Qualitative and Quantitative Framework for Quality Web Design

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***Abstract*- This paper proposes a Qualitative and Quantitative Framework Model (QQFM) for analysing websites in multiple dimensions like pagespeed download time, web components, website errors, website structure, compatibility, accessibility, privacy, standards, search and usability. After analysis the outputs obtained are observed, compared with standardization bodies guidelines like W3C and suggestive improvement measures are provided to make website functional to its full potential. This reduces network traffic and increases users traffic, which is ultimate goal of every developer.**

Keywords: QQFM, Pagespeed Download Time, Web Components, Website Errors, Website Structure, Compatibility, Accessibility, Standards, Search, Usability, W3C.

I.INTRODUCTION

Website is a collection of related network web resources, such as web pages, multimedia content which are typically identified with a common domain name and hosted through web server. Now, website is not only for information sharing, interactivity, liveliness of websites are must. Website making Internet as its driving force performing lot of activities like information providing, online form filling, online money transactions E-Commerce and information receiving. Easy coding of HTML, fault tolerance of browsers leads to the development of multiple websites. But, these websites mostly are designed improperly which leads to network traffic instead of Users or Visitors traffic. Here, we proposed a framework model, analyses websites and provides suggestive measures to improve quality of website and better functionality.

II.RELATED WORK

The concept of quality is defined by ISO 9000 as, the degree to which a set of inherent characteristics of an object fulfils requirements [1]. Aladwani and Palvia warned almost two decades ago, that web quality is a vastly undefined concept [2]. Someradova and Weinlich [3] continue to stress these despite the numerous studies that have been conducted on the matter, a uniform definition of website quality has yet to be formulated. Oslima, Covella and Rossi point out that whole the quality of a website is easy to recognize, it is different to define and evaluate: The meaning of quality is not simple and atomic, but a multidimensional and abstract concept [4]. The authors go on to say that website quality evaluation is based on the quantification of entities and attributes, where an attribute is a measurable property of an entity. As such, quality is an abstract relationship between attributes of entities and measurement goals. Elsewhere, Anusha [5] claims that website quality can be measured form two perspectives: that of programmers and that of users. The former focus their attention on the degree of maintainability, security and functionality, while the latter pay greater attention to usability, efficiency and credibility. Similarly Rocha [6] breaks down his definitions of website quality into three dimensions:

- Content quality
- Service quality

Technical quality

While Hasan and Audolrob [7] also think in terms of dimensions and identify four key criteria underpinning the website concept of website quality:

- Content
- Design
- Organization
- User friendliness

Drawing on these definitions and given that no unified formal procedural definitions has yet to be formulated. [8] Propose that website quality can be considered the ability of website to meet the expectations of its users

and owners, as determined by a set of measurable attributes.

III.METHODOLOGY

By observing previous works, it is clear that website quality is not a single measurable element; it must be measured in multiple dimensions and hence proposed a Qualitative and Quantitative Framework Model (QQFM). The framework categorized into five modules, each module of the program has specific task in the evaluation process.

1. Sitespeed and Performance Evaluation module
2. Website Analysis Module
3. Website Structure Module
4. Website Errors Module
5. Website Quality Characteristics Analysis Module

These five modules are implemented on some selected Sanskrit related websites and the details are depicted in following Table 1.

S. NO	WEBSITE NAME	WEBSITE CODE
1	http://www.Thesanskritlanguage.com	TSKTL
2	https://samskrittutorial.in	SMKTL
3	sanskrit.inria.fr	SKTIN
4	http://www.sanskrit.nic.in	SKTNIC
5	sanskrit.samskrutam.com	SKTSKM
6	https://www.sanskritworld.in	SKTWD
7	Spokensanskrit.org	SPNSKT
8	https://www.digitalsanskritguru.com	DGSKTG
9	https://www.gitasupersite.iitk.ac.in	GSIITK
10	aupasana.com	APSNA

Table 1: Websites with respective codes

Sitespeed and Performance Evaluation Module:

Front – End optimization (of CSS, JavaScript, Images, HTML etc.) makes the most impact on users of website. A faster and more responsive website will keep visitor more engaged and focused on content, rather than waiting for scripts and images to load. Google uses page speed in their ranking algorithm and plan to incorporate page experience in their ranking algorithm as well, through the web vitals initiative.

This means that fast loading sites with a good user experience may rank higher in search engine results. As developers and marketers look to optimize their sites, pagespeed and page experience should be among the top optimization to consider.

GTMetrix tool [9, 15] was used to analyze page speed and site performance of website and results are as follows:

S.No	Website Code	Performance Grade	Yslow Grade
1	TSKTL	B	D
2	SMKTL	B	C
3	SKTIN	A	B
4	SKTNIC	F	C
5	SKTSKM	D	C
6	SKTWD	C	D
7	SPNSKT	B	B
8	DGSKTG	F	D
9	GSIITK	C	C
10	APSNA	A	C

Table 2: Performance Grade and Yslow Grade

Website Analysis Module:

This module involves to analyze the components of website and to check if it contains some important elements that can be helpful for SEO purpose. This Website Analysis Module finds the number of objects used in each web page, web page size and downloading time of all web pages and in turn obtains the download time of the website. A web tool Web Page Analyzer [10] is embedded in this module to enhance functionality and results are presented in following Table:

S. No	Website Code	Total Website size (Kb)	Download Time (56K) (Seconds)	Download Time(1.44Mbps) (Seconds)
1	TSKTL	447175	98.52	11.77
2	SMKTL	1129259	237.86	18.78
3	SKTIN	49230	11.41	1.86
4	SKTNIC	985525	206.81	15.62
5	SKTSKM	70658	20.08	6.37
6	SKTWD	371452	83.03	10.97
7	SPNSKT	134533	28.01	1.91
8	DGSKTG	664289	139.59	10.72
9	GSIITK	912534	190.87	13.83
10	APSNA	62848	14.13	1.93

Table 3: Web Components Analysis

Website Structure Module:

This module identifies the organization of web page in the website and it is called sitemap of the website. The sitemap shows all webpage in a hierarchical tree with homepage as root of the tree. To simplify the procedure a web tool Power mapper [11] is used.

Website Errors Module:

The website errors module validates and identifies the number of different errors according to syntax errors

of HTML tags, properties of web page and standards mentioned by various organizations such as W3C [16]. This module uses standard web tool called W3C markup validator [12] in identifying website errors and results are shown in following Table:

S.No	Website Code	Pages with Broken Link Issues
1	TSKTL	30
2	SMKTL	59
3	SKTIN	26
4	SKTNIC	8
5	SKTSKM	15
6	SKTWD	94
7	SPNSKT	1
8	DGSKTG	58
9	GSIITK	8
10	APSNA	69

Table 4: Website Errors

Website Quality Characteristics Analysis Module:
In order to implement the website characteristics analysis module, a one-click website testing tool Sort siter [13] is implemented. In evaluating website quality various parameters were evaluated. The quality assurance parameters include accessibility, compatibility, search, standards according W3C and usability aspects of website. The module results are shown in following Table:

S.No	Website Code	Pages with Accessibility Issues	Pages with Compatibility Issues
1	TSKTL	43	1
2	SMKTL	62	6
3	SKTIN	29	1
4	SKTNIC	81	3
5	SKTSKM	37	36
6	SKTWD	94	94
7	SPNSKT	0	0
8	DGSKTG	58	58
9	GSIITK	49	4
10	APSNA	82	2

Table 5: Pages with Accessibility and Compatibility Issues

S.No	Website Code	Pages with Search Issues	Pages with Standards Issues	Pages with Usability Issues
1	TSKTL	38	39	39
2	SMKTL	60	62	61
3	SKTIN	21	26	26
4	SKTNIC	77	77	77
5	SKTSKM	35	36	38
6	SKTWD	94	94	90
7	SPNSKT	1	8	0
8	DGSKTG	58	58	58
9	GSIITK	49	51	53
10	APSNA	81	81	81

Table 6: Pages with Search, Standards and Usability Issues

IV.IMPLEMENTATION

Visualization of the results obtained by QQFM modules are implemented using TABLEAU [14], a data analysis software tool is depicted for better and easy analysis. The outputs are represented below:

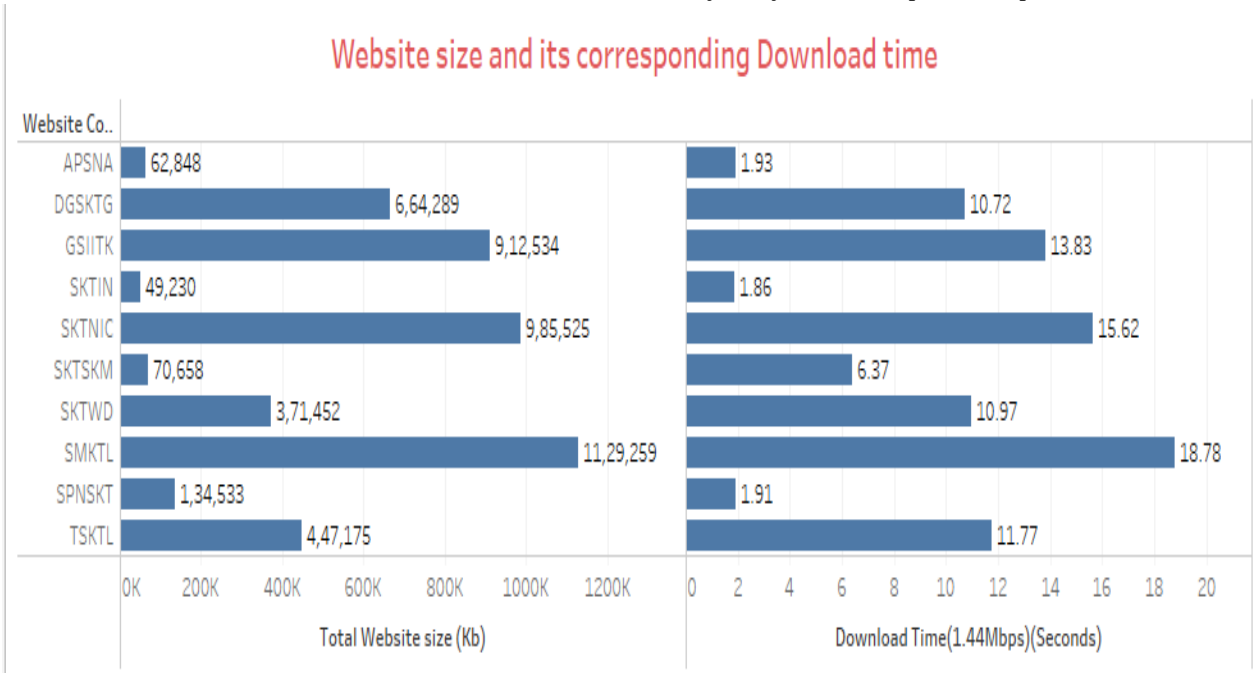

Figure 1: Website Size and its Corresponding Download time

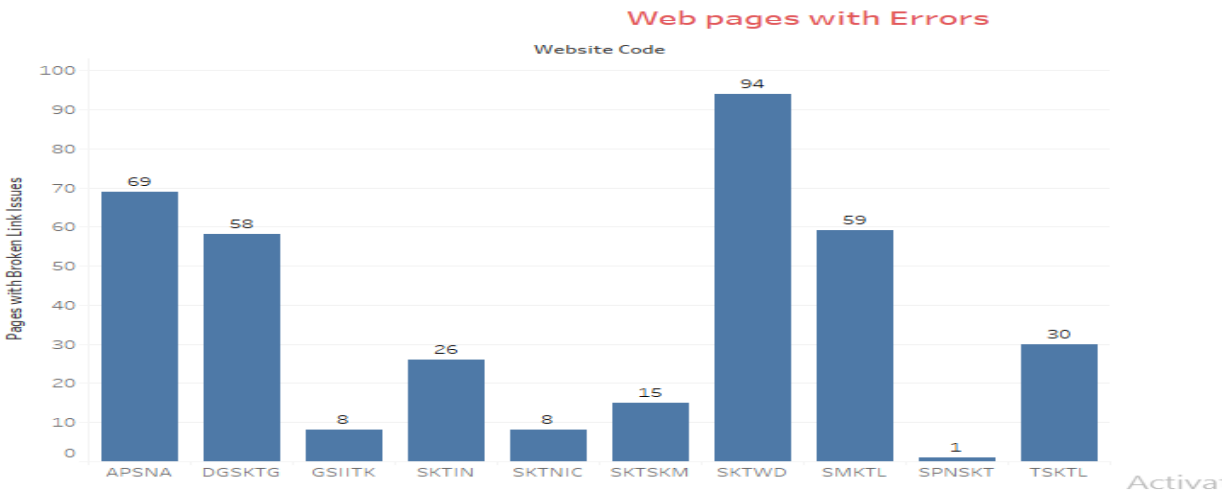

Figure 2: Web pages with Errors

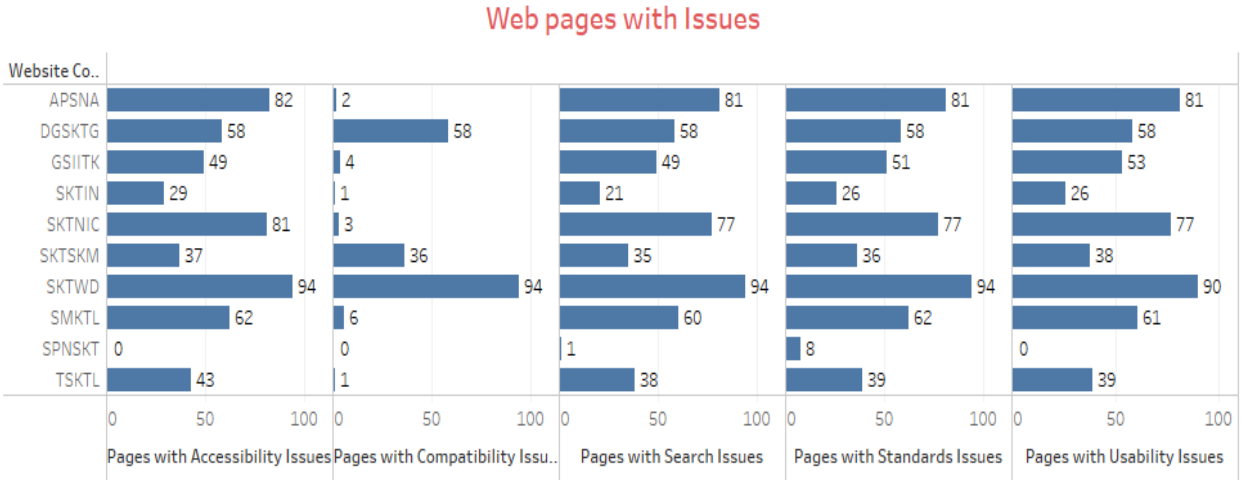

Figure 3: Web pages with Issues

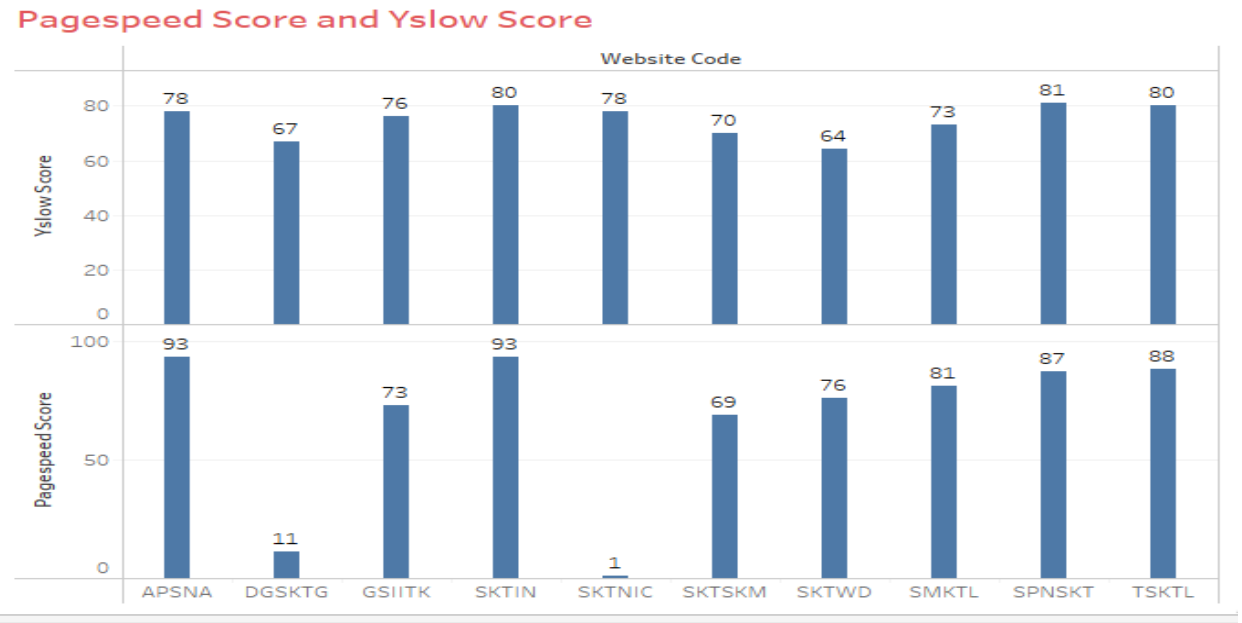

Figure 4: Pagespeed and Yslow Score

After observing analysed outputs of module, it is clearly compared with suggestive measures of standardization bodies and following suggestive measures [16] are prepared for overall improvement of the website quality.

Guideline 1: Provide a text equivalent for every non-text element. This includes images, graphical representations of text, image map regions, animations, applets and programmatic objects, frames, scripts, spaces, audio and video files.

Guideline 2: Do not rely on colour scheme only. The content of web page must match with foreground and background colour. Also provide sufficient contrast to the content for visibility.

Guideline 3: Use Markup and Style Sheets instead of images to convey information. Style sheets controls the layout and presentation of the web page and decreases the download time of the web page.

Guideline 4: Clearly mention the text information of web page with natural language. Specify the expansion of each abbreviation or acronym in the document.

Guideline 5: Use tables properly in the web document. For data tables, clearly specify row and column headers and number of rows and columns exactly.

Guideline 6: Ensure that web pages featuring new technologies transform gracefully. When dynamic contents are updated, ensure that content is changed. Ensure that pages are available and meaningful when scripts, applets or other programmatic objects are not supported by the browsers. If this is not possible, provide equivalent information as alternative in the web page.

Guideline 7: Ensure user control of time sensitive content changes. Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages.

Guideline 8: Ensure direct accessibility of embedded user interfaces. Make programmatic elements such as scripts and applets directly accessible or compatible with assistive technologies.

Guideline 9: Design for device – independence. Ensure that any element that has its own interface can be operated in a device- independent manner.

Guideline 10: Provide context orientation information. Title each frame to facilitate frame identification and navigation. Divide large blocks of information into more manageable groups wherever appropriate.

Guideline 11: Provide clear navigation mechanisms. Clearly identify the target of each link. Provide information about the general layout of a site such as site map or table of contents.

Guideline 12: Ensure that documents are clear and simple. Create a style of presentation that is consistent across pages.

V.CONCLUSION

The main objective of research article is to formulate a framework for evaluating quality and quantity of websites to provide complete effective experience to its visitors. The framework proposed helps a developer to analyse the website quality and quantity easily and accurately. The suggestive measures proposed helps to lessen the errors and make website usable, accessible, functional and easily compatible.

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