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User Satisfaction Analysis of the South Sumatra Spatial Planning Information System (SITARUNG): Generation Z Perceptions Using WebQual 4.0 and IPMA

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Abstract: Website quality is an important factor in user satisfaction with digital public services. The South Sumatra Spatial Planning Information System (SITARUNG) has not previously been evaluated from a user perspective. This study examines the effects of the WebQual 4.0 dimensions—usability, information quality, and service interaction quality—on user satisfaction with the SITARUNG website and identifies improvement priorities using Importance Performance Map Analysis (IPMA) based on the perceptions of Generation Z users. Using a quantitative survey design, data were collected from 100 Generation Z respondents through a web-based questionnaire. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4, followed by IPMA to identify indicators requiring improvement. The results show that information quality and service interaction quality significantly and positively influence user satisfaction, whereas usability does not have a significant effect. The model explains 51.6% of the variance in user satisfaction. IPMA identified five indicators in Quadrant I as improvement priorities: relevance of information to user needs (IQ3), appropriateness of information detail (IQ5), accuracy of service delivery information (SIQ1), ease of data management (SIQ2), and website processing and display speed (SIQ4). These findings indicate that information quality and service interaction quality are the primary factors associated with user satisfaction in the SITARUNG website, while usability does not show a significant effect in the present sample. Practically, the findings provide recommendations for improving spatial information services through continuous data updates, adequate GIS server infrastructure, and cross-agency data validation to support the accuracy of public spatial information.

Keywords: WebQual 4.0; PLS-SEM; IPMA; User Satisfaction; SITARUNG; Generation Z.

1. Introduction

According to Law No. 26 of 2007 concerning Spatial Planning, spatial planning encompasses the organization, utilization, and regulation of land use (Pemerintah Republik Indonesia, 2007). The implementation of spatial planning increasingly relies on technology-based information systems as part of digital transformation efforts to support efficient, integrated, and adaptive spatial management (Dewa, 2022). With internet penetration in Indonesia exceeding 220 million users, the digitalization of public services, including spatial information systems, has become a strategic means of supporting information transparency and public participation (Suwantoro, 2025). As one implementation of this digital transformation, the Government of South Sumatra Province developed the Spatial Information System (SITARUNG), a web-based platform managed by the Data and Information Section of the Department of Public Works for Road Infrastructure and Spatial Planning (PUBM-TR). The SITARUNG website provides spatial planning information to the public and is intended to support easier and more transparent access to spatial planning data (Beritasatu, 2021).

The quality of a website is an important factor in providing accessible and transparent information to users. In the WebQual 4.0 framework, website quality is assessed through three dimensions: usability, information quality, and service interaction quality (Mandias *et al.*, 2021). These dimensions contribute to the overall user experience and may influence user satisfaction, which is commonly used to assess the effectiveness of information systems (Sebayang & Maita, 2022). Despite the importance of these dimensions, interviews with PUBM-TR officials indicated that SITARUNG had not previously undergone a formal user-oriented website quality assessment, particularly regarding the relationship between website quality and user satisfaction. The absence of such an evaluation may also limit the identification of weaknesses in the delivery of spatial planning information and the determination of appropriate improvement priorities (Apriani & Zaen, 2025). Website quality can be evaluated using several established methods. Previous studies have frequently combined WebQual 4.0 with Importance Performance Analysis (IPA) to assess website quality and identify areas for improvement (Dhiannisa *et al.*, 2024; Sabila *et al.*, 2023). However, IPA determines importance primarily from users' perceptions and does not derive importance values from the structural relationships among variables (Hauff *et al.*, 2024). This limitation is relevant when the objective is to identify improvement priorities based on the relationships between website quality dimensions and user satisfaction. Importance Performance Map Analysis (IPMA), as an extension of PLS-SEM, combines performance values with importance values derived from the total effects of the structural model (Ringle & Sarstedt, 2016). Therefore, the use of IPMA can provide an additional basis for identifying indicators that have relatively high importance for the target outcome but require further improvement in performance.

Based on the literature reviewed in this study, research combining WebQual 4.0, PLS-SEM, and IPMA for website quality evaluation remains limited. Candiwan and Wibisono (2021), for example, applied WebQual 4.0, PLS-SEM, and IPMA to evaluate the JD.id e-commerce website and found information quality to be the most influential dimension. However, their study focused on an e-commerce context and did not specifically examine government information system websites or differentiate users based on generation. Other studies have applied WebQual 4.0 and PLS-SEM to different website contexts but have not incorporated IPMA to identify improvement priorities (Satria & Iswati, 2023). Similarly, studies using WebQual 4.0 and IPA have identified website quality gaps but have not examined the structural relationships between quality dimensions and user satisfaction through PLS-SEM (Dhiannisa *et al.*, 2024). Therefore, further research is needed to examine website quality in a government spatial information system using the combined WebQual 4.0, PLS-SEM, and IPMA approach, particularly from the perspective of Generation Z users.

Generation Z is relevant to this research because this cohort has grown up with internet technology and is generally familiar with digital services (Arum *et al.*, 2023). Previous studies have also reported expectations for fast and accessible digital services among Generation Z users (Permana *et al.*, 2024). Examining their perceptions can therefore provide additional evidence regarding how website quality dimensions relate to satisfaction when accessing a government spatial information system. However, the findings should be interpreted within the characteristics of the sample used in this study rather than generalized to all Generation Z users.

Based on the identified research gap, this study has two main objectives: (1) to determine whether usability, information quality, and service interaction quality significantly influence the satisfaction of Generation Z users with the SITARUNG website; and (2) to identify website quality indicators that should be prioritized for improvement based on the IPMA results. The study contributes to e-government website evaluation by examining the relationships between WebQual 4.0 dimensions and user satisfaction and by applying IPMA to identify indicator-level improvement priorities in a government spatial information system. The remainder of this manuscript is organized as follows. Section 2 presents the literature review, Section 3 describes the methodology, Section 4 presents and discusses the results, and Section 5 presents the conclusions and recommendations.

2. Related Work

2.1 Website Quality and User Satisfaction in Public Spatial Systems

In the context of digital public services, website quality is an important factor in determining how effectively an information system delivers services and information to its users (Saputra *et al.*, 2023; Ahoren *et al.*, 2025). For spatial information systems such as SITARUNG, website quality involves not only accessibility but also the accuracy, relevance, and responsiveness of spatial information delivery. These aspects are particularly important because spatial information supports public access to information and participation in spatial planning processes (Dewa, 2022; Syuaib *et al.*, 2023). Therefore, evaluating website quality in this context requires an approach that considers both the usability of the website and the quality of the information and services provided.

2.2 Webqual 4.0

To evaluate website quality, Barnes and Vidgen (2002) introduced WebQual 4.0, which assesses website quality through three dimensions: Usability, Information Quality, and Service Interaction Quality. The framework has been applied in various website evaluation studies because these dimensions capture different aspects of users' experiences when interacting with a website. Usability concerns the extent to which users can access and operate a website effectively and conveniently. Information Quality relates to the accuracy, relevance, completeness, and appropriateness of the information provided, while Service Interaction Quality concerns the quality of users' interactions with the services and functions available on the website. In the context of spatial information systems, these dimensions may contribute differently to user satisfaction because users require both accessible interfaces and reliable spatial information. Previous studies have also indicated that information quality and service-related characteristics can be important factors in determining users' evaluations of digital services (Givi *et al.*, 2023; Syuaib *et al.*, 2023). However, the relative contribution of each WebQual dimension needs to be examined empirically in the context of government spatial information systems.

2.3 PLS-SEM and IPMA

Importance Performance Analysis (IPA) is commonly used to identify areas that require improvement by comparing the perceived importance and performance of attributes (Hauff *et al.*, 2024). However, the importance values in IPA are generally based on respondents' perceptions. When the research objective is to examine relationships among website quality dimensions and user satisfaction, an approach that incorporates the structural relationships among constructs can provide additional information. Partial Least Squares Structural Equation Modeling (PLS-SEM) is suitable for examining complex relationships among latent variables and is widely used in predictive research involving multiple constructs and indicators (Hair *et al.*, 2022). Ringle and Sarstedt (2016) introduced Importance Performance Map Analysis (IPMA) as an extension of PLS-SEM that combines performance values with importance values derived from the total effects in the structural model. The resulting importance-performance map can be used to identify constructs or indicators that have relatively high importance but relatively low performance. Such indicators can then be considered priorities for improvement (Hair *et al.*, 2018). The combination of PLS-SEM and IPMA is therefore relevant to website quality evaluation because it allows researchers to examine both the relationships between website quality dimensions and user satisfaction and the relative priority of individual indicators. This approach can complement conventional website evaluation methods by providing improvement priorities based on the structural model.

2.4 Generation Z as Digital Natives in Spatial Information Contexts

Generation Z is commonly defined as the cohort born between 1997 and 2012 and is characterized by growing up alongside internet and digital technologies (Arum *et al.*, 2023). Previous research has reported that Generation Z users are familiar with digital services and may expect accessible and timely information delivery (Permana *et al.*, 2024). These characteristics make Generation Z a relevant user group for examining the quality of digital public services, including government spatial information systems. From the perspective of spatial information services, examining Generation Z users can provide evidence regarding how website usability, information quality, and service interaction quality are associated with satisfaction among users who are accustomed to digital environments. However, the findings should be interpreted according to the characteristics of the respondents included in the study and should not automatically be generalized to all Generation Z users.

2.5 Comparison with Previous Studies

Several previous studies were used as references in developing this research, as summarized in Table 1. Candiwan and Wibisono (2021) examined website quality in the JD.id e-commerce context using WebQual 4.0, PLS-SEM, and IPMA and reported that information quality was the most influential factor. However, their study

focused on an e-commerce website and did not examine generational differences or government information systems. Satria and Iswati (2023) examined a vocational school job board website using WebQual 4.0 and PLS-SEM and reported significant relationships involving Content and Service Interaction Quality, but did not apply IPMA to determine improvement priorities. Dhiannisa *et al*. (2024) evaluated a digital library website using WebQual 4.0 and IPA and reported negative gaps across the evaluated indicators. However, their approach relied on perceived importance rather than structural relationships estimated using PLS-SEM.

Table 1. Comparison with Previous Studies

Study	Method	Context	Key Finding	Limitation
Candiwan & Wibisono (2021)	WebQual 4.0 + PLS-SEM + IPMA	E-commerce (JD.id)	Information quality was the most influential factor	E-commerce context; no generational segmentation; not applied to government websites
Satria & Iswati (2023)	WebQual 4.0 + PLS-SEM	Vocational school job board website	Content and SIQ were significant; IPMA was not applied	No IPMA; improvement priorities were not identified using IPMA
Dhiannisa *et al*. (2024)	WebQual 4.0 + IPA	Digital library website	Indicators showed negative gaps	No PLS-SEM structural analysis; importance was based on perceived importance
This study	WebQual 4.0 + PLS-SEM + IPMA	Government spatial information website (SITARUNG)	IQ and SIQ significantly influenced satisfaction; five priority indicators were identified	Focused on Generation Z users and one government spatial information website

Building on these previous studies, this research applies WebQual 4.0 in combination with PLS-SEM and IPMA to evaluate a government spatial information website, SITARUNG. The study examines the relationships between Usability, Information Quality, Service Interaction Quality, and user satisfaction and uses IPMA to identify indicators that should receive greater attention for improvement. In this way, the study extends previous applications of WebQual 4.0 and IPMA beyond e-commerce and other website contexts to a government spatial information system involving Generation Z users.

3. Methodology

As shown in Figure 1, this study follows a series of systematic research stages using a quantitative research design with descriptive and structural analyses. The descriptive analysis describes the condition of SITARUNG website quality based on user assessments, while the structural analysis examines the hypothesized relationships between the WebQual 4.0 dimensions and user satisfaction using PLS-SEM. The research process began with problem identification and a literature review, followed by hypothesis development and research instrument design. Data were collected from 100 Generation Z respondents through a web-based survey using a five-point Likert scale. The data were then analyzed through three sequential stages: outer model evaluation, inner model evaluation and hypothesis testing using SmartPLS 4, and Importance Performance Map Analysis (IPMA) to identify improvement priorities. The final stage involved the presentation and interpretation of the research results.

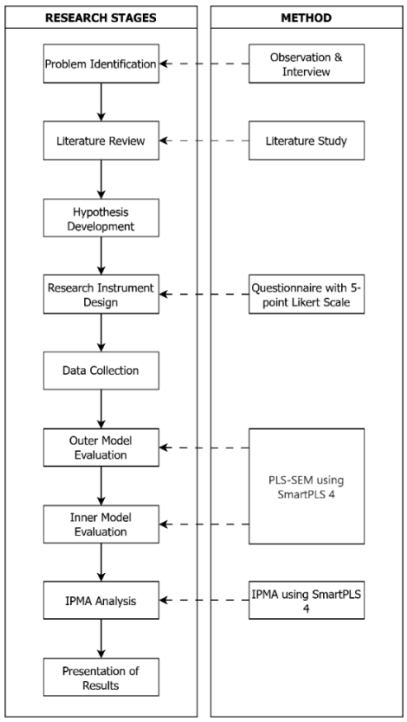

Figure 1. Research Stages

3.1 Research Variables and Hypotheses

The study examined three independent variables: Usability (X1), Information Quality (X2), and Service Interaction Quality (X3), with User Satisfaction (Y) as the dependent variable. As illustrated in Figure 2, the conceptual framework presents the hypothesized relationships among these variables. Based on this framework, three hypotheses were formulated. H1 proposes that Usability positively influences User Satisfaction. H2 proposes that Information Quality positively influences User Satisfaction. H3 proposes that Service Interaction Quality positively influences User Satisfaction.

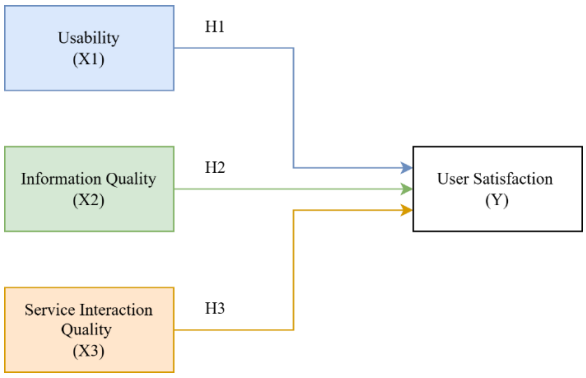

Figure 2. Theoretical Framework of Variables and Hypotheses

3.2 Research Instrument

The research instrument was developed using indicators adapted from previous studies and measured on a five-point Likert scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). The Usability instrument was adapted from Park and Park (2025), while the Information Quality instrument was adapted from Candiwan and Wibisono (2021), based on the WebQual framework developed by Barnes and Vidgen. The instruments for Service Interaction Quality and User Satisfaction were adapted from Hadi *et al.* (2023). Before the main survey was conducted, the adapted instrument underwent a content validity assessment by three experts in information systems. Each expert assessed the relevance of the indicators using a four-point scale ranging from 1 ("Not relevant") to 4 ("Highly relevant"). The Scale Content Validity Index (S-CVI) was calculated for each construct. The resulting S-CVI values were 0.86 for Information Quality, 1.00 for Service Interaction Quality, and 1.00 for User Satisfaction. These values exceeded the threshold used in this study (Puspitasari & Febrinita, 2021). Usability initially obtained an S-CVI value of 0.79. Based on the experts' assessment, three Usability items with Item-CVI values below 0.83 were removed because of redundancy and limited relevance.

In addition, the User Satisfaction construct was expanded to four indicators based on Hadi *et al*. (2023). After the content validation and instrument revision process, the final instrument consisted of 18 indicators distributed across four constructs, as presented in Table 2.

Table 2. Research Instrument Summary

Code	Indicator	Construct	Reference
US1–US5	Ease of use, visual design, design suitability, feature availability, and user experience	Usability	Barnes & Vidgen in Park & Park (2025)
IQ1–IQ5	Accuracy, currency, relevance, understandability, and detail of information	Information Quality	Barnes & Vidgen in Candiwan & Wibisono (2021)
SIQ1–SIQ4	Service delivery accuracy, data management ease, help availability, and processing speed	Service Interaction Quality	Hadi *et al*. (2023)
USAT1–USAT4	Overall comfort, security assurance, design attractiveness, and access speed	User Satisfaction	Hadi *et al*. (2023)

3.3 Population, Sample, and Data Collection

The population comprised Generation Z individuals aged 17–29 years who had accessed the SITARUNG website. Purposive sampling was used to select respondents who met these criteria. The study obtained 100 respondents. The sample size was determined with reference to the rule of thumb reported by Hair *et al*. (2022), which suggests a sample size of approximately five to ten times the number of indicators. With 18 indicators, the minimum sample size based on the five-times criterion was 90 respondents. Therefore, the 100 respondents included in this study exceeded the stated minimum criterion. Data were collected through a web-based questionnaire distributed using Google Forms.

3.4 Data Analysis

The data were analyzed using SmartPLS 4 through three sequential stages. First, the outer model was evaluated to assess convergent validity, discriminant validity, and construct reliability. Convergent validity was assessed using outer loadings and Average Variance Extracted (AVE), while discriminant validity was evaluated using cross-loadings and the Heterotrait-Monotrait (HTMT) ratio. Construct reliability was assessed using Composite Reliability and Cronbach's Alpha. Second, the inner model was evaluated using R-square (R^2), effect size (f^2), and hypothesis testing through bootstrapping. Hypothesis testing was based on the path coefficient, t-statistic, and p-value. Third, IPMA was conducted to identify improvement priorities by considering the importance and performance of the constructs and indicators. Importance was determined from the total effects estimated in the PLS-SEM structural model, while performance was assessed using the IPMA performance scale. The resulting importance-performance map was used to identify indicators with relatively high importance and lower performance as potential priorities for improvement.

4. Result and Discussion

4.1 Results

All 100 respondents were verified as Generation Z users who had previously accessed the SITARUNG website. Most respondents were aged 21–24 years (79%), followed by those aged 17–20 years (15%) and 25–29 years (6%). In terms of occupation, 94% were students. Most respondents (96%) reported rarely using the SITARUNG website, while 4% reported using it occasionally. The primary purpose of using SITARUNG was to search for spatial planning information (90%), followed by academic or research purposes (10%). Table 3 presents the outer model evaluation results. All indicators had outer loading values above 0.70, except US4, which had a loading of 0.646. US4 was retained because its loading exceeded 0.40 and the AVE of the Usability construct remained above 0.50 (AVE = 0.688), consistent with the criteria reported by Hair *et al*. (2019). Convergent validity was supported because the AVE values for all constructs exceeded 0.50. The cross-loading results showed that each indicator had its highest loading on the intended construct, while all HTMT values were below 0.85, with the highest value being 0.634. These results support discriminant validity. The Composite Reliability values (rho_c) for all constructs exceeded 0.70, indicating adequate construct reliability. The relatively low rho_A value for Usability (0.146) should be interpreted cautiously; therefore, reliability assessment should consider the overall reliability evidence rather than rho_A alone (Hair *et al*., 2022).

Table 3. Outer Model Evaluation Results (CA = Cronbach's Alpha; CR = Composite Reliability)

Construct	Outer Loading Range	AVE	CR (rho_c)	CA	HTMT Max
Usability	0.646–0.941	0.688	0.916	0.941	0.072
Information Quality	0.780–0.849	0.690	0.918	0.888	0.634
Service Interaction Quality	0.853–0.904	0.769	0.930	0.900	0.497
User Satisfaction	0.793–0.856	0.681	0.895	0.844	—

The R^2 value for User Satisfaction was 0.516, with an adjusted R^2 of 0.500. This indicates that Usability, Information Quality, and Service Interaction Quality jointly explained 51.6% of the variance in User Satisfaction. Based on the interpretation reported by Hair *et al.* (2022), the explanatory power of the model can be considered moderate. The f^2 results showed a large effect size for Information Quality (f^2 = 0.650) and Service Interaction Quality (f^2 = 0.409), while Usability had a small effect size (f^2 = 0.019). Table 4 presents the hypothesis testing results. H1 was not supported because the relationship between Usability and User Satisfaction was not statistically significant (β = 0.097, t = 0.929, p = 0.353). H2 was supported, indicating a significant positive relationship between Information Quality and User Satisfaction (β = 0.561, t = 8.131, p < 0.001). H3 was also supported, indicating a significant positive relationship between Service Interaction Quality and User Satisfaction (β = 0.445, t = 7.136, p < 0.001).

Table 4. Hypothesis Testing Results

Hypothesis	Path Coeff.	T-Statistic	P-Value	Decision
H1: Usability → User Satisfaction	0.097	0.929	0.353	Not Supported
H2: Information Quality → User Satisfaction	0.561	8.131	< 0.001	Supported
H3: Service Interaction Quality→User atisfaction	0.445	7.136	< 0.001	Supported

The following section describes the IPMA results, which were used to determine the relative importance and performance of each construct and indicator in the WebQual 4.0 model:

1) Requirements Check

The IPMA analysis was conducted after checking the required conditions. The path coefficients for the three predictor constructs were positive: Usability = 0.097, Information Quality = 0.561, and Service Interaction Quality = 0.445. The model used reflective indicators, and all indicators were coded in the same direction using a five-point Likert scale.

2) Performance and Importance Values

Table 5 presents the performance and importance values of the 14 indicators belonging to the three WebQual 4.0 predictor constructs. The four User Satisfaction indicators were not included in the indicator-level IPMA because User Satisfaction served as the target construct of the model. The lowest performance values were observed for US4 (24.000), SIQ2 (32.500), SIQ4 (33.000), and SIQ1 (35.500). These values indicate that these indicators received relatively low performance scores compared with the other indicators.

Table 5. IPMA Performance and Importance Values for All Indicators

Code	Indicator	Performance	Importance
IQ1	Accuracy and credibility of information	58.667	0.135
IQ2	Currency of information	61.667	0.125
IQ3	Relevance of information to user needs	41.000	0.148
IQ4	Ease of understanding information	59.000	0.140
IQ5	Appropriateness of information detail	43.500	0.128
SIQ1	Accuracy of service delivery information	35.500	0.144
SIQ2	Ease of data management	32.500	0.134
SIQ3	Ease of obtaining assistance	54.333	0.122
SIQ4	Website processing and display speed	33.000	0.106
US1	Ease of learning and using the website	50.333	0.074
US2	Visual design attractiveness	50.000	0.026
US3	Design suitability for spatial information	50.000	0.011
US4	Feature availability for user needs	24.000	-0.041
US5	User experience with the website	49.333	0.027

3) IPMA Map and Quadrant Analysis

The quadrant boundaries were established using the mean importance value of 0.098 and the mean performance value of 45.917. Figure 3 presents the construct-level IPMA map, while Figure 4 presents the indicator-level IPMA map. At the construct level, Information Quality had the highest importance value (0.561)

and a performance value of 52.399. This indicates that Information Quality had the strongest relationship with User Satisfaction among the three WebQual 4.0 dimensions, while its performance remained below the highest-performing construct. Service Interaction Quality had an importance value of 0.445 and the lowest performance value (38.783). Usability had the highest performance value (62.276) but the lowest importance value (0.097). At the indicator level, five indicators were located in Quadrant I, which represents relatively high importance and relatively low performance: IQ3, IQ5, SIQ1, SIQ2, and SIQ4. Quadrant II contained IQ1, IQ2, IQ4, and SIQ3. Quadrant III contained US4, while Quadrant IV contained US1, US2, US3, and US5.

4.2 Discussion

The significant positive relationship between Information Quality and User Satisfaction ($\beta = 0.561$, $f^2 = 0.650$) is consistent with Candiwan and Wibisono (2021), who identified Information Quality as an influential WebQual 4.0 dimension in the JD.id e-commerce context. The finding is also consistent with the respondent profile in this study, as 90% of respondents reported using SITARUNG to search for spatial planning information. This suggests that the quality of information is particularly relevant to users because information retrieval represents the main purpose of their interaction with the website. The IPMA results provide further detail regarding the aspects of Information Quality that require attention. IQ3, concerning the relevance of information to user needs, and IQ5, concerning the appropriateness of information detail, were both positioned in Quadrant I. These results indicate that these indicators combine relatively high importance with relatively low performance. Therefore, improvement efforts related to the relevance and level of detail of spatial planning information may be prioritized.

Service Interaction Quality also had a significant positive relationship with User Satisfaction ($\beta = 0.445$, $f^2 = 0.409$). This result indicates that users' evaluations of service-related interactions are associated with their overall satisfaction with SITARUNG. At the indicator level, SIQ1, SIQ2, and SIQ4 were positioned in Quadrant I. These indicators relate to the accuracy of service delivery information, ease of data management, and website processing and display speed. Their positions suggest that these aspects have relatively high importance but relatively low performance and therefore warrant attention in future improvement efforts.

The non-significant relationship between Usability and User Satisfaction ($\beta = 0.097$, $p = 0.353$) indicates that Usability did not have a statistically significant contribution to User Satisfaction in the tested model. One possible explanation is that respondents who are accustomed to digital technologies may place greater emphasis on information-related and service-related aspects when evaluating a spatial information website. However, this interpretation should be treated cautiously because digital literacy was not directly measured in this study. The result therefore does not establish that Usability functions as a baseline or hygiene attribute for Generation Z users.

The finding also differs from Marliana (2020), who reported a significant relationship between Usability and student satisfaction in Google Classroom. Differences in website context, user characteristics, usage patterns, and the type of information or services provided may contribute to the different findings. However, these factors were not directly tested as moderators in the present study. The results also show that the majority of respondents were infrequent users of SITARUNG, with 96% reporting that they rarely used the website. This characteristic provides useful context for interpreting the findings, but usage frequency was not tested as a moderator in the structural model. Therefore, it cannot be concluded that usage frequency acts as a boundary condition for the relationships between WebQual dimensions and User Satisfaction. Future research could examine this possibility by explicitly testing usage frequency as a moderating variable or by comparing groups based on usage frequency. From a practical perspective, the IPMA results indicate that improvement efforts should prioritize information relevance and detail, service information accuracy, data management, and website processing speed. These priorities are reflected in IQ3, IQ5, SIQ1, SIQ2, and SIQ4, which were all located in Quadrant I. Further technical or organizational actions, such as improvements to spatial data management, data updating procedures, server performance, or inter-agency data validation, would require additional technical and institutional evidence beyond the user perception data collected in this study.

5. Conclusion and Recommendations

This study evaluated User Satisfaction with the SITARUNG website from the perspective of Generation Z users using Webqual 4.0, PLS-SEM, and IPMA. The results showed that Information Quality had a significant positive relationship with User Satisfaction ($\beta = 0.561$), as did Service Interaction Quality ($\beta = 0.445$). In contrast, Usability did not have a significant relationship with User Satisfaction ($\beta = 0.097$, $p = 0.353$). The model explained 51.6% of the variance in User Satisfaction ($R^2 = 0.516$). At the indicator level, IPMA identified five priority indicators in Quadrant I: relevance of information to user needs (IQ3), appropriateness of information detail (IQ5), accuracy of service delivery information (SIQ1), ease of data management (SIQ2), and website processing and display speed (SIQ4).

The findings extend the application of Webqual 4.0, PLS-SEM, and IPMA to the evaluation of a government spatial information website from a Generation Z perspective. In particular, the results indicate that Information Quality and Service Interaction Quality were more strongly associated with User Satisfaction than Usability in the tested model. The IPMA results further provide a basis for prioritizing improvement efforts toward specific information and service interaction indicators rather than treating all website quality attributes as equally important. Several limitations should be acknowledged. First, the study involved only 100 Generation Z users of the SITARUNG website, which limits the generalizability of the findings to other age groups, government information systems, or user populations. Second, the model explained 51.6% of the variance in User Satisfaction, indicating that other factors may also be relevant but were not included in the present model. Third, although most respondents reported rarely using SITARUNG, usage frequency was not tested as a moderating variable. Therefore, the present study cannot establish whether usage frequency changes the relationship between website quality dimensions and User Satisfaction.

From a practical perspective, the findings suggest that improvement efforts should prioritize the five indicators identified in Quadrant I. The responsible agency may consider reviewing the relevance and level of detail of spatial information, the accuracy of service delivery information, data management functions, and website processing speed. Further technical and organizational assessments are needed to determine the specific causes of the identified performance gaps and the most appropriate implementation measures. For future research, the DeLone and McLean IS Success Model could be incorporated alongside Webqual 4.0 to examine additional factors related to User Satisfaction. Future studies could also test usage frequency as a moderating variable by comparing frequent and infrequent users. Such analysis would help determine whether the non-significant relationship between Usability and User Satisfaction observed in this study varies according to users' frequency of website use. Research involving larger and more diverse samples would also be useful to assess whether the present findings can be generalized to other government information systems and user groups.

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