Evaluating Information Quality in E-Government Implementation: A Case Study of City Government Websites in North Sulawesi

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Abstract. This study aims to evaluate the quality of information on local government websites in cities across North Sulawesi. This evaluation is important because official government websites are essential tools for providing public services, enhancing transparency, and encouraging community participation. The research employs a qualitative descriptive method, which allows for an in-depth analysis of website content and characteristics from the perspective of information quality. Data collection techniques include literature review, articles, and direct observation of the websites. This study was conducted using ten dimensions of information quality—Accuracy, Consistency, Timeliness, Completeness, Reliability, Availability, Relevancy, Believability, Efficiency, and Value-Added— to assess and evaluate the websites. Based on the findings, recommendations are provided for improving information quality, including system maintenance, data updates, and consistency enhancements. The results of this study, the quality of information on local government websites varies; there are several cities with good information quality and some that still need improvement in the information quality on their websites. This difference is primarily due to municipalities' differing commitments to data updates, consistency in information management, and the technical infrastructure available in each city. Therefore, this study presents recommendations for improving information quality through system maintenance, regular data updates, and greater consistency. By following these recommendations, it is expected that efficiency and user satisfaction with e-government websites will increase.
Keywords— Information Quality, E-Government, Websites, Local Government

1. Introduction

Information and communication technology has significantly advanced in recent times, bringing widespread impact, particularly in societal activities and public governance. In the context of digital government systems, there is an urgent need to enhance government performance. The implementation of e-government is not only aimed at meeting regulatory requirements but also at addressing the increasingly complex challenges faced by public services(Sitokdana, 2019). As information technology becomes a fundamental necessity, government institutions must continue to evolve, fostering creativity and innovation to deliver the best possible services to citizens. Modern society demands public services that are faster, more transparent, and more accessible(Hans C. A. Yepese, 2021).

The Indonesian government began its digital transformation in stages through Presidential Instruction No. 06 of 2001 on the Development and Utilization of Telematics (Telecommunications, Media, and Informatics)(Fadhlurrahman et al., 2018), which mandated all government institutions to utilize information technology in carrying out administrative functions and delivering public services. Subsequently, Presidential Instruction No. 3 of 2003 on the National Policy and Strategy for the Development of E-Government became a key benchmark in the government's digitalization agenda. Through this directive, the President formally encouraged all ministries and government agencies to

design and develop strategies for the implementation of e-government (Presiden, 2003). From that point forward, the Government of the Republic of Indonesia officially began the process of digital transformation in its governance (De Haan, 2020; Effendi & Susanto, 2019).

The implementation of e-government is an important strategy for achieving good and transparent governance at all levels of government (Kurniawan et al., 2017). Through a digital approach, governments can improve operational efficiency, optimize resource utilization, ensure process transparency, enhance accountability, strengthen public responsibility, (Rasool et al., 2020)and encourage active citizen participation in governance processes (Hans C. A. Yepese, 2021; Sitokdana, 2019). The development of e-government is a complex and systematic digital transformation process aimed at improving the quality of public services(Khalid & Lavilles, 2019; Rasool & Warraich, 2018).

The implementation of e-government in Indonesia still faces numerous challenges, particularly in the development and utilization of government websites. Various assessments conducted by academics and internal auditors—using indicators from the Ministry of Communication and Information Technology as well as the World Bank—show that most e-government websites remain in the early (preparatory) stages. Only a small number of institutions have reached the maturity stage, while the consolidation and full utilization stages are often not yet achieved. This situation is closely related to the complexity of issues faced by Indonesia. These challenges hinder the process of digital government transformation and require a comprehensive approach (Sitokdana, 2015).

The success of e-government application development is greatly influenced by adequate investment, both in terms of funding and human resources, and is determined by the commitment of policymakers, stakeholder support, and the readiness of public administration(Guo, 2024). Without effective synergy among various stakeholders, efforts to digitalize public administration will struggle to reach optimal levels. However, these challenges should not serve as obstacles. On the contrary, these challenges should encourage public administration to undertake systematic, sustainable, and measurable transformations to develop a more effective e-government ecosystem that meets public needs(Sitokdana, 2015).

According to data from the Ministry of Home Affairs (Kemendagri), there are 38 provinces and 514 regencies/cities in Indonesia; however, not all of them have official local government websites (Hans C. A. Yepese, 2021). Among those that do, many still suffer from poor information quality. Information quality is a key indicator in the successful implementation of information systems (Dean Johandi Fredriko Kambey, 2020; Hussain Alenezi , Ali Tarhini, 2013). Poor-quality information can negatively affect communication and decision-making processes, which in turn may harm the reputation and effectiveness of the government itself (Hussain Alenezi , Ali Tarhini, 2013), as information refers to processed data that is meaningful and beneficial to those who need it(Dean Johandi Fredriko Kambey, 2020).

The structure of information on local government websites generally follows the guidelines set by the Ministry of Communication and Information Technology of the Republic of Indonesia. However, many citizens still do not access these websites, possibly due to the lack of useful information or monotonous page designs filled with generic articles, making the sites less appealing to users(Effendi & Susanto, 2019). Good-quality information plays an essential role in helping users easily understand and navigate the content of government websites.

Therefore, this study evaluates the information quality of local government websites in cities across North Sulawesi—specifically in Manado, Bitung, Tomohon, and Kotamobagu—using ten dimensions of information quality: accuracy, consistency, timeliness, completeness, reliability, availability, relevancy, believability, efficiency, and value-added(Hans C. A. Yepese, 2021). The aim of this research is to provide recommendations for improving the quality of information on e-government websites of local governments in these North Sulawesi cities.

2. Literature Review

Research on the evaluation of information quality on local government websites is not a new topic in the academic field. Therefore, this article presents a series of previous studies from various sources and uses them as a foundation for further exploration, including:

A study conducted by Sitokdana and Melkior (2019), titled "Evaluation of Information Quality on E-Government Websites of Provincial Governments in Eastern Indonesia", revealed that although provincial governments in Eastern Indonesia have had E-Government websites for a long time, various issues persist in their implementation—particularly regarding the quality of the information provided. Since information quality is a fundamental indicator in public service delivery, the E-Government websites of East Nusa Tenggara (NTT), Maluku, North Maluku, West Papua, and Papua were evaluated. This study measured information quality using ten dimensions: accuracy, consistency, timeliness, completeness, reliability, availability, relevancy, believability, efficiency, and value-added. The evaluation results showed that these websites have not yet been able to deliver high-quality information that meets public expectations. Therefore, local governments are advised to continuously improve the accuracy and consistency of the information presented, ensure that data is always up to date and complete, and transform their websites into primary tools for delivering public information. Doing so can enhance the value-added aspect of public services(Sitokdana, 2019).

In the study by Puling and Melkior (2020) on the information quality of the Kupang City Government website, ten variables were used to measure information quality: accuracy, consistency, timeliness, completeness, reliability, availability, relevancy, believability, effectiveness, and value-added. The findings showed that the Kupang City Government website still failed to deliver high-quality information to the public. Some of the identified issues included a lack of accuracy and consistency in the presentation of information(Puling & Sitokdana, 2020).

Previous studies, such as Sitokdana and Melkior (2019) and Puling and Melkior (2020), have emphasized the importance of information quality on e-government websites. However, most of these studies are general in nature and do not conduct comparative analyses across cities. Other studies focus more on issues such as bureaucracy, transparency, and digital divide at the national level (Prayitno, 2023; Utama, 2020). Furthermore, studies that specifically compare information quality on local government websites in North Sulawesi are still very limited. This study aims to bridge this gap by applying ten dimensions of information quality to four local government websites, thereby providing a deeper understanding of the quality differences and challenges in the development of local e-government.

According to the World Bank, e-government refers to the use of information technologies—such as Wide Area Networks (WANs), the internet, and mobile computing—by government agencies with the capability to establish connections with citizens, businesses, and other government entities (Dean Johandi Fredriko Kambey, 2020; Prahono & Elidjen, 2015).

Information and communication technology has transformed the paradigm of government interaction through four innovative models of digital relationships. First, the Government-to-Citizen (G-to-C) model serves as an electronic platform that facilitates direct communication between the government and its citizens. Second, the Government-to-Business (G-to-B) model supports transactions and services between government institutions and the private sector or business community. Third, the Government-to-Government (G-to-G) model enables information exchange and coordination among government agencies. Lastly, the Government-to-Employee (G-to-E) model focuses on internal governmental relationships concerning resource management and inter-official communication(Abdullah, Omar A Alshikhi, 2018; Effendy & Subowo, 2018).

Although data quality and information quality are distinct concepts, both are multidimensional in nature. As such, they can be broken down into common characteristics—referred to as dimensions—for the purpose of measurement(Abdullah, Omar A Alshikhi, 2018). Information quality is an emerging field that focuses on maximizing the value of an organization's information assets, minimizing risk, and ensuring that information products deliver value to the customers who use them(Abdullah, Omar A Alshikhi, 2018). Information quality is a systematic and continuously evolving approach aimed at transforming raw data into valuable resources that protect organizations from potential information leaks while also creating information products that offer useful and meaningful contributions to stakeholders.

3. Method

This study employs a qualitative research method that gathers textual data through direct interaction and in-depth observation, which are collected and analyzed in a structured manner with a

focus on the information quality of e-government websites (Laumann, 2020; Ramdhan, 2021) in four cities within North Sulawesi Province. The analyzed data were obtained from secondary sources such as literature reviews, academic articles, website observations, and extensive research on the information quality of e-government websites in the four cities: Manado, Bitung, Tomohon, and Kotamobagu.

In collecting this web data, a comparison was made between previous documentary research and direct observations of the websites of the four cities, which the researcher conducted directly in November 2024. The data collection from these websites was conducted in November 2024, using ten information quality criteria for each e-government website. These criteria are detailed in the table below.

Table 1 Information Quality Dimensions

No	Information Quality Dimension	Definition
1	Accuracy	Information is free from errors
2	Consistency	Information does not contradict previous information
3	Timeliness	Information is available in a timely manner
4	Completeness	The information is complete, with no missing components.
5	Reliability	Information is dependable and trustworthy
6	Availability	Information is accessible at any time
7	Relevancy	Information is useful and applicable to a particular context
8	Believability	Information is credible and can be trusted
9	Efficiency	Information facilitates task completion
10	Value-Added	Information provides significant benefits

4. Results

4.1 Manado City

Figure 1. Manado City Official Website Profile

Table 2 Analysis of Information Quality Dimensions – Manado City (https://www.manadokota.go.id/)

No	Indicator	Evaluation	Recommendation
1	Accuracy	In general, the information on the website is considered accurate as it includes clear sources.	It is recommended to perform system maintenance, enhancements, and continue to maintain the quality of information.
2	Consistency	Website consistency is generally good, but some pages still need updates. For example, the tourism section only contains data from 2017.	Improve and update the data to be more current and comprehensive.
3	Timeliness	The availability of data and information does not fully reflect current developments.	Information should be updated regularly and in a timely manner.

4	Completeness	The information on the website is not yet comprehensive. For instance, the "Local Government Agencies" section lacks data and content.	Routine evaluations and periodic reviews of data and information availability should be conducted.
5	Reliability	Existing data is generally reliable, but for the "Local Government Agencies" section, its reliability is uncertain due to missing content.	Routine evaluations should be conducted to maintain website quality.
6	Availability	The information is fairly accessible, although users sometimes encounter disruptions.	System maintenance is needed to sustain and improve performance.
7	Relevancy	The information provided is fairly relevant to the public's needs in using e-government services.	Improve both the quality and quantity of each website page to provide added value.
8	Believability	The information is trustworthy as it originates from official government institutions.	Enhance the data and information in each section of the website to ensure completeness and clarity.
9	Efficiency	The data and information are useful to the public, particularly for academics and practitioners conducting research.	Provide public service data and information by ensuring each website page is complete and well-structured.
10	Value-Added	The information provides added value to the public, especially through accessible links to various e-government applications.	Maintain the achieved system quality to increase website traffic and enhance overall usefulness.

4.2 Bitung City

MUNCULNYA BITUNG DALAM SEJARAH KEWILAYAHAN SULAWESI UTARA, TIDAK TERLEPAS DARI PERJUANGAN SEORANG
YANG BERNAMA SIMON TUDUS SEBAGAI TUNDUANG WANUA BITUNG.

BERAWAL DARI SATU TEKAD UNTUK MEMBUKA SEBUAH HUMA ATAU KEBUN DI KAWASAN YANG
TERLETAK DI TEPIAN PANTAI, SIMON MENDIRIKAN SEBUAH GUBUK DI BAWAH POHON BESAR DI ANTARA SEKIAN BANYAK
POHON BITUNG YANG TUMBUH SUBUR DI DAERAH RAWA.

POHON ITU TUMBUH DI RENTANG PAGAR POS I PELABUHAN BITUNG SEKARANG
DAN KURANG LEBIH 30 METER DARI TEPIAN PANTAI, SAAT AIR PASANG NAIK

Figure 2 Bitung City Official Website Profile

Table 3 Analysis of Information Quality Dimensions – Bitung City (http://www.bitungkota.go.id/)

No	Indicator	Evaluation	Recommendation
1	Accuracy	Only presents information in the form of brief news without sources or supporting explanations. Although there are government activity photos on the homepage, there are no explanatory links. However, important documents such as accountability reports (LPJ), regional budgets (APBD), and development plans (RPJMD) are directly and accurately provided for public transparency.	The quality and quantity of information must be improved.

No	Indicator	Evaluation	Recommendation
2	Consistency	The information presented is fairly current and updated. However, older information is not displayed, resulting in a lack of consistency in information provision.	Data and information consistency needs to be improved in the future.
3	Timeliness	News updates are provided but not on a weekly basis.	Regular updates are recommended to ensure information remains relevant and timely.
4	Completeness	The completeness of information on the website is still lacking. For example, the "Gallery" section does not yet contain data or information.	Conduct routine checks on website areas with missing information.
5	Reliability	The information provided is generally reliable since it comes from the government, but there are no links included for news-related information.	Update the available information so the website serves as a useful support tool for the public.
6	Availability	Overall, the website is accessible, but some parts (such as certain sections of the Data Bank) are occasionally inaccessible.	System maintenance is required to maintain and enhance performance.
7	Relevancy	The information presented is highly relevant to the public's needs.	Maintain and improve the quality of information presented on the website.
8	Believability	The regularly updated information is trustworthy, useful, and sufficiently relevant for the general public.	The quality of information should be maintained and improved to enhance the completeness of the website.
9	Efficiency	The services and information provided are fairly efficient. However, some government agency pages have not been updated or used effectively.	Improve data quality maintenance and consistency.
10	Value-Added	The services and information provided by the website have added value for users, particularly the "services" option that facilitates public feedback.	Maintain and regularly evaluate the website's information to ensure continued added value.

4.3 Tomohon City

Table 4 Analysis of Information Quality Dimensions – Tomohon City (https://tomohon.go.id/)

No	Indicator	Evaluation	Recommendation
1	Accuracy	In general, the website does not contain errors, and the information presented is supported by sources and managed by government authorities.	System maintenance, improvement, and continuous preservation of information quality are recommended.
2	Consistency	The information presented is consistent, particularly with complete page options that facilitate public access.	The consistency of data and information should be further improved in the future.
3	Timeliness	Overall, the information on the website is up to date.	Maintain the quality of regular information updates.
4	Completeness	The data and information completeness is very good.	Maintain and continue to improve.
5	Reliability	The information and data on the website are highly reliable.	It is strongly recommended to maintain and enhance the quality of information.

6	Availability	The information can be accessed at any time, except during technical disruptions.	Maintain server quality to avoid interruptions during user access.
7	Relevancy	The information displayed on the website is highly relevant to public needs.	Maintain and improve the quality of information posted on the website.
8	Believability	The information is highly trustworthy as it is managed by the government.	Reliable information helps increase public trust.
9	Efficiency	The information provided is very helpful to the public.	Maintain and improve the quality of information to ensure continued usefulness.
10	Value-Added	The website information adds value, particularly in terms of data completeness.	The completeness of data and information on this website will be highly beneficial.

4.4 Kotamobagu City

Table 5 Analysis of Information Quality Dimensions – Kotamobagu City (https://kotamobagu.go.id)

No	Indicator	Evaluation	Recommendation
1	Accuracy	The available data and information are fairly complete, and the accuracy of presentation on each page is also considered good.	Maintain the quality of information.
2	Consistency	The information presented is not fully consistent (e.g., in the geographic section, some locations are not listed, and email addresses are missing), and only recent data is available.	Information presentation must be more consistent and up to date at all times.
3	Timeliness	News information on the website is regularly updated. However, other types of information are rarely updated.	Maintain regular updates and improve the quality of information.
4	Completeness	Overall, the data and information are sufficiently complete.	Maintain and improve the quality and integrity of the information.
5	Reliability	The information and data on the website are highly reliable.	Strongly recommended to maintain and enhance the quality of information.
6	Availability	The information can be accessed at any time, except during technical disruptions.	Monitor and maintain server quality to avoid disruptions when needed by users.
7	Relevancy	The information presented on the website is highly aligned with the needs of the community.	Continue to maintain and improve the quality of the information presented on the website.
8	Believability	The information is trustworthy because it is managed by the government.	High-quality and accurate information can build public trust.
9	Efficiency	The information on the website helps make things easier for the audience.	Improve the quality of information to ensure it remains useful for the community.
10	Value-Added	The website provides added value, particularly through its "Services" section.	Continue improving the information on this website to ensure it consistently delivers added value.

Based on the assessment of the ten information quality elements (Table 1) conducted in this study, the analysis of the official government websites from Manado City to Kotamobagu City (Tables

2 to 5) indicates that the characteristics and quality levels of the information presented by each local government's website vary. Overall, the government website of Manado City still requires improvement, particularly due to significant delays in updating tourism data and the lack of data and information on the regional government pages. Similarly, the website of Bitung City presents summarized information without links to photos or news content, making the provided data and information less relevant. The gallery page also lacks photos and videos. On the other hand, the official website of Tomohon City performs very well, offering useful, relevant, and high-quality information. Meanwhile, the Kotamobagu City government website displays inconsistency, particularly in the geographic page, where certain locations and email addresses are missing, resulting in incomplete information. However, overall, it still provides added value and benefits to the public. Therefore, the recommendations outlined in Tables 2 through 5 can serve as references for the development of the government websites of Manado, Bitung, Tomohon, and Kotamobagu. These findings align with the results of the comprehensive evaluation conducted in the Indonesian E-Government Ranking (PeGI) by the Ministry of Communication and Information Technology during the 2012–2014 period (with its last publication in 2015). The evaluation covered five main aspects: policy, institutional framework, infrastructure, applications, and planning. Based on these aspects, the assessment provides several recommendations that can be used as guidelines to develop government websites in the four cities of North Sulawesi (Manado, Bitung, Tomohon, and Kotamobagu). These findings are consistent with studies by Sitokdana and Melkior (2019) and Utama (2020), which found that obsolescence and poor consistency were common in e-government implementation across regions. The results obtained in Kotamobagu also corroborate Prayitno's (2023) assertion that limited infrastructure and human resources are factors influencing poor information quality. However, these findings differ from those of Puling and Melkior (2020), who found poor information quality on the Kupang City website, while Tomohon City demonstrated better information quality. This difference indicates differences in local government commitment and system management effectiveness, which may be key factors in the success of e-government across regions.

5. Conclusion

The conclusion that can be drawn is that the implementation of E-Government in Indonesia, particularly in North Sulawesi, still faces various challenges, including unequal infrastructure distribution and the quality of human resources. The research indicates that the quality of information on local government websites varies, with some cities such as Tomohon demonstrating good quality, while others, like Manado, Bitung, and Kotamobagu, still require significant improvements. Moving forward, it is necessary to regularly update and maintain the information, enhance consistency and data presentation, and strive to improve the overall quality of information on government websites. By following these recommendations, the effectiveness and user satisfaction of E-Government websites are expected to improve. The limitations of this study are its limited scope, with only four cities in North Sulawesi evaluated, and its use of qualitative methods that focus on information content without considering usability and web design. Therefore, future studies should extend the evaluation to all provinces/cities in North Sulawesi or other regions of Indonesia and include surveys or interviews with community users to obtain direct information on information quality and their level of satisfaction with e-government services.

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