form of the feedbacks (satisfaction).
(Note: There may be the chance of the content change in the websites over a period)

### 4.1.2 Usability Methods and its sub features

We have developed the usability features of the websites based on the related works [1-4, 6-8, 10, 12-18, 20-26, 28-30]. We describe these briefly in the following

- **Navigation Feature**: This feature includes search results and navigation menu as key attributes, which not only gives links to a user to assess the site, but also helps the user to find the required piece of information. In website usability, navigation is the key factor in the design that is discussed in the extensive literature [8, 9, 20]. This section covers five sub features, namely:

  − *Link support*s i.e. The links are very clear on pages for which a user can navigate the site easily.
  − *Search result, i.e.* This feature enables a user to find a product very fast, its results for easy interpretation.
  − *No misleading links, i.e.* The obvious links work perfectly without misleading the user and the user can pre-suppose the content from the final page.
  − *No broken links*: The entire site remains free from any broken links.
  − *No orphaned pages, i.e.* The entire site do not have the disadvantage of the null end pages.

- **Structure-Feature**: This feature deals with the architecture of the websites that includes various information like logical, clear groups etc. This involves:

  − *Architecture of a site, i.e.* The architecture of the site appears very simple and clear.
  − *No depth structure, i.e.* The structure is not so deep to reach the destination page with not more than three clicks only.

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− *Link path, i.e.* The link paths is very simple as providing clear visibility.

• **Ease of use Feature**: This feature is required to relate the cognitive effort to use a website [1] and provide information through which the user communicates with the online shopping in different ways. In website usability, ease of use is the key factor in the design, which is discussed in the extensive literature [1, 13, 14, 17]. It covers the following four sub features:

− *Downloading time,* i.e. the information is arranged in such a way that it needs less amount of time to download.
− *Simple communication with sites,* i.e. this sub-feature is used for finding the information, backtrack to the home page, navigate through the site is easy when various types of user interaction with the website.
− *Contact us information,* i.e. This sub feature provide company name, their address, fax number, telephone number, email address through which a user can easily interact with the provider.
− *Multilingual support,* i.e. the information is provided by website in various types of languages.

• **Design Feature**: This feature deals with the aesthetic aspects of the sites design which include efficient page designing, efficient image display, appropriate fonts and color combination. It has the following six sub advantageous features.

− *Attractiveness of sites,* i.e. the website home page should look beautiful, attention catching and attractive for the customers.
− *Images display,* i.e. the apparent image quality, properly sized and projected with good resolution without broken images; the task of understanding and downloading the images is easy and less time consuming.
− *Fonts clarity, i.e.* The appropriate readable and user-friendly fonts.
− *Color combination,* i.e. appropriate color combination on both fonts along with background colors.
− *Page structure,* i.e. Better display of the page margins with appropriate alignment and the page title
− *Consistency,* i.e. Consistency in the text, types of font, font sizes, color combination, page layout, and link bar position on each page.

• **Content based Feature:** In website usability, content, the key factor in the design, discussed in the extensive literature [1, 14].This feature studies whether the a consists of adequate information which is needed by the user It has the following seven sub features:

− *Updated information* (updated and current information)
− *Relevant information* (user friendly and unambiguous texts, non-repetitive terminologies, and very relevant as well as concise content.)
− *No under construction pages* (no under construction page, which might lead to broken links.)
− *True information* (correctness of information with all accuracy).
− *The shopping information* (providing information on shopping.)
− *Product information* (Displaying adequate product information about size, cost etc.)
− *Company information* (providing a company's product-lists and their cost information)

## 5. Calculation of Usability Values of Websites

This section presents an overview of the users in term of their characteristics, their perceptions, and experience of online shopping. **For the purpose,** ten novices and ten expert participants (five female and five male) were taken as subjects and the average weight was calculated and analyzed from the collected data in several ways. These are:

a)  Collection of weights of the usability features (five main features and corresponding sub features) from the users was done.
b)  Carrying out the descriptive analysis (the mean and standard deviation) of the weights of the developed usability features based on the users (novice and expert).
c)  Determining the possibility of statistically significant difference in the website usability features on the basis of one-way analysis of variance (ANOVA)used for each feature and the corresponding sub features of the developed usability featurism for rating the ten e-commerce websites by using the Likert scale ranging (Range analysis: 1-3 represents the negative response, 4 for neutral, and 5-7 for positive response).
d)  Calculating the overall usability of the individual e-commerce websites related to each sub features and five main features by multiplying the rating with the weights i.e. average weights of the sub features.
e)  Adding the usability values of the related sub features for each website to produce the usability values for each site with regard to the five main features of the developed usability features.
f)  Producing an overall usability value for each website by adding the usability values of the five features related to each website

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Details of the user's characteristics and the frequency distribution are given in Table 2.

Table 2: User's characteristics and the frequency distribution

| No. | Characteristic | Range | Frequency Distribution | |
|---|---|---|---|---|
| | | | Novice Group | Expert Group |
| Personal Information | | | | |
| 1 | Age | 18-29 | 60% | 60% |
| | | 30-39 | 20% | 20% |
| | | 40-49 | 10% | 10% |
| | | Over 50 | 10% | 10% |
| 2 | Gender | Male | 50% | 50% |
| | | Female | 50% | 50% |
| 3 | Education | Postgraduate Degree | 10% | 20% |
| | | Higher Diploma | 0% | 0% |
| | | Bachelors Degree | 40% | 60% |
| | | Diploma | 40% | 20% |
| | | High School | 10% | 0% |
| Computer Experience | | | | |
| 4 | Experience using a Computer | Under 1 year | 0% | 0% |
| | | 1-3 years | 30% | 0% |
| | | More than 3 years | 70% | 100% |
| 5 | Daily use Computer | Less than 2 hours | 20% | 0% |
| | | 2-4 hours | 10% | 30% |
| | | More than 4 hours | 80% | 90% |
| Internet experience | | | | |
| 6 | Browser | Internet Explorer | 90% | 90% |
| | | Netscape Navigator | 10% | 10% |
| | | Other | 0% | 0% |
| 7 | Experience using the Internet | Less than 1 year | 10% | 0% |
| | | 1-3 years | 90% | 0% |
| | | More than 3 years | 0% | 100% |
| 8 | Weekly use of internet | Less than 2 hours | 0% | 0% |
| | | 2-4 hours | 20% | 10% |
| | | More than 4 hours | 80% | 90% |
| 9 | Did the user used the internet for Purchasing | Yes | 100% | 100% |
| | | No | 0% | 0% |

## 5.1 Results

Firstly, the Table 3 reveals that a navigation feature was getting the highest weights in aspects of users, which are the most important design features for the usability of websites. Secondly it also shows that content is the next most design criteria for the usability of a website. From the user's perspective, design and ease of use come to third and fourth place for the usability of websites respectively. Finally, from the user aspects, it was also observed that the structure has the least weights for the usability of e-commerce websites with sub features variations. The link support, which is the single sub features of the numerous design features, was considered the highest weight that is 6.15 where as no under construction page getting the lowest weight that is 2.02.

The other sub features, that got the highest weight, are search result 6.10, link path 5.81, and architecture of site 5.65, no depth structure 5.63, and simple communication with site 5.38. However, the lowest weights occupied by the sub features are company information 2.50, fonts are clear 2.56, color combination 2.75, and shopping information 2.89. Therefore, under the stated condition the users pay more attention to product information in comparison with shopping and the company information (as the users assign the highest weight to product information 3.02 whereas gave weight to shopping

information 2.89 and company information 2.50). Detailed information is shown in Table 3.

Table 3: The weights of the features and sub features of the developed usability feature and the total weight for each feature.

| Features | Sub features | Weight | Total weight for each feature |
|---|---|---|---|
| Navigation | Link support | 6.15 | **25.16** |
| | Search result | 6.10 | |
| | No misleading links | 5.58 | |
| | No Broken Links | 3.02 | |
| | No Orphan Pages | 4.31 | |
| Structure | Architecture of a site | 5.65 | **17.09** |
| | No depth structure | 5.63 | |
| | Link path | 5.81 | |
| Ease of use | Downloading time | 5.20 | **17.12** |
| | Simple communication with sites | 5.38 | |
| | Contact Us Information | 4.43 | |
| | Multilingual support | 2.11 | |
| Design | Attractiveness of sites | 4.28 | **19.15** |
| | Images displayed | 3.15 | |
| | Fonts are clear | 2.56 | |
| | Color combination | 2.75 | |
| | Page structure | 3.34 | |
| | Consistency | 3.07 | |
| Content | Up-to-date Information | 4.74 | **21.48** |
| | Relevant Information | 3.21 | |
| | No Under Construction Pages | 2.02 | |
| | True information | 3.10 | |
| | The shopping information | 2.89 | |
| | Company information | 2.50 | |
| | Product information | 3.02 | |
| Total weight | | | **100** |

Finally, the Analysis of Variance (ANOVA) test was conducted to investigate the possibility of any statistically significant difference between novice and expert user in the context of their impact on our selection features. It led to discover that there is some significant difference between the novice and the expert user. The novice users were assigned highest weights to navigation feature 27.14 where as expert users were assigned the weight 23.18.

The entire novice and expert assigned values showing the importance of features in ascending order is referred to in Appendix 1.

## 6. Analysis of Results

This section, deals with the influence of usability features on ten e-commerce websites from the quantitative and qualitative data collected from the above case study using our usability evaluation methodology. The following impacts of the features in e-commerce websites are:

Table 4: Ten E-Commerce Websites and their Overall Usability Value

| S.No: Assigned Rank As per user's preference | E-commerce Websites | Overall Calculated Usability Value | User's Satisfaction in respect of : | User's Dissatisfaction in respect of |
|---|---|---|---|---|
| 1 | www.naaptol.com ($W_9$) | 962.64 | Noticeable images in content, easy navigation, and discount offer by websites | Camouflaged information on the home page. . |
| 2 | www.yepme.com ($W_{10}$) | 937.58 | Easy registration, easy navigation, easy understanding of the information, and fastest downloading of the images | Content, and ease of use and use of Multilanguage |
| 3 | www.snapdeal.com ($W_2$) | 910.69 | Easy registration, no misleading link, no orphan pages, no broken links, aesthetic appeal | Use of Multilanguage, inadequate company information and irrelevant product information |
| 4 | www.jabong.com ($W_6$) | 897.05 | The content information was good, adequate images and text size, company and product information are not complex | Use of Multilanguage, inadequate company information, irrelevant product information |
| 5 | www.myntra.com ($W_7$) | 886.84 | The structure of the website, navigation, and design of the website | Missing shopping information, and lack of easy search facility |
| 6 | www.flipkart.com ($W_1$) | 880.28 | Easy navigation, the structure of the website and design of the website | Content provided, more download time, and non supporting Multilanguage |
| 7 | www.quikr.com ($W_5$) | 877.32 | Downloading time of images is less, simple communication with the site, and true information was provided by the site | Content aspect, more download time and non-supporting Multilanguage |
| 8 | www.futurebazzar.com($W_8$) | 873.99 | Up to date information, relevant and true information, no misleading link, no broken link, and no orphan pages | Design aspects i.e lack of page structure, poor visibility of font, non-proper color combination, non-supporting Multilanguage |
| 9 | www.ebay.com ($W_3$) | 749.51 | Easy navigation, and structure of the website was good | The content, and ease of use of the website, and non-supporting Multilanguage |
| 10 | www.homeshp18.com ($W_4$) | 742.45 | The content of the site, easy navigation, and good design | The structure, and ease of use of the website, and non-supporting Multilanguage |

## 6.1 Strength and weaknesses of design usability features

In this section from the user' perspective we discuss the strength and weaknesses of design, usability features that are used to investigate the ten e-commerce websites.

**Strengths:**

The analysis and interpretation of the results found that the e-commerce websites have strong in respect of the below mentioned usability features:

**Navigation:** Nine out of ten e-commerce websites have good navigation feature except Jabong.com, which relates to link support, search result, no-misleading link, no broken links, and no orphan pages. Users are satisfied to visit these sites.

**Content:** Eight out of ten e-commerce websites have good content feature except Quikr.com and ebay.com. Whose users are very delighted when they found the up to date, relevant and true company information, and its product information (price, and size).

**Design**: The users have indicated that seven out of ten websites have good design feature other than Quikr.com, futurebazzar.com, and naaptol.com. They express their dissatisfaction with fonts, and colors unattractiveness.

### Weaknesses in respect of Ease of use and Structure

In spite of the above strong points, the results also reveal that the most of the investigated e-commerce websites do not support the multilingual feature, non-clarity of *Contact us* information, more time consuming downloading process of the images, non-clarity of Link paths, more depth structure and a few other attributes. In nutshell Consistency level in respect of the mentioned features, which is the big factor for those websites, is not properly maintained.

## 7. Comparison with Related Work

The outcomes of this research suggest that navigation feature is the most important feature that affects the usability of e-commerce websites from other aspects. This particular approach is set in the settlement with the outcomes extracted from previous investigation [3, 8, 9, 10, 13, 14, 21]. This research outcome of the navigation feature not only deals with the CD e-retailing website [10] and other web services like supermarket, clothing product, medical, financial, entertainment [9, 13, 14], but also affecting the e-commerce websites. In [9], they proposed search tool is one of the key features in website

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design, whereas we derived the search tool is one of the sub features within the navigation, which gives importance in navigational issues while designing e-commerce websites.

Even though usability methods has been extensively discussed in the literature work using user testing method to find out features for designing of e-commerce websites is scarce [9, 11, 13, 20]. Oppenheim et al. [11] proposed the idea of utilizing heuristic method, to find out features for chocolate websites. They suggests that simple and search facilities, customer service and help functions, secure sites, site supports and personalization/customization, interesting sites are the important features for chocolate websites. In contrast, our works derive user-testing method. Now, using the user testing method associated with users, we have gone down more details, and derive features and sub features related to content. The results of this research suggest that content feature is one of the second most important features that affect the usability of e-commerce websites from other aspects. This research results of the content feature and its sub features not only deals with the chocolate, and clothing product websites [11, 13] and other web services like supermarket, medical, financial, entertainment [9, 14], but also affecting the e-commerce websites.

The outcomes of this research suggested that design feature is the third most important feature that affects the usability of e-commerce websites from other aspects. This particular approach is set in the settlement with the outcomes extracted from previous investigation [12]. This research result of the design feature only deals with the food and drink website [12] and no other web services like supermarket, medical, financial, entertainment [9, 14] are considered design is a feature, but it's affecting the e-commerce websites.

The outcome of this research suggested that structure feature is the least important feature that affects the usability of e-commerce websites from other aspects whereas users are rated ease of use is the fourth feature that is used in designing the e-commerce websites. The outcomes shows that these two features are put less influence when designing the e-commerce websites, but these two features and there sub features must be taken into account while designing or evaluating the usability of e-commerce websites. This particular approach is set in the settlement with the outcome extracted from previous investigation [10, 12]. This research outcome of the structure feature not only deals with the CD e retailing, and food and drink websites [10, 12], but also affecting the e-commerce websites.

Our research outcomes were comparable with previous research suggested by Pearson et al. [20] regarding the usability features of the derived features differently by novice and expert. Here, we found that there is little inconsistency between outcomes from our research and previously studied Pearson et al. [20]. The outcomes of our research shows that novice users are giving more emphasis in navigation feature in comparison with expert users whereas in Pearson et al. [20] results shows that novice users are giving more emphasis in content and ease of use features. This difference between the outcomes might relate to the fact that our research based on e-commerce websites whereas Pearson et al. [20] research based on educational websites.

## 8. Conclusion

The outcomes indicate the users' (novice and expert user related to usability features) priority or the order of preference based evaluation of usability of websites i.e. first - NAVIGATION, second - CONTENT, third - DESIGN, fourth - EASE OF USE and the least important features - STRUCTURE. Based on the qualitative data related to what features they liked and disliked provided by the users. We have investigated the usability of ten e-commerce websites using the design features and calculated the usability value for each website. Accordingly, it was observed that naaptol.com e-commerce website gets maximum overall usability value, whereas homeshop18.com is of the minimum value. This outcome of the usability features based researches reflecting the strength and weaknesses of ten e-commerce websites may help the founders of the websites to consider it as an evidence to go for further developments on the functioning style of their websites. However, the current research has two limitations: The first limitation is that we have used the user testing method only though questionnaire for evaluating the ten e-commerce websites without using the Heuristic testing and tool based testing and the second limitation deals with the number of clicks, which may influence the outcomes while evaluating the usability of e-commerce websites.

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Appendix 1: For usability features the impact of users are shown in Descriptive statistics and ANOVA results.

| Descriptive statistics | | | | | ANOVA Results | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Category | Users | N | Mean | Standard Deviation | | Sum of Squares | df | Mean square | F | Sig. |
| Structure | Novice | 10 | 16.18 | 8.819 | Between Groups | 24.643 | 1 | 24.643 | 0.428 | 0.514 |
| | Expert | 10 | 18.10 | 9.813 | Within Groups | 13542.673 | 9 | 1504.74 | | |
| | Total | 20 | 17.09 | 9.153 | Total | 13567.316 | 10 | | | |
| Ease of Use | Novice | 10 | 17.02 | 7.563 | Between Groups | 0.702 | 1 | 0.702 | 0.009 | 0.923 |
| | Expert | 10 | 17.12 | 7.668 | Within Groups | 17592.749 | 9 | 1954.74 | | |
| | Total | 20 | 17.12 | 7.682 | Total | 17593.451 | 10 | | | |
| Design | Novice | 10 | 18.12 | 7.852 | Between Groups | 142.332 | 1 | 142.332 | 1.101 | 0.295 |
| | Expert | 10 | 20.18 | 9.868 | Within Groups | 30390.892 | 9 | 3376.76 | | |
| | Total | 20 | 19.15 | 8.635 | Total | 30533.224 | 10 | | | |
| Content | Novice | 10 | 20.62 | 11.626 | Between Groups | 570.222 | 1 | 570.222 | 5.286 | 0.022 |
| | Expert | 10 | 22.34 | 10.955 | Within Groups | 25352.141 | 9 | 2880.26 | | |
| | Total | 20 | 21.48 | 11.384 | Total | 25922.363 | 10 | | | |
| Navigation | Novice | 10 | 27.14 | 9.832 | Between Groups | 37.785 | 1 | 37.785 | 0.440 | 0.508 |
| | Expert | 10 | 23.18 | 11.268 | Within Groups | 20169.025 | 9 | 2241.00 | | |
| | Total | 20 | 25.16 | 10.481 | Total | 20206.810 | 10 | | | |