Empirical Evaluation of Quality Assurance Framework for E-Commerce Websites

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Abstract-*Increasing volume of e-commerce in the world points out the intendment of research of the e-commerce web sites evaluation, design solutions, and quality assurance. There are existing website evaluation methods and criteria for evaluating website quality. Previous researchers on the quality of E-Commerce websites developed a methodological framework for the evaluation and assessment, the need arises to validate these frameworks. The objective of the paper is to validate the existing quality assurance framework on the E-Commerce websites with the user based analysis, by doing the systemic analysis on the survey conducted on E-Commerce websites to record the user's experience.*

Keywords- Electronic - Commerce, Quality, Framework, Validation, Evaluation.

I. INTRODUCTION

Website development for E-Commerce is growing at a fast pace in recent years for variety of purposes in different domains, in which its user group has their own specific requirements and expectation from the websites. Hence, evaluating the Quality of E-commerce websites needs to take into account the needs of these different user groups. The objective of the paper is to assess the quality of the E-Commerce websites by performing the user based analysis on the quality assurance framework. This is done by the systematic analysis and survey that allowed unveil E-Commerce quality measurement criterions. In conducting the research comparison of different E-commerce websites , structured questionnaire analysis, data analysis on the data collected, observation and multiple criteria evaluation was performed.

II. CRITERIONS FOR WEBSITE EVALUATION

Today E-Commerce websites plays a vital role so it is much more needed to evaluate and assess the e-Commerce websites. In past there are different models and frameworks which have been developed to evaluate and assess the websites in the different domains. Layla Hasan [1] developed a theoretical, comprehensive, and measurable framework for assessing the quality of websites. The dimensions of the proposed criteria are content quality, design quality, organization quality, and user-friendly quality, on the other hand Davidaviciene [3] proposed a quality evaluation model for the e-commerce websites. The five most important criterion groups were identified (easy to use, navigation, security assurance, real time help, and content). whereas Caelos, et al. [4] in 2008 focused on e-commerce website's success and showed that website design is the key factor for the success of a website it gives emphasis on the idea that successful website design or factors affecting the usability of a website enhance the level of a user satisfaction. Rian van der marwe [2] proposed a framework and methodology for evaluating the e- commerce websites. In order to evaluate the performance of the websites not only individually but with the comparison of other websites also by focusing on two objectives: by developing a framework and criteria for the comprehensive evaluation of e-commerce websites. Many researches portrayed quality in hierarchical way to understand and measure software quality. McCall's model provides different perspective of software quality according to the major three processes in software life cycle. Bohem's model represents a hierarchical of quality characteristics, whereas, ISO 9126-1 quality standard model incorporates the features of both the previous model. Akriti Vyas et.al [5] developed a framework to evaluate the Quality of E-commerce websites, by taking five high quality factors which are Usability, Performance, Design, Functionality, and Content, on the other hand, Hasan [6] develop a methodological usability evaluation framework for e-commerce websites. A multiple-case study (comparative design) was used, where three usability methods (user testing, heuristic evaluation and web analytics) were applied whereas, Paul A. Walcott [7] proposed a paper to determine the readiness of e-commerce websites by developing framework. Website Evaluation Framework which consisted of six categories; these categories were: company information and function, product/service information and promotion, buy / sell – transactions, customer services, ease of use and innovation in services and technology, Many of the existing website evaluation methods and criteria for evaluating website quality are not able to effectively assess the performance and quality of a website, and there is no specific lining between the quality factors in a particular domain.

Luisa et.al [8], 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, whereas Offut [9] analyzed the quality attributes of web applications and identifies eight attributes: reliability, usability, security, availability, scalability, maintainability, performance and time-to-market. In Websites Quality Metrics, Lilburne et al. [10] proposed a Quality Compliance Framework (QCF) consisting of components such as quality measurement, quality characteristic, quality sub-characteristic and measurable indicator, however Christophe Bezes [11] distinguishes three major website evaluation approaches, analyzing websites as information systems, as communication channels, or as retailing channels. Study and framework proposed by Akriti Vyas et.al [5] is a cumbersome one incorporating the common factors of quality especially in the domain of e-commerce websites. Further, it considered vital, most effecting factors and sub factors of quality. This study has attempted to validate the framework proposed by Akriti Vyas et al. [5]. An attempt to validate the Quality Assurance Framework for E-Commerce websites is made, so as to propose an authenticated framework for assessment of available and future E-Commerce websites, for which empirical study was performed.

III. QUESTIONNAIRE

In past researches, there are variety of frameworks and software quality models to assess the quality of E-commerce websites, now the main issue is to validate these existing frameworks. So here we have taken a quality assurance framework of E-Commerce websites, Akriti vyas [5] and validate its quality factors by user based analysis. For this, a survey has been conducted to record the experience on different E-Commerce websites. A well structured questionnaire was developed by taking four high quality factors into consideration that is Usability, Performance, Design and Content. The case study mainly used to validate assess the effectiveness of the framework. The Questionnaire was circulated among 200 Bachelors, Masters and PhD. Students. Out of which 184 valid Responses were gathered. The number of male students who participated in the questionnaire was 90, while that of female students were 94. The frequency of the student's visits to the websites varies in the response gathered. According to the data collected, the highest frequency of use is in a occasionally period with scoring 41.5% and weekly scoring 30.8%. the options everyday and monthly scored 14.6% and 13.1% respectively as per Figure 1.

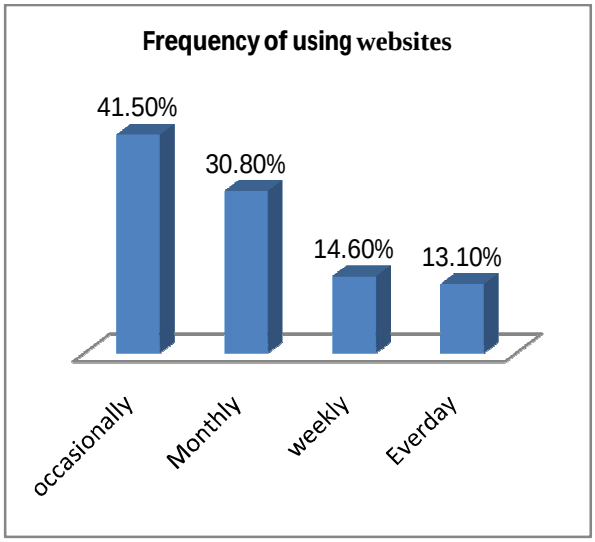

Figure 1: Student's frequency of using websites.

Survey is conducted to evaluate the quality of five E – Commerce websites, which are Amazon, Ebay, Flipkart, Snapdeal, and Shopclues. Four high quality factors are taken:

A. Usability: is the ease of use and of a human-made object such as a tool or device. In software engineering, usability is the degree to which software can be used by specified consumers to achieve quantified objectives with effectiveness [5].

B. Performance:Web performance refers to the speed in which web pages are downloaded and displayed on the user's web browser. Web performance optimization (WPO) or website optimization is the field of knowledge about increasing web performance. Performance is mainly concerned with the reliability of the website [12]. Reliability is all about the performance of the website and the performance of the website starts with the fact whether website to recover quickly at times of any kind of problems [13].

C. Presentation: the presentation is the capability of the website that how to present it in front of users. The new technology should be applied on the website. It should be attractive. The sub factors under presentation are: Design, Technology, formatting, and multimedia, attractiveness [5].

D. **Content:** it is the information provided on a website. Most authors articulate the importance of this characteristic with this motto "content is king". The main nature of web applications is that they are a combination of information, services and

functionalities. Information provided on a website should be relevant, engaging and appropriate to users. Content is the most crucial part of the website. Users come to a website primarily looking for a special kind of information; they give less attention to the navigation, visual design and interactivity of the site. The aim is to validate these four quality factors framework by user based analysis [14].

IV. RESULTS AND ANALYSIS

From Rank 1 to Rank 5 are assigned to the E-commerce websites. Rank 1 is for the best and Rank 5 is least ranked. As per the ranking criteria considered the website for which highest number of times Rank 1 is recorded is considered to be of best quality. In the questionnaire, questions were framed for which reply was sought from respondents on four criteria namely Usability, Performance, design, and content. A total set of 16 questions comprised in the questionnaire. Each question was well directed towards one of those quality factor . Eventually the last question evaluated the best e-commerce website as per the respondent's choice overall. For the purpose of validation of Quality Assurance Framework, set of these 184 responses were gathered and analyzed. The analysis was performed quality factor wise that is Usability wise, Performance wise, Design wise, and Content wise. The e-commerce website which was ranked first factor wise and also as per overall evaluation, if matched would result in marking the framework validated.

Table 1: Results on Usability

Rank	Amaz-on	Ebay	Flip-kart	Snap-deal	Shop-clues
1	86	170	94	161	216
2	158	120	158	144	153
3	151	147	181	128	131
4	166	159	145	151	112
5	171	136	154	148	120

So here we analyze, that top ranked among these websites is Shopclues having maximum times rank 1, and and Amazon is least ranked having maximum no of rank 5.

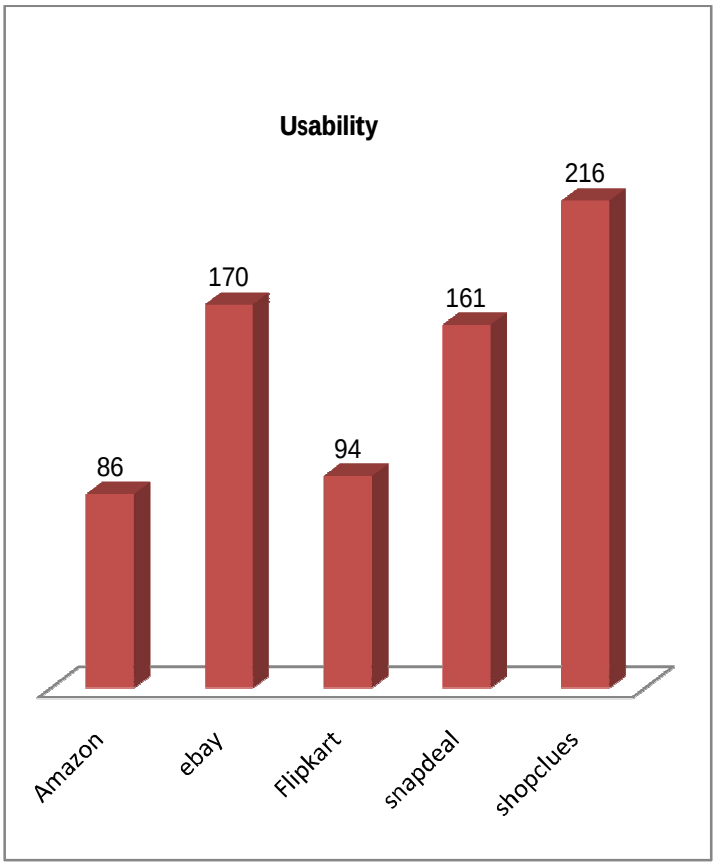

Figure 2: Graphical Representation on the Usability.

In above figure we interpret that Shopclues is having maximum times Rank 1, whereas Amazon recorded least number of rank 1.

Table 2: Results On Performance

Rank	Amaz-on	Ebay	Flip-kart	Snap-deal	Shop-clues
1	95	137	76	93	144
2	116	92	114	99	129
3	130	92	128	116	86
4	98	121	115	129	90
5	110	108	116	112	99

So here we analyze, that top ranked among these websites is Shopclues having maximum times rank 1, and Flipkart is least ranked having maximum no of rank 5.

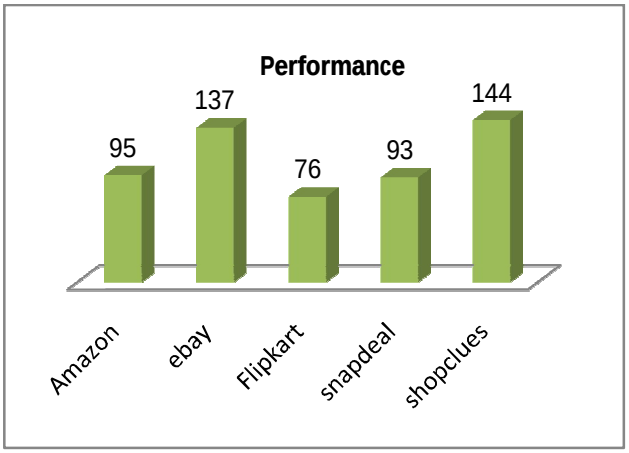

Figure 3: Graphical Representation on the Performance

In figure 3 we interpret that Shopclues is having maximum times Rank 1, whereas Flipkart recorded least number of rank 1.

Table 3: Results on Design

Rank	Amaz-on	Ebay	Flip-kart	Snap-deal	Shop-clues
1	151	161	153	134	133
2	149	151	157	137	141
3	158	159	145	144	128
4	151	150	152	147	147
5	135	111	125	170	183

So here we analyze, that top ranked among these websites is Ebay having maximum times rank1,and Shopclues least ranked having maximum no of rank 5.

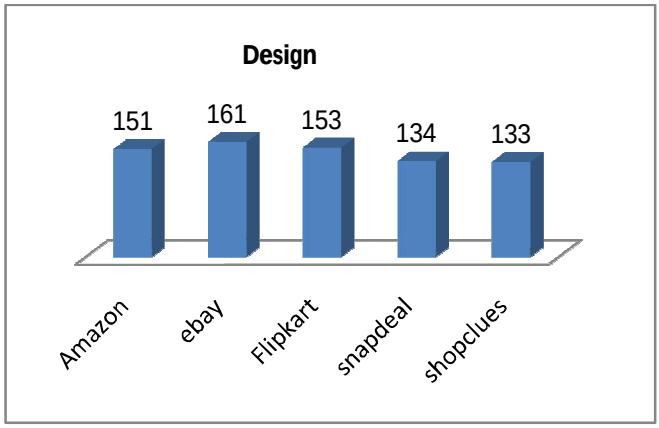

Figure 4: Graphical representation on Design

In above figure we interpret that Ebay is having maximum times Rank 1, whereas Shopclues recorded least number of rank 1.

Table 4: Results on Content

Rank	Amaz-on	Ebay	Flip-kart	Snap-deal	Shop-clues
1	107	120	166	133	207
2	157	122	132	166	152
3	141	168	146	148	127
4	146	167	159	146	122
5	181	155	124	139	121

So here we analyze, that top ranked among these websites is Shopclues, having maximum times rank, and Amazon is least ranked having maximum no of rank 5

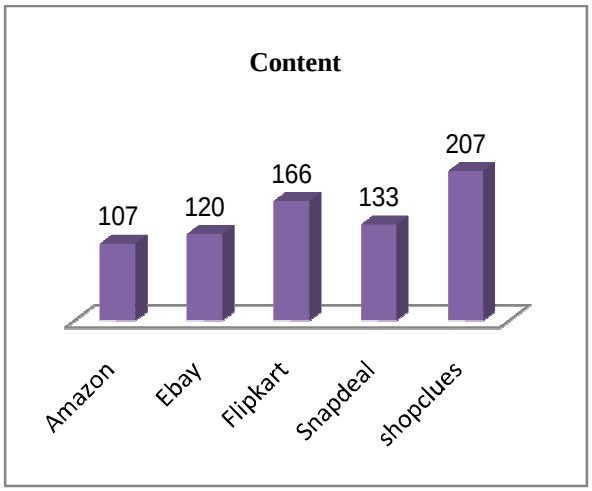

Figure 5: Graphical Representation on the Content

In above figure we interpret that Shopclues having maximum times Rank 1, whereas Amazon recorded least number of rank 1.

Table 5: Results on overall analysis of websites

Rank	Amaz-on	Eba y	Flip-kart	Snap-deal	Shop-clues
1	21	40	32	33	56
2	29	38	31	34	52
3	38	41	30	46	28
4	42	371	41	35	29
5	53	27	39	35	17

So again here we analyze, that top ranked among these websites is Shopclues having maximum times rank 1, and Amazon is least ranked having maximum number of rank 5.

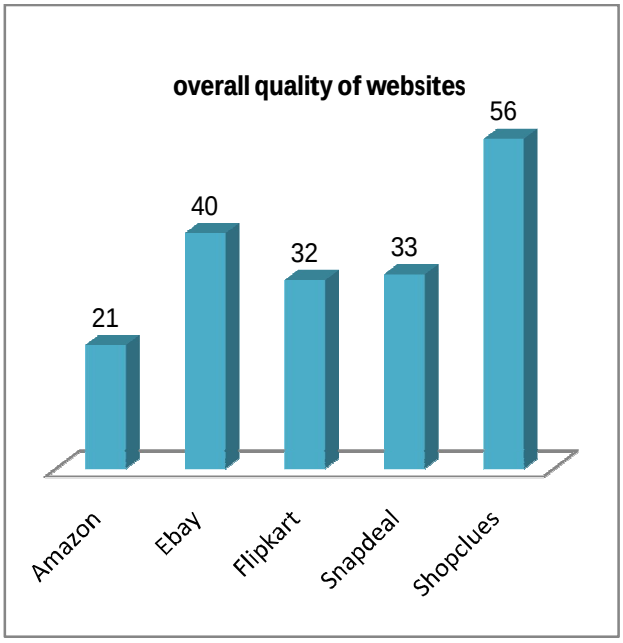

Figure 6: Graphical representation on overall analysis on websites

The respondents were asked to evaluate all these websites in totality and were asked to specify overall rank of the websites. Accordingly, the results "Shopclues" has been ranked no. 1 maximum no. of times. Refer table 5 for details. Thereby, the proposed framework is authentic, valid and may be used for assessment of other E-Commerce websites.

V. CONCLUSION & FUTURE SCOPE

According to the user based analysis where we evaluate four quality factors that is Usability, Performance, Design, and Content "Shopclues" ranked "1" three times. So we concluded that, in user based analysis "Shopclues" is top ranked, and it was observed that the "Shopclues" was also top ranked by respondents in the overall judgment of the websites refer Table 5. So here the framework to evaluate the E-Commerce Websites is validated with the user based analysis on the framework by taking the four quality factors into consideration. In future this quality assurance framework of E-Commerce websites can also be validated with the tool based analysis.

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