A Proposed Empirically Validated Model for Evaluating Quality of Websites and Web Applications

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Abstract: The heterogeneous background of the people involved in the development of websites calls to question the quality of websites. Website quality model is the keystone for website quality evaluation. Existing models for website quality evaluation are based on variegated perspectives or standards. They are either domain specific or stakeholder specific, addressing a particular website domain based on specific stakeholder perspective. Thus, they cannot be used for another type of websites or stakeholder. Consequently, attempts have been made by website researchers to bridge the gaps between the different stakeholders group by developing generic models that combine the different website stakeholders and applicable across website domains. The resulting models still remain conceptual as they lack empirical validation on existing websites. Therefore, to address these gaps in the existing models, this study proposes an empirically validated generic model that will integrate website quality factors from all website key stakeholders (users, designers/developers, and owners/managers) and then validated across website domains. The proposed model aims to bridge the perceptual gap between the various stakeholder groups which will facilitate collaborative website quality evaluation. The study will contribute some unique quality dimensions that are necessary to improve existing quality models. Also, the quality dimension attributes of the model can be translated into a set of guidelines that would contribute to improving website design and development.

Index Terms: generic model, website evaluation, empirical validation, website quality, model validation

I.   BACKGROUND OF STUDY

A website is a collection of web pages that are semantically related and physically linked usually accessible through the internet. Website has become an indispensable tool in all works of life. Users visit websites for different purposes ranging from information sourcing and gathering to online marketing of products and services. Websites are also used as means of communication and public relations to promote organizational identities. Also, websites provide the interfaces for the interactions between humans and computer systems. The underlying web applications provide the driving force for the website interactions.

Websites are most times developed by non-experts, that is, people who are neither computer scientist, information technology (IT) specialist nor interaction design experts. This heterogeneous background of the people involved in the development of websites calls to question the quality of websites. This is especially important because of the increasing roles of websites in everyday life. For example, E-commerce success and growth are dependent on the quality of websites.

The quality of websites and the ease of user's interactions remains an area of concern because human attention span is very short and must be captured in a brief time interval. And one current area of active research aimed at addressing this challenge is useful feedback information gathering to aid the design and development of highly interactive and rich quality websites. The outcomes of these categories of studies are grouped under website quality models.

A   Website Quality Models

Websites quality model or simply, quality models is the cornerstone of a website quality evaluation. Quality models are important in all phases of websites life cycle. Reference [1] enumerated the importance of quality models to include its use in the elicitation and description of all important facets of the site to be designed, helping development team to keep eyes on all desired quality, and in assessing the quality of existing websites. These important roles of website quality models underscore their relevance in website design, development, and maintenance processes.

Websites differ from conventional software systems. Reference [2] traced the differences to four fundamental facts about websites: presence of several diverse components in websites that go beyond the traditional components of software systems, variety of stakeholders, the strategic role of websites, and the market and technological evolution of websites. The constant evolution of websites on the passage of time makes the development of quality models for websites more challenging than traditional software systems.

Quality models should define the quality factors that provide basis for specifying quality requirements. Reference [3] hinged website quality on three set of factors which include task-related, performance-related, and development-related. These three set of factors address the different aspects that relate to end users and developers of websites. The task-related and performance-related factors are the concerns of the end users and they relate to external and quality in use attributes of a system. The website developers are concerned with development-related factors that describe the internal quality of the system while the website owners are concerned with the overall performance of the website. Both the internal and external qualities are important in the overall website quality assessment. Reference [4] opined that a quality model should consider both internal and external qualities since quality perceived by the user is hardly achieved without good intrinsic code quality and good performances. This implies that a basic (or a generic) quality model should capture both internal and external qualities including quality in use for it to provide a comprehensive feedback of the system.

B.   Issues on Existing Website Quality Models

Existing models for website quality evaluation have been developed for evaluating websites based on variegated perspectives or standards. For example, the models of [5], [6], [7], [8], [9], [10], [11], [12], and [13] are focused on website usability which only addresses an aspect of quality. The problem inherent in these models is that they address only a particular type of website and thus cannot be used for other type of websites.

Other sets of website quality models, such as [14], [15], [16], [17], [18], [19], [20], [21], [22], [23], [24], and [25] are tailored to specific stakeholders such as users, designers, or owners of websites. This category of models is both domain and stakeholder specific. That is, they address a particular website domain based on specific stakeholder perspective. While each of these models may be useful in their respective domains, their applications are limited - being domain and stakeholder specific in their applications. The import of this is that they do not consider the holistic view of the system they evaluate.

References [26] and [1] have attempted to bridge the gaps between the different stakeholders group by developing generic models that combine the different stakeholders. Their models were intended to be applicable across website domains. References [27] and [28] also developed a conceptual framework for independent website evaluation. However, these existing models are conceptual and lack empirical validation on existing websites.

The problem with all these subsisting models is that they cannot be adopted as a standard for website quality evaluation because the empirical evidence of their suggested quality dimensions have not been proven. And this drawback underscores [29] recommendation that quality models should be empirically validated before being included in the website evaluation process.

In addition to the non-empirical validation of these existing models, the method used for obtaining the model quality factors is another concern as these quality factors were merely extracted from other models reported in the literature. The problem inherent in this method is the fact that relevant key quality factors that were not addressed in the literature were omitted from the new model.

Therefore, to address these gaps in the existing models, this study proposes to:

(i)   Integrate website quality factors extracted from existing models with factors elicited from website key stakeholders (users, designers/developers, and owners/managers) into a model that will be applicable to all the key stakeholder's groups and across website domains.

(ii)   Test the model on existing websites to obtain empirical evidence of the model quality factors.

This process will bridge the perceptual gap between the various stakeholder groups and harmonize the various dimensions of website quality evaluation. Also, the quality dimension attributes of the model can be translated into a set of guidelines that would contribute to improve website design and development.

II.   MATERIALS AND METHOD

A.   Research Approach: A qualitative and quantitative research approach based on the Repertory Grid Technique (RGT) is the ideal research approach for this study. The reason for this choice is its inherent capability to empirically elicit and evaluate stakeholders and users subjective experience of interaction with websites or web applications.

The qualitative aspect of the research will explore literature for trends in website quality dimensions with the intent to identify suitable website quality dimensions and attributes. It will also entail in-depth elicitation of website quality factors from the different website stakeholders. The identified quality factors will then be consolidated subsequently in the development of this study proposed quality.

The quantitative aspect of the study will involve the generation of a set of numerical data to validate the model. This will involve experimentation of the model on existing websites closely followed by statistical data analysis.

B.   Sample and Sampling Method. Logically, sample must be drawn from website users, website designers/developers and website owners/managers. The selected sample must represent the three perspectives of websites stakeholders. Since the population would not be homogenous, stratified random sampling would be most appropriate as it will affords each member of the sample in the population an equal opportunity of being selected. The population will be stratified into users, designers, and owners from which representative samples will be selected. The demographic profile of the sample must include age, gender and internet usage/experience.

C.   Data Collection Method: Two sets of data should be collected – one set for formulating the quality framework and the other set for validating the model. The first set of data will be collected by means of the repertory grid technique while the second set of data for model validation will be collected through experimentation. This second method will involve the testing of the proposed model on selected websites. This approach will provide empirical data for validating the proposed model. This will be necessary to determine the effectiveness of the model on different websites and the satisfaction of the different perspective groups.

D.   Data Analysis: The data collected from the RGT should be analyzed quantitatively by using a data reduction approach such as the Principal Component Analysis (PCA)/ Cluster Analysis. This will help to explore the relationship between the model factors and to classify the factors into categories. This will be required to compare the quality attributes of the selected websites based on the proposed model**.** Also, a regression analysis should be used to determine any relationship in the proposed model quality factors and satisfaction among the different perspective groups for the selected websites.

E.   Experimental Design: Experiments involving the use of the proposed model on selected website will need to be conducted. The websites will be selected from different domains such as educational website, ecommerce website, and e-government websites. The sample for the research will constitute the participants for the experiment.

III.   EXPECTED OUTCOME

The expected outcome of this study will include the following:

(i)   The identification of the key factors required to define a holistic website quality based on the combined perceptions of the website key stakeholders - users, designers/developers, and owners/managers.

(ii)   The impact of the isolated key factors on the satisfaction of the different key stakeholders.

(iii)   The emergent of an empirically validated generic model for evaluating the quality of websites that addresses the perspectives of key stakeholders and that is domain independent.

These expected outcomes will help evolve and enhanced model with the following features.

(i)   An empirically supported domain independent meta-model that will be scalable across website categories.

(ii)   Identification of unique quality factors that will improve the existing quality models and add to existing guidelines on website design and development.

(iii)   A collaborative evaluation method that will be based on consolidated perspectives of key stakeholders

IV.   CONCLUSION

The lack of empirical validation of existing generic model lays the ground work for this study. In order to contribute to this gap, this study concern is of two folds. Firstly, literature is being explored for critical website quality factors. Also, key stakeholders of website quality are involved to contribute relevant quality factors in this process. Then, factors from both methods are integrated into a model. The second part of the study involves the experimentation of the model on existing websites to obtain empirical evidence of the model quality factors. The study will contribute some unique quality factors that are necessary to improve existing quality models. Also, the quality dimension attributes of the model will contribute to the set of guidelines that would improve website design and development.

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