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Analysis of Success Factors in the Implementation of the Regional Government Information System in Palu

Aura Dwi Kartika[1], Andi Chairil Furqan[2], Femilia Zahra[3], Masruddin[4]

Department of Public Sector Accounting, Universitas Tadulako Kota Palu, Indonesia

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ABSTRACT

This study aims to identify and analyze the key factors influencing the implementation of the Regional Government Information System (SIPD RI), in order to provide recommendations for more effective and sustainable implementation. The research is grounded in the DeLone and McLean Information System Success Model (2003) and George Edward III's Policy Implementation Model (1980), employing Principal Component Analysis (PCA) and factor analysis methods. The study adopts an exploratory design with a quantitative approach. Data were collected through questionnaires distributed to 230 SIPD RI users across 41 regional work units (OPD) within the Palu City Government, using a proportionate stratified random sampling technique. The results of the factor analysis, conducted on 37 variable indicators, reveal the emergence of 10 new composite variables representing critical factors in the successful implementation of SIPD RI in Palu City. These factors are labeled as: information quality, organizational support, system benefits, system performance, employee attitudes, technical support, user satisfaction, infrastructure availability, integration and procedures, and system usage. This study offers important implications by contributing to a deeper understanding of the key elements supporting successful SIPD RI implementation. The findings can serve as a guideline for local governments in prioritizing and preparing the identified components, thereby enabling more strategic and effective implementation planning. However, this research is limited in its geographic scope, as it focuses solely on a single region, which may limit the generalizability of the findings to other contexts. Additionally, the limited number and diversity of variables may have resulted in the omission of other potentially significant factors.

Corresponding Author:
Aura Dwi Kartika
Department of Public Sector Accounting, Universitas Tadulako,
Jl. Soekarno Hatta No.KM. 9, Tondo, Kec. Mantikulore, Kota Palu, Sulawesi Tengah 94148
Email: auranimerz@gmail.com

INTRODUCTION

In the current digital era, local governments continue to promote the use of information technology to enhance the effectiveness, transparency, and accountability of financial management and public service delivery. This is realized through the adoption of electronic-based financial systems, in accordance with Presidential Regulation No. 95 of 2018 on Electronic-Based Government Systems (SPBE), which emphasizes the national integration of financial, development, and regional performance data to support decision-making processes and national policy oversight (Nova et al., 2024). One of the strategic measures to achieve this objective is the implementation of SIPD, which supports the nationally integrated SPBE infrastructure to promote the realization of good governance (Seputra, 2020). SIPD is a web-based information system that provides real-time data to facilitate government agencies (OPD) in managing documents, administrative tasks, and regional development data, thereby supporting informed decision-making (Fahzura & Najamudin, 2022). SIPD also serves as a conduit for public accountability and provides information transparency that reinforces public trust in government performance assessments, development programs, and development outcomes (Lubis et al., 2024).

The Palu City Government has implemented the Regional Government Information System (SIPD) since 2020 to improve governance and public services, following Minister of Home Affairs Regulation No. 70 of 2019, which mandates that all regional governments adopt SIPD to promote more effective and efficient governance. By 2023, the Palu City Government, through the Ministry of Home Affairs, had officially adopted the microservices based version of SIPD, representing an advanced development of the previous system now referred to as SIPD RI. This provision was formally conveyed

through Circular Letter No. 600.54/48/SJ, issued on January 6, 2023, regarding the implementation of SIPD RI. In addition, the implementation of SIPD RI also refers to Presidential Regulation No. 39 of 2019 on One Data Indonesia. The system is designed to integrate all processes from planning to reporting into a unified framework that delivers accurate, up to date, and easily accessible data to effectively support regional development (Warsyena & Wibisono, 2021).

However, in its implementation, according to Mawuntu et al., (2024) The implementation of SIPD RI has encountered various challenges, including technical and infrastructure constraints, limited human resources, as well as policy and regulatory factors that significantly influence the success of the system. Lubis et al., (2024), their study also indicates that numerous challenges persist in the implementation of SIPD RI at the regional government level. The system's operations have not yet reached full optimization, and various technical issues have hindered the smooth execution of several governmental activities. During the Coordination Meeting on the Implementation of SIPD RI held at the East Java Governor's Office, Acting Regional Secretary Bobby Soemiarsono stated that planning and budgeting processes are conducted simultaneously across all provincial and district/city governments. However, limited internet access and inadequate communication bandwidth remain major obstacles, often causing delays from document preparation to discussions at the Regional House of Representatives (DPRD) due to the extended time required for data entry (*Kominfo.Jatimprov.Go.Id*, 2024). In line with this, the SIPD RI operator at the Social Affairs Office and the Technical Activity Implementation Officer (PPTK) at the Special Economic Zone Administration Agency of Palu City noted that the SIPD RI system is still under development and often encounters issues such as server downtime and application errors. These problems are particularly evident when planning and budgeting processes are carried out simultaneously across all regional work units (OPDs), hindering data entry. Therefore, a factor analysis is necessary to identify the key elements contributing to the successful implementation of SIPD RI in Palu City. The Principal Component Analysis (PCA) approach is employed to simplify the variables and uncover the dominant factors influencing this success.

A review of existing literature indicates a lack of studies specifically analyzing the success factors of SIPD RI implementation within OPDs of the Palu City Government. This study addresses that gap by employing PCA to develop a more structured understanding of the variables influencing the success of SIPD RI at the local level. The study aims to identify and analyze the key factors contributing to successful implementation, providing evidence-based recommendations for more effective and sustainable strategies. It draws on two theoretical frameworks: the Information Systems Success Model by DeLone and McLean (2003) and the Policy Implementation Model by George Edward III (1980), to assess both technical and policy related dimensions influencing system success. Theoretically, this research extends both models by contextualizing them within the implementation of electronic based government systems at the local level. The findings suggest that the dimensions of both models complement one another in explaining the success of SIPD RI implementation, thereby reinforcing their relevance in the domain of public sector information systems in Indonesia. The analysis was conducted using PCA on questionnaire data collected from a total sample of 230 SIPD RI users across 41 OPD in Palu City. The results of the study reveal that, out of 37 variable indicators subjected to factor analysis using PCA, 10 principal factors were identified as key determinants of the successful implementation of SIPD RI. These factors include information quality, organizational support, system benefits, system performance, employee attitudes, technical support, user satisfaction, infrastructure availability, integration and procedures, and system usage. The findings of this study provide valuable insights and practical implications for supporting the future success of SIPD RI implementation, serving as a reference for local governments in preparing the necessary components to ensure effective system deployment. The main limitations of this study lie in its geographical scope, which is restricted to a single region, and in the limited number and diversity of variables considered factors that may hinder the identification of other potentially significant determinants.

LITERATURE REVIEW

The Delone And Mclean (2003) Information Systems Success Theory

The success of information technology systems is expected to enhance organizational performance and support the achievement of institutional objectives. The DeLone and McLean Model (2003), an extension of their earlier framework (1992), has been widely utilized to evaluate information

system success through six key dimensions: system quality, information quality, service quality, system use, user satisfaction, and net benefits (Ardianto et al., 2014). This model has been extensively applied across various contexts. Nadir et al., (2023), found that Dorobat (2014) modified the model to assess the success of e-learning systems, while Zaied (2012) applied it to evaluate information system implementation more broadly. These six dimensions were selected for their ability to represent both the technical aspects and user perceptions related to the SIPD RI within local government environments. The model provides a comprehensive framework for assessing the extent to which information systems contribute to efficiency, transparency, and the improvement of public service delivery.

Policy Implementation Theory (George Edward III, 1980)

The policy implementation model developed by George Edward III highlights four key variables that influence implementation success: communication, resources, disposition, and bureaucratic structure Dewi et al., (2021). Pratama & Annisa, (2022), along with Zamzam et al., (2023), demonstrate that these factors are also critical in determining the successful implementation of SIPD at the regional level. Communication refers to the clarity of policy information, resources encompass personnel and infrastructure support, disposition reflects the implementers' attitudes, and bureaucratic structure relates to coordination and workflow mechanisms. Accordingly, this model is highly relevant for identifying and analyzing the success factors of SIPD RI implementation. These four variables collectively assess the institutional environment and managerial effectiveness in the execution of SIPD RI.

Regional Government Information System (SIPD)

According to Minister of Home Affairs Regulation No. 70 of 2019, Article 1 Section 12, the Regional Government Information System (SIPD) is defined as an integrated system for managing regional development, financial, and governance data. It serves as an electronic platform to enhance the effectiveness, accountability, and transparency of regional financial management (Citra, 2023). The implementation of SIPD enhances the development of data and information systems for regional planning and financial management, while also supporting data integration and utilization across governmental institutions at regional and national levels (Dione, 2020).

Factor Analysis Through Principal Component Analysis (PCA)

Factor analysis is a statistical technique used to group correlated variables into factors that represent specific underlying constructs (Tabachnick, (2019); (Rizqi et al., (2024)). One of the most commonly employed methods in this analysis is Principal Component Analysis (PCA), which aims to reduce data dimensionality and simplify variable structures (Ririhena & Loklomin, 2020). In this study, PCA is utilized to identify the underlying factor structure of variables derived from the DeLone & McLean (2003) model and George Edward III's (1980) policy implementation model, with the objective of determining the key dimensions influencing the successful implementation of SIPD RI in Palu City. This analytical approach enhances the clarity of data interpretation and supports the development of evidence-based recommendations. Several key considerations in conducting factor analysis include the following:

Communalities Value

Communality values reflect the extent to which a variable's variance is explained by the extracted factors. Values below 0.3 indicate weak contribution and poor alignment with other variables, thus such items are typically excluded to maintain the validity and reliability of the factor structure (Bandalos, DL, 2020). Communalities indicate the proportion of variance in the original variables that is accounted for by the extracted factors. Ideally, they should explain at least 50% of the variation. The higher the communality values, the stronger the association between the observed indicators and the underlying factors (Yahya et al., 2024).

Total Variance Explained

Total variance explained indicates the proportion of variance captured by each extracted component in factor analysis. The table presents eigenvalues, calculated as the sum of squared loadings,

reflecting each component's contribution to explaining variance among the original variables. Components with eigenvalues greater than one are typically considered significant. The percentage of variance shows each component's relative contribution to the model's total variance (Field, 2021).

Scree Plot

The scree plot is a visual tool in principal component analysis that depicts the variance explained by each factor based on eigenvalues. The x-axis shows the number of factors, while the y-axis displays their eigenvalues. The "elbow point" where the curve levels off indicates the optimal number of factors, beyond which additional factors contribute minimally (Rizqi et al., 2024). The scree plot illustrates a broken line pattern based on the eigenvalues plotted against the number of factors, indicating the point at which the "scree" begins to appear representing the optimal number of meaningful factors to retain (Yahya et al., 2024).

Component Matrix

The Component Matrix displays standardized coefficients (factor loadings) that reflect the strength of association between variables and extracted factors. High loadings indicate significant contributions to factor formation. When the matrix is complex, rotation is applied to simplify interpretation and clarify factor groupings (Verdian, 2019).

Rotated Component Matrix

The Rotated Component Matrix displays variable correlations with extracted factors post-rotation, grouping them by factor loadings. Loadings above 0.5 indicate strong associations, aiding in factor interpretation and the identification of dominant variables (Rizqi et al., 2024). Following rotation, the factor loading values may change, and variables with loadings < 0.5 are generally considered to have low contribution to the factor and may warrant elimination from the analysis (Verdian, 2019).

Component Transformation Matrix

The Component Transformation Matrix displays the degree of correlation among the extracted factors. High correlation values along the diagonal indicate a strong relationship between the resulting factors and their associated variables (Yahya et al., 2024).

Interpretation of Factor Results

Factor interpretation involves identifying the underlying theme linking variables within each factor and assigning a label that reflects their dominant characteristics. This generalization clarifies variable interrelationships, ensuring the factor name accurately represents the group and aligns with the study's analytical objectives (Rizqi et al., 2024). The naming of factors is based on the similarity of item characteristics, and there are no fixed rules governing this process; hence, researchers are afforded the flexibility to determine factor names according to their own interpretations (Yahya et al., 2024).

RESEARCH METHOD

This study adopts an exploratory design with a quantitative approach, aiming to gain a comprehensive understanding of the key components that influence the successful implementation of SIPD RI in the City of Palu. This study employs factor analysis techniques, specifically Principal Component Analysis (PCA), to simplify the dataset and eliminate less dominant indicators without compromising the integrity or meaning of the original data (Zulfahmi, 2019). The data were collected through the distribution of questionnaires to users of the SIPD RI system within the local government organizations (OPD) of Palu City. This study employed a proportional stratified random sampling method at the OPD level. The population consisted of 540 users distributed across 41 OPDs in Palu City. From this total population, a sample size of 230 respondents was determined using Slovin's formula. Each OPD had a different number of users, and there were nine job strata involved in the implementation of SIPD RI, as presented in Table 1.

Table 1 User Positions in SIPD – Palu City OPD's

No	Position

1.	Budget User (PA)
2.	Budget Authority Holder (KPA)
3.	Financial Administration Officer (PPK SKPD)
4.	Technical Activity Implementing Officer (PPTK)
5.	Revenue Treasurer
6.	Assistant Revenue Treasurer
7.	Expenditure Treasurer
8.	Assistant Expenditure Treasurer
9.	SIPD RI System Operator

Source: Researcher, 2025

The number of samples per OPD was determined proportionally based on the number of SIPD RI users in each OPD relative to the total population. Initially, the study assumed that each OPD comprised nine job strata of SIPD RI users. However, data collection revealed that not all OPDs were represented across all strata. As a result, random sampling was conducted from the entire population of users within each OPD, regardless of their job position proportions. This approach ensured equitable representation across OPDs, even though the distribution of positions was not always balanced particularly in OPDs with a small number of users or where certain positions were absent. This method was selected to preserve representative balance in accordance with the objectives of the study.

Data Sources

This study used primary data collected through a questionnaire with 37 indicators measured on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." According to Sugiyono (2018:173), as cited in Marcelani et al., (2021), obtaining valid and reliable research results requires the use of instruments that have been proven to be both valid and reliable. Validity was tested by comparing the r-count with the r-table at a 5% significance level; items were valid if r-count > r-table. Reliability was tested using Cronbach's Alpha, with values above 0.60 considered reliable (Larasati & Jatiningrum, 2021), The validity and reliability assessments of the questionnaire in this study were performed using SPSS version 30.

Table 2 Variable Operational

No	Variable	Definition	Indicator
1.	System Quality	It refers to the characteristics of an information system, encompassing various inherent aspects such as system ease of use, reliability, and responsiveness (Hidayatullah et al., 2022).	X1. Access speed of the SIPD RI system X2. System reliability in data processing X3. Ease of navigation within the SIPD RI interface X4. Consistency of the SIPD RI user interface design
2.	Information Quality	Information quality refers to the output generated by the information system in use. This quality can be observed through various aspects, such as ease of comprehension, a high degree of accuracy, data completeness, and the precision of the information produced (Hidayatullah et al., 2022).	X5. Accuracy of data generated by SIPD RI X6. Completeness of information provided X7. Ease of understanding SIPD RI reports
3.	Service Quality	Information system service quality refers to the support provided to users by the system developers, including services such as system updates and the responsiveness offered when issues arise during its use (Subroto & A. A. Uliansyah, 2023).	X8. Responsiveness of technical support in resolving issues X9. Availability of training or user guidance X10. Technical team's ability to resolve system issues
4.	System Use	Usage refers to the extent to which the system is utilized by its users. The indicators employed to measure the level of usage include the frequency of system use and the specific purposes for which the system is employed (Sulistyorini et al., 2021).	X11. Frequency of SIPD RI use in daily tasks X12. Frequency of using core SIPD RI features X13. Duration of system usage X14. Accessibility of SIPD RI across devices
5.	User Statisfaction	User satisfaction refers to the responses and feedback that emerge following the use of an	X15. Satisfaction with system speed and performance

No	Variable	Definition	Indicator
		information system. Users' attitudes toward the system reflect their subjective evaluation of how much they favor or appreciate the system in use (Subroto & A. A. Uliansyah, 2023).	X16. Satisfaction with system usefulness in work tasks X17. User expectations for future system improvements
6.	Net Benefit	This variable captures the system's impact on user and organizational performance, measured through improvements in performance, efficiency, effectiveness, productivity, and overall work quality (Sapty Rahayu et al., 2018).	X18. Increased work efficiency post-SIPD RI implementation X19. Reduction of financial reporting errors X20. Enhanced transparency in budget management X21. Improved inter-departmental coordination
7.	Communication	According to Edward III, the success of public policy implementation is greatly influenced by communication. Implementation can proceed effectively when policymakers clearly understand what actions need to be taken. The indicators used to assess the effectiveness of communication include transmission, clarity, and consistency (Zulkani & Dede, 2024).	X22. Clarity of SIPD RI usage instructions X23. Policy consistency in system implementation X24. Employee understanding of SIPD RI policies X25. Effectiveness of SIPD RI-related information dissemination
8.	Resources	Resources constitute a critical factor influencing the success of policy implementation. Even if the content of a policy is communicated clearly and consistently, its execution will not be effective if the implementers lack the necessary resources (Putera, 2024). Several indicators can be used to measure the effectiveness of the resource variable, which include key elements such as personnel, information, authority, and facilities (Enggok et al., 2022).	X26. Availability of hardware and network infrastructure X27. Staff proficiency in operating the system X28. Reliability of SIPD RI data backup mechanisms X29. Availability of responsive and professional experts
9.	Disposition	According to Edward III, effective policy implementation depends on implementers' attitudes and their competence to execute tasks in line with policy objectives (Yuliansyah et al., 2022). Indicators of disposition in implementation include aspects such as bureaucratic appointments and incentives (Zulkani & Dede, 2024).	X30. Leadership commitment to SIPD RI adoption X31. Employee positive attitudes toward implementation X32. Awareness of SIPD RI benefits among employees X33. Motivation to optimize SIPD RI usage
10.	Bureaucratic structure	The bureaucratic structure is central to policy implementation, serving as the primary executing body. Edwards III highlights two defining features Standard Operating Procedures (SOPs) and fragmentation which critically shape implementation effectiveness, regardless of resource availability or implementer readiness (Yuliansyah et al., 2022).	X34. Policy and regulatory alignment with implementation X35. Coordination mechanisms among administrative units X36. Clarity of operational procedures in system usage X37. Integration effectiveness with other government systems

Source: Researcher, 2025

Data Analysis Technique

Data analysis techniques in this study required that, prior to the application of Principal Component Analysis (PCA), the data exhibit multivariate normality. A multivariate normality test was conducted to determine whether the dataset followed a normal distribution, which is a necessary assumption for the proper implementation of PCA (Billah et al., (2020); Tabachnick, (2019)). Data that involve measurements of multiple variables for each sampling unit are referred to as multivariate data (Billah et al., (2020); Yahya et al., (2024)). In the study conducted by Marcelani et al., (2021), it was stated that since the data obtained were ordinal in scale, they first needed to be transformed into interval scale using the Method of Successive Intervals (MSI) with the assistance of the Sstat97 application in Microsoft Excel to ensure the appropriateness of PCA. Once the data satisfied the assumption of multivariate normality, the subsequent step involved conducting factor analysis using the PCA technique. This process included Bartlett's test of sphericity to examine the presence of correlations

among variables, an assessment of data adequacy determined by a Kaiser-Meyer-Olkin (KMO) value > 0.5, examination of the inter-variable correlation matrix using the Measure of Sampling Adequacy (MSA) where values > 0.5 were considered acceptable, execution of PCA, and finally, interpretation of the resulting factor structure (Ilmaniati & Putro, (2019); Tabachnick, (2019); Wangge, (2021)). The results of this analysis will identify new significant factors, which will then be interpreted and assigned names that reflect the representative characteristics of the factor groupings formed (Mangitung, 2022).

RESULT

Characteristics of the Factors Contributing to the Success of SIPD RI Implementation in Palu City

The characteristics of the factors influencing the success of SIPD RI implementation in Palu City were analyzed using descriptive statistics. The questionnaire results indicate that the respondents' mean scores range from 3.08 to 4.58, with a minimum value of 1 and a maximum of 5. This suggests that the majority of respondents tended to choose responses such as "agree" to "strongly agree," reflecting generally positive perceptions. However, item X02 recorded the lowest mean score (3.08), indicating that respondents were more neutral or less agreeable toward this item compared to others. The standard deviations range from 0.53 to 0.79, indicating a relatively homogeneous distribution of responses. This suggests limited variability in the participants' answers across items, and the data are considered sufficiently stable and consistent. Overall, the dataset is deemed appropriate for further analysis, thereby justifying the continuation with the KMO test, Bartlett's Test of Sphericity, and exploratory factor analysis using PCA.

Validity Test

The validity test was conducted by comparing the calculated r value and the r-table value for each questionnaire item, aiming to assess the extent to which the tested variables are reliable and accurate. Based on the total sample size of 230 respondents, the degree of freedom (df) is calculated as n-2 = 228. At a 5% significance level, the r-table value is determined to be 0.1294. A variable is considered valid if the r-count > r-table (Sakinah et al., 2024). All questionnaire items were declared valid as the r-count values exceeded the r-table threshold of 0.1294. The validity test in this study employed the Pearson correlation method by examining the significance values for each variable. If the significance value is Sig. < 0.05, it can be concluded that the data are valid (Yudha et al., 2024). Of the 37 variables tested using SPSS, all were found to have significance values (Sig.) < 0.05, indicating that each variable is valid and suitable for further analysis in this study.

Table 3 Validity Test

Item	*rhitung*	*rtabel*	Sig (<0,05)	Conclusion	Item	*rhitung*	*rtabel*	Sig (<0,05)	Conclusion
X1	0,488	0,1294	<,001	Valid	X20	0,537	0,1294	<,001	Valid
X2	0,437	0,1294	<,001	Valid	X21	0,441	0,1294	<,001	Valid
X3	0,519	0,1294	<,001	Valid	X22	0,546	0,1294	<,001	Valid
X4	0,622	0,1294	<,001	Valid	X23	0,520	0,1294	<,001	Valid
X5	0,552	0,1294	<,001	Valid	X24	0,476	0,1294	<,001	Valid
X6	0,542	0,1294	<,001	Valid	X25	0,532	0,1294	<,001	Valid
X7	0,506	0,1294	<,001	Valid	X26	0,276	0,1294	<,001	Valid
X8	0,421	0,1294	<,001	Valid	X27	0,365	0,1294	<,001	Valid
X9	0,332	0,1294	<,001	Valid	X28	0,447	0,1294	<,001	Valid
X10	0,563	0,1294	<,001	Valid	X29	0,583	0,1294	<,001	Valid
X11	0,490	0,1294	<,001	Valid	X30	0,513	0,1294	<,001	Valid
X12	0,574	0,1294	<,001	Valid	X31	0,474	0,1294	<,001	Valid
X13	0,557	0,1294	<,001	Valid	X32	0,407	0,1294	<,001	Valid
X14	0,516	0,1294	<,001	Valid	X33	0,474	0,1294	<,001	Valid
X15	0,435	0,1294	<,001	Valid	X34	0,448	0,1294	<,001	Valid
X16	0,524	0,1294	<,001	Valid	X35	0,518	0,1294	<,001	Valid
X17	0,416	0,1294	<,001	Valid	X36	0,556	0,1294	<,001	Valid
X18	0,420	0,1294	<,001	Valid	X37	0,577	0,1294	<,001	Valid
X19	0,587	0,1294	<,001	Valid					

Source: Primary data, SPSS 30 output (processed, 2025)

Reliability Test

The reliability test in this study employed Cronbach's Alpha. If the resulting Cronbach's Alpha value is greater than 0.60, it can be concluded that the data are reliable (Larasati & Jatiningrum, 2021). The results of this test indicate that the Cronbach's Alpha value is 0.911. Based on the SPSS output obtained, it can be concluded that all the variables are reliable and deemed suitable and trustworthy for further analysis.

Table 4 Reliabilitiy Test

Reliability Statistics	
Cronbach's Alpha	N of Items
,911	37

Source: Primary data, SPSS 30 output (processed, 2025)

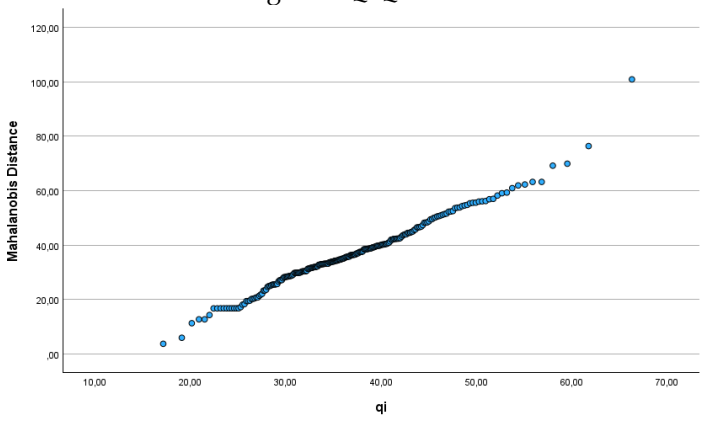
Assumption Testing on the Factors Contributing to the Successful Implementation of SIPD RI in Palu City

Factor analysis was conducted to identify key factors influencing SIPD RI implementation in Palu City by reducing a large set of variables into fewer, more meaningful components. As the original data were ordinal, they were first transformed into interval scale using the Method of Successive Intervals (MSI) in Microsoft Excel 2007, and subsequently analyzed using SPSS 30. Prior to factor extraction, key assumptions were tested, including multivariate normality, variable independence via Bartlett's test, sampling adequacy using the KMO measure, and inter-variable correlation through the anti-image correlation matrix (Ramadhan, 2024). The results of these assumption tests are presented as follows:

Multivariate Normality Test

The purpose of the multivariate normality test is to determine whether the data collectively follow a normal distribution, as this can significantly influence the accuracy and validity of conclusions drawn from the analysis (Billah et al., 2020). The multivariate normality test was conducted through both visual and statistical examinations. The results of the visual assessment of multivariate normality are presented in Figure 2.

Figure 1 Q-Q Plot



Source: Primary data, SPSS 30 output (processed, 2025)

Figure 2 shows that data points align with the normal line, suggesting multivariate normality. This was further confirmed through a correlation test between Mahalanobis distance and chi-square quantiles.

Table 5 Correlation Mahalanobis & Chi Square

Correlations			
		Mahalanobis Distance	Chi Square
Mahalanobis Distance	Pearson Correlation	1	,991**
	Sig. (2-tailed)		<,001
	N	230	230

Chi Square	Pearson Correlation	,991**	1
	Sig. (2-tailed)	<,001	
	N	230	230
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary data, SPSS 30 output (processed, 2025)

Based on Table 8, the obtained correlation coefficient of 0.991 indicates a strong correlation. The correlation coefficient ranges from −1 to +1. For this dataset, the critical r-value at a 5% significance level with N = 230 is 0.1294, meaning the correlation coefficient (0.991) > r-table and the significance value (< 0.001) < 0.05. These results indicate a statistically significant correlation, leading to the conclusion that the data are drawn from a multivariate normal distribution.

Kaiser-Meyer-Olkin (KMO) Test

The Kaiser-Meyer-Olkin (KMO) test is conducted to assess the adequacy of the data for factor analysis, determining whether the sample is suitable for the application of multivariate statistical techniques (Rizqi et al., 2024). According to Rezky et al., (2022) the appropriateness of the data for factor analysis is evaluated using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, where a KMO value greater than 0.50 indicates that factor analysis can be appropriately conducted. Based on the SPSS output presented in Table 9, the KMO value obtained is 0.841, which exceeds the threshold of 0.50. Thus, the data meet the sampling adequacy criteria required for factor analysis. This test can also be formulated in terms of the following hypotheses:

H_0: The sample size is sufficient to conduct factor analysis

H_1: The sample size is not sufficient to conduct factor analysis

The decision criterion is to reject H_0 if the KMO value is < 0.5. Conversely, if the KMO value is > 0.5, then H_0 is accepted (Ririhena & Loklomin, 2020). Accordingly, since the KMO value is > 0.5, H_0 is accepted, indicating that the sample size is sufficient for conducting factor analysis.

Bartlett's Test of Sphericity

Bartlett's Test is employed to assess the independence of correlations among the factors influencing the successful implementation of SIPD RI in Palu City. This test aims to determine whether there are significant relationships or dependencies among the observed variables (Ramadhan, 2024). The hypotheses for Bartlett's Test can be formulated as follows:

H_0 : $\boldsymbol{\rho = I}$ (The correlation matrix of the factors influencing the successful implementation of SIPD RI in Palu City is independent)

H_1 : $\boldsymbol{\rho \neq I}$ (The correlation matrix of the factors influencing the successful implementation of SIPD RI in Palu City is dependent)

The rejection region is determined when the significance value (Sig.) of Bartlett's Test of Sphericity is less than 0.05, indicating that there are statistically significant correlations among the variables (Ramadhan, 2024). Based on the test results presented in Table 9, the significance value is < .001, which is well below the 0.05 threshold. This indicates a highly significant result and the presence of correlations among variables. Therefore, the null hypothesis (H_0) is rejected, meaning that the correlation matrix among the factors influencing the successful implementation of SIPD RI in Palu City is dependent. Consequently, factor analysis in this study can be appropriately continued, as the necessary assumptions have been satisfied.

Table 6 KMO and Bartlett's Test Results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,841
Bartlett's Test of Sphericity	Approx. Chi-Square	3327,363
	df	666
	Sig.	<,001

Source: Primary data, SPSS 30 output (processed, 2025)

Anti-Image Matrix Results

The Anti-Image Matrices are employed to evaluate the appropriateness of variables for inclusion in factor analysis. In the Anti-Image Correlation section, the letter (a) denotes the Measure of Sampling Adequacy (MSA) value (Santoso, 2017). The criterion for accepting the anti-image correlation is that the Measure of Sampling Adequacy (MSA) value must be greater than 0.5. If the MSA > 0.5, the variable is considered predictable and suitable for further analysis. Conversely, if the MSA < 0.5, the variable is deemed inappropriate for analysis and should be eliminated (Rizqi et al., 2024).

Table 7 Anti Image Matrix

Variable	MSA Value (> 0,5)	Variable	MSA Value (> 0,5)
X1	,813	X20	,846
X2	,782	X21	,862
X3	,823	X22	,848
X4	,857	X23	,867
X5	,852	X24	,836
X6	,857	X25	,888
X7	,869	X26	,622
X8	,767	X27	,802
X9	,751	X28	,826
X10	,817	X29	,855
X11	,838	X30	,845
X12	,868	X31	,822
X13	,884	X32	,765
X14	,900	X33	,843
X15	,797	X34	,831
X16	,860	X35	,907
X17	,839	X36	,893
X18	,783	X37	,823
X19	,885		

Source: Primary data, SPSS 30 output (processed, 2025)

Based on the results above, it can be concluded that the MSA values for all examined variables are greater than 0.5. This indicates that each variable can still be adequately predicted by the other variables. Therefore, all variables influencing the successful implementation of SIPD RI in Palu City are deemed predictable and suitable for further analysis.

Communalities Test Results

Communalities indicate how well a variable contributes to explaining the underlying factors. A variable is considered to adequately represent a factor if its extraction value exceeds 0.50 (Santoso, 2017).

Table 8 Communalities Test

Communalities		
	Initial	Extraction
X01	1,000	,661
X02	1,000	,597
X03	1,000	,582
X04	1,000	,711
X05	1,000	,694
X06	1,000	,704
X07	1,000	,613
X08	1,000	,665
X09	1,000	,516
X10	1,000	,704
X11	1,000	,674
X12	1,000	,726
X13	1,000	,671
X14	1,000	,565
X15	1,000	,625
X16	1,000	,643
X17	1,000	,605
X18	1,000	,530
X19	1,000	,661

Communalities		
	Initial	Extraction
X20	1,000	,649
X21	1,000	,565
X22	1,000	,616
X23	1,000	,629
X24	1,000	,593
X25	1,000	,664
X26	1,000	,576
X27	1,000	,642
X28	1,000	,615
X29	1,000	,677
X30	1,000	,633
X31	1,000	,599
X32	1,000	,655
X33	1,000	,578
X34	1,000	,634
X35	1,000	,556
X36	1,000	,669
X37	1,000	,675

Extraction Method: Principal Component Analysis.

Source: Primary data, SPSS 30 output (processed, 2025)

Based on Table 11, the initial communalities for each variable are shown to be 1.00, while the extraction column indicates the extent to which the derived factors explain the variance of each respective variable. The highest value is found in the variable frequency of use of SIPD RI's core features (X12), with a value of 0.726, indicating that X12 explains 73% of the factor variance. Conversely, the lowest value is observed in the variable availability of training or guidance for using SIPD RI (X9), with a value of 0.516, meaning that X9 accounts for 52% of the factor variance. All variables can be interpreted using the communalities values in the extraction column, with the principle that higher communalities reflect stronger relationships between the variable and the extracted factor.

Total Variance Explained Results

The Total Variance Explained table presents the variance values for each variable analyzed. Given that this study involves 37 variables, a total of 37 components are examined. Two types of outputs are used to describe the explained variance: Initial Eigenvalues and Extraction Sums of Squared Loadings. The values under Initial Eigenvalues indicate the number of factors that are initially formed in the analysis (Santoso, 2017). The total variance explained for the factors contributing to the successful implementation of SIPD RI in Palu City is presented in Table 12 as follows:

Table 9 Total Variance Explained

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9,263	25,036	25,036	9,263	25,036	25,036	2,948	7,969	7,969
2	2,718	7,347	32,383	2,718	7,347	32,383	2,872	7,762	15,731
3	1,947	5,263	37,646	1,947	5,263	37,646	2,618	7,075	22,806
4	1,673	4,522	42,168	1,673	4,522	42,168	2,452	6,626	29,432
5	1,650	4,459	46,627	1,650	4,459	46,627	2,239	6,051	35,482
6	1,387	3,748	50,375	1,387	3,748	50,375	2,146	5,801	41,284
7	1,313	3,548	53,923	1,313	3,548	53,923	2,104	5,687	46,970
8	1,223	3,306	57,229	1,223	3,306	57,229	2,046	5,531	52,501
9	1,159	3,133	60,363	1,159	3,133	60,363	2,043	5,520	58,021
10	1,043	2,818	63,180	1,043	2,818	63,180	1,909	5,159	63,180
11	,924	2,496	65,676						
12	,891	2,409	68,086						
13	,854	2,308	70,394						
14	,814	2,199	72,593						

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
15	,754	2,039	74,632						
16	,713	1,927	76,559						
17	,694	1,874	78,433						
18	,690	1,866	80,299						
19	,628	1,698	81,997						
20	,564	1,525	83,523						
21	,545	1,473	84,995						
22	,538	1,454	86,450						
23	,511	1,382	87,832						
24	,488	1,318	89,150						
25	,434	1,173	90,324						
26	,422	1,140	91,464						
27	,390	1,055	92,519						
28	,387	1,045	93,564						
29	,349	,943	94,507						
30	,325	,877	95,385						
31	,309	,835	96,219						
32	,300	,812	97,031						
33	,252	,681	97,712						
34	,232	,627	98,339						
35	,221	,596	98,935						
36	,208	,563	99,498						
37	,186	,502	100,000						

Extraction Method: Principal Component Analysis.

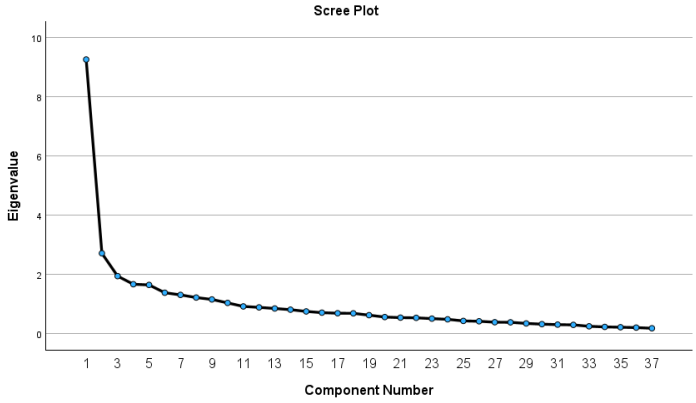
Source: Primary data, SPSS 30 output (processed, 2025)

Based on Table 12, it is shown that there are 10 principal components with eigenvalues greater than one, accounting for a cumulative total of 63.180%. Therefore, these 10 factors collectively explain 63.180% of the variance in the variables associated with the factors influencing the successful implementation of SIPD RI in Palu City.

Scree Plot Results

The scree plot is utilized to identify the number of extracted factors by observing the point at which the components have eigenvalues > 1 (Santoso, 2017). As illustrated in Figure 3, there are ten component points with eigenvalues > 1, indicating that ten distinct factors can be extracted.

Figure 2 Scree Plot



Source: Primary data, SPSS 30 output (processed, 2025)

Rotated Component Matrix Results

The Rotated Component Matrix is a table that displays the correlation coefficients between the original variables and the factors after the rotation has been performed. This table is used to facilitate a clearer and more interpretable understanding of the underlying factors, making the structure of the factor loadings more distinct and easier to interpret. According to Santoso, (2017) the assignment of variables to specific factors is determined by identifying the highest correlation value between each variable and the corresponding factor.

Table 10 Rotated Component Matrix

Rotated Component Matrixa										
	Component									
	1	2	3	4	5	6	7	8	9	10
X05	,778									
X06	,696									
X07	,689									
X04	,648									
X03										
X30		,691								
X23		,591								
X35		,568								
X34		,563								
X25			,684							
X20			,634							
X13			,557							
X21										
X19										
X15				,694						
X02				,681						
X01				,656						
X26										
X32					,762					
X31					,595					
X33					,529					
X22					,510					
X08						,696				
X10						,622				
X09						,607				
X16							,641			
X18							,601			
X17										
X14										
X27								,702		
X28								,588		
X29								,586		
X36									,720	
X37									,544	
X24										
X11										,733
X12										,719

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.a

a. Rotation converged in 16 iterations.

Source: Primary data, SPSS 30 output (processed, 2025)

After the component rotation was performed, variables were grouped into factors based on their highest factor loading values. Variables with loadings > 0.5 are considered to have a strong association with the corresponding factor. However, variables X3, X21, X19, X26, X17, X14, and X24 displayed loading values < 0.5, indicating a weak contribution to the extracted factors. Therefore, these variables should be eliminated from the respective factors.

Transform Component Matrix Results

Table 11 Component Transformation Matrix

Component Transformation Matrix										
Component	1	2	3	4	5	6	7	8	9	10
1	,415	,398	,390	,269	,324	,222	,279	,210	,298	,282
2	,284	-,440	-,207	,533	-,309	,528	-,137	,066	-,025	,033
3	-,461	-,157	-,003	,340	,240	-,179	-,067	,720	,115	-,146
4	-,269	,146	-,208	,563	-,002	-,178	,568	-,418	-,035	-,129
5	,281	-,440	,292	-,048	-,062	-,335	,442	,198	-,518	,147
6	,003	,007	-,648	-,153	-,009	-,114	,175	,181	,131	,681
7	-,497	-,156	,270	-,306	-,255	,512	,436	,043	,166	,119
8	-,121	,055	-,197	-,074	,624	,452	,013	-,032	-,586	-,002
9	,030	,607	-,118	,003	-,517	,097	,067	,387	-,404	-,151
10	-,348	,114	,362	,295	-,130	-,080	-,394	-,183	-,277	,599

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Source: Primary data, SPSS 30 output (processed, 2025)

Based on the results of the Component Transformation Matrix, it was found that components 4 and 10 exhibited correlation values > 0.5, indicating stronger stability in summarizing the original variables. Nevertheless, the ten factors extracted through PCA remain appropriate and valid for use, as all satisfy the validity criteria namely, eigenvalues > 1 and factor loadings > 0.5 after rotation. Therefore, all ten factors are retained as they represent essential dimensions in the successful implementation of SIPD RI, despite the varying degrees of strength among the components.

Factor Interpretation Results

The naming of the factors derived from the 10 components representing the success factors in the implementation of SIPD RI in Palu City is presented in Table 16.

Table 12 Factor Interpretation Results

Factor Name	Variable	Variable Definition
Factor 1 **Information Quality**	X_5	Accuracy of data generated by SIPD RI
	X_6	Completeness of information provided
	X_7	Ease of understanding SIPD RI reports
	X_4	Consistency of the SIPD RI user interface design
Factor 2 **Organizational Support**	X_{30}	Leadership commitment to SIPD RI adoption
	X_{23}	Policy consistency in system implementation
	X_{35}	Coordination mechanisms among administrative units
	X_{34}	Policy and regulatory alignment with implementation
Faktor 3 **System Benefits**	X_{25}	Effectiveness of SIPD RI-related information dissemination
	X_{20}	Enhanced transparency in budget management
	X_{13}	Duration of system usage
Faktor 4 **System Performance**	X_{15}	Satisfaction with system speed and performance
	X_2	System reliability in data processing
	X_1	Access speed of the SIPD RI system
Faktor 5 **Employee Attitude**	X_{32}	Awareness of SIPD RI benefits among employees
	X_{31}	Employee positive attitudes toward implementation
	X_{33}	Motivation to optimize SIPD RI usage
	X_{22}	Clarity of SIPD RI usage instructions
Faktor 6 **Technical Support**	X_8	Responsiveness of technical support in resolving issues
	X_{10}	Technical team's ability to resolve system issues
	X_9	Availability of training or user guidance
Faktor 7 **User Satisfaction**	X_{16}	Satisfaction with system usefulness in work tasks
	X_{18}	Increased work efficiency post-SIPD RI implementation
Faktor 8 **Infrastructure Availability**	X_{27}	Staff proficiency in operating the system
	X_{28}	Reliability of SIPD RI data backup mechanisms
	X_{29}	Availability of responsive and professional experts
Faktor 9 **Integration and Procedures**	X_{36}	Clarity of operational procedures in system usage
	X_{37}	Integration effectiveness with other government systems
Faktor 10 **System Usage**	X_{11}	Frequency of SIPD RI use in daily tasks
	X_{12}	Frequency of using core SIPD RI features

Source: Researcher, 2025

Table 16 presents the naming of the factors based on the variables grouped within each newly formed factor. The ten new factors identified were assigned names that accurately represent and interpret the underlying variables, as follows:

1. **Factor 1: Information Quality**, this factor reflects the quality of information provided by the system, including accuracy, completeness, ease of data comprehension, and consistency in the SIPD RI interface, which collectively support users' perception of information quality.
2. **Factor 2: Organizational Support**, this factor relates to structural and policy support from the organization in implementing the system, including regulations, coordination mechanisms, and leadership support.
3. **Factor 3: System Benefits**, this factor emphasizes the practical benefits derived from using the system, particularly in enhancing transparency, improving communication, and promoting effective time utilization.
4. **Factor 4: System Performance**, this factor reflects the technical performance of SIPD RI in supporting user activities. A system that is fast, reliable, and responsive is essential to ensuring smooth workflow processes and enhancing employee efficiency and productivity in government tasks.
5. **Factor 5: Employee Attitude**, this factor pertains to individual dispositions within the organization toward the system, including awareness, positive attitudes, and motivation to optimize system usage.
6. **Factor 6: Technical Support**, this factor assesses the extent to which technical services and assistance meet users' needs. It encompasses the responsiveness of support personnel, the technical expertise of the IT team, and the availability of training or guidance.
7. **Factor 7: User Satisfaction**, this factor captures the level of user satisfaction with the system's benefits. It represents users' perceived usefulness of SIPD RI in their work and its contribution to improving work efficiency.
8. **Factor 8: Infrastructure Availability**, this factor describes the readiness of both technological and human resources necessary to ensure the system operates effectively.
9. **Factor 9: Integration and Procedures**, this factor is associated with the clarity of operational procedures and the system's ability to integrate with other systems, which is crucial for supporting seamless workflows and interoperability.
10. **Factor 10: System Usage**, this factor reflects user behavior in operating the system, including the intensity and variety of features utilized. It indicates the level of user engagement with the system, where higher frequency and diverse usage of features suggest stronger acceptance and utility of the system in daily tasks

DISCUSSION

The findings derived from the analysis of factors contributing to the successful implementation of SIPD RI in Palu City reveal the computed results for each criterion used in the PCA. The analysis employed three primary criteria: total variance explained, eigenvalues, and the scree plot. Based on the combined interpretation of these three criteria, as presented in Table 12 and Figure 3, the results indicate that 10 distinct factors emerged from the analysis of 37 variables. These findings are methodologically aligned with the study conducted by Nurdiana & Hasanah, (2024) which employed PCA to reduce 8 variables into 2 principal factors in evaluating the effectiveness of the MyBulletinBoard (MyBB) forum. In addition, a previous study by Mangitung, (2022) employed PCA to identify the factors influencing the success of electronic tenders based on contractors' perceptions in Palu, reducing 18 initial variables into 6 dominant factors. This demonstrates that variable reduction through PCA yields a more concise set of principal factors while remaining representative of the phenomenon under investigation.

The findings confirm that Principal Component Analysis is effective in identifying key factors influencing the successful implementation of SIPD RI within Palu City's Regional Government Organizations (OPD). This study aligns with prior research indicating that SIPD RI implementation challenges are national in scope (e.g., Zamzam et al., (2023); Arief & Hayati, (2021); Kelana & Fahlevvi, (2024); Tumija & Erlambang, (2023)), However, most existing studies rely on qualitative methods or regional case studies. In contrast, this study offers a novel, quantitative contribution by empirically

identifying principal success factors through PCA, thus providing a more data-driven perspective that enriches the current understanding of SIPD implementation.

Accordingly, the findings indicate that both the DeLone & McLean Information Systems Success Model (2003) and George Edward III's Policy Implementation Model (1980) play significant roles in supporting the successful implementation of SIPD RI. These two theoretical frameworks are complementary and highly relevant in explaining the factors that influence the success of SIPD RI implementation in Palu City. The DeLone & McLean model emphasizes technical aspects and system benefits, while George Edward III's model highlights policy-related dimensions and the practical aspects of implementation on the ground. The integration of these two approaches provides a comprehensive perspective for analyzing the implementation of SIPD RI both theoretically and empirically.

CONCLUSION

The objective of this study is to identify and analyze the key factors influencing the implementation of SIPD RI in order to provide recommendations for more effective and sustainable implementation. Based on a factor analysis using Principal Component Analysis (PCA) applied to 37 indicators, the study identified 10 principal factors contributing to the success of SIPD RI implementation: information quality, organizational support, system benefits, system performance, employee attitudes, technical support, user satisfaction, infrastructure availability, integration and procedures, and system usage. These ten factors collectively explain 63.18% of the total variance, indicating that they provide substantial insights into the critical dimensions influencing the successful implementation of SIPD RI.

Therefore, the implications of this study offer important contributions and a more comprehensive understanding to support the successful implementation of SIPD RI in the future. The findings may serve as a reference for local governments in preparing and directing their focus toward the key components identified in this study, enabling a more strategic formulation of implementation efforts. This study has two primary limitations. **First**, the research scope is confined to a single regional government, which limits the generalizability of the findings to other areas that may exhibit different characteristics. Consequently, the factor patterns identified in this study may not be universally applicable across different contexts. **Second**, the research variables employed were limited in number and derived from specific indicators grounded in the theoretical framework used. This constraint may have excluded other relevant factors that could significantly influence the success of SIPD RI implementation but remain unidentified or unmeasured in this analysis. For future research should expand variable scope and geographic coverage to allow comparative analysis across regions. Advanced methods such as Structural Equation Modeling (SEM) or Confirmatory Factor Analysis (CFA) are recommended to examine causal relationships, while mixed methods can offer deeper insights into variable interrelations. For policymakers, especially the Government of Palu City, it is recommended to follow up on these findings by prioritizing the ten key factors identified such as enhancing the quality of information and system performance, strengthening organizational support including inter-unit coordination, and revising regulatory frameworks to ensure optimal system integration. The government is also advised to invest in digital infrastructure, improve the responsiveness and expertise of IT support services, and provide ongoing training for human resources. Active commitment and leadership from top-level officials are crucial to driving the comprehensive success of SIPD RI implementation.

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