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Web quality evaluation of Jordan's e-government

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Abstract

The web quality is very critical factor for the usability and the performance of E-government. It contributes to the success of web applications. Quality evaluation is vital for efficient usage of information. In this paper we evaluate and account the quality of web service for developing strategies that improve web services, and this will increase the user satisfaction. In our approach we consider Jordan's e-government websites.

Keywords— Web quality, E- government, Quality Evaluation, tools.

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I. INTRODUCTION

Website is very important in the online businesses planning; so usefulness and ease of use website design will lead to efficient and effective target business. Quality website is important to increase visitor satisfaction, because if the visitors can't find what they want in the website they may not use the website again. The services of organizations are transformed from traditional to electronic way because the continuously growth of using information technology applications and internet.

Web quality evaluation is necessary for efficient usage of web information. It is very critical for the performance and usage of websites since it contributes to the success of web-based applications. The quality evaluation considers the quality of both website and e-service, since customers that use governmental sites are either seeking for information or require a service. In general, quality dimensions depend on the attributes of provided services such as usability, security; availability, and customer satisfaction.

Development policies continuously expand their action scope, considerable combining between public services implementation and the population needs. Many organizations start to evaluate the quality of their services. The European Commission (2013), announced that the Internet is used by 46% of European people for looking for a job, public library used, services of tax submitting, birth registering, and many other services, because 80% of European people believe that using e-services will save time, 76% said that it is flexible, 62% hope for saving money by using e-services. So that measuring quality of online services of government becomes very important for improving services and people satisfaction.

The structure of this paper is organized as the following: Section II reviews some of the recent related work. Methodology and steps of work are detailed described in section III. Section IV presents experimental result and finally, section V concludes the paper.

II. RELATED WORK

Akincilar and Dagdeviren [1] considered a hybrid Multiple Criteria Decision Making MCDM to evaluate the quality of hotels websites especially 5 stars hotels in Ankara. MCDM refers to the analytic hierarchy process for the analytic hierarchy process for weighing criteria and ranking the alternatives.

Yu, Guo, Guo, and Huang [2] evaluated web sites related to E-commerce to rank them using AHP and fuzzy TOPSIS. Aydin and Kahraman [3], in the same field of evaluation, proposed a fuzzy AHP approach to rank alternatives considering qualitative and quantitative factors. They compared their results to fuzzy VIKOR.

AlBalushi, T., Ali, S., Ashrafi, R. and Al Balushi, S [4] used web diagnostic tools to evaluate the e-services quality in Oman, they considered the accessibility and performance dimensions for the evaluation.. Website accessibility depends on designing, developing, and modifying a suitable websites for all users. There are some factors ensure accessibility for websites such as functionality, content type, environment, and design of websites. A number of popular websites were chosen for the evaluation, seven websites were chosen. Websites performance affected by many key factors includes page size, load time, average speed, performance grade, speed, response time, and total number of requests. For the performance measuring of chosen websites; the researchers conducted multiple tests at four different times (days and weeks). Moreover, among recent studies, Hung and Tang [5] interested in evaluating electronic service quality using consistent fuzzy method to distribute weights.

The study of [6] searched for factors that lead businesses in Jordan to adopt e-government. The researchers used 113 responses for determining the relationships the website quality, website design and adoption of businesses e government. This study predicts that the support for quality website can lead efficient and effective usage of e-government in businesses planning. The researcher used Statistical Package for Social Science (SPSS) for determining the relationship between variables. They used Cronbach alpha method to test reliability for variables. There is strong correlation between website quality and a usage behaviours e-government, and between website design and a usage behaviors e-government.

Ip, Law and Lee [7] used AHP Fuzzy approach to evaluate the functionality of hotel websites .the purpose was to define the most important criterion according to the "Reservation Information". Cebi [8] proposed an Integrated MCDM technique to evaluate the design parameters of websites according to web site type with Decision Making Trial and Evaluation Laboratory (DMTEL) method. Those parameters were discussed to help designers adopting good websites that meet users' satisfaction.

A summary of the literature and related works examined in this paper is provided in Table. It shows the methodology, procedures, results and limitations.

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TABLE I.   LITERATURE ANALYSIS AND SUMMARY

Citation	methodology	Procedures	Results	Limitations
Lehemets, 2012	user-centric eGovernment quality management to evaluate 21 criteria	Dimensions Reliability, Efficiency, Citizen Support, and Trust	Comprehensive eGovernment quality assessment model	Lack of user-surveys focused on user-centric e- and user-satisfaction
Jati & Dominic, 2009	Measure the quality of e government web site of five Asian countries	Use online web tools performance and webpage analyser	Egovernment websites neglect performance and quality	No aware of ultimate determinant of quality from cultural perspective
Bikfalvi et al., 2013	Develop holistic service quality assessment tools	Tested 5 participant local	Satisfaction a good level value	Monitor user perception innovation's adoption
Garcia et al., 2005	Propose guidelines to design egovernment sites	Evaluate, services to 127 Brazilian egovernment sites	Sites need to highlight security and information veracity	The evaluation is not at all an accurate and it needs to refine
Choudrie et al., 2004	Evaluative e-Government portals from accessibility, quality and	Use standard web diagnostic tools to examine three criteria	Motivate to hurry embracing the first phase of e-governance	Significant work still needs to make the portals 'best practice'

privacy issues			

III. DEVELOPMENT OF E-GOVERNMENT QUALITY

E-government means using the communication and information technologies by governments to improve quality of their services provided to companies, citizens, and other governmental bodies [9].

The e-government services quality analysis is based on many dimensions includes website design, responsiveness, reliability, information availability, privacy and ease of use. E_ government service provides online channel for transaction provision, for example paying the bills and obtained the building permits. The services provided by governments is incessant so several Governments in the world offer the electronic services strategies more than services. There are many criteria used to evaluate quality of web:

1) *Website design:* the appearance and technical operation of websites.
2) *Reliability:* Delivering the services on time and this cause citizen satisfaction.
3) *Responsiveness:* The government service is useful, fast, and efficient.
4) *Security/Privacy:* Protecting personal data for web user.
5) *Ease of Use:* E-Government Websites should be user friendly.
6) *Information:* the e-Government service should provide accurate, understandable information.
7) *Customization:* the provided services should focus on consumers.
8) *Communication:* It means using many communication channels for easier access to services.

IV. METHODOLOGY

In our methodology, we use different diagnostics tools to evaluate the Jordanian e-government websites. Table shows the tools we used for evaluation and assessment. These tools are web optimization tool, w3 validator, link popularity, tawdis, website grader, and speed insights.

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TABLE II.   WEB DIAGNOSTIC TOOLS

Tool URL and Name	Goal of use
http://www.websiteoptimization.com	Webpage speed analyser online service
http://validator.w3.org/checklink	Monitor broken links in the HTML code
http://validator.w3.org	Validate the HTML code
www.linkpopularity.com	Determine the amount and quality of links that are made to a single website from many websites
www.tawdis.net	Test the criteria to be accessed by people with disabilities
https://website.grader.com/	Page size, Page requests, Page speed, Browser caching/
https://developers.google.com/ speed/pagespeed/insights/	Optimizing website for mobile contributes to valuable traffic
http://nibbler.silktide.com/	Accessibility, experience, marketing & technology

A. *Website Grader*

Website Grader is powered by Hubspot and it focus on four essential metrics.

1) *Performance*

Optimizing website's performance is crucial to increasing traffic, improving conversion rates, generating more leads, and increasing revenue. The performance depends on Page size, Page requests, Page speed, Browser caching, Page redirects and Compression.

2) *Mobile*

Traffic from mobile devices is growing fast. Optimizing website for mobile contributes to valuable traffic, leads, and revenue. This can be done by maintaining the Responsive and Viewport.

3) *SEO*

SEO refers to Search Engine Optimization. Website should be easy for users to discover—and easy for search bots to understand—with better page titles, headings, Sitemap and Meta descriptions.

4) Security

Protecting websites from attacks strengthens the confidence of visitors that the site is trustworthy and authentic.

B. Nibbler

Nibbler, on high-level, audits website for more than 24 parameters and specifies the overall score. It scans for essential factors including: accessibility, experience, marketing & technology. Each metric has a score, and valued by list of parameters.

1) *Acce*ssibility: How the website is accessible to mobile and disabled users?

2) *Expe*rience: How the website is satisfy for users?

3) *Mar*keting: How popular and well marketed the website is?

4) *Tec*hnology: How well designed the website is

To evaluate each metric, Nibbler analyser considers a list of parameters including: Code quality, Meta tags, Headings, URL format, Mobile, Internal links, Server behaviour, Images, Facebook page, Twitter, Social interest, Analytics, Popularity, Amount of content, Incoming links, Page titles, Freshness. Table 1 bellow obtains the overall score of the analysis.score 70% and above is rated high quality.

C. PageSpeed Insights

PageSpeed Insights is a tools developed by google, page performance for desktop and mobile device can be measured by PageSpeed Insights. The URI is fetched twice once for mobile and once for desktop and provides a score which ranges from 0 to 100 points about how pages applied best performance practices and give a suggestions to make that pages faster, it provides three categories to classify web pages:

1) *Good*: Most of performance best practices are applied by web page and a good user experience should be delivered.

2) *Needs work*: Some of common performance optimizations are missing by web page and a slow user experience may result. Some recommendations have to be investigated.

3) *Poor*: The page is not optimized and is likely to deliver a slow user experience. Many recommendations have to be prioritized and applied.

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D. Website optimization

In this part, four tools are used for analysis and collecting data. Website optimization tool for Webpage speed analyser online service. W3 validator is used to monitor broken links in the HTML code and validate the HTML code. Further, link popularity tool aims to determine the amount and quality of links that are made to a single website from many websites. Finally, tawdis can test the criteria to be accessed by people with disabilities. The factors and standardized specifications of websites undertaken for evaluation are listed in Table III.

TABLE III.   WEB QULITY EVALUATION .

Tested Factor	Quality Standard
Average server response time	< 0.5 second
Number of component per page	< 20 objects
Webpage loading time	< 30 second
Webpage size in byte	< 64K

V. **RESULTS**

In this section, we induct the main outcomes and findings resulted from the analysis of web portals of Jordanian government. Table IV shows encoding of the website names and their links. We made this step for design of the paper and for more appropriate display if information.

TABLE IV.   WEB PORTALS ENCODES

E- government website	Web link	Code
The Ministry of Public Works and Housing	http://mpwh.gov.jo/	MPWH
Ministry of Energy	http://memr.gov.jo/	MEMR
Ministry of Transportation	http://mot.gov.jo/	MOT
Ministry of Sector Development	http://www.mopsd.gov.jo/	MOPSD
Parliamentary Affairs	http://moppa.gov.jo/	MOPPA

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Ministry of Information	http://www.jmm.jo/	JMM
Irrigation and water ministry	http://www.mwi.gov.jo/	MWI
Ministry Of Agriculture	http://www.moa.gov.jo/	MOA
Ministry of Labor	http://www.mol.gov.jo/	MOL
Ministry of Environment	http://www.moenv.gov.jo/	MOENV
Ministry of Youth	http://www.moy.gov.jo/	MOY
Ministry of Finance	http://www.mof.gov.jo/	MOF
Ministry of Planning and International Cooperation	http://www.mop.gov.jo/	MOP
Ministry of Awqaf and Holy Sites	http://www.awqaf.gov.jo/	AWQAF
Ministry of Industry, Trade, and Supply	http://www.mit.gov.jo/	MIT
Ministry of Municipal Affairs	http://www.mma.gov.jo/	MMA

Table IV presents the results of analyzing 16 web portals for Jordanian government. The five factor measures viewed in the table are server response time loading time, web page size, markup validation, and broken links. The number of websites the shows good results according to the standardized and threshold numbers is 1 regarding the server response time. Whereas the number of websites that conform loading time is 2. In terms of web page size, there is no website under this criteria and no achievement for standardized web page size. Moreover, 8 websites belong to the quality measure of number of components per page. The results indicate a low level of quality measure for 16 e-government web portals till 16/12/2017. For more details see the numbers in the Table displayed below.

TABLE V.   WEB QUALITY EVALUATION

Web portal	Response time (s)	Load time (s)	Size (mb)	Markup Validation	Broken link(n)
MPWH	1.76	31.6	580	40	3
MEMR	0.98	43.0	896	14	8
MOT	1.16	67.3	748	14	1
MOPSD	1.59	28.8	950	13	5
MOPPA	0.42	56.2	829	12	13
JMM	0.84	120	925	24	17
MWI	0.75	45.6	667	7	8
MOA	0.83	50	827	56	0
MOL	1.46	58.9	628	28	25
MOENV	1.34	90.2	885	47	39
MOY	0.54	63.8	467	65	4
MOF	0.62	80.1	792	35	15
MOP	1.36	116	732	18	23
AWQAF	1.47	62.5	947	20	9
MIT	1.72	20	268	5	0

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MMA	0.73	76.4	448	39	16

Results

TABLE VI.   WEB QUALITY EVALUATION .

E-government website code	Site Analyzer					
	Nibbler	Website Grader	Page Speed			
			Mobile	Level	Desktop	*Level*
MPWH	50%	59%	1.00	Good	0.78	Needs work
MEMR	71%	62%	0.99	Good	0.99	Good
MOT	63%	27%	0.00	Poor	0.00	Poor
MOPSD	61%	29%	0.49	Poor	0.42	Poor
MOPPA	64%	62%	0.38	Poor	0.45	Poor
JMM	52%	49%	0.53	Poor	0.68	Needs Work
MWI	44%	34%	0.90	Good	0.72	Needs Work
MOA	58%	62%	0.33	Poor	0.31	Poor
MOL	70%	62%	0.34	Poor	0.40	Poor
MOEN	64%	62%	0.00	Poor	0.00	Poor

V						
MOY	52%	49%	0.29	Poor	0.28	Poor
MOF	40%	45%	0.25	Poor	0.32	Poor
MOP	55%	74%	0.36	Poor	0.42	Poor
AWQ AF	60%	30%	0.48	Poor	0.52	Poor
MIT	72%	55%	0.49	Poor	0.57	Poor
MMA	67%	53%	0.47	Poor	0.54	Poor

VI. CONCLUSIONS

The main goal of our work is evaluating some of e-Government in Jordan, we use five tools: Nibbler, Website, Grader, and PageSpeed insights to evaluate quality for 16 Jordanian web pages. Based on Page Speed tool, 3 websites are good in mobile; these websites are The Ministry of Public Works and Housing, Ministry of Energy, and Irrigation and water ministry. Consequently, 3 websites needs work in desktop; these web sites are The Ministry of Public Works and Housing, Ministry of Information, and Irrigation and water ministry. The rest of websites are poor in mobile and desktop. Further, 1 website is good in desktop which is Ministry of Energy.

Likewise, only 1 website is good in server response time which is Parliamentary Affairs. Furthermore, Ministry of Sector Development and Ministry of Industry, Trade, and Supply are good in loading time. In terms of web page size, there is no website under this criteria and no achievement for standardized web page size. Moreover, Ministry of Energy, Ministry of Transportation, Ministry of Sector Development, Parliamentary Affairs, Irrigation and water ministry, Ministry of Planning and International Cooperation, Ministry of Awqaf and Holy Sites, and Ministry of Industry, Trade, and Supply websites belong to the quality measure of number of components per page. The results indicate a low level of quality measure for 16 e-government web portals till 16/12/2017.

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