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Evaluating the Performance of "Sitata" (Our Land Validation) Application Using the Pieces Framework at the Bandung City Land Office

Poppy Citra Luthfiya [1*], Adhika Bergi Nugroho [2], Riky Rinaldy Maulana [3], Ramdani Priatna [4]

[1,2] Public Sector Business Administration, Politeknik STIA LAN Bandung
[3] State Development Administration, Politeknik STIA LAN Bandung
[4] Human Resource Management Appratus, Politeknik STIA LAN Bandung, Indonesia
Corresponding Author: poppycitra99@gmail.com
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Abstract

The development of information technology has prompted government agencies to provide efficient digital services, one of which is the implementation of the SITATA (Our Land Validation) application at the Bandung City Land Office. This study aims to evaluate the performance of the SITATA application from a user's perspective, using the PIECES Framework, which consists of six dimensions of information system evaluation: Performance, Information & Data, Economics, Control, Efficiency, and Service. Using a descriptive quantitative method, data was collected via a Likert-scale questionnaire from 38 active users (total sampling) and analyzed using Confirmatory Factor Analysis (CFA). The evaluation results indicate that SITATA's overall performance is in the "sufficiently good" category, with an average score of 3.7705. The Service dimension recorded the highest satisfaction, suggesting good ease of use and accuracy. However, the Efficiency dimension was identified as the most dominant aspect influencing user perception, despite having the lowest average score. This suggests a fundamental gap related to data processing speed, which is a key determinant of satisfaction and productivity. These findings have significant implications, highlighting the urgency of strategic improvements to SITATA's core functionality. The recommendations include updating and adjusting the base map, adding flexible revision and navigation features, and developing a cross-platform application. These improvements are expected to increase overall productivity and the quality of public services.

Keywords: Information System Evaluation, PIECES, Land Administration, SITATA.

1. Introduction

In the digital age, which embraces information technology, artificial intelligence, and integrated systems, every organization relies on these technologies to achieve its goals. Information technology plays a vital role in an organization's strategic planning and performance improvement. (Manora et al., 2021). Rapid advancements in information and communication technology have prompted the government sector to undergo digital transformation to improve the efficiency of public services. In land administration, this transformation is realized through the digitalization of services to ensure data security, transparency, and easy access to information for the public. Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN) has responded to this by implementing digital services. One example is the electronic land certificate program, which is regulated by Regulation of the Minister of ATR/Head of BPN Number 1 of 2021 This regulation aims to implement electronic-based services and transition to producing documents in an electronic format. (Assidiqih & Susilowati, 2024). The aim is to reduce the risk of forgery and loss of physical documents due to disasters. (Syafitri et al., 2024) Thus, this policy can accelerate land services and accurately improve the certainty of land ownership and types of land rights through an integrated system.

The implementation of electronic certificate services within, Ministry (ATR/BPN) is being carried out in phases but faces significant challenges. These include concerns about data security, the digital divide in technology access, and public resistance. Hidayah et al. (2024)identified several obstacles, such as cyber threats, inconsistent digital infrastructure, and the need for regulatory

adjustments. Meanwhile, Elora (2024) specifically noted that in the Bandung City Land Office, the implementation of electronic certificates is hindered by the readiness of human resources, available facilities and infrastructure, and data validation. To support the digitalization of land services, Ministry (ATR/BPN) issued Minister's Regulation Number 2 of 2023, which regulates the verification of physical and juridical data. As an implementation of this, the Data and Information Center of the ATR/BPN (PUSDATIN ATR/BPN) developed an internal application called Validasi Tanah Kita (SITATA). This application is designed to provide accurate and integrated land data with the Land Activity Computerization (KKP) system, enabling digital and real-time data verification and validation. This supports the efficiency, transparency, and accuracy required for issuing electronic certificates.

Although the SITATA application has met the institution's needs, its implementation at the Bandung City Land Office still faces several obstacles. The main problems are a decrease in system performance that hinders login (Performance), there is a data mismatch between the KKP and SITATA systems (Information and Data), experiencing maintenance disruptions and limited system working hours that cause a buildup of files that result in delays in service (Efficiency and Service), requiring a strong signal to be accessible (Economics), and where corrections to data errors must go through a complaint process to the application developer because there is no feature to correct saved data (Control). These obstacles overall have an impact on increasing workloads and decreasing employee productivity. and delays in services to the public.

Therefore, to ensure the application meets its intended purpose, it is important to evaluate the performance of the SITATA application from a user perspective. This evaluation aims to provide a comprehensive overview of the application's service performance based on user experience and identify areas requiring improvement in order to make appropriate recommendations for improving performance and service quality.

A previous study by Puput Pakaya, Lillyan Hadjaratie, Muchlis Polin, Rampi Yusuf (2024)analyzed the performance and obstacles of the LAPOR e-government application at the Gorontalo City Communications and Encryption Office. Using PIECES indicators, that research concluded that the LAPOR application successfully met user expectations, categorized as "SATISFIED." In contrast, this study evaluates the operational aspects of the service and performance of the SITATA application at the Bandung City Land Office. While the previous research used a descriptive quantitative approach with mean satisfaction scores, this study specifically uses Confirmatory Factor Analysis (CFA) to test a structural model. This model examines the relationships between the variables and their indicators within the PIECES Framework, representing a significant methodological difference.

The primary approach used in this study is the PIECES Framework, a methodology recognized as significant and comprehensive for evaluating information systems (Whitten & Bentley, 2007). As an analytical tool, PIECES enables a detailed system evaluation to identify strengths and weaknesses, which then serves as a reference for future improvements (Pratiwi & Susanti, 2021). Given the lack of specific research evaluating the performance of the SITATA application, this study is expected to fill that gap and become an important guide for future system development.

2. Methods

This research was conducted at the Bandung City Land Office. This location was chosen based on preliminary observations and secondary data indicating complaints from employees regarding the performance of the SITATA application, particularly in its data verification and validation services. The research method used was a quantitative approach with descriptive analysis. This study's descriptive analysis uses the PIECES Framework, which comprises six dimensions: Performance, Information, Economy, Control/Security, Efficiency, and Service (Fuaddin et al., 2025). The framework serves to classify problems, opportunities, and strategic directions in the analysis and design of information systems (Fatoni et al., 2020). Its use allows for the identification of potential innovations and important considerations for future system development. Data was collected by distributing Likert-scale questionnaires to all 38 active users of the SITATA application. Given the limited population, a saturated sampling (total sampling) technique was used. The collected data were then analyzed using Confirmatory Factor Analysis (CFA) to test the fit between the conceptual research model and the empirical data. This analysis included a goodness-of-fit assessment to ensure the questionnaire items accurately and validly measured the variables under study.

3. Results and Discussion

The results of this study were obtained through a series of data analyses. The first stage involved validity and reliability tests to ensure the questionnaire instrument was accurate and consistent. Next, descriptive analysis was conducted to outline the data characteristics. Finally, Confirmatory Factor Analysis (CFA) was applied to validate the measurement instruments and the conceptual model of the PIECES Framework..

Characteristics	Category	n	Percentage (%)
Gender	Male	13	34.2
	Female	25	65.8
Age	20-25 Years Old	0	0
	26-35 Years Old	4	10.5
	36-45 Years Old	16	71.5
	> 45 Years Old	16	18
Educational Background	SMA/SMK	2	5.27
	D3	3	7.89
	S1/D4	33	86.84
	S2	0	0
	S3	0	0
Work Unit Institutional Relations	Sub-section for the Maintenance of Land Rights, Spatial Affairs, and Development	13	34.21
	Sub-section for Land Registration, Communal Land, and Institutional Relations	12	31.58
	Sub-section for Cadastral Surveying & Mapping	13	34.21
Have you ever received information/socialization? (Directly, via Instagram, or through posters/banners)	Yes	25	65.79
	Bo	13	34,21

Table 1. Respondent Characteristics
Source: Research Results (2025).

This section outlines the demographic and service usage characteristics of the 38 research respondents. The majority of participants were female, representing 65.8% (n=25), while male respondents made up 34.2% (n=13). In terms of age, the largest group >45 years old at 18% (n=16), followed by the 36-45 age group at 71.5% (n=11), and the 26-35 age group at 10.5% (n=4). The analysis of educational background showed that a bachelor's degree (S1/D4) was the most common, held by 86.84% (n=33) of the respondents. Those with a D3 diploma accounted for 7.89% (n=3), while high school graduates (SMA/SMK) and master's degree holders (S2) were less common at 5.27% (n=2) and 0% (n=0) respectively. The respondents were distributed across three work units: the Sub-section for the Maintenance of Land Rights, Spatial Affairs, and Development and the Sub-section for Cadastral Surveying & Mapping both had 34.21% (n=13) of the respondents, while the Sub-section for Land Registration, Communal Land, and Institutional Relations accounted for 31.58% (n=12). Finally, regarding socialization about the SITATA application, the majority of respondents stated they had received it 65.79% (n=25), with the remaining 34.21% (n=13) reporting they had not.

The instrument was tested for validity using the Pearson Product Moment correlation. All questionnaire items for each PIECES dimension had a calculated r-value (>0,3), which was larger than the r-table value of (0.1614). This result confirms that all statements are valid. A reliability test was also conducted using Cronbach's Alpha, with all variables achieving a value (>0,6), indicating that the instrument is reliable.

No	Variable	Indicator	r	Mean
1.	Performance (P) Alpha Cronbach = 0.944 Mean = 3.800	Throughput	.870	3,89
		Respon time	.845	3,84
		Communication Norms	.866	3,84

		Completeness	.837	3,68
		Error Tolerance	.832	3,74
	Information and Data (I)	Accuracy	.895	3,79
2.	Alpha Cronbach = 0.953	Relevancy	.837	3,68
	Mean = 3.796	Information Presentation	.939	3,82
		Accesibility	.899	3,89
	Economics (EC)	Resource	.763	3,84
3.	Alpha Cronbach = 0.908	Utility	.867	3,66
	Mean = 3.737	Reusability	.829	3,71
4.	Control & Security (C)	Integritas	.772	3,68
	Alpha Cronbach = 0.880	Security	.850	3,76
	Mean = 3.746	Audibility	.691	3,79
	Efficiency (EF)	Maintability	.811	3,84
5.	Alpha Cronbach = 0.917	Usability	.870	3,71
	Mean = 3,702	Data Processing Latency	.844	3,55
	Service (S)	Accuracy	.701	3,87
6.	Alpha Cronbach = 0.790	Simplicity	.531	3,89
	Mean = 3.842	Reability	.673	3,76

Table 1. Descriptive Statistic, Validity and Reliability Result
Source: Research Results (2025).

Based on the analysis of descriptive statistics, validity, and reliability presented in Table 2, the measurement instrument is shown to be dependable and accurate. This finding is crucial as it provides a comprehensive understanding of how respondents perceive and evaluate each dimension of the PIECES Framework.

Data validity was determined by analyzing the correlation coefficient (r) between each indicator and its corresponding variable. The analysis consistently showed high 'r' values across all indicators, ranging from (0.832) to (0.870) for Performance, (0.837) to (0.939) for Information and Data, (0.763) to (0.867) for Economics, (0.691) to (0.850) for Control and Security, (0.811) to (0.870) for Efficiency, and (0.531) to (0.701) for Service. This high correlation indicates that each item demonstrates excellent construct validity and shows a strong inter-item relationship within a single variable. Additionally, the average score for each variable reflects the respondents' perception of the system's overall performance. Furthermore, the reliability of each variable was assessed using Cronbach's Alpha. The results show very high values for each construct: Performance (0.944), Information and Data (0.953), Economics (0.908), Control & Service (0.880), Efficiency (0.917), and Service (0.790). All these values are far above the standard reliability threshold of >0.70 according to Ghozali (2021) and most of them exceed 0.70. These findings demonstrate that each item within the respective PIECES variables is well-correlated and effectively represents the intended dimension, so the measurement instrument can be considered reliable and suitable for subsequent analysis.

Based on a Likert scale, where a higher average score indicates a more positive perception, the Service (S) dimension recorded the highest overall average at 3.842. Specifically, "Simplicity" (3.89) received the highest individual rating, followed by "Accuracy" (3.87) and "Reliability" (3.76), which reflects a very positive perception of the services the application provides. The Performance (P) dimension followed with an overall average of 3.800. Within this dimension, "Throughput" (3.89) had the highest individual average, indicating that the system's stability under concurrent use is its most prominent and beneficial performance element for employees. This was followed by a quick "Response Time" (3.84) and "Communication Norms" (3.84), which received similar individual ratings. "Error Tolerance" was rated at 3.74, and "Completeness" at (3.68). The Information and Data (I) dimension achieved an overall average of 3.737, showing a strong perception of "Accessibility" (3.89), "Information Presentation" (3.82), "Accuracy" (3.79), and "Relevance" (3.68). This suggests that the format of the information generated by the SITATA application can be used as needed by users. The Control and Security (C) dimension had an overall average of 3.702, which reflects a positive view of "Auditability" (3.79), "Security" (3.76), and "Integrity" (3.68). The Economics (EC) dimension also recorded a strong overall average of 3.737, with high scores for "Resource" (3.84), followed by "Reusability" (3.71), and "Utility" (3.66). Last, the Efficiency (EF) dimension showed an overall average of 3.702, with generally strong scores. However, "Data Processing Latency" (3.55) was identified as the lowest-rated indicator among all others.

The overall average for the SITATA Application System Performance variable (X) is 3.7705, which reflects that users perceive the application's performance as quite good. Although employees are generally satisfied, there are still specific service aspects that need improvement due to relatively low ratings. Overall, these findings confirm that the SITATA application performs quite well across the various PIECES dimensions, which can contribute to increasing user effectiveness in performing land data verification and validation processes.

The following tables present the results of the data analysis in a concise format. They detail the mean values and factor loadings for each construct observed in this study:

Indicator	Factor Weight	Mean
When the SITATA application is used simultaneously, the system's performance remains stable (P1)	.919	3.89
Total waktu yang dibutuhkan dalam melakukan pengolahan data hingga menghasilkan informasi sudah dilakukan dengan cepat oleh SITATA (P2)	.904	3.84
The amount of data that the SITATA information system can process in a given time period meets expectations (P3)	.917	3.84
The menus and features available in SITATA can be used properly according to their functions (P4)	.897	3.68
The SITATA application frequently experiences errors during use (P5)	.892	3.74

Table 4. Factor Weight and Mean Results for Performance Variables
Source: Research Results (2025).

Table 4 shows that the factor loadings for all performance aspects were found to be in the range of 0.892 to 0.919, with a significance criterion below 0.05. This performance aspect is most strongly reflected by the indicator, "When the SITATA application is used concurrently, the system's performance remains stable," which has the largest factor loading at ($\lambda = 0.919$)

Indicator	Factor Weight	Mean
The data stored by the SITATA application is consistent with the data entered into the KKP system (I1)	.942	3.79
The format of the information generated by the SITATA application can be used as needed according to user requirements (I2)	.906	3.68
The information displayed by the SITATA application is easy for users to understand (I3)	.969	3.68
The data managed by the SITATA application is stored in a single storage medium and can be accessed at any time (I4)	.945	3.89

Table 5. Factor Weight and Mean Results for Information and Data Variables
Source: Research Results (2025).

Table 5 shows that the factor loadings for all aspects of Information and Data were found to be in the range of 0.906 to 0.969, with a significance criterion below 0.05. Based on the factor loading values for each indicator, the Information and Data dimension is most strongly reflected by the indicator, "The information displayed by the SITATA application is easy for users to understand," which has the highest factor loading at ($\lambda = 0.969$).

Indicator	Factor Weight	Mean
The use of SITATA helps reduce company expenses compared to conventional work methods (E1)	.890	3.84
There has been a significant change in performance development for the verification and validation of documents with the SITATA information system (E2)	.943	3.66
The SITATA application can be reused on different devices (E3)	.926	3.71

Table 6. Factor Weight and Mean Results for Economics Variables
Source: Research Results (2025).

Table 6 shows that the factor loadings for all aspects of Economics were found to be in the range of 0.890 to 0.943, with all meeting the significance criterion below 0.05. The indicator with the largest factor loading for this dimension is, "There has been a significant change in performance development for the verification and validation of documents with the SITATA information system," with a value of (λ = 0.943).

Indicator	Factor Weight	Mean
Data in the SITATA application is safe from unauthorized changes (C1)	.905	3.68
The SITATA application is equipped with security measures that can protect data from potential fraud or crime (C2)	.940	3.76
SITATA has access limitations for its users (C3)	.854	3.79

Table 7. Factor Weight and Mean Results for Control and Security Variables
Source: Research Results (2025).

Table 7 shows that the factor loadings for all aspects of Control and Security were found to be in the range of 0.854 to 0.940, with a significance criterion below 0.05. Based on the factor loading values for each indicator, the Control and Security dimension is most strongly reflected by the indicator, "The SITATA application is equipped with security measures that can protect data from potential fraud or crime," which has the highest factor loading at (λ = 0.940).

Indicator	Factor Weight	Mean
Errors that occur during the data validation process can be easily corrected (EF1)	.915	3.84
The SITATA application is easy for users to operate (EF2)	.944	3.71
The SITATA application system processes data quickly, which can reduce delays in services (EF3)	.932	3.55

Table 8. Factor Weight and Mean Results for Efficiency Variables
Source: Research Results (2025).

Table 8 shows that the factor loadings for all aspects of Efficiency were found to be in the range of 0.915 to 0.944, with a significance criterion below 0.05. Based on the factor loading values for each indicator, the Efficiency dimension is most strongly reflected by the indicator, "The SITATA application is easy for users to operate," which has the highest factor loading at (λ = 0.944).

Indicator	Factor Weight	Mean
The SITATA application can provide accurate land data results during the validation process (S1)	.884	3.87
ach menu in the application is easy to understand (S2)	.764	3.89
The services provided by the SITATA application meet user expectations (S3)	.874	3.76

Table 9. Factor Weight and Mean Results for Service Variables
Source: Research Results (2025).

Table 9 shows that the factor loadings for all aspects of Service were found to be in the range of 0.764 to 0.884, with a significance criterion below 0.05. Based on the factor loading values for each indicator, the Service aspect is most strongly reflected by the indicator, "The SITATA application can provide accurate land data results during the validation process," which has the highest factor loading at (λ = 0.884).

Dimensi	Factor Weight	Mean
Performance (P)	.941	3.800
Information & Data (I)	.950	3.796
Economics (EC)	.934	3.737

Control & Security (C)	.950	3.746
Efficiency (EF)	.957	3.702
Service (S)	.904	3.842

Table 10. PIECES Variable Factor Weight and Mean Scores
Source: Research Results (2025).

Based on Table 10 the highest factor loading was found in the Efficiency dimension, with a value of (λ = 0.957), while the lowest was in the Service dimension, with a value of (λ = 0.904). Conversely, the Service dimension recorded the highest mean score at 3.842, whereas the Efficiency dimension had the lowest mean at 3.702.

This finding reveals a key difference between what users perceive as the most satisfying aspect of the application and what they consider most representative of its overall performance. Users rated the Service of the SITATA application as the most satisfactory and beneficial aspect based on their experience. However, the factor analysis indicates that Efficiency is the most crucial element in reflecting the application's overall performance in the minds of users. In other words, while the service quality of the SITATA application is highly regarded from a user experience perspective, efficiency is seen as the most important core of the system's performance and is the most representative of the system as a whole. This is a valuable insight for future application development, as it highlights the need to maintain high service quality while also continuously strengthening system efficiency.

Description of SITATA Application Performance Based on the PIECES Framework

The performance evaluation of the Validasi Tanah Kita (SITATA) application, utilizing the PIECES Framework, shows that the application falls into the "quite good" category, with an overall mean score of 3.7705. All PIECES dimensions received scores above 3.5, indicating that the application has met user needs, though not yet optimally across all aspects. The Service dimension earned the highest score at 3.842, which reflects a positive perception of the application's ease of use, accuracy, and support services. Conversely, the Efficiency dimension recorded the lowest score at 3.702, indicating that data processing speed and system efficiency remain major obstacles. The indicators with the highest scores were "Throughput," "Accessibility," and "Service Simplicity" (each scoring 3.89), demonstrating that the application is easily accessible, capable of handling large volumes of data, and has a user-friendly interface. Conversely, the indicators "Data Processing Latency" (3.55) and "Utility" (3.66) are the primary concerns. These low scores suggest the system is not yet optimal in data processing and has not fully provided benefits commensurate with the effort expended. Therefore, system improvements should focus on enhancing efficiency and utility to improve the application's overall performance and support a smoother land validation process at the Bandung City Land Office.

Most Important Factors According to User Perception Based on Factor Analysis

Based on factor analysis, the Efficiency dimension has the highest factor loading (λ=0.957), making it the most dominant aspect in user perception of the SITATA application's performance. This dimension includes ease of use, data processing speed, and the minimal need for extra work. Despite being considered the most important, the average score for this dimension (3.702) is the lowest among all dimensions, indicating a gap between user expectations and reality. Overall, the SITATA application is rated as having "quite good" performance across the various PIECES dimensions, and higher scores on each variable tend to correlate with increased user satisfaction. However, several obstacles still need attention. The main problems are in the Efficiency and Economics dimensions, such as data processing delays caused by manual input and checks. Furthermore, the use of Open Street Map as a base map is considered inaccurate, leading to incorrect street names on electronic certificate drafts and causing numerous public complaints. User feedback to address data processing delays also highlights the need for new features, such as a "back" button, a revision menu for electronic documents, and the ability to modify data without needing to open other applications. The application also lacks support for cross-device access, limiting its flexibility outside of Windows-based PCs. These findings emphasize the importance of developing a more efficient and integrated system to support overall performance and boost user satisfaction, particularly in government land services.

Recommendations for Improving SITATA Application Performance

According to (Jayawardhana et al., 2025), the PIECES method is highly relevant because it can comprehensively identify system strengths and weaknesses, provide a clear picture of system

effectiveness, and present relevant improvement recommendations. In line with this theory, the results of the descriptive analysis showed that the Efficiency dimension recorded the lowest average value (3.702) among all six PIECES dimensions. The indicator with the lowest score was data processing latency (3.55), which shows that users are still experiencing delays in the validation process, particularly during the verification of land right and survey documents. To improve efficiency, several system enhancements are recommended: update and align the base map with the official registration map, dd more flexible revision and navigation features, such as a "back" button for viewing multiple land right numbers, develop a cross-platform application to provide wider and more flexible access, include a revision menu for electronic documents to ensure data processing is faster and more responsive.

4. Conclusion

An evaluation of the SITATA Land Validation application using the PIECES Framework shows that the application generally performs well in meeting user needs. The service dimension was rated as very satisfactory, highlighting its ease of use and accuracy. However, the efficiency dimension was identified as the most crucial factor in users' overall perception of performance, despite also being the area with the biggest challenges. This finding suggests that fundamental issues with data processing speed and operational efficiency are the primary drivers of user satisfaction and productivity. These conclusions have significant practical implications for the Bandung City Land Office and the Ministry of ATR/BPN, underscoring the urgent need for strategic improvements to SITATA's core functionality, particularly its efficiency and utility.

System Improvement Recommendations based on the identified efficiency gaps, specific recommendations include: updating and Adjusting the Base Map to improve the accuracy of spatial data, adding Flexible Revision and Navigation Features, such as a "back" button and a revision menu for electronically signed data, to speed up data correction, developing a Cross-Platform Application to expand accessibility and operational flexibility for users.

Future Research Directions

This research opens up several opportunities for future studies: A follow-up study would be valuable to evaluate the impact of these recommendations on user satisfaction and system performance after they have been implemented, research could be expanded to investigate the effectiveness of the SITATA application in other regional land offices to assess if the findings are generalizable and to identify any unique challenges in different locations, conducting qualitative research, such as in-depth interviews or Focus Group Disscution (FGD), could provide a more profound understanding of user experiences and perceptions.

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