

Exploring Indicators and Developing the Initial DigiGOVQUAL Model: An Exploratory Factor Analysis in Banjar City

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ABSTRACT

The digital transformation of government through the Electronic-Based Government System (Sistem Pemerintahan Berbasis Elektronik—SPBE) has become a foundational element of bureaucratic reform in Indonesia. However, the absence of a standardized instrument for assessing SPBE service quality—particularly within the Government-to-Government (G2G) domain—has hindered systematic evaluation and continuous improvement efforts. This study aims to develop a preliminary model called DigiGOVQUAL, designed to measure the quality of SPBE services from the perspective of internal users within government institutions. The model adapts and refines relevant indicators from the E-Government Service Quality (EGSQUAL) framework to better reflect the specific characteristics of digital public services in the Indonesian bureaucratic context. Employing a quantitative research approach, the study utilizes Exploratory Factor Analysis (EFA) to validate the construct dimensions. Data were collected via an online survey distributed to over 200 active civil servants in the Banjar City government who have experience using G2G SPBE services. The findings are expected to contribute to the development of a valid and contextually appropriate evaluation tool for digital government service quality. Ultimately, the DigiGOVQUAL model is intended to support more accountable and user-centered public service delivery policies in the digital era.

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1. Introduction

Information Technology (IT) supports many aspects of human life (Giri et al., 2019). Digital transformation within the public sector has become a critical component of bureaucratic reform in Indonesia. The government has positioned the Electronic-Based Government System (Sistem Pemerintahan Berbasis Elektronik, SPBE) as a strategic instrument to foster a more responsive, transparent, and efficient bureaucracy through the adoption of information and communication technologies (ICT). Since the enactment of Presidential Regulation No. 95 of 2018 concerning SPBE, various governmental institutions, both at the national and regional levels, have actively pursued digitalization initiatives to enhance public service delivery. These initiatives are primarily driven by public expectations for services that are more accessible, timely, and transparent. In this regard, SPBE serves not merely as a technological modernization effort, but as a paradigmatic shift in governance practices [1]. The low quality of information and communication technology infrastructure affects the level of digital service utilization (Arsyilia & Giri, 2023).

Figure 1 illustrates the upward trend of the National SPBE Index from 2019 to 2024, with a steady increase from 2.18 (moderate) in 2019 to 3.12 (good) in 2024. In line with Presidential Regulation No. 95/2018, government institutions are mandated to conduct user needs and satisfaction surveys as part of the systemic development of SPBE. These surveys are intended to assess the extent to which SPBE services meet user expectations and to understand evolving user requirements. However, despite this regulatory mandate, there remains a notable absence of a valid and standardized measurement instrument for evaluating user satisfaction with SPBE services. As a result, decision-making processes concerning service evaluation and improvement often lack the support of robust empirical data.

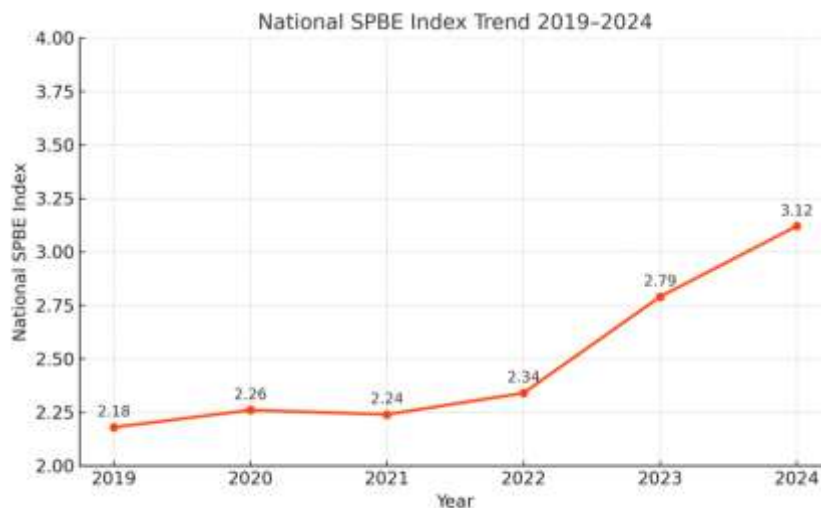


Fig 1. SPBE Index Trend 2019–2024 (PNG)

The need to develop quality indicators for SPBE services, particularly in the domain of Government-to-Government (G2G), has become increasingly pressing. Recent empirical studies have underscored this urgency. Alim et al. (2024), employing the E-GovQual model and Importance–Performance Analysis, reported a negative gap of 0.03 between user expectations and perceptions regarding CRM (Cepat Respon Masyarakat) services in Jakarta's provincial government. The findings suggest deficiencies in efficiency, reliability, and accessibility dimensions, highlighting the need for more accurate and context-sensitive measurement tools [2]. Similarly, Cahyati (2024) investigated the impact of digital service innovation on public service quality in local government, revealing that while digitalization enhances efficiency and accessibility, internal organizational readiness—such as technical limitations and bureaucratic resistance—remains a key challenge. These studies collectively demonstrate that digital service quality is not solely contingent upon technological availability but also hinges on the alignment of measurement indicators with user characteristics and local bureaucratic structures [3]. Hence, the development of a new measurement model, DigiGOVQUAL, using Exploratory Factor Analysis (EFA) in the context of Banjar City, is deemed essential for generating a valid, empirically grounded, and user-centered scale for evaluating SPBE services.

A comprehensive evaluation of SPBE implementation is thus required to determine the extent to which it meets the needs and expectations of its users. Such evaluation must be based on methodologically sound data, necessitating the design of a carefully constructed and participatory survey instrument. This study aims to develop a user satisfaction survey instrument for SPBE, which can serve as a foundation for evidence-based policy formulation and continuous service improvement. The proposed instrument is expected not only to assess satisfaction levels but also to identify service dimensions requiring further enhancement. Ultimately, the goal is to support national evaluations of SPBE implementation and to promote greater efficiency and accountability in digital public service delivery. In this regard, the development of this instrument is envisaged as an integral component of the monitoring and evaluation mechanisms for SPBE in Indonesia.

To date, no measurement instrument has been specifically designed to assess SPBE service quality from the perspective of Indonesian citizens or internal users. Existing models such as SERVQUAL (Parasuraman et al., 1988) and E-GovQual (Papadomichelaki & Mentzas, 2012) have been widely adopted to evaluate digital service quality; however, these models were developed in different socio-cultural and bureaucratic contexts, limiting their applicability in Indonesia [4] [5]. Therefore, there is a pressing need to develop a more contextually relevant measurement model tailored to the characteristics of Indonesia's digital government services. One promising framework is the EGSQUAL model developed by Aljukhadar et al. (2022), which comprises seven core dimensions: interactivity and personalization, information quality, assistance quality, user-friendliness, website functionality, privacy and security, and visual appeal. EGSQUAL was designed to address the limitations of previous models by emphasizing user experience, digital trust, and service efficiency within digital government ecosystems [6]. These principles are closely aligned with the foundational objectives of SPBE as articulated in Presidential Regulation No. 95/2018 [7]. Understanding consumer behavior in the implementation of digital services can serve as a strategic opportunity for the sector to develop its business (Ramadhani & Giri, 2024).

In practice, SPBE encompasses three core domains: Government-to-Government (G2G), Government-to-Citizen (G2C), and Government-to-Business (G2B). The G2G domain involves the integration of services across governmental institutions, facilitating efficient data exchange and coordination. The G2C domain addresses direct service provision to the public, such as administrative services and public information. G2B focuses on interactions between government and private sector entities, including licensing, procurement, and tax reporting [8]. Effective service delivery in all three domains requires robust, secure, and user-friendly systems. Therefore, the development of an SPBE service quality evaluation instrument must account for the needs and expectations of all user groups in order to build an inclusive and sustainable system.

Within the G2G domain, SPBE plays a strategic role in enabling seamless coordination and integration among government agencies. A key function is ensuring system interoperability, which allows real-time and secure data exchange across institutions—facilitating tasks such as demographic synchronization, cross-sectoral development planning, and inter-agency financial reporting. SPBE also enhances data-driven decision-making through centralized performance monitoring dashboards. Furthermore, it supports inter-agency collaboration through integrated communication platforms and digital mechanisms for policy oversight, auditing, and evaluation. In essence, SPBE serves as the digital backbone for governance, promoting efficient, transparent, and data-informed coordination within the public sector.

Over the past three years, Banjar City has made substantial progress in SPBE implementation, particularly within the G2G domain. In 2022, the initiative began with the deployment of an e-Office application to facilitate digital correspondence and internal administrative processes [9]. In 2023, institutional governance was further strengthened through the issuance of Mayor Regulation No. 38/2023, which established the SPBE Architecture and Roadmap and promoted inter-agency digital integration [10]. The most notable advancement occurred in 2024 with the launch of the "Bebeong" super-application (<https://bebeong.banjarkota.go.id>), integrating over 120 internal service features, including HR systems (SIMPEG), performance tracking (e-Kinerja), and attendance monitoring. As part of the city's Smart City initiative, this application was officially launched by the Acting Mayor, marking a shift from initial capacity-building to institutionalized digital service delivery [11]. These developments reflect Banjar City's transition from the initiation phase to a more consolidated phase in SPBE implementation.

Given this context, the present study focuses specifically on the G2G dimension, examining internal governmental interactions. The EGSQUAL model serves as the conceptual foundation for developing a more contextually appropriate measurement model suited to Indonesia's unique administrative landscape. Accordingly, the primary objective of this research is to initiate the development of the DigiGOVQUAL model—a digital government service quality measurement instrument derived from the user perspective. By employing an exploratory quantitative approach using Exploratory Factor Analysis (EFA), this study aims to construct a valid, empirically based, and user-informed evaluation framework. The findings are expected to contribute to the advancement of

user-centered policy development and support national efforts to improve the quality and accountability of digital public services.

2. Method

This study employs a quantitative methodology with an exploratory aim to uncover pertinent parameters. The quantitative method entails gathering data in numerical format using standardized and systematic tools, such as questionnaires. The exploratory objective is deemed suitable if the subject under investigation is insufficiently comprehended, necessitating an initial delineation of the phenomena. The employed research strategy is a survey, facilitating data gathering from a representative sample to delineate the general characteristics of the community. This study's unit of analysis is the individual, as measurements are derived from each respondent's perceptions (Sekaran & Bougie, 2016) [12].

Given the widespread distribution of G2G SPBE service users across various government institutions and the absence of accurate data regarding the total population of users, it was not feasible to apply a representative quota sampling approach. Consequently, the study adopted a purposive-judgment sampling technique. This non-probability sampling method involves the deliberate selection of respondents based on specific criteria, particularly their relevance to the research objectives. In this study, respondents were selected because they possessed direct experience with and substantive knowledge of G2G SPBE services within their respective agencies.

To get data pertinent to the research aims, many inclusion criteria were created for respondents, specifically:

1. Current employees engaged in governmental institutions in Banjar City.
2. Must have utilized the G2G SPBE service for a minimum of one year.

The criteria were created to ensure that respondents possess adequate experience with the G2G SPBE service, enabling them to deliver precise and comprehensive evaluations of the service quality received. Hair et al. (2021) recommend a minimum sample size of 100 responders or greater when the precise population size is indeterminate. In research methodology, a prevalent technique for calculating sample size involves multiplying the number of indicators by ten [13]. According to this methodology, the computation is as follows:

- n multiplied by the number of indicators 10 multiplied by 18 is 180
- The minimum advisable sample size for this investigation is 180 participants.

3. Results and Discussion

The research data was collected through a primary source using an online survey distributed via Google Forms. The survey instrument was administered to internal users of the Electronic-Based Government System (SPBE) services in Banjar City, particularly those who had utilized digital public administration applications within the past six months. A total of 182 responses were collected, out of which 180 met the validity criteria and were deemed suitable for further analysis. The majority of respondents were active civil servants working in various government agencies across Banjar City, as seen in Table 1 most of the respondents were male (55.9%), while 45.1% were female.

Table 1. Respondents by gender

Gender	Frequency	Percentage
Male	100	55.9%
Female	82	45.1%
Total	182	100%

The most frequently used application as seen in table 2 was SPAN (22.5%), followed by SRIKANDI (20.3%) and SAIBA (14.3%). PDNS was the least used (8.2%).

Table 2. Respondents by SPBE application usage

Application	Frequency	Percentage
SRIKANDI	37	20.3%
SIPINTER	19	10.4%
SPAN	41	22.5%
SAIBA	26	14.3%
PDNS	15	8.2%
SIPD	25	13.7%
e-Planning	22	12.1%

Exploratory Factor Analysis Results

Sample Adequacy

To determine the adequacy of the sample for factor analysis, communalities were examined. The values ranged from 0.4 to 0.9, indicating sufficient shared variance among items. The final sample of 180 valid responses satisfies the recommended sample size for exploratory factor analysis (EFA).

Table 3. Communalities Values

Item Code	Communality
IP1	0.612
IP2	0.805
KI1	0.709
KI2	0.687
KI3	0.684
KI4	0.758
KD1	0.512
KD2	0.997
FS1	0.771
FS2	0.774
FS3	0.733
FS4	0.726
FS5	0.772
K1	0.700
K2	0.728
K3	0.748

The Kaiser-Meyer-Olkin (KMO) test yielded a value of 0.675, exceeding the minimum threshold of 0.5, thus indicating sampling adequacy. Additionally, Bartlett's Test of Sphericity was significant ($p = 0.001$), confirming the appropriateness of the data for factor analysis.

Table 4. KMO and Bartlett's test

Test	Criterion	Value	Interpretation
KMO	> 0.5	0.675	Adequate
Bartlett's	$p < 0.05$	0.001	Significant

Based on the Eigenvalue criterion (>1.0), six distinct factors were extracted. These components cumulatively accounted for a significant proportion of the variance in the dataset.

Factor	Eigenvalue	% of Variance
1	2.835	17.721%
2	2.662	16.638%
3	2.367	14.795%
4	2.293	14.334%
5	1.671	10.443%
6	1.438	8.986%

An Exploratory Factor Analysis (EFA) using Principal Component Analysis with Varimax rotation and Kaiser Normalization was conducted to identify the underlying constructs of the DigiGOVQUAL instrument. Data suitability was confirmed by the Kaiser-Meyer-Olkin (KMO) measure of 0.871, exceeding the minimum threshold of 0.60, and a significant Bartlett's Test of Sphericity ($\chi^2 = 3665.812$, $df = 435$, $p < 0.001$), indicating that the correlation matrix was appropriate for factor analysis. Communality values for all items were above 0.50, showing that each indicator shared a sufficient amount of variance with the others. Eigenvalue and scree plot analysis led to the extraction of six components with eigenvalues greater than 1, explaining a cumulative variance of 73.06%, which is considered adequate for social science research. The factors were identified as: (1) Digital Access and Infrastructure, (2) System Integration and Interoperability, (3) Transparency and Accountability, (4) User Orientation and Responsiveness, (5) Data Governance and Security, and (6) Performance and Evaluation. These dimensions encompass both technical and experiential elements of SPBE service delivery in the Government-to-Government (G2G) context, particularly within Banjar City's digital transformation initiatives. The DigiGOVQUAL model retains six dimensions—interactivity and personalization, information quality, support quality, website functionality, and security/privacy—that align closely with the seven-dimension EGSQUAL construct validated in Canada and the USA [6], [14]. However, adaptation to the Indonesian context involved consolidating aesthetic and ease-of-use items into broader usability and support constructs, reflecting the priorities of internal government users [6]. This approach parallels the modified E-GovQual framework used by Septa et al. (2019), which included trust, content, reliability, functionality, and support, but DigiGOVQUAL introduces a clearer distinction between security/privacy and personalization [14], [15]. This differentiation suggests that internal users—civil servants—perceive nuanced service quality aspects not typically addressed in citizen-focused models. Empirical evidence in information systems research supports the view that user experience and service quality jointly influence system effectiveness [[16]. In this study, no indicators were removed during EFA and all factor loadings were high, indicating construct stability and confirming the value of incorporating internal user perspectives. Comparative EFA-based studies on SPBE implementation in Surabaya and Mojokerto have identified region-specific performance factors such as digital literacy, IT infrastructure, regulation, and human resources [[17]. DigiGOVQUAL complements these findings by structuring its quality dimensions around internal service delivery processes rather than organizational capacity, in line with the objectives of Indonesia's Presidential Regulation No. 95/2018. The model provides a foundation for internally oriented, user-centered evaluation tools that can inform policy decisions and support continuous improvement in digital public services..

4. Conclusion

This study developed the DigiGOVQUAL model as a contextually adapted measurement tool for assessing the quality of Government-to-Government (G2G) services within Indonesia's Electronic-Based Government System (SPBE). Using the EGSQUAL framework as a reference and applying Exploratory Factor Analysis (EFA), six dimensions were identified: Digital Access and Infrastructure, System Integration and Interoperability, Transparency and Accountability, User Orientation and Responsiveness, Data Governance and Security, and Performance and Evaluation. These dimensions represent both technical and user-experience aspects of SPBE service delivery from the perspective of internal government users. All indicators were retained during factor extraction, indicating that the measurement structure was consistent and aligned with the intended constructs. The model reflects the characteristics of Indonesian government institutions and addresses the absence of a measurement

tool specifically designed for the G2G context. From a theoretical perspective, this research contributes to digital government service quality studies by providing a measurement approach that incorporates internal user perspectives and adapts existing frameworks to local administrative conditions. From a practical perspective, DigiGOVQUAL offers a basis for government institutions to conduct systematic evaluations, identify areas for improvement, and align service quality enhancement efforts with the SPBE policy framework. By incorporating internal user input into the design of the measurement model, this study supports the development of SPBE services that are not only technically functional but also aligned with user needs and operational realities, contributing to more effective and accountable digital public service delivery.

Author contribution.

All authors contributed to the conception of the study, instrument development, data collection, data analysis, and manuscript preparation and revision. All authors have read and approved the final version of the manuscript.

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Conflict of interest.

The authors declare no conflict of interest.

Additional information.

No additional information is available for this paper.

Data and Software Availability Statements

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request. Exploratory Factor Analysis (EFA) was conducted using commonly available statistical software, including IBM SPSS Statistics (latest version at the time of the study).

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