WEBSITE QUALITY EVALUATION METHODOLOGY UNIVERSAL STAR: 3d POINT – "USABILITY"

SIDDIKJON GAIBULLOJONOVICH ABDUGANIEV [1]

[1]*Tajik Technical University, 735700 Khujand, Tajikistan*
[1]*Johannes Kepler University, 4040 Linz, Austria*
Email: abduganievsg@gmail.com [1],

ABSTRACT

On the website with ease of use, beautiful design, quality information and good functionality, users want to return again and again. In particular, the website that takes into account the rules of web usability, is better perceived by the user, has a good indicator of the time spent on the website, obtains a high conversion rate, brings a lot of customers and increases its position in search engines. Therefore, one of the most important aspects of building the website is usability testing that lies on evaluating techniques. Hence, this article proposes the third point of the website quality evaluation methodology universal star (WQEMUS), which is evaluating the usability satisfaction degree of internet users from websites.

Keywords: WQEMUS; consistency; intelligibility; searchability; navigability; accessibility;

1. INTRODUCTION TO THE TOP QUALITY CRITERION "USABILITY"
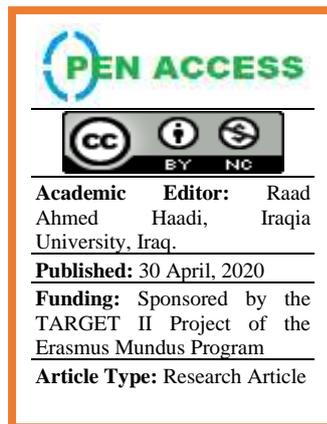
The ISO model describes usability as "the ease of use for a given function" [1]. The website should be designed to support visitors irrespective of their knowledge or experience to get necessary information at the scheduled time [2]. It is also defined as "the sum of one's feelings or attitudes toward a variety of factors affecting that situation" [3]. Usability, as a fundamental feature for the success of web applications and sites, is connected with interface, content and other elements of the site which are easy to use, navigate, understand, operate, learn, remember and find [2, 4–17, 17–21] as well as pleasant to use and operable with a minimum errors and effort [22–32]. It is one of the most frequently used criteria since it maintains a certain level of site performance [20] and is usually associated with user satisfaction [33–35]. The researchers Nielsen [22] and Toh and Pendse [36] stated that websites ought to be developed for usability and understandability. [22] ([22], [9]) supposed that every software development process, including website construction must be subjected to usability testing. Nevertheless, even a good usable site cannot guarantee a complete satisfaction of user preferences [37].

Based on our data analysis and conducted research studies, we conclude that usability indicates how well, consistent, simple, efficient, productive, intuitive and straightforward the website is organized in assisting users to perform various tasks within its competence. A significant number of deep interview respondents answered that "If I experience difficulties or do not understand how to work with the website, I will leave it".

2. METHODLOGY

The methodology of this study is explained in detail in the methods section of a research paper, which is called "Website Quality Evaluation Methodology Universal Star: 1st point – "Content".

3. SUB CRITERIA OF THE "USABILITY" CRITERION

3.1 Consistency

Human intellect is eager to cognitive balance and coordination which is the ability to place things logically in the place, where resources of the same category are grouped together and get those things without difficulty from there. Some researchers called this place as logical "home" [38], where things are supposed to be. Hence, the site's structure should be logical enough, always clear to the user in terms of what to do next [39, 40] and intuitive to him or her [41]. Further, the consistency of a website is reached when "people can move around the website from page to page and find the similar content or information displayed in the similar ways" [42]. Schneiderman ([43], [44]) proposed that struggling for consistency is the first golden rule of designing interfaces, as highly

consistent websites with logical structures reduce the number of mistakes and time of learning as well as increase the productivity and satisfaction of users.

Actually, the in-depth interviews helped to change the name of this sub-criteria from "Logical structure" to "Consistency". Additionally, they disclosed that a logical structure makes the interface of sites easy to remember and instinctive. In most cases, when the site is logical, then the need for using internal search engines and help instructions decreases substantially as long as such a logical site helps to find information significantly faster with less help. However, the structure of sites should not be changed frequently, otherwise, it leads to confusion. Finally, the pages and components of sites should hold logically well together to succeed in getting new users/customers and perspectives, assist users to reach necessary content with a minimum effort, be useful and ensure visitors' feelings of enjoyment. In the end, Naik and Tripathy [45] suggested using a uniform design, implementation techniques and notation throughout the website.

3.2 Intelligibility

Given the scope and nature of the evaluation, the in-depth interviews gave to this attribute the name of "Intelligibility". Then it has been approved in the further studies. Under this sub-criterion, we consider the conditions for obtaining easy to use websites and smart ways to create web content. Particularly, the easier is the website to use, the more people use it. Substantial parts of the "easy to use" are navigability, intuitiveness, learnability and memorability. The design of sites is already intuitive when users know exactly what to do and can complete tasks without interruption and long thoughts.

a) The knowledge that users get when they arrive at the site,
b) The awareness that users need to operate sites and complete tasks and
c) The help instruction that users can get to enhance their awareness are the major ingredients for making website design intuitive to users.

Consequently, users' understanding of what is intuitive for them is a key factor in getting a pleasing and intuitive design. Finally, if learnability belongs to how quickly users might develop an understanding of the interface usage, then memorability characterizes users' ability to remember that interface to perform tasks when they have learned it. Furthermore, respondents of our in-depth interview are sure that this quality characteristic does not affect much on the way users leave web pages or the entire site.

As we also found out during the interviews, many visitors, especially those with limited literacy read only the first few sentences on the web page. If they find out that the content presented is simple and easily understandable, they will continue reading. Otherwise, they will move to other locations of the page [46, 47]. Hence, it is necessary for web content to be composed for easy understanding [39, 48] and easily understandable content should be geared towards a more specialized reading level [49]. Understandability is also the site's capability to assist users to understand content and perform required tasks under certain conditions. Furthermore, there are visual and linguistic readability [50]. The first one concerns with the problems of perception through video clips, images, charts, maps and etc. Here, some rules are: low resolution reduces readability and artificial light of the monitor decreases reading comprehension to 25-30%. The second one is related to the syntax and usage of a language and the characteristics of text used in website pages [2, 11, 18, 23, 30, 51].

Next, linguistic readability is affected by many factors such as:

- web content, provided by the website should be easily understandable, plain, simple and concise. It has to be introduced in a directly understandable format without requiring additional interpretation, decoding or calculation [52]
- web content should be ensured in a smaller amount of text, i.e. 50% less text than on paper, since it is more difficult to read from the site than on paper [53] or using multiple pages for a long text [54–56]. The size of sites such as a number of pages or documents ought to be appropriate [56] and pages have to be inter-connected [57]. Even a plain text may look overwhelming, if there is too much text or not enough spaces on the web page [22, 54, 58]
- clear and easy-to-understand wording of the content, using familiar words and the same terms, defining acronyms and abbreviations, emphasizing the importance and coherence of images/icons, where the same icons used for the same purposes [59], displaying characters with one font size and style except for titles [30, 60–62] and using the most readable and familiar text fonts [16, 21, 63] with relative sizes [30, 32, 62, 64] are important components of linguistic readability. Lastly, the font size of the main content should be no less than 11 points or a bit larger to take into account anticipated age-related changes [37, 58, 65, 66]

- older adults with low motor coordination can move and click the mouse, scroll down a web page [47] or click on standard links with difficulty [46]. Scrolling text distracts visitors, but if it is still used, it should not hide a large amount of text [61]

Moreover, a third of the respondents of both kinds of the interview studies had recommended displaying text first and then images. It is justified, e.g. in the case of rendering images. Apart from this, it is advised to introduce general information first and then the remaining details. Content should be written in a short form as possible, but meaningful, in literary language by avoiding dialect, interesting to read and understandable with minimal efforts. For example, Wikipedia delivers content that is difficult to understand even for those whose mother tongue is the same. In addition, when the level of reading understandability of sites is misaligned with those levels of the reading comprehension skills of targeted users, then sites lose a substantial amount of their users. As a result, an appropriate level of reading complexity, which helps users to better understand, enjoy and benefit from reading, is an important usability issue for sites.

3.3 Searchability

Another aspect that helps to better organize digital content, so that everyone could easily find its exhaustive pieces is searchability. Subsequently, an effective internal tool for searching open or "hidden" information from the entire site with massive keyword-based indices has to be available [5, 12, 13, 17, 19, 21, 24, 26, 28, 61, 64, 67–72] in order for the site to be effective. A hybrid search mechanism that merges varied information sources simplifies users' navigation and thus, saves their time and energy. That is why it should be located in very visible places of web pages with various search options, usable search results and hints to improve search performances. Furthermore, search tools are welcome on nearly every site [73], mainly on large sites or sites with lots of random access [74] or dynamically generated content.

Our in-depth interviews claim that it is a pity not to have an internal search engine, especially when the site contains a lot of pages and information. However, there were also other opposite opinions that indicated "an internal search engine is not needed since there are Google and others". Yet, site visitors get used to internal search engines in order to find more relevant information. Lastly, if the site' search mechanism is easy to use, fast, accurate and efficient, it helps to open the wealth of freely available content.

3.4 Navigability

The Web is generally can be understood as a space to move on it [75]. Visitors can orient themselves and know the current page and location while browsing the website by means of navigation [18, 21, 29, 64]. Diverse features of the navigation system are navigation bars/menus, sidebars, breadcrumbs, cross-references, hyperlinks and meaningful link names [4, 18, 21, 28, 32, 59, 70, 71, 76, 77] as well as assistant links to get back to the previous location or homepage and forwarding or returning options to the top and down positions within long pages [4, 11]. These navigation methods must be well constructed and be available in possibly

Each page or section of the site. Moreover, all important pages of the site have to be accessible through the homepage navigation mechanism and thereby, a general idea about the site is expressed [4, 31, 64]. Next, appropriate navigation options should be always available and change their colors or status after being visited [3, 7, 64, 78].

Personal experience of the author proves that mostly logos or banners forward users to homepages. Additionally, today's browsers contain part of the navigation features such as backward, forward or scrolling options, which can be used actively. Respondents of the in-depth interviews suggested having only necessary links from the homepage in order not to confuse users. Generally, ensuring complete navigation functionalities increase users' satisfaction since users feel that they can control the whole website (Nielsen, [22], [60]). An easy to use website can be provided by convenient navigation tools [17] and thus, a website with sophisticated navigation and limited flexibility has a major problem of usability.

3.5 Mapping

The qualitative interviews contributed to the emergence of this sub-criterion. Website components are supposed to be well-organized, explicitly shown and be accessed from indices [31, 78], sitemaps, tables of content, maps and plans of buildings. They present the general scheme of the site [39, 79] and inform about interrelations of web pages and components. Moreover, like navigation, mapping enables users to jump from page to page if needed [74]. In particular, the sitemap and table of contents are a visual representation of content and site areas. More specifically, they point to the organizational structure of sites in a hierarchical way. Website sitemap has parent/child relationships. Not every page has a child, but all pages have a parent [38]. The Sitemap.xml protocol and the Simple Website Foot-printing are some methods to construct a detailed sitemap and relationship architecture for a site [80]. In conclusion, this quality attribute, being as an essential element of structure, design and usability, is independent from content. It is associated with both the easiness and convenience of moving in

and around the site and motivates visitors to better understand the whole structure of a site as well as reopen, revisit and get more focused on the site.

4. MEASURABLE INDICATORS FOR THE SUB-CRITERIA OF "USABILITY"

Next, with regard to the usability sub-criteria, Table 1has decomposed them in several direct indicators.

Table. 1 Necessary indicators for each sub-criterion of "Usability"

Sub-criteria	Measurable indicators
Consistency	Logically structured site with well-organized components
	Appropriate amounts of components to fit into web pages
	Similar design, colors, layouts, structure and style for each web page
Intelligibility	Easy-to-use, -understand and -operate the site's pages
	Easiness to become skillful and remember how to reach the same pages and site components
	•Relevant web page font types and sizes •Suitably used the most readable
	Presence of multiple/adequate headings, paragraph division, lists, capital letters and breathing spaces
	Obvious and descriptive headings and hyperlink text
	•Balanced and appropriately used key terms, words and phrases •Non-existence of unnecessary jargons and acronyms
Searchability	Well-constructed and convenient internal search engine with advanced search options (e.g. people, books, courses, products, date, keywords and/or etc.)
	Effective internal search engine with accurate search results
	Location of internal search boxes in very prominent places and in required pages
Navigability	Effective and well-designed horizontal/vertical/side navigation bars/menus
	•Availability of buttons such as back and next page, to the home page, down and top of the current page •Traceable visited links, locations and pages
	•Existence of helpful links to all important site pages from the homepage •Convenient, logical and easy navigation system
Mapping	Clear, relevant and informative table of contents (is mostly reflected in the navigation bar) and alphabetic index
	Adequate sitemap
	Clear, relevant and complete maps, indoor maps of large building complexes, etc.
Accessibility	Compliance of the website with accessibility issues (e.g. Conformity to W3C guidelines) A large part of this indicator can be checked automatically.

5. CONCLUSION AND FUTURE WORK

It's better to think about the usability of the site before its development and to conduct testing at every stage of the site's development. However, even if the site has existed for a long time and usability assessment was not carried out during website creation, it is never too late to improve it for users. So, this is possible with the help of the developed metric for WQEMUS on this scientific paper. The theoretical metric, obtained from the literature is strengthened by the empirical evidences that were ensured through in-depth and qualitative interviews and the user evaluation and judgment survey. In future work, we plan to extend WQEMUS improved in this article by establishing the fourth point of WQEMUS.

ACKNOWLEDGEMENT

REFERENCES

1. ISO/IEC, *ISO 9126-1:2001 Software Engineering–Product Quality: Quality model*. International Organization for Standardization and International Electrotechnical Commission, 2001, vol. 1.
2. M. A. E. Lautenbach, I. E. Ter Schegget, A. E. Schoute, and C. L. M. Witteman, "*Evaluating the usability of web pages: A case study,*" Artificial Intelligence Preprint Series, vol. 11, 2008.
3. S. S. Greene, *Security program and policies: Principles and practices.* Indianapolis, US: Pearson IT Certification, 2014.
4. R. Fitzpatrick, "*Additional quality factors for the world wide web.*" in Proceedings of the 2nd World Congress for Software Quality, Yokohama. Union of Japanese Scientists and Engineers, Tokyo, 2000.
5. B. J. Fogg, J. Marshall, O. Laraki, A. Osipovich, C. Varma, N. Fang, J. Paul, A. Rangnekar, J. Shon, P. Swani et al., "*What makes web sites credible?: A report on a large quantitative study,*" in Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM, 2001, pp. 61–68.
6. S. J. Barnes and R. T. Vidgen, "*Assessing the quality of auction web sites,*" in Proceedings of the 34th International Conference on System Sciences. IEEE, 2001, pp. 10–pp.
7. SJ Barnes, RT Vidgen, "*An integrative approach to the assessment of e-commerce quality,*" Journal of Electronic Commerce Research, vol. 3, no. 3, pp. 114–127, 2002.
8. K. Lim, "*Security and motivational factors of eshopping web site usage*," in Proceedings of Decision Sciences Institute 2002 Annual Meeting, 2002, pp. 611–616.
9. J. Nielsen. (1997, 1 January) *Usability testing of advanced homepage concepts for the sun microsystems' 1997 web design.* https://www.nngroup.com/articles/usability-testing-advanced-homepage-concepts-sun-microsystems-1997-web-design/.
10. J Nielsen, *Designing web usability: The practice of simplicity*. New Riders Publishing, 1999.
11. A. Basu, "*Context-driven assessment of commercial web sites,*" in Proceedings of the 35th Hawaii International Conference on System Sciences. IEEE, 2002.
12. A. Basu, "*Context-driven assessment of commercial web sites,*" in Proceedings of the 36th Annual Hawaii International Conference on System Sciences. IEEE, 2003.
13. K. Krauss, "*Testing an e-government website quality questionnaire: A pilot study,*" in Proceedings of the 5th Annual Conference on World Wide Web Applications (WWW2003), 2003.
14. W. H. Delone and E. R. Mclean, "*Measuring e-commerce success: Applying the Delone & Mclean information systems success model,*" International Journal of Electronic Commerce, vol. 9, no. 1, pp. 31–47, 2004.
15. O. Lin and D. Joyce, "*Critical success factors for online auction web sites,*" Proceedings of the 17th NACCQ, pp. 341–344, 2004.
16. A. Abanumy, A. Al-Badi, and P. Mayhew, "*E-government website accessibility: In-depth evaluation of Saudi Arabia and Oman,*" The Electronic Journal of E-Government, vol. 3, no. 3, pp. 99–106, 2005.
17. C. Fernandes and R. Awamleh, "*Internet banking: An empirical investigation into the extent of adoption by banks and the determinants of customer satisfaction in the United Arab Emirates,*" Journal of Internet Banking and Commerce, vol. 10, no. 1, pp. 1–12, 2005.
18. J. Chanaron, "*Evaluating e-learning: The case of automative small-medium suppliers,*" in Proceedings of the 1st International Conference on e-Business and E-learning, 2005, pp. 13–25, Amman, Jordan.
19. E. Diniz, R. M. Porto, and T. Adachi, "*Internet banking in brazil: Evaluation of functionality, reliability and usability,*" The Electronic Journal of Information Systems Evaluation, vol. 8, no. 1, pp. 41–50, 2005.
20. G. Gledec, "*Quality model for the world wide web,*" in Proceedings of the 8th International Conference on Telecommunications-(ConTEL), 2005a, pp. 162–166.
21. I. A. Kokkinaki, S. Mylonas, and S. Mina, "*Egovernment initiatives in cyprus,*" E-Government Workshop (eGOV05) of the Brunel University, UK, 2005.

22.   J. Nielsen, *Usability engineering*. Boston: Academic Press, 1993.
23.   M. Singh and J. Fisher, *"Electronic commerce issues: A discussion of two exploratory studies,"* in Proceedings of the Electronic 3rd Annual Conference on Electronic Commerce, 1999, victoria University, New Zealand.
24.   C. Liu and K. P. Arnett, *"Exploring the factors associated with web site success in the context of electronic commerce,"* Information & Management, vol. 38, no. 1, pp. 23–33, 2000.
25.   A. Srivihok, *"An assessment tool for electronic commerce: End user evaluation of web commerce sites,"* Faculty of Science, Kasetsart University, Bangkok, Tech. Rep., 2000.
26.   P. Zhang and G. Von Dran, *"Expectations and rankings of web site quality features: Results of two studies on user perceptions,"* in Proceedings of the 34th Hawaii International Conference on System Sciences. IEEE, 2001.
27.   A. Molla and P. S. Licker, *"E-commerce systems success: An attempt to extend and respecify the delone and maclean model of is success,"* Journal of Electronic Commerce Research, vol. 2, no. 4, pp. 131–141, 2001.
28.   W. Chung and J. Paynter, *"An evaluation of internet banking in new zealand,"* in Proceedings of the 35th Hawaii International Conference on System Sciences. IEEE, 2002, pp. 2410–2419.
29.   H.-Y. T. Ma and P. Zaphiris, *"The usability and content accessibility of the e-government in the UK,"* in Proceedings of Human Computer Interaction International Conference, 2003, greece.
30.   F. B. Tan and L. L. Tung, *"Exploring website evaluation criteria using the repertory grid technique: A web designers' perspective,"* in Proceedings of the 2nd Annual Workshop on HCI Research in MIS, 2003, pp. 65–69, seattle, WA.
31.   D. Wenham and P. Zaphiris, *"User interface evaluation methods for internet banking web sites: A review, evaluation and case study,"* Human-Computer Interaction, Theory and Practice, pp. 721–725, 2003.
32.   O. Signore, *"A comprehensive model for web sites quality,"* in Proceedings of WSE2005 - 7th IEEE International Symposium on Web Site Evolution. IEEE, 2005, pp. 30–36.
33.   W. H. DeLone and E. R. McLean, *"Information systems success: The quest for the dependent variable,"* Information Systems Research, vol. 3, no. 1, pp. 60–95, 1992.
34.   S. F. Abdinnour-Helm, B. S. Chaparro, and S. M. Farmer, *"Using the end-user computing satisfaction (eucs) instrument to measure satisfaction with a web site,"* Decision Sciences, vol. 36, no. 2, pp. 341–364, 2005, wiley Online Library.
35.   A. Mohammad, R. Darvish, and B. Farhad, *"An examination of the effect of website quality on satisfaction and customer retention: The case of iranian online book stores,"* GMP Review, vol. 16, 2015.
36.   L. Y. Toh and S. Pendse, *"An empirical evaluation of web page design and consumer behaviour,"* in 1st Annual Collected Workshop on Electronic Commerce, vol. 59, no. 4, 1997, pp. 410–429.
37.   T. S. Tullis, *"A method for evaluating web page design concepts,"* in Proceedings of ACM CHI'98 Conference on Human Factors in Computing System. ACM, 1998, pp. 323–324.
38.   M. Sharlin, E. Tu, and T. Bartus, *"Guide to creating website information architecture and content,"* Princeton University, p. 43, 2008.
39.   L. Olsina, *"Metodología cuantitativa para la evaluación y comparación de la calidad de sitios web,"* Ph.D. dissertation, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, Argentina, 1999.
40.   T. Brinck, D. Gergle, and S. D. Wood, *Designing Web sites that work: Usability for the Web*. Morgan Kaufmann, 2002.
41.   W. M. Liu, G. Soleck, J. Hopps, K. Dunston, and T. Pickett, *"A new framework to understand social class in counseling: The social class worldview model and modern classism theory,"* Journal of Multicultural Counseling and Development, vol. 32, no. 2, pp. 95–122, 2004.
42.   Z. Zhou, *"Evaluating websites using a practical quality model,"* Master's thesis, De Montfort University, 2009.
43.   B. Shneiderman, *"Designing information-abundant web sites: Issues and recommendations,"* International Journal of Human-Computer Studies, vol. 47, no. 1, pp. 5–29, 1997.
44.   B Shneiderman, *"Designing trust into online experiences,"* Communications of the ACM, vol. 43, no. 12, pp. 57–59, 2000.
45.   K. Naik and P. Tripathy, *"Software testing and quality assurance: Theory and practice,"* Hoboken, New Jersey: John Wiley & Sons, Inc., 2008.
46.   R. D. Ellis and S. H. Kurniawan, *"Increasing the usability of online information for older users: A case study in participatory design,"* International Journal of Human-Computer Interaction, vol. 12, no. 2, pp. 263–276, 2000.
47.   D. Hawthorn, *"Possible implications of aging for interface designers,"* Interacting with Computers, vol. 12, no. 5, pp. 507–528, 2000.

48. Y. Lee and K. A. Kozar, *"Understanding of website usability: Specifying and measuring constructs and their relationships,"* Decision Support Systems, vol. 52, no. 2, pp. 450–463, 2012.
49. S. J. Koyanl, R. W. Balley, and J. R. Nall, *Research-based Web design and usability guidelines*. National Cancer Institute, 2004.
50. R. Flesh, *The art of readable writing*. Harper & Row Publishers, Inc., 1949.
51. K. K. Singh, P. Kumar, and J. Mathur, *"Implementation of a model for websites quality evaluation–du website,"* International Journal of Innovations & Advancement in Computer Science, vol. 3, 2014.
52. E. Grose, C. Forsythe, and J. Ratner, *"Using web and traditional style guides to design web interfaces,"* Human Factors and Web Development, pp. 121–131, 1998.
53. J. Morkes and J. Nielsen, *"Applying writing guidelines to web pages,"* in CHI 98 Conference Summary on Human Factors in Computing Systems. ACM, 1998, pp. 321–322.
54. E. K. R. E. Huizingh, *"The content and design of web sites: An empirical study,"* Information & Management, vol. 37, no. 3, pp. 123–134, 2000.
55. J. Nielsen, *Designing for the Web*. Indianapolis, USA: New Riders Publishing, 2000.
56. M. Y. Ivory and M. A. Hearst, *"Improving web site design,"* IEEE Internet Computing, vol. 6, no. 2, pp. 56–63, 2002.
57. J. M. Spool, T. Sconlong, W. Schroeder, C. Snyder, and T. DeAngelo, *Web site usability: A designer's guide*. North Andover, MA: User Interface Engineering, 1997.
58. D. Chisnell, A. Lee, and J. Redish, *"Designing web sites for older users: Comparing aarp's studies to earlier findings,"* https://archive.li/9LXM0, 2004.
59. J. A. Borges, I. Morales, and N. J. Rodriguez, *"Page design guidelines developed through usability testing,"* University of Puerto Rico, Tech. Rep., 1998.
60. J. Nielsen, *"A home-page overhaul using other web sites,"* IEEE Software, vol. 12, no. 3, pp. 75–78, 1995.
61. S. Yoo and J. Jin, *"Evaluation of the home page of the top 100 university websites,"* Academy of Information and Management Sciences, vol. 8, no. 2, pp. 57–69, 2004.
62. L. Hasan and E. Abuelrub, *"Assessing the quality of web sites,"* Applied Computing and Informatics, vol. 9, no. 1, pp. 11–29, 2011.
63. O. Signore, *"A simple architecture for adaptive hypertext,"* in Proceedings of the 2nd International Conference on Adaptive Hypermedia and Adaptive Web-Based Systems. Springer Berlin, Heidelberg, 2002, pp. 568–571.
64. J. E. Heimlich and K. Wang, *"Evaluating the structure of web sites,"* Environmental Education and Training Partnership Resource Library, Ohio State University Extension, 1999, USA.
65. M. Bernard, C. Liao, and M. Mills, *"Determining the best online font for older adults,"* Usability News, vol. 3, no. 1, pp. 1–4, 2001.
66. J. Nielsen and P. K. Coyne, *"Web usability for senior citizens: 46 design guidelines based on usability studies with people age 65 and older,"* 2002, nielsen Normal Group Report.
67. J. Heimlich, *"Evaluating the content of web sites,"* Environmental Education and Training Partnership Resource Library, Ohio State University Extension, 1999.
68. B. K. Guru, B. Shanmugam, N. Alam, and C. J. Perera, *"An evaluation of internet banking sites in islamic countries,"* Journal of Internet Banking and Commerce, vol. 8, no. 2, pp. 1–11, 2003.
69. M. Cao and Q. Zhang, *"Evaluating e-commerce web site design: A customer's perspective,"* in Proceedings of Decision Sciences Institute 2002 Annual Meeting, 2002, pp. 1186–1191.
70. F.-J. Lin, K. Huarng, Y.-M. Chen, and S.-M. Lin, *"Quality evaluation of web services,"* in E-Commerce Technology for Dynamic E-Business, 2004. IEEE International Conference. IEEE, 2004, pp. 226–233.
71. H. Achour and N. Bensedrine, *"An evaluation of internet banking and online brokerage in Tunisia,"* in Proceedings of the 1st International Conference on E-Business and E-learning, 2005, pp. 147–158, amman, Jordan.
72. H. Hussin, A. S. Mohd, and M. Mustafa, *"E-commerce and ethical web design: Applying the online guidelines on Malaysian websites,"* The International Arab Journal of Information Technology, vol. 2, no. 3, pp. 219–227, 2005.
73. L. Rosenfeld and P. Morville, *Information architecture for the world wide web*, 2nd ed. O'Reilly Media, Inc., 2002.
74. D. Gehrke and E. Turban, *"Determinants of successful website design: Relative importance and recommendations for effectiveness,"* in Proceedings of the 32nd Hawaii International Conference on System Sciences. IEEE, 1999.
75. J. Fleming, *Web navigation: Designing the user experience*. CA: O'reilly Sebastopol, 1998.
76. P. Vora, *"Human factors methodology for designing web sites,"* in Human Factors and Web development, E. Grose, C. Forsythe, and J. Ratner, Eds. New Jersey: Lawrence Erlbaum Associates, 1998, pp. 153–172.

77.   P. Vora, *Web application design patterns*. Morgan Kaufmann, 2009.
78.   D. Gefen, E. Karahanna, and D. W. Straub, *"Trust and tam in online shopping: An integrated model,"* MIS Quarterly, vol. 27, no. 1, pp. 51–90, 2003.
79.   S. J. Westerman, D. R. Davies, A. I. Glendon, R. Stammers, and G. Matthews, *"Age and cognitive ability as predictors of computerized information retrieval,"* Behaviour & Information Technology, vol. 14, no. 5, pp. 313–326, 1995.
80.   S. Mansfield-Devine, *"Simple website footprinting,"* Network Security, vol. 2009, no. 4, pp. 7–9, 2009.

AUTHORS PROFILE

Siddikjon G. **Abduganiev** obtained his Master's Degree of Science in Systems Engineering with honors from the Khujand branch of the Technological University of Tajikistan (KBTUT) in 2007, Khujand city, Tajikistan. Until 2012, after university graduation, he has worked as a junior and senior teacher at KBTUT and the Khujand Polytechnic Institute of the Tajik Technical University (KPITTU) in the departments of Computer Programming and Information Technologies and Higher Mathematics and Informatics, respectively. His core research areas are software development and testing. He has published and presented around twenty research papers in national and international conferences and peer reviewed journals.