# Towards Digital Governance Divide Index Development: Evaluating City Government Websites in the Philippines

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**Abstract**

The Philippines has actively pursued e-government initiatives, yet Local Government Units (LGUs) need support to achieve optimal digital governance and improve public service delivery. This study assessed the websites of all 33 Highly Urbanized Cities (HUCs) in the Philippines, identifying significant performance gaps based on the internationally recognized Rutgers E-Governance Performance Index. Through qualitative analysis, content deficiencies were highlighted, leading to the development of the Digital Governance Divide Index (DGDI), encompassing five key dimensions: content quality, data privacy, inclusivity, public engagement, and technical infrastructure. The DGDI framework offers actionable recommendations for LGUs to enhance their digitalization efforts and supports policy development to advance e-government readiness. Additionally, the findings contribute to the academic literature by addressing the digital governance gap in local government websites and provide practical insights for improving e-governance to better meet citizens' needs.

**Keywords**: Digital Governance Divide Index, Website Assessment Framework, City Government Websites, Highly Urbanized Cities (HUCs), Philippines

## Introduction

In the present world, Information and Communication Technologies (ICTs) contribute to building a knowledge-based society and transforming governments by altering the delivery of public services (Ullah et al., 2021). This transformation, termed digital government, is often referred to as e-government, which is the planned utilization of information technologies to transform communication with citizens, businesses, and other arms of government (OECD, 2020). Digital government is crucial in raising service delivery, making it a cornerstone of modern public administration (Heeks, 2006). It has the possibility of increasing efficiency, reducing corruption, increasing revenues, increasing transparency, increasing convenience, and decreasing costs in public sector activities. Hence, the Sustainable Development Goals (SDGs) have progressed from the social, environmental, and economic perspectives to attracting the political, technological, and sociocultural organizations worldwide (Koirala & Pradhan, 2020).

The Philippine government is increasing its drive to promote ICT throughout the Philippines. For instance, under Electronic Commerce Act 8792, the government requires each department to create a website so that the public can access information and communicate with elected officials better. Furthermore, with the creation of the Department of Information and Communication Technology (DICT) through the enactment of Republic Act No. 10844, six major projects in e-governance, namely eLGU, eTravel, eGovPay, eGovCloud, eReport, and eGov PH application, have been embarked on. Such emphasizes the nation's unrelenting support for using and developing Information and Communication Technology (ICT) for national development.

In addition, this commitment finds its expression in enacting the E-Government Master Plan (EGMP) 2022. This comprehensive plan seeks to harmonize the utilization of ICT across all facets of government, encompassing institutions, agencies, processes, resources, and policies. The EGMP 2022 and the government's parallel ICT

plans are expected to improve efficiency and equip the government to build an interoperable e-government inside its agencies (OpenGov Asia, 2019). Promoting e-government increases administrative efficiency, transparency, accountability, and public trust (Bajar, 2020). However, e-government adoption is a major policy concern for the international community, especially for developing nations like the Philippines. Though the country has taken e-government initiatives, local governments needed help providing quality, relevant, and timely online services, especially on their concerned websites, which leads the citizens to realize the actual benefits of e-government (Urbina & Abe, 2017).

Numerous studies have assessed the extent of e-government adoption within the country, focusing on using government websites and portals. For example, the study of Lagura (2017) concentrated on evaluating the city government websites in the Davao Region. This study revealed that while all cities in the Davao Region have established an online presence, the quality of the website contents indicated substandard adoption and underutilization. Furthermore, Lagura et al. (2017) recommended that local government units maximize portal use to promote transparency and accountability. Their insights point out the untapped potential of these platforms in promoting responsible governance practices.

To add with, Khalid and Lavilles (2019) found that several local government websites are still in the Basic or Emerging stages of development. This suggests ample room for improvement in the digital presence and functionality of the evaluated websites. This is backed by the study of Bajar (2020), which investigated 21 websites belonging to the executive branch of the Philippine government and assessed the characteristics of websites, including their features, level of user engagement, and the types of electronic services they offer. Another study related to this is the research of Manoharan et al. (2023). The survey was carried out in 100 countries in 2019, and one of the least-performing cities was Manila, the Philippines capital, with a score of 11.6 and ranked 97$^{th}$. This contrasts with Seoul, the capital city of South Korea, which ranks 1$^{st}$ with a score of 84.07. These disparities underscore the need to encourage a culture of openness, delivery of services, and a forum for enhancing competitiveness in the city government websites of the country.

Despite ongoing efforts to develop e-government in the Philippines, significant gaps remain in the quality and performance of government websites. Research highlights a notable discrepancy between the capabilities of Philippine government websites and global benchmarks, underscoring the need for improvement in service quality, monitoring, and international benchmarking (Salvio & Palaoag, 2019). Addressing these disparities, particularly among the HUCs, is essential to identify actionable insights and enhance the delivery of vital e-governance services.

Based on Wei et al. (2010) Social Cognitive Model that differentiates three levels of the digital divide: access, capability, and outcome, the primary concern for our country's government websites has become the digital outcome divide. This shift requires that these websites be benchmarked against international standards to enhance e-government service delivery and efficiency by dealing with this digital governance gap. There is another framework that can be used to build on the improvement of digital governance: the Digital Governance Framework, which focuses on the organizational administration of technology and data and has principles, regulations, and practices. As for the framework concept, more efforts should be put into guaranteeing that digital technology is appreciated for being opened to the public and held responsible for its operations. Rose et al. (2018) describes the Stakeholder Digital Governance Approach as a model that originates from the stakeholder view of digital governance. Every nation must design an e-governance model according to the needs of citizens as recipients of digitization services (Singh, 2023).

This survey research focuses on Philippine city websites, drawing comparisons with the international sample from the E-Governance Institute of Rutgers University. Specifically, the study aims to 1) evaluate the digital divide gap among Highly Urbanized Cities (HUCs) websites in the Philippines using the Rutgers E-Governance Performance Index framework, and 2) propose a website assessment framework. The research provides comprehensive insights into the current state of HUC website development and introduces a checklist tool to enhance website services. The expected output represents a novel contribution to the field by offering a tailored framework for assessing website performance and addressing service delivery disparities. By introducing this framework, the study advances the theoretical understanding of e-governance with a nuanced tool for measuring digital divide gaps in local government websites. In practice, the framework is a valuable benchmarking tool, enabling HUCs to systematically evaluate their website performance and pinpoint areas for targeted improvement.

## Methods and Materials

Inspired by the Global E-Government Survey project, which measures the performance of digital governance in large municipalities around the world (Holzer & Manoharan, 2016; Ingrams et al., 2020; Manoharan et al., 2023), this survey was exclusively directed toward city government websites of Highly Urbanized Cities (HUCs) of the country. This selection was influenced by a prior study by Khalid and Lavilles (2019), assessing the maturity level of local E-Government websites in the country, revealing that HUCs had progressed to Stage Two or an Enhanced Stage, enabling them to provide one-way communication services. In contrast, other city government websites were categorized as either Emerging or at Stage One, and several municipalities did not possess independent websites then. A Freedom of Information (FOI) request through the Philippine Statistics Authority (PSA) via https://www.foi.gov.ph was submitted to compile the list of HUCs. As of April 2023, the Philippines has thirty-three (33) Highly Urbanized Cities (HUCs), wherein official websites can be accessed at 10.6084/m9.figshare.25635510. To note, twenty-one (21) HUCs are located on the island of Luzon, while both the Visayas and Mindanao islands each host 6 HUCs. To see the categorization and clustering of these HUCs based on island groups and regions, access it at 10.6084/m9.figshare.25635657.

Figure 1 presents an overview of the methodology employed in the study to obtain the digital governance score of the concerned websites, which led to the creation of the assessment framework and the checklist tool.

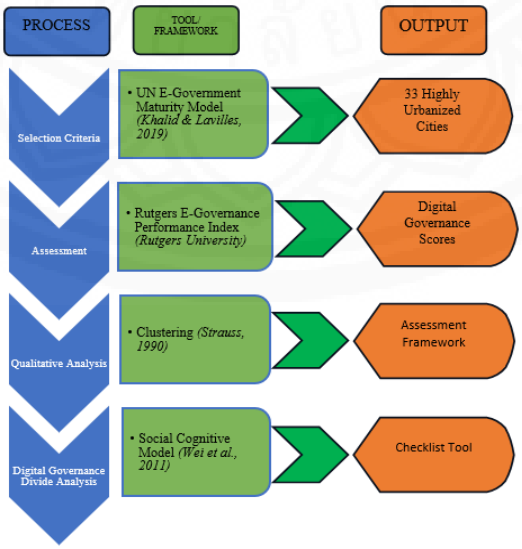


**Figure1** Methodology for Creating the Framework and Tool.

A survey instrument was employed as a primary evaluation tool to assess these websites. The Rutgers E-Governance Performance Index, a recognized benchmark in this field, was utilized to evaluate the government websites of all thirty-three (33) Highly Urbanized Cities (HUCs) in the Philippines. This methodology is supported by the Organizational Theory, which emphasizes the importance of understanding how organizations function and how they can be improved. The IPO framework is used to identify processes' inputs, outputs, and error states so that organizations can explore and understand their website's dynamics.

The instrument used in this study provides rich coverage for E-Government research, including 104 variables spanning five categories: Privacy/Security, Usability, Content, Services, and Citizen and Social Interaction. To prevent this instrument's ethical misuse, an email request for formal written permission was sent to the National Center for Public Performance, School of Public Affairs and Administration of Rutgers University-Newark, USA.

Of the 104 measures utilized in the survey instrument, 43 follow a dichotomous scale, requiring either 0 or 1 ratings. For the remaining non-dichotomous questions, each measure was assessed on a four-point scale ranging from 0 to 3. Furthermore, this study adopted an equal weighting strategy for all five categories in the final score calculation to maintain a balanced and impartial approach. Regardless of the number of questions within each category, an overall weighted score was computed to ensure that each category held equal weightage in the analysis.

In addition, two participants familiar with website content management were used in this study to survey the respective websites. This concern is addressed by a rigorous procedure that creates reliability in the analysis process. When a disparity of ± 10% is detected on the weighted scores of the two raters, the evaluators were asked to conduct another round of evaluation to establish the causes of disparities. The latter was provided with assessment guidelines to ensure consistency among the evaluators. The contents of the concerned websites were evaluated between May and July of 2023. The tool used to assess the concerned websites remained unmodified as the tool is designed with an auto-compute feature where results are generated directly from the inputs provided during the evaluation.

After obtaining the digital governance scores of the websites, descriptive statistical techniques were employed to conduct a more in-depth analysis. The summary of this technique offers a comprehensive overview of the data, facilitating researchers or analysts in acquiring insights and comprehending patterns, trends, and distributions present within the datasets (Vetter, 2017). Frequency analysis was employed to gauge the extent to which these websites featured the specific content categories outlined in the survey instrument. In addition, percentage calculation was used to discern the presence or absence of website content. From the conducted quantitative assessment of the website contents, pinpointing items that were notably absent, accounting for 80% to 100% of the content, were designated as "particular data". Subsequently, qualitative clustering was employed to distill the components essential from the "particular data" for the assessment framework. This technique reveals patterns and insights within complex data, which helps analyze government websites in Highly Urbanized Cities (HUCs) to identify the digital divide. Inspired by the model of Wei et al. (2010), this method supports the creation of a checklist tool with five components to assess this divide.

## Results and Discussion

Table 1 shows the rankings of the thirty-three (33) Highly Urbanized City (HUC) Websites in the Philippines for 2023, emphasizing their digital governance indices. More particularly, among the cities of the Visayas region, Bacolod is the city that received the highest score of 42.93. This score is still admirable, but it is a tiny fraction

of the best possible score of 100, according to this study's Rutgers E-Governance Performance Index survey instrument. The same instrument was used in the study conducted by Manoharan et al. (2023), which evaluated official government websites of capital cities across the globe. During their research, they found that the website of the Seoul City Government in South Korea was the one that performed the best, scoring 84.07.

On the other hand, the official website of the Manila City Government of the Philippines received a total score of 11.6; it ranked 97 among one hundred surveyed countries according to overall E-Government rankings as of 2019. As of 2023, Manila, as evaluated in this study, has achieved a score of 31.31, placing it 11$^{th}$ among the thirty-three (33) Highly Urbanized City (HUC) websites. This marks an increase in its score compared to the 11.6 it received in 2019. Therefore, from the above scores, one can deduce that the significant barriers are conspicuous within the e-government process within the HUCs, particularly in providing services offered through the official government websites.

**Table 1** Digital Governance Scores of Highly Urbanized Cities in the Philippines 2023

| Rank | City | Score | Island Group | Rank | City | Score | Island Group |
|---|---|---|---|---|---|---|---|
| 1 | Bacolod | 42.93 | Visayas | 18 | Olongapo | 25.50 | Luzon |
| 2 | Pasig | 40.31 | Luzon | 19 | Puerto Prinsesa | 25.03 | Luzon |
| 3 | Quezon | 39.53 | Luzon | 20 | Paranaque | 25.00 | Luzon |
| 4 | Davao | 37.89 | Mindanao | 21 | Pasay | 24.90 | Luzon |
| 5 | Navotas | 37.33 | Luzon | 22 | Baguio | 24.49 | Luzon |
| 6 | Cebu | 36.95 | Visayas | 23 | General Santos | 24.20 | Mindanao |
| 7 | Valenzuela | 36.37 | Luzon | 24 | Mandaue | 23.41 | Visayas |
| 8 | Mandaluyong | 33.15 | Luzon | 25 | Caloocan | 23.30 | Luzon |
| 9 | Makati | 32.30 | Luzon | 26 | Iloilo | 22.23 | Visayas |
| 10 | Cagayan de Oro | 31.70 | Mindanao | 27 | SanJuan | 21.22 | Luzon |
| 11 | Manila | 31.31 | Luzon | 28 | Marikina | 21.10 | Luzon |
| 12 | Taguig | 30.36 | Luzon | 29 | Tacloban | 20.97 | Visayas |
| 13 | Muntinlupa | 29.94 | Luzon | 30 | Malabon | 18.58 | Luzon |
| 14 | Las Pinas | 28.12 | Luzon | 31 | Lucena | 18.05 | Luzon |
| 15 | Iligan | 26.79 | Mindanao | 32 | Lapu-Lapu | 17.95 | Visayas |
| 16 | Zamboanga | 25.96 | Mindanao | 33 | Angeles | 16.28 | Luzon |
| 17 | Butuan | 25.88 | Mindanao | | | | |

Depicted in Table 2 are the top 10 HUCs in digital governance for 2023, showing the garnered scores in the five categories as evaluated. Bacolod ranked first in the survey with an overall score of 42.93, which also topped for privacy, usability (along with Davao and Valenzuela), and services categories. Notably, with a score of 39.53, Quezon ranked third, which got the top score for the content category. Mandaluyong (rank 8) and Makati (rank 9) got scores of 33.15 and 32.30, respectively, and lead the citizen and social engagement category.

**Table 2** Top 10 Cities in Digital Governance 2023

| Rank | City | Overall | Privacy | Usability | Content | Services | Citizen and Social Engagement |
|---|---|---|---|---|---|---|---|
| 1 | Bacolod | 42.93 | 12.22 | 14.69 | 4.44 | 10.33 | 1.25 |
| 2 | Pasig | 40.31 | 11.85 | 13.13 | 5.87 | 7.38 | 2.08 |
| 3 | Quezon | 39.53 | 8.15 | 12.50 | 10.69 | 5.90 | 2.29 |
| 4 | Davao | 37.89 | 11.11 | 14.69 | 6.51 | 4.75 | 0.83 |
| 5 | Navotas | 37.33 | 11.48 | 12.81 | 4.60 | 6.56 | 1.88 |

**Table 2** (Cont.)

| Rank | City | Overall | Privacy | Usability | Content | Services | Citizen and Social Engagement |
|---|---|---|---|---|---|---|---|
| 6 | Cebu | 36.95 | 11.11 | 12.81 | 4.76 | 6.39 | 1.88 |
| 7 | Valenzuela | 36.37 | 7.04 | 14.69 | 5.72 | 7.05 | 1.88 |
| 8 | Mandaluyong | 33.15 | 3.33 | 12.19 | 10.38 | 4.75 | 2.50 |
| 9 | Makati | 32.30 | 7.04 | 13.44 | 5.56 | 3.77 | 2.50 |
| 10 | Cagayan de Oro | 31.70 | 7.41 | 13.44 | 5.40 | 5.25 | 0.21 |

**1. Privacy / Security**

In terms of privacy/security, Bacolod managed to score 12.22, which secured first place. It needs to be highlighted that each category has a maximum possible score of 20; in other words, all the categories are equally important. Throughout the Philippines, 60% of the top ten were from Luzon, while two from the islands of Visayas and Mindanao combined contributed 40%. Fudge and Manoharan (2013) stated that privacy policy can strongly contribute to improving the image of governmental institutions and, consequently, raising the levels of citizens' participation. Nowadays, privacy is a technical challenge to the government since it is a big deal to be transparent and address privacy concerns to users. In the specific case of the official government website of Bacolod, a feature stands out: a pop-up box of a data privacy and protection policy that every user must read before entering their information into the site or receiving information related to the site.

**2. Usability**

Butuan, Caloocan, and Paranaque obtained a total score of 15 points and ranked first. This is the highest score that can be gotten in any of the five coherent categories assessed above. However, these three HUCs featured outside the top 10 cities in digital governance for 2023. It has been reported that the usability of the government website significantly determines the delivery of civil benefits and services to the citizens (Ashraf et al., 2017). Accordingly, Raju et al. (2018) have made attractiveness another usability aspect of a website for maintaining interest level and interactivity. Worthily acknowledging, the websites of Butuan, Caloocan, and Parañaque have the best instance of this concept in the consistent and clickable navigation bars as implemented in their sites that demonstrate a commendable practice for the website users. This may increase user satisfaction concerning web usability since the end users' experiences are enhanced.

**3. Content**

Quezon City took the lead, scoring 10.69 points. Specifically, the Philippine cities in the top rankings are Quezon City and Marikina, while the Davao City of the island of Mindanao has ranked highly in third place. Notably, the other six HUCs with excellent performance are those HUCs situated in Luzon, and there are no HUCs from Visayas. Content is deemed as one of the constantly developing segments in the sphere of website construction. Holzer and Manoharan (2016) pointed out that it is crucial to acknowledge that its efficiency depends on the update of its content, the simplicity of the site's structure, and the reliability of the information it offers. These all work harmoniously to decide whether the site is achieving its purpose. Further support for this standpoint comes from Bajar (2020), who noted that there is an absolute necessity for the government websites in his country to present the content of their websites in a much more systematic and more organized manner to provide ample, acceptable services to the users in the country.

**4. Service Delivery**

The city that generated the highest score of 10 is Bacolod, which ranks it in rank 1. 33. However, it is interesting to note that 60% of HUCs came from Luzon while 40% from two cities each from Visayas and

Mindanao islands. Yet, it is seen that HUCs have a long way to go in getting the online resources to deliver public services in terms of web accessibility criteria, where the E-Government Masterplan 2022 by the Department of Information and Communications Technology holds promise in bringing change in the top gear of digital transformation of the essential services to build harmonized government websites.

**5. Citizen and Social Engagement**

Makati, Pasay, and Mandaluyong were the top performers, and they only had 2.50. While Cebu is the only city in the top 10 from the Visayas, all other places are from Luzon, while none of the Mindanao cities made the list, showing regional bias. Given that the groups of citizens use such social services as Facebook, X (previously called Twitter), and YouTube to interact with their government, Holzer and Manoharan (2016) proposed incorporating other forms of communication into the government's websites. Such channels should differ from traditional ones and include features like chat, discussion forums, and polls. Therefore, the purpose is to engage citizens in decision-making and gain helpful feedback. Lack of such services may result in reduced page visits and, hence, a decline in the effectiveness of the existing internet platforms.

Addressing the digital divide and enhancing digital governance have profound implications for fostering inclusivity, economic growth, and citizen engagement. Bridging this divide ensures that marginalized communities gain equitable access to vital services such as education, healthcare, and financial systems, promoting social equity and reducing disparities. Economically, robust digital infrastructure and governance can drive innovation, attract investments, and support local entrepreneurship. Moreover, improved digital platforms enhance transparency, accountability, and trust in government services, enabling institutions to respond more effectively to the needs of citizens and communities.

Regional disparities in digital governance highlight the urgent need for tailored approaches. Highly Urbanized Cities (HUCs) often demonstrate more potent digital platforms than less urbanized regions, underscoring the importance of context-sensitive strategies. Lessons from global benchmarks, such as the e-governance successes of Seoul and Singapore, offer valuable insights into creating citizen-centric, integrated digital ecosystems. For the Philippines, benchmarking local government websites against international standards can identify performance gaps, while regional collaboration and knowledge-sharing can foster innovative solutions. By adapting global best practices to local needs, the Philippines can build a more equitable digital landscape, strengthen citizen-government relations, and contribute to inclusive development nationwide.

**6. Digital Governance Divide Assessment Framework**

The study used the digital governance scores to assess website content using descriptive statistics, which indicated a severe lack of discrete content categories, as 80% to 100% of the sampled websites lacked the features. Using qualitative clustering, the study categorized these critical 'particular data' into five elements of the assessment framework; in the 'inclusive content' domain, it was discovered that all the assessed HUC websites lacked them, which was a 100% absence rate. These components have been sorted based on the average percentage of unavailability: content inclusiveness got the highest score, followed by content quality, 98.5%, technical infrastructure: 97.3% and public engagement: 95.1%, followed by data privacy: 89.1%.

The digital governance divide refers to a significant discrepancy marked by the need for more pivotal elements within five identified components. The five main categories identified are Inclusive Content, Content Quality, Technical infrastructure, Public Engagement, and Data Privacy. This divide explains the variation in accessibility and effectiveness of these essential elements, leading to inequalities in digital inclusion, quality

of service delivery, technology readiness, citizenship engagement, and data protection in the delivery of government website services.

Figure 2 presents the assessment framework, which has been derived from the identification of five interconnected key components. At its core is the concept of the Digital Governance Divide, which emphasizes gaps in accessibility, quality, and engagement within digital governance platforms. Surrounding this central issue are as follows: Inclusive Content, which focuses on providing accessible and user-friendly content for diverse users, including marginalized communities and individuals with disabilities; Content Quality, which stresses the importance of accurate, high-quality, and regularly updated content to maintain user trust; Technical Infrastructure, which highlights the need for reliable broadband, server capacity, and security measures to support digital governance; Public Engagement, which encourages interactive platforms and participatory tools to foster a sense of ownership and enhance the relevance of digital governance; and Data Privacy, which underscores the importance of protecting users' data and ensuring transparency in its usage to build trust. The framework emphasizes the interdependence of these dimensions, advocating for a comprehensive approach to bridging the digital governance divide and creating inclusive, efficient, and equitable digital platforms for all citizens. As depicted in the figure, the extent to which features aligned with these components are offered directly correlates with reducing the digital governance divide. In other words, a higher provision of features related to these components corresponds to a narrower digital governance divide.

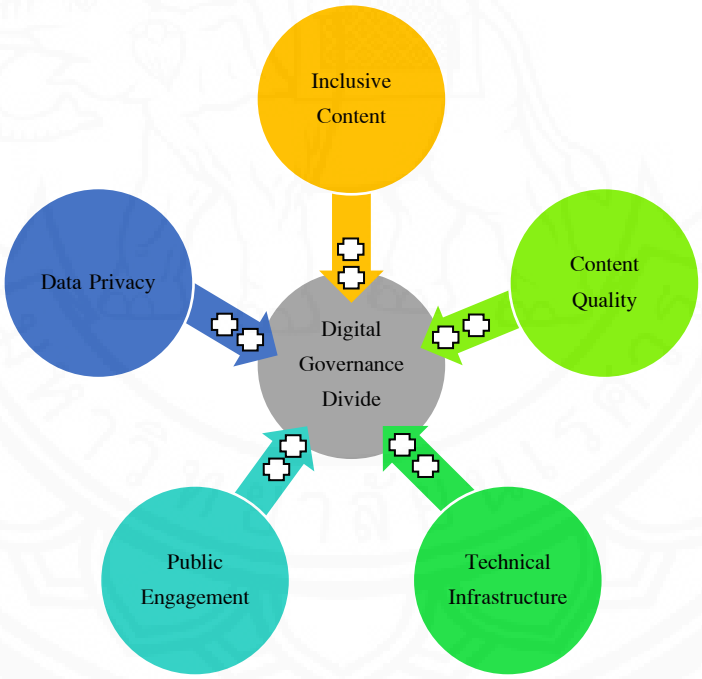


**Figure 2** Digital Governance Divide Framework.

### 6.1 Inclusive Content

Many governments across the globe are constantly adopting IT training to improve the delivery of equal and accessible public service online and encourage the development of an inclusive e-government (Lee & Porumbescu, 2019). Such policies and e-governance services make the citizens more informed, trusting, and active in policymaker processes (Azad & Zablith, 2022). E-inclusion presents the need to go beyond the IT-based strategy and towards a strategic, open, and responsible management of e-governance (Sahraoui, 2007). Moreover, governments must create accessible e-services and straightforward ICT and ICT-based content and

promote a fair, unbiased e-government environment through regulations, strategies, and mechanisms. There is a need to advocate the development of an appropriate culture for e-government concerning accessibility, equity, legal instruments, strategic directions, and governmental guarantees.

### 6.2 Content Quality

E-government service quality is crucial to the success of the beneficiaries and the electronic service. The study focuses more on website design, reliability, responsiveness, security, privacy, information availability, and simplicity of use regarding customer satisfaction (Al-Hawary & Al-Menhaly, 2016). The importance of information quality in e-government services comes from the discovery that correctness and completeness are key predictors of citizen satisfaction with e-government services (Chan et al., 2021). A study by Pham et al. (2023) identifies five crucial elements of e-government service quality: engagement, fulfillment, citizen care, security/privacy, and trustworthiness, noting their impact on citizen loyalty via perceived value and satisfaction.

### 6.3 Technical Infrastructure

The technical infrastructure is essential to addressing the digital divide and advancing e-governance. Implementing an e-government system, with the aid of Information and Communication Technology (ICT), aims to improve administrative efficacy, performance, community involvement, and service provision. The platform functions as a medium via which the government can deliver services to individuals and enterprises to enhance the overall well-being and standard of living of the populace. Inclusive governance can only be achieved with ICT infrastructure and digital literacy. Hence, the government should prioritize establishing mediums for digital growth and fair technological access. Policymakers must be motivated to develop excellent digital services with the right technical infrastructure. Effective public e-services are believed to be hindered by bureaucratic and institutional silos which impede public e-services. However, a well-funded connection, digital identification, interoperability, and data registries are found to improve service delivery. Hence, political decision-making should center on a country's digital transition.

### 6.4 Public Engagement

Closing the digital gap requires public engagement. Participation in the design and implementation of e-governance services could ensure they are tailored to the needs of the citizens and improve their quality of life. Public engagement may ensure that e-governance services are accessible, equitable, user-centered, trustworthy, and inclusive, allowing all citizens to participate in democracy (Refat et al., 2023). The study analyses how visuals affect public engagement with health data governance. The study stresses the need for public participation to create a more responsive innovation culture, legitimize research programs, and meet service users' requirements. Public participation informs local government decision-making and improves community outcomes (Di Giovanna & DeSantis, 2022). Aham-Anyanwu and Li (2015) attempt to analyze e-public engagement literature from a historical perspective by revisiting notions like the public sphere, public engagement, and e-public engagement. The study result gave a more precise definition of public engagement in e-governance. It provided the public needs framework to help demonstrate the necessity of overhauling e-government platform content to involve citizens more actively. Tejedo-Romero et al. (2022) investigated how citizen involvement in e-government impacts societal issues by implementing strategies that promote the active participation of individuals and society. They argued that its role is to uphold transparency, accountability, and legitimacy. Additionally, Axelsson et al. (2010) found that public engagement is critical to effectively organizing and managing e-government, which is the key component for the success and wide usage of public e-services.

### 6.5 Data Privacy

It is necessary to observe that there are numerous reasons to gather, exchange, and disseminate personal information. Several organizations, such as public, private, or governmental departments and agencies, can share data for research, statistical analysis, service development purposes, or compliance with legal requirements. Nevertheless, sharing personal data can be dangerous for privacy (De Capitani di Vimercati et al., 2012). Data protection laws like the General Data Protection Regulation (GDPR) must be implemented on the government's websites. Failure to adhere to these standards may lead to a legal risk, besides losing local citizens' trust. Like the Philippines' case, a recent study established that factors such as deterrent, legitimacy, and moral obligation compel LGUs to change their behavior and adhere to the law (Pitogo, 2019). A closer look at the evaluation shows grave issues such as a lack of awareness, a watch-and-wait approach, and time and resource constraints. To enhance the delivery of government and e-governance, measures like the acquisition of ICT resources, allotment of ICT resources, and proportionate hiring of qualified ICT human resources are being implemented by the LGUs. The study by Al-Jamal and Abu-Shanab (2015) found that the privacy of personal information had a significant relationship with the effectiveness of public organizations on the one hand and the end user satisfaction index on the other.

Finally, based on the literature analysis presented in this paper, one can identify several factors that may affect the success of inclusive e-governance services. Thus, governments all over the world must pay special attention to the information that is placed on the websites providing public service for several reasons, such as beginner guides to help those who are not very familiar with using technology for public service, FAQs to increase the credibility of the information with regular questions and answers about online services, Case Studies with real-life examples of the practical applications of such services, closing Thoughts section to sum up the findings and The quality of e-government services influence the satisfaction level of the user through web design, security of web sites and relevant citizens' care. Reducing disparities in technological access and closing the digital divide entails digital literacy, the government's investment in digital services, and supporting technical infrastructure. Public participation in e-governance delivery contributes to better e-governance service delivery, providing better justification, legitimacy, and equal access to better e-governance services. Eradicating skepticism in the provision of public services necessitates obedience to data protection laws when handling individuals' data. Therefore, governments need to embrace these areas and implement e-governance models that are inclusive, qualitative, technologically sophisticated, community-engaging, and consistent with the protection of citizens' data for an improved structure of digital governance.

## 7. Proposed Digital Governance Divide Index

The conceptualization of the assessment framework led to the Digital Governance Divide Index proposal, accessed at 10.6084/m9.figshare.25635543. The proposed index has five components, each with ten (10) measures inquired, totaling 50 items following a dichotomous scale requiring either Yes (Relevant information about a specific topic can be found on the government website) or No (Information regarding the specified topic is not available on the government website) answers.

In the computation of the digital governance rating, the formula as shown below is used:

$$DGDR = (((A/10) *100) *.2) + (((B/10) *100) *.2) + (((C/10) *100) *.2) + (((D/10) *100) *.2) + (((E/10) *100) *.2)$$

where, A = Inclusive Content Score, B = Content Quality Score, C= Technical Infrastructure Score, D = Public Engagement Score, E = Data Privacy Score and DGDR = Digital Governance Divide Rating

The range of ratings is as follows: for Level 5, it means that between 81% and 100% of the items assessed using the checklist tool are absent from the government website; for Level 4, it means that between 61% and 80% of the items assessed using the checklist tool are absent from the government website, for Level 3 it means that between 41% and 60% of the items assessed using the checklist tool are absent from the government website, for Level 2 it means that between 21% and 40% of the items assessed using the checklist tool are absent from the government website and for Level 1 it means that between 0% and 20% of the items assessed using the checklist tool are absent from the government website. The higher the rating, the greater the level of the digital governance divide since the frequency counting is concerned with "No", which means the information about a given topic does not exist on the website.

### 7.1 Digital Governance Divide Rating of Top 10 Websites

Using the proposed digital governance divide index as a checklist tool, the Top 10 websites listed in Table 3 are evaluated as reflected in the table. The table shows that 9 out of 10 websites are categorized under Level 5 of the Digital Governance Divide. This means that 81% and 100% of the items assessed using the checklist tool must be added to the government website. Note that the higher the percentage, the greater the level of digital governance divide since the frequency counting is concerned with "No", which means the information about a given topic does not exist on the website.

**Table 3** Digital Governance Divide Level of Top 10 HUCs Websites

| City | Inclusive Content | Content Quality | Technical Infrastructure | Public Engagement | Data Privacy | Rating | Level |
|---|---|---|---|---|---|---|---|
| Bacolod | 20 | 16 | 20 | 18 | 12 | 86% | 5 |
| Pasig | 20 | 20 | 20 | 20 | 12 | 92% | 5 |
| Quezon | 20 | 14 | 18 | 16 | 12 | 80% | 4 |
| Davao | 20 | 16 | 20 | 20 | 16 | 92% | 5 |
| Navotas | 20 | 18 | 18 | 18 | 16 | 90% | 5 |
| Cebu | 20 | 16 | 20 | 20 | 14 | 90% | 5 |
| Valenzuela | 20 | 16 | 20 | 18 | 18 | 92% | 5 |
| Mandaluyong | 20 | 18 | 20 | 20 | 18 | 96% | 5 |
| Makati | 20 | 18 | 18 | 16 | 18 | 90% | 5 |
| Cagayan de Oro | 20 | 18 | 20 | 20 | 16 | 94% | 5 |
| Average | 20 | 17 | 19.4 | 18.6 | 15.2 | 90.2% | |

A multifaceted strategy is essential to bridge the digital divide and strengthen citizen and community engagement. First, expanding digital infrastructure accessibility is paramount, particularly in underserved rural and economically disadvantaged areas. Public-private partnerships can bolster this effort, incentivizing telecommunications companies to establish networks in remote regions. Simultaneously, prioritizing digital literacy programs ensures inclusivity, targeting diverse groups such as seniors, marginalized populations, and individuals with limited formal education. Collaboration with schools, universities, and NGOs can facilitate community-based workshops and the creation of digital resource centers.

Inclusive website design and accessible content are vital for bridging the digital divide. Government websites must adhere to Web Content Accessibility Guidelines (WCAG) to ensure usability for individuals with disabilities

and offer content in multiple languages. Regular audits can identify and address accessibility gaps, ensuring continuous improvement. Moreover, integrating interactive features such as feedback portals, forums, and real-time chat services into e-governance platforms can enhance public engagement. These platforms should evolve based on user feedback and citizen satisfaction surveys, ensuring they remain responsive to community needs. Monitoring and evaluating digital governance performance is equally critical. Tools like the Digital Governance Divide Index (DGDI) provide a systematic approach to assess website performance and identify areas for improvement. Publishing annual performance reports promotes transparency and accountability. Additionally, fostering innovation through community-centric approaches, such as grants and technical assistance for grassroots digital projects, can inspire creative solutions. Hosting innovation challenges and hackathons further encourages collaboration and addresses local issues effectively.

Legislative measures play a crucial role in promoting digital equity. Enacting laws to ensure the fair distribution of digital resources and opportunities can address systemic disparities. Concurrently, raising awareness about data privacy is essential. Nationwide campaigns can educate citizens about their rights and secure online practices, while government websites should maintain transparency in data usage and regularly update privacy policies. These combined measures narrow the digital divide and empower communities to participate actively in governance and societal development. Looking ahead, a comprehensive digital governance framework is needed to address the multidimensional aspects of digital transformation. This framework should integrate open data and government principles, emphasizing transparency and accountability. Key priorities include improving connectivity, particularly in underserved regions, through innovative solutions like public-private partnerships and low-cost connectivity technologies. Successful models from countries such as Estonia and Singapore highlight how robust digital infrastructure can underpin effective governance.

Cybersecurity must also be a cornerstone of this framework. With increasing reliance on digital systems, robust cybersecurity measures are essential to safeguard public data and build trust. Adopting global best practices, such as the EU's General Data Protection Regulation (GDPR), provides valuable insights into balancing data accessibility with privacy protection. Public engagement strategies are another critical component. Research should focus on how digital platforms can foster meaningful citizen participation, central to strengthening democratic processes. Tools like e-participation platforms and online feedback mechanisms should be evaluated for their effectiveness in promoting inclusivity and civic responsibility. Lessons from countries like South Korea, which has successfully integrated public engagement into its digital governance initiatives, can serve as valuable benchmarks. Finally, developing a robust evaluation framework is essential to measure the outcomes of inclusive digital services. This framework should assess not only the accessibility of services but also their impact on empowering marginalized communities. Incorporating qualitative and quantitative metrics can provide a comprehensive understanding of how digital services address the needs of diverse populations. This approach ensures that digital governance initiatives foster social equity while driving transformative change.

## Conclusions and Suggestions

It can be seen in the case of the Philippines' maturing e-government through the existing Government Information System Plan 2000, which was preceded by the e-Commerce and the e-Procurement Acts and later the e-Government Master Plan. However, ICT must be applied optimally for these initiatives to be salient. The primary issue faced by the globe, particularly in developing countries such as the Philippines, is the curb in

internet usage, which can be a barrier to e-government implementation (Urbina & Abe, 2017). The scores ascertained from the survey reflect that even the highly ranked Highly Urbanized Cities (HUCs) need more time to enhance their websites, especially in the Citizen and Social Engagement category. This observation aligns with research conducted by Khalid and Lavilles (2019), in which such websites were categorized as either Stage 2 or the Enhanced Stage as per the United Nations Four-Stage Model. For HUCs to advance to the next stage, they must improve their website, efficiently ensuring public and government communication. This should include acquiring certificates, permits, and related documents and even conducting financial transactions. Transitioning to Stage 4, the country is digitally sophisticated, with active participation from the citizens. To get there, one must consider specific advice from Magno (2018) that pointed out the role of online transparency and portals in offering access to information intermediaries capable of analyzing data. Partnership with HEI as a knowledge partner is also suggested to foster research and innovation in e-government.

Some work has also been done to respond to the security policies on HUC websites. However, improvements are required regarding data encryption techniques, cookie use policies, and digital signatures at HUC. When it comes to e-government and privacy, Al-Jamal and Abu-Shanab (2015) have said that e-government privacy does influence the level of confidence bubbles as well as e-government acceptance among businesses and citizens. That is why it is possible to assume that site maps are underutilized while improving navigation can solve the problem. In addition, although most of the HUC websites have more than one language available in the browser translation, the downloadable forms and applications and added audio and video functionality should have more directed efforts to build accessibility and inclusiveness.

Moreover, the quality of e-government services encompasses five key aspects. Other factors include accessibility of engagement, satisfaction, citizens' needs, safety and confidentiality, and credibility (Pham et al., 2023). It also positively impacts reducing the digital divide gap and positively contributes to growth in the technological sector of e-governance. As suggested by Jia (2021), disseminating information makes providing services within governmental institutions efficient and offers better services to people online. This also enhances the relationship between government bodies and, in the long run, improves the service delivery to the public.

Xia (2017) proposed that feedback mechanisms should be supported on different platforms for citizens to give their opinions. Social media should be incorporated into government websites to enhance service delivery and citizens' engagement. Furthermore, public participation is an essential component in organizing, managing, and adopting e-government programs, and there is a necessity for public participation to develop accepted and effective e-services (Axelsson et al., 2010). However, the case of the National Government Portal (NGP) established a good starting point in which the Government conveys information to the citizens and engages them. The E-Government Master Plan of the Department of Information and Communication Technology (DICT) is said to improve e-governance solutions nationwide.

This study proposes a comprehensive checklist tool with five key elements and fifty specific measures to evaluate the digital governance divide, particularly in the context of Highly Urbanized Cities (HUCs) in the Philippines. Despite the generally low digital governance scores found across HUC websites, this tool provides a structured approach to identifying areas of improvement, offering local governments a practical instrument to enhance the services on their official websites. However, the tool's focus is currently limited to assessing government websites, and its validation by field experts is needed. Future research should expand the tool's scope to include cultural, institutional, and political factors influencing digital governance. It should also refine its

methodology to include a broader range of cities for a more comprehensive analysis of the digital divide across varying urban classifications.

For policymakers and Local Government Units (LGUs), integrating the proposed digital governance index into strategic planning will allow them to assess digital services, pinpoint gaps, and prioritize improvements. This index facilitates benchmarking against global best practices, helping to target underserved communities and guide decisions on expanding connectivity, improving cybersecurity, and enhancing public engagement. A crucial aspect of this process is the incorporation of user feedback, which can help LGUs tailor services to citizens' needs, ensuring digital inclusiveness and increasing service effectiveness. This evidence-based approach can drive practical solutions that improve accessibility and relevance in digital governance.

Future studies should also consider applying the digital governance framework to smaller municipalities facing distinct challenges due to limited resources and infrastructure. Integrating cultural and political contexts into the framework would provide a deeper understanding of how local dynamics affect digital governance adoption. This broader perspective would allow for more context-specific recommendations, supporting the digital transformation of governance across diverse regions.

Finally, it is essential to recognize that addressing the digital governance divide can significantly enhance public service delivery, reduce inequality, and support the Philippines' e-government goals. Digital governance can foster greater inclusivity, improve public service efficiency, and contribute to a more transparent and accountable government by ensuring equitable access to digital services, particularly for underserved communities. Aligning efforts to bridge the digital divide with the country's broader e-government objectives will accelerate the digital transformation of public administration, ultimately benefiting national development and achieving more significant social equity.

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