INTERACTIVE MODEL OF GOVERNMENT WEBSITES BASED ON DECISION TREE ANALYSIS AND WEB QUALITY 4.0

Ali Rokhman *, Pinar Çömez **, Slamet Rosyadi ***

* *Corresponding author*, Department of Public Administration, Faculty of Social and Political Sciences, Jenderal Soedirman University, Central Java, Purwokerto, Indonesia
Contact details: Department of Public Administration, Faculty of Social and Political Sciences, Jenderal Soedirman University, Jl. Prof. Dr. HR Boenjamin 708, Dukuhbandong, Grendeng, North Purwokerto, Banyumas Regency, Central Java 53122, Indonesia
** Faculty of Engineering, Düzce University, Düzce, Türkiye
*** Department of Public Administration, Faculty of Social and Political Sciences, Jenderal Soedirman University, Central Java, Indonesia

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Abstract

Government websites are important for providing citizens access to vital public information. However, many government websites are not well-designed, difficult to navigate, even out-of-date, and insufficient in providing information and interactive channels. Based on previous studies, website development often fails because it is oriented toward implementing a mandate without evaluating the website traffic and visitors. The evaluation process of e-government websites is essential for developing the performance and quality of the websites (Lee-Geiller & Lee, 2019). This study aims to evaluate the quality of Indonesian local governments. This study used a quantitative approach with a web quality 4.0 (WebQual 4.0) instrument for assessing the quality of websites. WebQual 4.0 consists of three components: usability design, information quality, and interaction services. Data were analyzed using decision tree techniques. The main finding of the study is that not all WebQual 4.0 components affect the number of visitors. The interaction service component is the most influential factor. The results suggest a website paradigm that focuses on visitors' interaction. Visitors should feel they are well-served and engaged when using a website. This approach of interactive websites can employ popular social media platforms to offer real-time visitor interaction.

Keywords: Decision Tree, E-Government, Government Websites, Human-Computer Interaction, Interactive Model, Interactive Website, Web Quality 4.0

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1. INTRODUCTION

The emergence of the Internet has fundamentally changed how governments and citizens communicate and engage with each other (Evans & Yen, 2006; Zhuravskaya et al., 2020). Governments are increasingly turning to online channels to connect with their citizens and provide them access to information and services. Therefore, digitalization is inevitable for all sectors of life in both the private and public sectors (Quarato et al., 2020). In the public sector emerged digital governance concept is characterized by modern ways of delivering personalized public services to citizens and enables the establishment of online networks and partnerships between stakeholders (Linhartova, 2022). According to the standard terminology, digital governance refers to a framework for establishing accountability, roles, and decision-making authority for an organization's digital presence, such as websites, mobile sites, social channels, and other Internet and web-enabled products and services (Welchman, 2015). To provide online services, every level of government today must have a well-developed, quality website. Unfortunately, this crucial element is often overlooked. Website development often fails because it is oriented towards implementing a mandate without evaluating the website traffic. The evaluation process of e-government websites is essential for developing the performance and quality of the websites. After all, parallel with the digital transformation in public services, government websites are vital in providing services to the public and platforms for citizens to participate in public affairs and decision-making processes (Abdel-Basset et al., 2018; Anwariningsih, 2011; Lee-Geiller & Lee, 2019; Schank, 2020; Teo et al., 2014).

Scholars have conducted multiple research projects on website quality, but very few investigate government websites. Mainly use the web quality 4.0 (WebQual 4.0) instrument for the government websites. On the other hand, research on government websites rarely found a correlation with the number of visitors or website traffic. In addition, there are currently few studies regarding the evaluation of the quality of local government websites using the WebQual tool, especially in relation to Indonesia. Most studies that use the WebQual 4.0 tool to assess website quality focus primarily on global or Western contexts, and few studies directly address the inherent problems and requirements of Indonesian municipal websites. This gap leads to a lack of understanding of specific conditions and recommendations for local government in Indonesia.

Theoretically, the primary purpose of website development is to be visited by users, so it must be visually appealing to catch their attention (Allison et al., 2019; Chivinge et al., 2021). However, it is not the only determining factor. If the visitors cannot find what they are looking for in one website, they may not revisit it in the future. This study aims to analyze the number of visitors to government websites using the WebQual 4.0 instrument. Based on the WebQual 4.0 instrument, this research proposed a question: *What are the dominant variables affecting the number of visitors to the government website?*

The observed variables are website quality, infrastructure availability, population, and type of government in city and district government (Alshrida & Mohammad, 2018; Brown, 2021; D'Ambra, 2018; Kramer, 2020). This comprehensive theoretical and conceptual framework focuses on interactive website design and user interaction aspects, ensuring that research considers user experience as a fundamental element of local government websites in Indonesia. This framework provides a structured approach to evaluating the extent to which interactive features match user expectations and contribute to the overall quality of these websites. It also lays the foundation for developing user-centred design principles and best practices for local government websites, with an emphasis on interactivity to improve engagement and customer satisfaction.

This study offers substantial relevance and significance due to the following factors: First, the quality of local government websites has a significant impact on the availability and use of public services. An empirical analysis of website quality using the WebQual 4.0 instrument can provide recommendations for improving the provision of basic services to Indonesian residents. Second, the results of this study can be used to create case-specific guidelines and suggestions for Indonesian local government website managers. These suggestions have the potential to enhance these websites' efficacy and efficiency, which will ultimately help citizens and government organizations alike. Third, local government websites serve as a valuable tool for public participation, research assessing website quality is closely linked to the government's objective of fostering openness, transparency, and citizen communication. The government can encourage government participation and provide better services to its constituents by using this website. Fourth, the methodology and findings of this study can serve as a framework for similar research in other countries and regions and contribute to extensive knowledge of local government website quality assessments around the world, as well as upgrade to a new web quality tool.

The novelty of this study provides insights into the factors influencing the number of users visiting government websites and identifies whether design factors (web quality) or external factors (demographic characteristics and availability of infrastructure) have more influence. Finding is a meaningful, initial effort for transformation towards digital governance to meet the requirements of digital governance, namely serving the community through a website. Therefore, this study seeks to answer three research questions:

RQ1: How is the quality of the district/city government website?

RQ2: What factors can affect the number of visitors to government websites?

RQ3: Which dimensions need to be improved on the government website?

To answer these questions, this study uses a quantitative approach, with descriptive statistical techniques and a decision tree model processed using RapidMiner software version 10.3.

The structure of this paper is as follows. Section 2 reviews the relevant literature. Section 3

analyses the methodology that has been used to conduct empirical research on website quality, Section 4 presents results and findings, Section 5 discusses the findings with related theories and previous research, and Section 6 proposes conclusion, recommendations for future research, and limitations of the study.

2. LITERATURE REVIEW

Web quality refers to the act of delivering a practical web experience that meets the user's needs in a usable and sustainable manner (Zeithaml et al., 2002). As websites have grown into a vital tool for communication and information sharing, governments are increasingly turning to the Internet to interact with their constituents and improve the efficiency of their operations. However, many government websites fail to provide users with an engaging experience, leading to low usage rates and poor online engagement. Poor website quality can reflect the severe effectiveness of an organization, making it difficult to achieve its objectives and serve the customers' needs. Therefore, government agencies need to implement effective strategies to improve the quality of their websites to enhance user satisfaction and organizational efficiency (Abd Ellatif, 2006; Mardani-Nejad et al., 2019).

WebQual 4.0 instrument was developed by Barnes and Vidgen (2000) to help organizations identify areas for improvement, especially the effectiveness of their websites in a quick and convenient manner. This tool is based on a five-point scale ranging from 'Excellent' to 'Needs improvement' and provides suggestions for improving each area identified on the website. WebQual 4.0 consists of three elements: usability design, information quality, and interaction service. Usability design means that it is friendly to the user with a positive view of the site's utility, namely a good user experience and easy navigation. Since website design is the first thing noticed by the users, the design should be easy to use, the navigation should be clear and uncluttered so that users can locate the information they need seamlessly. The second essential element is the information quality of the website (Chen et al., 2020) which provides content that is both conformable to the organization's policies of acceptable content and sufficiently rewarding to the needs of the intended audience. In addition to ensuring that information is presented clearly and consistently across the website, it is crucial to provide accurate and up-to-date details. The next/last element to consider in website development is the interaction service, which refers to the availability of online services, such as help-desk support, live chat, or an online directory. In this way, users would expect to be able to access online support services and obtain answers to their questions in a fast and timely manner without having to wait for a response (Barnes & Vidgen, 2000; Barnes & Vidgen, 2006).

At the end of the paper, the Appendix presents a list of previous studies that have been compiled from various references classified by subject, instrument, and result.

Based on Table A.1 (Appendix), many experts, including Indonesians, have carried out research on WebQual 4.0, such as Hartomo and Ramadhan (2021) on the Sikabi website from Boyolali district government, Central Java province. Analyzing the correlation between web quality and user satisfaction, Hartomo and Ramadhan (2021) reported that information quality influenced the satisfaction of the users of the Sikabi website. Another study by Rahmat et al. (2021) used the WebQual 4.0 instrument equipped with the ServQual instrument for the academic information system of a university and reported that ServQual and WebQual 4.0 collectively produce a positive influence on user satisfaction. Another study by Warjiyono et al. (2020) on Tegal city's public service information system reported that the city system generally had good quality and suggested some top-priority improvements for providing accurate information and allowing users to easily understand the information.

Other studies used web qual instruments but did not specifically mention WebQual 4.0, including Shayganmehr and Montazer (2019) who drew a correlation between web quality and citizen participation in the websites of the governments of Indonesia, China, Australia, and Vietnam. This study found that content, information quality, and usability were the most important attributes (Shayganmehr & Montazer, 2019). Web quality research has also been conducted on the websites of provincial governments across Indonesia. A study on DKI Jakarta, Bali, and Banten Provinces reported that the provincial government of DKI Jakarta and Banten had high-quality websites, whereas Bali was the opposite (Jalil et al., 2021). Web quality of East Java provincial government websites reported that the website served as an online platform for the public to file complaints and supported the achievement of good governance (Oktaviani, 2022). Further research on the web quality of the Manado city government's official website showed that the website provided excellent services that almost met the expectations of the community to realize thein terms of optimal use of information and communication technology (Putra & Imanuel, 2020). Meanwhile, Susanto et al. (2019) conducted subsequent research on the academic websites of universities in Indonesia and found that the web quality of five university websites was under the expectations of their users.

In other countries, studies on the web quality of government websites are prevalent. For example, Alshrida and Mohammad (2018) have researched the quality of web service from 16 web portals of Jordan's e-government websites and found a low level of quality across all portals. Another study on the e-government of the Turkish Republic using the WCAG 2.0 standards instrument reported the findings that both state and local-level websites performed poorly in usability, accessibility, quality, and readability (Akgül, 2019). Verkijika and Wet (2018) found that the performance of Sub-Saharan African e-government websites were highly unsatisfactory in delivering public value. Finally, Abdel-Basset et al. (2018) used the Neutrosophic VIKOR method to research web quality and the success of e-government sites in Singapore, Finland, Canada, Hong Kong, and Australia. The results showed that all e-government efforts were critically based on the accessibility of its website.

3. RESEARCH METHODOLOGY

This research used a quantitative approach to analyze the primary data of web quality assessment using the WebQual 4.0 instrument. Engaging purposive sampling to district and city governments across Indonesia, we gathered data from the websites of 29 district governments and six city governments of Central Java province. The respondents engaged as the web quality assessors were 110 undergraduate students of the Digital Governance Program, Department of Public Administration, Jenderal Soedirman University. The consideration to involve these students was based on the program curriculum which required them to measure the quality of a website, with a time allocation of two sessions of 150 minutes. The respondents have demonstrated mastery, both theory and practice, in measuring website quality using WebQual 4.0.

The secondary data were generated from various sources. Website visitor data were generated from https://www.similarweb.com/ site by filtering the average visitors per month during 2022. Population and infrastructure availability were obtained from the Central Bureau of Statistics of the Republic of Indonesia website[1]. Using the decision tree technique procedure, this study categorized the data into several attributes as depicted in Table 1.

Table 1. Attribute, type, and role of the study

Name of attribute	*Type*	*Role*
Number of visitors	Polynominal	Label
Usability design	Polynominal	Regular
Information quality	Polynominal	Regular
Interaction service	Polynominal	Regular
The population of the district/city	Polynominal	Regular
Infrastructure availability	Polynominal	Regular
Type of government	Binominal	Regular

In Table 1, the number of visitors means the average number of website visitors every month in 2022, and usability design refers to the ease with which visitors can use a website. Information quality is the extent to which quality information is provided on the website, while interaction implies the degree to which the website offers services to interact with website managers through various media. The population of the district/city is the number of residents of the district/city whose website was being studied. Infrastructure availability refers to cellular signals for Internet connections in each village, and the type of government is district government and city (municipality) government.

WebQual 4.0 instrument was developed by Barnes and Vidgen (2000) and has been widely adopted by many researchers (Lestari et al., 2020; Nugraha et al., 2022; Warjiyono et al., 2020), therefore, reflecting the validity of the instrument. WebQual 4.0 assesses three dimensions, usability design, information quality, and interaction service, and each dimension consists of several items (Table 2). The respondents conducted the assessment then processed into an average score by SPSS software.

Table 2. WebQual 4.0 instrument

Category	*Questions*
Usability:	Ease to learn to operate [usab-1]
	Interaction with the site is clear and understandable [usab-2]
	The site is easy to navigate [usab-3]
	The site is easy to use [usab-4]
	Attractive appearance [usab-5]
	Appropriate to the type of site [usab-6]
	Conveys a sense of competency [usab-7]
	Positive experience [usab-8]
Information quality:	Provide accurate information [info-1]
	Provide believable information [info-2]
	Provide timely information [info-3]
	Provide relevant information [info-4]
	Ease to understand information [info-5]
	Information at the right level of detail [info-6]
	Information in an appropriate format [info-7]
Interaction service:	Safe to complete transaction [inter-1]
	Information feels secure [inter-2]
	Sense of personalization [inter-3]
	Sense of community [inter-4]
	Communicate with the organization [inter-5]
	Confident that goods/services will be delivered as promised [inter-6]
	Overall view of the website [inter-7]

The variables in Table 2 were processed using the decision tree requirements which were classified into polynominal and binominal. Polynominal classification using the Likert scale with five options, then binominal classification into two options: district government and city government.

Prior to use, the WebQual 4.0 instrument also was re-tested for validity and reliability. The validity test aims to assess measuring instruments' accuracy in performing their functions. The validity test correlates each question score with the total answer scores using the product-moment correlation. Meanwhile, the reliability test used Cronbach's alpha. The test results showed that all questions proved to be valid and reliable.

The web quality assessment was initially conducted for one month by 120 students, each assessing 35 targeted district and city government websites. Upon data collection, missing and outlier data were removed, resulting in only data from 110 students which were then processed into an average score of assessment for each district. Then, data about web quality were imported into the RapidMiner software version 10.3 along with data on the number of visitors, infrastructure availability, and population.

4. RESULTS

4.1. Web quality of the district and city governments

The results of the web quality assessment for each district are presented in Figure 1. The average web quality score is 3.66 with the highest score observed on the website of Cilacap Regency 4.10, and the lowest score was Salatiga City 3.19.

[1] https://www.bps.go.id/id

Figure 1. Web quality of district and city governments

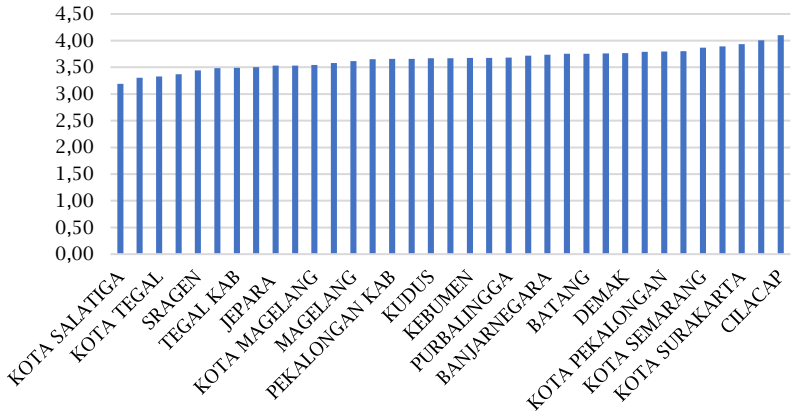
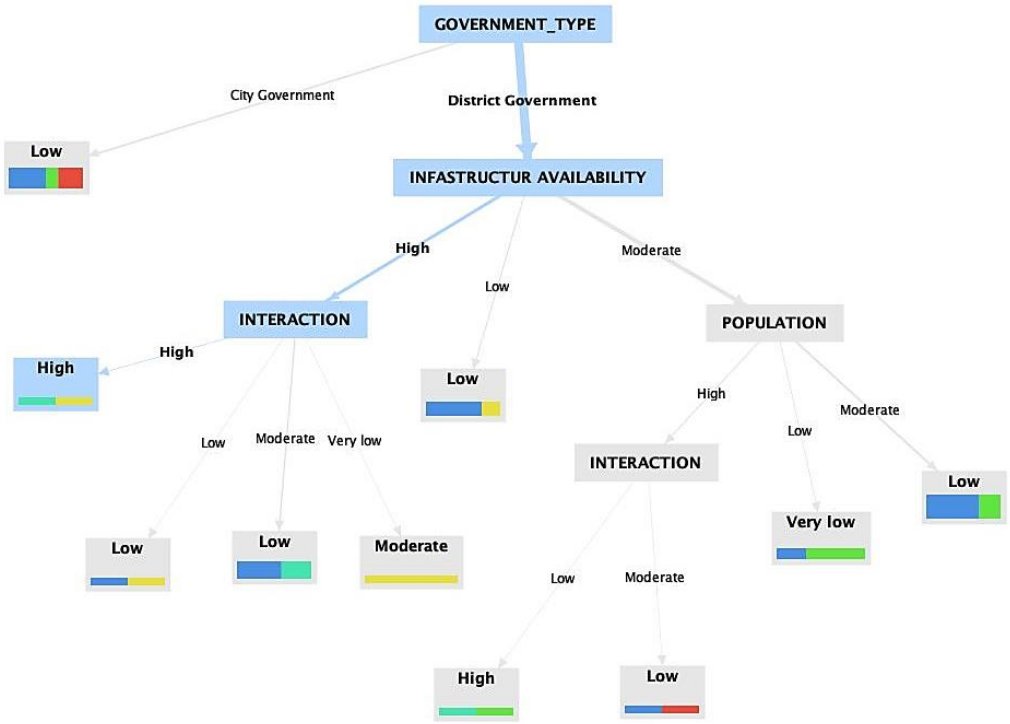


Figure 2. Decision tree



4.2. Factors affecting the number of visitors to the government website

Figure 2 shows data processing using the decision tree algorithm in the RapidMiner software version 10.3. The label attributes denote the number of website visitors.

Based on the decision tree diagram above, several findings were explained. From the attributes predicted to affect the number of visitors (usability design, information quality, interaction service, government type, population of the district/city, infrastructure availability), government type was at the top of the decision tree. In other words, government type was the most contributing factor to the number of visitors to the government website. In this case, more visitors came to the websites of district governments instead of city governments without considering other attributes.

Of the three dimensions of web quality attributes (usability design, information quality, interaction service), only interaction service appears in the decision tree diagram. It suggested that usability design and information quality did not correlate with the number of visitors to the district government websites.

After the government type attribute, the following attribute that correlates to the number of visitors is infrastructure availability where the infrastructure availability's position node is under the government type. If a district in its area had a high availability of Internet infrastructure availability, followed by a high level of interaction service quality, it would have an increased number

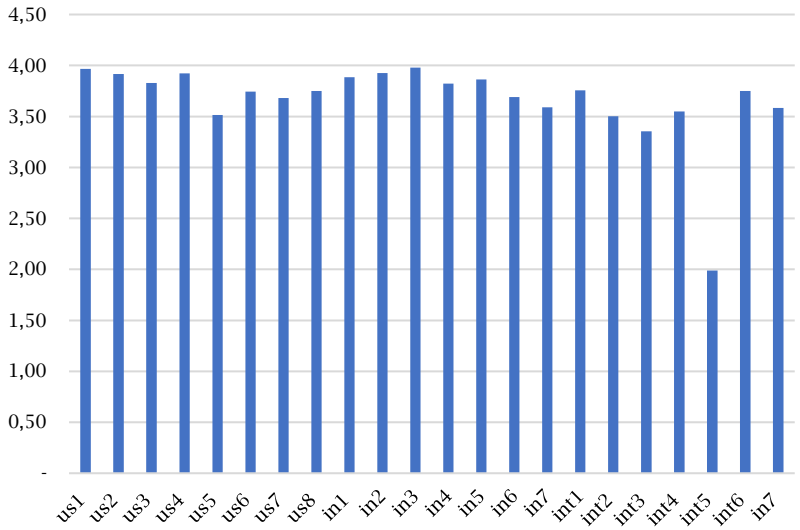
of website visitors as well. In contrast, a low level of interaction quality would attract fewer visitors. If the level of interaction quality is low, then the number of visitors will be low. The number of visitors would hit a low level if the districts had low availability of infrastructure.

If a district had a moderate availability of infrastructure, the number of website visits would depend on the district population. In other words, the low level of web visits reflected the low-to-moderate size of the population. However, the number of government web visits in high-populated districts was influenced by the extent of interaction quality on the website.

4.3. Which dimensions need to be improved on a government website?

Figure 3 illustrates that each web quality dimension has multiple variations. The highest scores of web quality are observed in *in3* (3.98 = timely information) followed by *us1* (3.97 = easy to learn to operate) and *us4* (3.93 = easy to use). As for the lowest scores, we found a considerably significant difference across dimensions, namely *int5* (1.99 = communicate with the organization), followed by *int3* dimension (3.35 = sense of personalization), and *int2* (3.50 = information feels secure).

Figure 3. Component of web quality



5. DISCUSSION

An interesting finding from this study was that not all dimensions of WebQual 4.0 were equally influential to the number of visitors to government websites. Both decision trees and bar diagrams show that while interaction variables were very influential, the usability design factor and information quality were not significant factors. This interaction service dimension includes seven-item questions: safe to complete the transaction, information feels secure, sense of personalization, sense of community, communication with the organization, confidence that goods/services will be delivered as promised, and overall view of the website.

Essential findings about this interaction service include the item communication with the organization. The website provides contact persons ready to interact with visitors through the media. The media consists of an e-mail, a feedback menu, and an office phone number. Through these media, a government website should have officers who are always ready and competent to interact with visitors. But in reality, this study found that the contact persons listed on the website are not all responsive. Of respondents who assessed the website, the majority said that when they contacted the admin or contact person of the website, they got a late answer. Among the respondents, some got an immediate reply but only a standard response saying that the message had been received. They were asked to wait for an answer from the contact person because the message had to be forwarded to the relevant unit in their offices. Some websites complement the website with social media logos, such as Facebook, Instagram, and YouTube, but this media is still not entirely used optimally as a two-way interactive media. The reason for this fact is that website admins who always monitor public complaints do not have the authority to directly interact with visitors, for example, in providing answers. If the website admins ask the relevant officials or employees to answer visitors' questions, the website admins have no authority. Ideally, if there are questions asked by visitors, the website admins can directly forward them to the relevant officials or staff. He/she cannot do this because there is still an unclear division of duties and authorities and uneven Internet literacy in government agencies. These findings show that regulatory factors are very important in the management of interactive websites.

This finding showed that the need for human touch remained the dominant element in digital behavior when users navigate government websites. It was in line with previous research which proved no significant positive correlation between the quality of government websites and user satisfaction, so public websites should pay attention

to the human touch in the form of human-computer interaction (HCI) (Sørum et al., 2012). HCI is the branch of study concerned with optimizing how users and computers interact by creating interactive computer interfaces that meet the needs of users. It is a multidisciplinary field that includes computer science, behavioural science, cognitive science, ergonomics, psychology, and design principles. HCI is critical in creating intuitive interfaces that people of various abilities and expertise can use. Most importantly, HCI is beneficial to communities that lack knowledge and formal training on how to interact with specific computing systems. Users do not need to consider the intricacies and complexities of using the computing system when using efficient HCI designs. Interfaces that are user-friendly ensure that user interactions are clear, precise, and natural. The primary goal of HCI is to create functional systems that are usable, safe, and efficient for end users (Kanade, 2022).

Similarly, other research claimed that the greater the contingent interactivity, the more positive the perceptions of the site interactivity as a modality feature (Sundar, 2009). In addition, Sulikowski et al. (2018) reported that interactive personalization is a factor that needs the recommendation to be developed because it affects online store user behavior and product interest prediction.

Based on empirical findings, this study recommends a website model based on visitor interaction. A website should be designed as interactive as possible so that visitors feel as if someone is serving them when they access the website. In this case, the website should be managed as a government office in cyberspace where employees are always ready to serve the public online at any time, as a consequence of the concept of 24/7 office hours. This interactive website model can take advantage of various social media platforms widely used by the public, allowing visitors to interact directly in real-time, including Twitter, Instagram, LinkedIn, Facebook, TikTok, etc. To make this happen, the government must make its website the primary means of public service, not simply a compliment. The government must assign extraordinary employees, such as tech-savvy, special tech staff, and skilled employees who are ready to serve on the website as if they are serving the public at the conventional government office counters. An ideal interactive website model that integrates with a physical office can be described as follows.

Figure 4. Government website interactive model

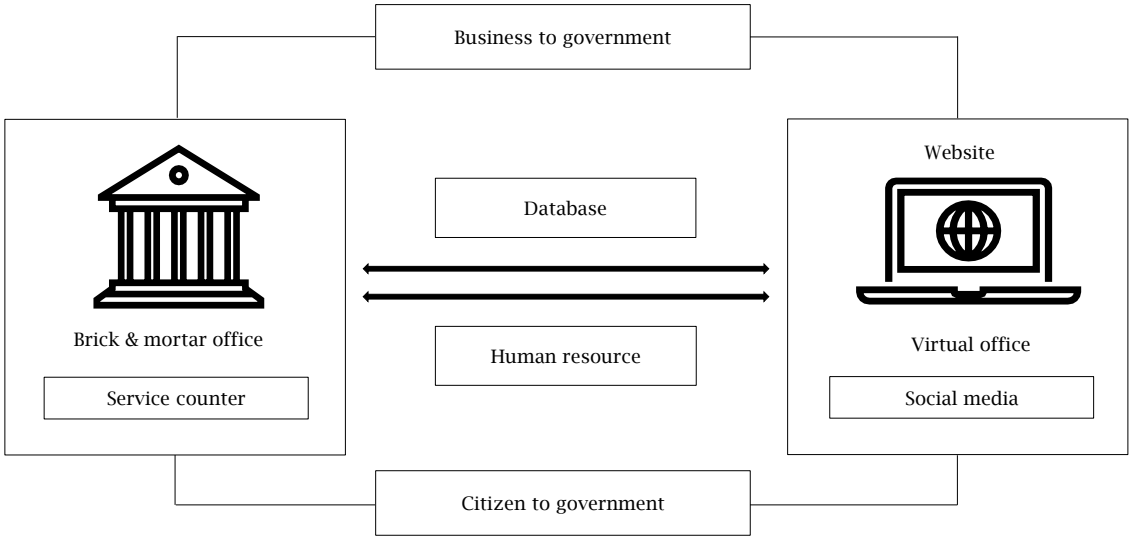


Figure 4 illustrates the government website interactive model where the government must serve the public through both brick-and-mortar and virtual offices. These two office models have interconnected, inseparable databases and human resources. In this way, the virtual office is not only a complement of service but also the main part of the government's responsibility to serve in parallel through these two office models. Therefore, databases and human resources must be integrated. In brick-and-mortar offices, users are associated with service counters, while in virtual office model services, service counters are replaced by social media. Its application can be through providing a direct chat menu to WhatsApp, Telegram, and other instant social media platforms. Social media platforms must always be adjusted to recent trends, namely the platforms that are most widely used by the public as users. Through various social media platforms, public servants are interactive. Social media is not only for branding and complementing a website but is an actual service counter that must always be active for public services and social media platforms must be embedded in the government websites.

Public services have been utilizing social media platforms for years now (Setiawan, 2021). While there are a variety of reasons for this, one of the most important is that social media allows for communication and engagement with the public in a way that traditional methods do not (Yuan et al., 2023). For example, by using social media, officials can easily communicate with the public, update them on important events and activities happening at the government, and answer their questions. By staying updated on current events and communicating effectively with the public, public officials can keep the public informed and engage

them in a more meaningful way. In addition to this, social media can also provide a platform for public officials to interact with their constituents. Through the use of social media, officials are able to interact directly with their constituents and create a more personal connection with them. In this way, social media can serve as a tool that allows public servants to connect with their constituents and better understand their needs and concerns. Through the use of social media, officials can stay up-to-date on the latest events happening in the government and keep their constituents informed about them. Additionally, through social media, officials can interact directly with their constituents and build stronger relationships with them. Ultimately, the use of social media allows public officials to better serve their constituents and engage them more effectively. This is something that needs to be considered carefully when creating a social media strategy for the organization. One of the most common challenges for public organizations when creating a social media strategy is the use of the word 'we'. Many organizations view social media as a resource that should be used by their entire staff and not just their chief executive or board of directors. Therefore, one of the biggest challenges for public organizations when creating a social media strategy. Many organizations struggle with social media because they do not have the capital or resources necessary to keep up with the demanding world of social media. Social media requires organizations to respond in real-time and with relevancy ideally (Salim, 2022).

6. CONCLUSION

The study found that not all WebQual 4.0 factors affect the number of visitors to government websites. While interaction is the most influential factor, information quality and usability design seem to be less important ones because website visitors prefer to feature engagement availability. The significant finding of this study is the need for engagement services on government websites. A user-centered approach, which emphasizes interaction and engagement, should be a key consideration in the design of public websites. Integration between social media platforms and websites can be a website model for delivering services in an interactive and real-time method. The government should use the most popular and the latest social media technologies when designing the website model. This model requires the readiness of human resources from the government who must always be ready to provide online ubiquitous services effectively, efficiently, and responsively.

This study also demonstrates the effectiveness of the decision tree model as an analytical technique for determining the key elements that should be improved in order to increase the quality of government websites. The decision tree model provides a data-driven approach to decision-making, enabling government administrators to decide on website improvements with knowledge and ultimately improving citizens' digital experiences.

Based on the results, this study recommends that the development of government websites should focus on user interaction. The government websites should provide features to invite user engagement. The role of the HCI field in the development and implementation of government websites is very important, and it should reflect the user's requirements for interactive and engaging interactions. The results emphasize the importance of the HCI principles in the design of interactive and user-centred websites for local governments. Future research may deepen the aspects of the HCI, explore innovative ways to improve usability, efficiency, and user satisfaction on government websites, and ensure continuous and efficient digital interaction between citizens and local governments.

The integration of local government websites into social media platforms has proven to be a valuable method for the model of interactive websites. The results of this study highlight the importance of using social media to increase transparency, communication, and the delivery of public services. Future research may look at the details of social media integration and explore how local governments can effectively use a variety of social platforms to interact with citizens, disseminate information, and collect comments. In addition, the research may examine the role of social media in promoting community engagement and community building.

This research has several limitations. First, this research is based on Indonesian government websites, especially on local government websites, and further research may be necessary to address differing regions, cultural, and technological contexts before generalizing the findings to other areas. Second, the WebQual 4.0 tool is primarily used in the research to evaluate local government websites. In order to give a complete finding of website quality, future research may take initiation into a wider range of assessment techniques and instruments toward WebQual 5.0. Third, because digital governance and technology are dynamic, there's a chance that social media integration and interactive design will continue to evolve and change. In order to satisfy the changing needs of governments and citizens, future research should be able to adapt and offer current insights.

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APPENDIX

Table A.1. List of literature review (Part 1)

No.	*Author and title*	*Subject*	*Instrument*	*Result*
1.	Hartomo and Ramadhan (2021). Quality evaluation in disaster mitigation information system using WebQual 4.0 method	The disaster mitigation information system (Sikabi) Boyolali Regency government	WebQual 4.0	There is an influence of information quality on user satisfaction in using the Sikabi website.
2.	Rahmat et al. (2021). ServQual and WebQual 4.0 for usability check academic information system of private university	Academic information system	ServQual and WebQual 4.0	ServQual (X_1) and WebQual 4.0 (X_2) have a positive effect simultaneously on user satisfaction (Y).
3.	Andry et al. (2019). Using Webqual 4.0 and importance performance analysis to evaluate e-commerce website	Lazada marketplace e-commerce	WebQual 4.0 and IPA (importance performance analysis)	Average respondents from students at Bunda Mulia University were satisfied with the facilities, menus and contents.
4.	Warjiyono et al. (2020). WebQual and importance performance analysis method: The evaluation of Tegal city's public service information system web quality	Tegal city's public service information system	WebQual 4.0 and IPA	The city system is good in general. Top priority improvements; providing accurate information and the easy for people to understand the information.
5.	Shayganmehr and Montazer (2019). Identifying indexes affecting the quality of e-government websites	Government websites: Indonesia, China, Australia, Vietnam	WebQual 4.0	Content, information quality, and usability are the most the models respectively
6.	Hayu et al. (2020). The effect of website quality and government regulations on online impulse buying behavior	Online website stores in Indonesia	WebQual 4.0	Both website quality and government regulations had some impacts on online impulse-buying behaviour.
7.	Hermawan (2022). The effects of web quality, perceived benefits, security and data privacy on behavioral intention and e-WOM of online travel agencies	Online travel agency users in Indonesia	WebQual 4.0	Perceived web quality, perceived benefits, security and privacy have a positive and significant effect on behavioral intention.
8.	Jalil et al. (2021). Quality analysis of local government websites (Study case DKI Jakarta, Bali, Banten Provinces)	Governemnt website of DKI Jakarta, Bali, Banten Provinces	Website quality assessment	Overall website of the provincial government of DKI Jakarta and Banten is high-quality. The Bali provincial government website has low quality.
9.	Lee-Geiller and Lee (2019). Using government websites to enhance democratic e-governance: A conceptual model for evaluation	Article in "*Government Information Quarterly*"	Qualitative meta-analysis	A new governance model, characterized as citizen engagement or public participation, has increasingly become a standard of contemporary governance.
10.	Nishant et al. (2019). Using polynomial modeling to understand service quality in e–government websites	E-government websites	Polynomial modeling	Both agreement and disagreement between expected and perceived information system service quality are positively associated with continued use intention.
11.	Nugraha et al. (2022). Mobile news applications quality analysis using web quality and importance performance analysis	Mobile news applications	WebQual 4.0 and IPA	Attributes of the usability, information quality, and service interaction dimensions require corrective action and to be prioritized for improvement.
12.	Oktaviani et al. (2022). Study of official government website and Twitter content quality in four local governments of Indonesia	City government websites in East Java Province	E-governance readiness	The existence of a website itself makes it easy for the public regarding complaints that can be accessed online at any city government website. The use of the website shows that the city government in East Java province supports the achievement of good governance in the government through the website.
13.	Putra and Imanuel (2020). Evaluation of service quality of Manado city government website with e-GovQual approach to calculate importance performance analysis	Manado city government's official website	E-GovQual	The services provided by the Manado city government website to the community were very good and almost approached expectations to realize the optimal use of information and communication technology

Table A.1. List of literature review (Part 2)

No.	*Author and title*	*Subject*	*Instrument*	*Result*
14.	Putri and Ruldeviyani (2019). Prioritization strategy for government's website information quality: Case study: Indonesia National Public Procurement Agency	National Public Procurement Agency (NPPA) website	IPA	The most important IQ characteristics are believability, reliability, and validity of information. that comprehensiveness, currency, flexibility, and value-added in information should be prioritized to be improved.
15.	Rasool et al. (2020). Citizens' assessment of the information quality of e-government websites in Pakistan	E-government websites/portals in Pakistan	Information quality	Value-added, accessibility and objectivity were the top three indicators. While timeliness, ease of operation and advertisement were the least rated indicators.
16.	Susanto et al. (2019). Evaluating web quality and its influential factors in higher education: A comparative study	Several universities in Indonesia universities	WebQual 4.0 and IPA	The quality of academic websites in five universities is under the expectations of its users.
17.	Wirandari et al. (2022). Analysis website quality official government tweet accounts to campaign for tourism sites in the Lampung area	The tourism and cultural official website and Twitter account of the provincial governments of Lampung	Website quality assessment	The quality of government websites supported applying the principles of good governance.
18.	Alshrida and Mohammad (2018). Web quality evaluation of Jordan's e-government	Jordan's e-government websites (16 web portals)	Nibbler, website, Grader, and PageSpeed insights	The results indicate a low level of quality measure for 16 e-government web portals.
19.	Ogunsola and Tiamiyu (2017). Assessment of levels and interrelationships of ICT deployment, web readiness, and web presence quality of Nigerian e-government websites	17 public servants in 20 government agencies	Web readiness and web presence quality	The government agencies should re-align information and communications technology deployment with the information, services and features of their e-government websites.
20.	Asrese et al. (2019). Measuring web quality of experience in cellular networks	Mobile network operators (MNOs)	Web latency and rendering (WebLAR)	Most of the websites do not show a significant difference in quality of service.
21.	Akgül (2019). The accessibility, usability, quality and readability of Turkish state and local government websites: An exploratory study	E-government in the Turkish Republic	WCAG 2.0 standards	Both state and local-level websites perform very badly in usability, accessibility, quality, and readability.
22.	Abdel-Basset et al. (2018). A group decision making framework based on neutrosophic VIKOR approach for e-government website evaluation	E-government sites in Singapore, Finland, Canada, Hongkong, Australia	Neutrosophic VIKOR method	All e-government efforts are critically based on the accessibility of its website.
23.	Verkijika and Wet (2018). Quality assessment of e-government websites in Sub-Saharan Africa: A public values perspective	E-government websites from 31 countries in Sub-Saharan Africa	Public values descriptives	The performance of Sub-Saharan Africa e-government websites was highly unsatisfactory when it comes to the delivery of public values.