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Digital Local Government Asset Governance and SIPD: A Conceptual Model and Diagnostic Pilot Assessment

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ABSTRACT

Purpose – This study proposes a conceptual model of digital local government asset governance in which utilization of the Regional Government Information System (SIPD) acts as a conditional enabler of financial, governance, and asset-management foundations. It also reports a diagnostic pilot assessment, carried out in one Indonesian city government, of the instrument and data set prepared for testing the model.

Design/methodology/approach – The model and its directional hypotheses were derived from public value theory and technology–organization complementarity. A pilot questionnaire of 20 five-point Likert items was administered to officials of the Baubau City Government, Southeast Sulawesi, producing 126 recorded responses. The response matrix was audited row by row, and PLS-SEM estimates were computed only to show whether the data could support confirmatory inference.

Finding/Results – The audit found only 54 unique response patterns among 126 rows and indicator columns from different constructs that are identical or nearly identical, and verification against the original questionnaires has not been completed. All HTMT values were 1.23–1.40 and structural VIFs 10.4–15.7. The estimates therefore illustrate why the present data cannot support confirmatory inference; no substantive conclusion is drawn from any coefficient, loading, R^2, or significance test.

Originality/Value – The contribution rests on three elements: a conceptual model with directional complementarity hypotheses for SIPD, a transparent data-audit procedure, and a measurement-development roadmap that re-specifies two constructs as reflective–formative higher-order constructs and sets out how they are to be validated in a confirmatory study.

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1. Introduction

Regional assets occupy a strategic position in local government because they provide the infrastructure and resources needed to run government functions and deliver public services. Managing them well therefore means preserving their value, confirming their existence and status, optimizing their use, and producing information that can be held to account. Tirayoh et al. (2021) emphasize that public-sector asset management is closely tied to a government's ability to provide quality services, and Ehalaiye et al. (2021) show that accounting information on public assets helps in understanding how governments invest in, use, and sustain those assets.

The effectiveness of asset management does not depend on accurate administrative recording alone. It is part of an organizational governance system shaped by information quality, institutional commitment, internal control, staff competence, and the application of governance principles. Dharma et al. (2023) find, for Indonesian local governments, that accounting information quality and governance are linked to the effectiveness of fixed asset management, while Faridah et al. (2023) show that optimizing government-owned assets is related to institutional factors such as governance, asset knowledge, internal control, and competence. Asset management is thus a multidimensional problem that connects public finance, governance, institutional capacity, and information quality.

Digital technology has further changed how public resources are managed. Digital transformation in government is more than moving administrative processes from paper to applications: it involves changes in work processes, organizational structures, culture, staff capabilities, and data use. Moser-Plautz and Schmidthuber (2023) show that digital transformation in public organizations affects organizational and innovation-culture aspects, whereas Irani et al. (2023) show that transformation can be held back by non-integrated systems, legacy-system complexity, and difficulties in aligning technology with work processes. Technology alone does not improve governance unless processes, institutions, and information quality adjust with it.

In Indonesian local governments, this transformation is embodied in the Regional Government Information System (Sistem Informasi Pemerintahan Daerah, SIPD), which supports the management of government and financial information and aims to connect information across organizational units. Empirical results on SIPD are mixed. Vitriana et al. (2022) find that SIPD implementation at the regional financial and asset agency in Pekanbaru was not yet optimal, even though the system offers wider coverage and cross-agency integration. Tumija et al. (2023) report that SIPD in Semarang faces limited training, system capability, and technical problems in accounting and reporting functions, and Teken and Romarina (2024) report similar constraints in Denpasar. By contrast, Paat and Saleh (2023) find that SIPD implementation significantly affects financial report quality in Cimahi. This variation suggests that the contribution of SIPD to governance quality cannot be read from the existence of the system alone and must be placed in its institutional and governance context.

The variation matters even more for asset management. Asset data come from processes that involve many units and stages, from needs planning, use, administration, maintenance, and security to valuation and reporting. Digitalizing them requires data quality, cross-unit coordination, accountability, staff ability, and process consistency, not only an application. Alam et al. (2026) show that strengthening local asset management needs an integrated policy ecosystem and identify policy gaps, institutional fragmentation, and weak coordination, while

Warsito (2025) notes that local governments still lack adequate instruments for evaluating how well asset management paradigms work. In Baubau City, Lawealai et al. (2021) studied capacity-building strategies for the regional financial, asset, and revenue management body, but did not test empirically how public finance, governance, asset management, and information systems jointly shape digital asset governance.

These observations point to three gaps. First, few studies integrate public finance, government governance, and asset management as determinants within a single model of digital asset governance. Second, SIPD research mostly evaluates implementation or direct effects, so its possible role in changing the strength of the relationships between governance foundations and digital asset governance remains untested. Third, prior work relies largely on case studies, whereas simultaneous tests of construct relationships are scarce. These gaps are a synthesis of the literature used here and are not a claim that no related study exists.

This study therefore develops a conceptual model of digital local government asset governance that integrates four dimensions (public finance, government governance, regional asset management, and SIPD utilization) and specifies SIPD utilization both as a direct determinant and as a moderator of the other three. Because the instrument had not been piloted beforehand, the empirical part of the study is a diagnostic pilot in one city government rather than a confirmatory test. The objectives are to (1) develop the model and its hypotheses from public value theory and technology–organization complementarity; (2) audit the pilot data set and show what the pilot instrument could and could not measure; and (3) set out a measurement-development roadmap and a research design for confirmatory testing. The pilot estimates serve only to illustrate why the current data set is unsuitable for confirmatory inference. They are not findings about digital asset governance. The contribution of the article therefore rests on the conceptual model, the data-audit procedure, and the lessons for redeveloping the instrument.

The theoretical argument of the study concerns how SIPD is positioned within the literature on public-sector digitalization. Much prior work treats information systems as an independent driver of public-sector outcomes, so that the presence or implementation quality of a system is modeled as a direct predictor of performance (e.g., Paat & Saleh, 2023; Tumija et al., 2023). We propose instead that digital value comes less from the technology itself than from its combination with financial discipline, institutional governance, and the quality of asset-management processes. In this view, SIPD utilization is a complementary and conditional capability. The argument follows the logic of technology–organization complementarity (Fan & Pan, 2023) and applies it to digital asset governance, an outcome that, among the studies reviewed here, has not been specified in this way. Stated in directional form, greater SIPD utilization should strengthen the contribution of each organizational foundation to digital asset governance, because sound foundations supply the system with processes and data that it can integrate and reuse (Section 2.4). The proposition is conceptual. The pilot data in Section 4 neither confirm nor reject it, because the constructs could not be separated empirically and the interaction tests are underpowered. A stricter weakest-link version, in which the weakest foundation caps digital governance quality, is a necessary-condition claim that an additive and interaction specification cannot test; it is left for future work (Section 7). If later confirmed, the proposition would add to public value theory an account of how organizational foundations turn digital systems into public value for local assets, and it would be in line with the view in digital-era governance (Dunleavy et al., 2006) that reintegrating fragmented information is an organizational achievement rather than a software feature.

The remainder of the paper is organized as follows. Section 2 reviews the literature, develops the hypotheses, and sets out the intended measurement architecture; Section 3 describes the pilot design and analysis; Section 4 reports the data audit, the measurement diagnostics, and the provisional estimates; Section 5 separates evidence-supported observations from provisional propositions for practice; Section 6 concludes; and Section 7 sets out the limitations and the design for confirmatory research.

2. Literature Review & Hypothesis Development

2.1. Public value theory as the overarching lens

The study draws on public value theory, which starts from Moore's (1995) argument that public organizations should be judged not only by administrative efficiency or financial results but also by their ability to use authority and resources to create value for society. In this view, government resources are not merely administrative inputs; they are instruments to be managed responsibly so that they yield benefits relevant to public needs. Dallagnol et al. (2023), in a systematic review, show that accountability can be seen as a governance practice that supports public value creation by strengthening legitimacy, while also being part of public value itself.

Public value theory is also relevant to digital transformation. Scupola and Mergel (2022) show that digital transformation in public administration can generate several forms of public value when digitalization is connected to changes in how governments work and serve citizens. For local assets, Tirayoh et al. (2021) stress the role of asset management in supporting public services, and Ehalaiye et al. (2021) stress the value of asset information for public decisions. Within this lens, good asset management means managing assets in an orderly, transparent, accountable, and efficient way and directing them toward public benefit; finance, institutional governance, asset management, and information systems become interrelated contributors to public value.

2.2. Supporting perspectives

Three perspectives support the model. Public governance explains how authority, decision-making, accountability, coordination, and relations with stakeholders are exercised, and it underpins the public finance and government governance constructs. Public asset management treats government assets as strategic resources managed across their life cycle (needs planning, administration, use, maintenance, security, valuation, reporting, and optimization) and underpins the asset management construct. Digital government stresses that transformation involves integrating technology with structures, work processes, people, and information. Digital-era governance (Dunleavy et al., 2006) frames digitalization as a response to the fragmentation produced by new public management, through the reintegration of functions, needs-based holism, and the digitization of administrative processes; applied to local assets, whose records are dispersed across units and applications, it implies that integration is an organizational achievement that systems enable but do not substitute for. Fan and Pan (2023) show that the interaction between information technology infrastructure and organizational resources matters for e-government performance. This technology–organization complementarity is the theoretical basis for testing SIPD not only as a direct predictor but also as a moderator: the effect of organizational capacity may differ with the level of SIPD utilization, and technology is not assumed to always strengthen relationships.

2.3. Constructs and research gap

SIPD utilization is treated as a digital enabler rather than as a technical evaluation of the application. It is represented by ease of use, data reliability, module integration, and decision support. The outcome construct, digital regional asset governance, is the governance condition that emerges when information, processes, accountability, and institutions for asset management are supported by a digital environment. It is represented by inter-agency asset data integration, digital accountability, asset benefits for public services, and institutional readiness. It is deliberately distinguished from regional asset management (the quality of the asset life-cycle process) and from SIPD utilization (the quality of use of the information system).

The three organizational foundations are defined as follows. Public finance (X1) is the quality of the budgeting and financial accountability arrangements through which government resources are planned, used, and accounted for, represented by realistic and accountable budget preparation, transparency, accountability for resource use, and asset control. Government governance (X2) is the set of institutional mechanisms through which authority, responsibility, and coordination are exercised, represented by policy openness, clarity of responsibility, stakeholder involvement, and inter-agency coordination. Regional asset management (X3) is the quality of the asset life-cycle process, represented by needs planning, recording and administration, maintenance and security, and valuation and reporting. Because the asset-control item (X1.4) and the budget-and-asset transparency item (X1.2) refer to assets from a financial-accountability standpoint, they sit closest to the boundary with X3 and are among the items most in need of re-specification (Section 7).

These boundaries require explicit justification because government governance, SIPD utilization, and digital regional asset governance can appear conceptually adjacent: all three touch on coordination and information flow across organizational units. The constructs are nonetheless kept analytically separate on theoretical grounds. Government governance (X2) describes institutional mechanisms (policy openness, clarity of responsibility, stakeholder involvement, inter-agency coordination) that exist independently of any particular information system and could, in principle, be practiced through paper-based procedures. SIPD utilization (Z) describes the quality of use of one specific digital tool (ease of use, data reliability, module integration, decision support). Digital regional asset governance (Y) describes an outcome condition, that is, the extent to which asset information and accountability are integrated and used in practice, regardless of which mechanism produced it. A government could score high on X2 but low on Y if coordination exists on paper but is not reflected in system-level data integration, or high on Z but low on Y if the system is used competently for functions unrelated to assets. Item wording was reviewed only internally, without a pilot test or expert judgment (Section 3.3), and a few items, notably X2.4 and Y.1, remain close in meaning. Section 4.2 shows that the intended separation was not achieved in the data. The conceptual boundaries are therefore retained as the basis for rewriting the items, but the present data provide no evidence that five distinct constructs were measured.

Compared with the studies reviewed above, this model addresses four gaps: an integration gap (finance, governance, asset management, and SIPD are rarely combined), a technology-role gap (SIPD is usually treated as an implementation object or direct predictor rather than a moderator), an outcome gap (studies use implementation success, financial report quality, or asset management effectiveness rather than a digital asset governance outcome), and a

contextual gap (the Baubau study by Lawealai et al. (2021) is strategy-oriented and does not test a structural model).

2.4. Hypothesis development

Public finance**.** Public finance provides the basis for using and accounting for government resources. Realistic budgeting helps governments determine resource needs rationally, and transparency and accountability improve traceability. Tran et al. (2021) show the importance of accountability mechanisms in public organizations, and Ehalaiye et al. (2021) show the value of public asset information for investment and financing decisions. Better public finance should therefore increase a government's capacity to produce accountable asset information that supports decisions. Hence:

H1: Public finance has a positive effect on digital regional asset governance.

Government governance. Digitalization does not remove the need for governance; integration raises the need for clear responsibilities, coordination, transparency, and accountability. Dallagnol et al. (2023) link accountability and governance to public value creation. Because assets and asset information are spread across many units, better governance should enable more integrated and accountable digital asset management. Hence:

H2: Government governance has a positive effect on digital regional asset governance.

Regional asset management. Technology processes information generated by organizational processes. The quality of digital asset data depends on orderly planning, recording, maintenance, security, valuation, and reporting. Dharma et al. (2023) link information quality to the effectiveness of local government asset management, Tirayoh et al. (2021) show the importance of orderly asset management, and Faridah et al. (2023) show the role of institutional factors. Hence:

H3: Regional asset management has a positive effect on digital regional asset governance.

SIPD utilization. Information systems can support the integration, storage, processing, and use of government information. Paat and Saleh (2023) find a significant effect of SIPD on financial report quality, and studies in Semarang and Denpasar show that implementation limits make the quality of use decisive for the benefits obtained. If SIPD is easy to use, provides reliable data, integrates information, and is used in decisions, it should contribute to digital asset governance. H4 is retained to represent the conventional assumption in the literature that system use is itself a driver of outcomes; testing it alongside the moderation hypotheses would allow the conditional-enabler proposition in Section 1 to be assessed in a confirmatory study rather than assumed. Hence:

H4: SIPD utilization has a positive effect on digital regional asset governance.

Moderating role of SIPD utilization. Technology–organization complementarity holds that an information system raises the return on organizational resources when those resources produce inputs the system can integrate and reuse (Fan & Pan, 2023). Applied to SIPD, the logic points in the same direction for each foundation. Where budgeting is realistic and accountable, the budget and realization data held in SIPD are consistent and traceable, so more intensive use of the system makes this financial information more available for decisions about assets. Where responsibilities are clear and coordination routines exist, a shared system gives those routines a common data infrastructure, and coordination is more readily turned into integrated asset information. Where assets are planned, recorded, valued, and reported in an orderly way, reliable SIPD use allows the records to be combined and reused across units; disorderly records gain little from digitalization, because their errors are simply carried into the system. Each foundation should therefore matter more for digital asset governance when

SIPD utilization is high, which implies a positive interaction. The direction was set on these theoretical grounds alone. The pilot estimates played no part in the choice, because the interaction terms are severely underpowered and affected by structural collinearity (Sections 3.2 and 4.3). Hence:

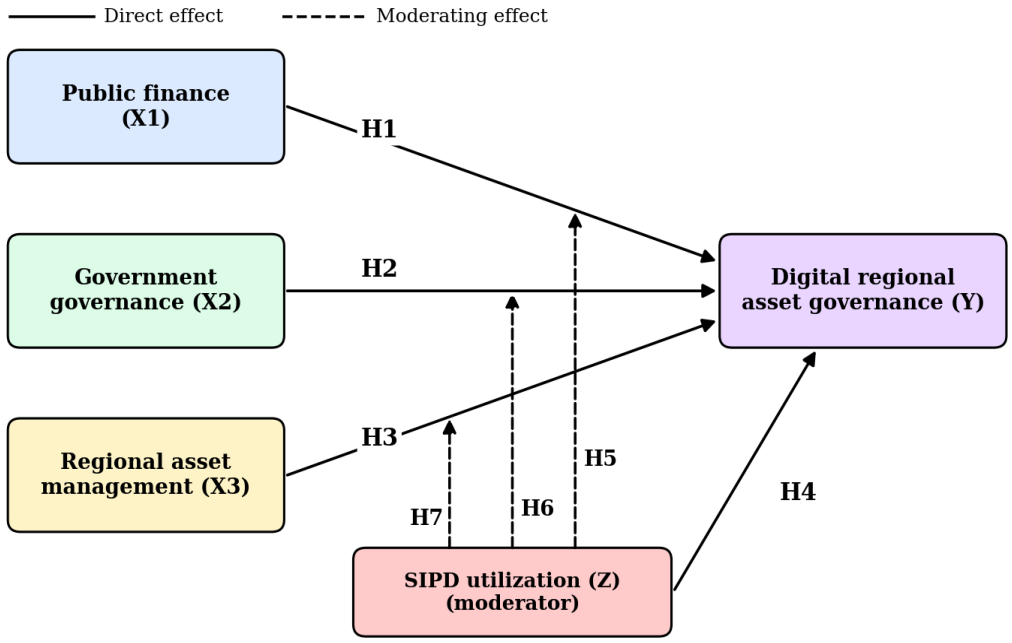
H5: SIPD utilization strengthens the positive relationship between public finance and digital regional asset governance.

H6: SIPD utilization strengthens the positive relationship between government governance and digital regional asset governance.

H7: SIPD utilization strengthens the positive relationship between regional asset management and digital regional asset governance.

The seven hypotheses define the confirmatory test that the model calls for. They are not tested in that sense here. The pilot data are used to examine whether the instrument can support such a test (Section 4), and the hypotheses are kept in their original form so that a later study can test them against a verified data set.

Figure 1. Conceptual framework and hypotheses



Source: Authors' development based on public value theory, 2026.

2.5. Proposed measurement architecture for confirmatory testing

All five constructs were modeled reflectively in the pilot, following common practice in survey-based PLS-SEM studies of public-sector governance. On reflection, this choice holds for only part of the model. A reflective specification assumes that indicators are interchangeable manifestations of one latent condition, so that dropping an item leaves the meaning of the construct unchanged and the items should move together (Jarvis et al., 2003; MacKenzie et al., 2011). Public finance and government governance come reasonably close to this assumption when their items are worded as expressions of a single quality, such as accountable financial practice or clarity of institutional responsibility. Regional asset management does not. Needs planning, recording, maintenance and security, and valuation and reporting are distinct stages of the asset life cycle, and an agency can record its assets well

while planning or valuing them poorly. Together these stages form asset-management capability; they do not simply reflect it.

The same reasoning applies to digital regional asset governance. Data integration, digital accountability, and service benefits are related but separable results, while institutional readiness (Y.4) is conceptually an input to digital governance rather than one of its outcomes; its comparatively low loading (0.606; Table 3) fits this reading. For the confirmatory study, regional asset management and digital regional asset governance are therefore re-specified as reflective–formative higher-order constructs. Each life-cycle stage or outcome dimension becomes a lower-order construct measured by at least three reflective items, and the dimensions jointly form the higher-order construct (Sarstedt et al., 2019). Institutional readiness is taken out of the outcome and treated as a separate antecedent or control variable. SIPD utilization remains a first-order construct, with items limited to the quality of system use. Public finance and government governance remain reflective, and the asset-control item (X1.4) is moved out of public finance to remove its overlap with asset management. This architecture was developed after the pilot results had been inspected. It is therefore a theory-informed redesign proposed for confirmatory testing, not a specification that the pilot has established, and it cannot be evaluated with the pilot measurement model, which has already failed discriminant validity. The estimates in Section 4 come from the original reflective model. Section 7 explains how the proposed constructs will be operationalized and assessed, and Table 8 summarizes the design.

3. Methodology

3.1. Research design and setting

The study is a cross-sectional, single-site pilot with a diagnostic purpose. The setting is the Baubau City Government, Southeast Sulawesi, Indonesia, and the unit of analysis is the government official involved in public financial management and/or regional asset management. The survey was originally planned as an explanatory test of the hypotheses in Section 2.4. After the data audit reported in Section 4.1, its role was redefined: the data are used to evaluate whether the instrument and the data-handling process can support a confirmatory test, not to estimate the hypothesized effects. The study does not evaluate the technical aspects of the SIPD application.

3.2. Sampling and respondents

The population comprises Baubau City Government officials connected with financial management, regional asset management, use of regional government information, and/or administrative processes related to asset management. Respondents were required to be officials of the Baubau City Government, to be involved in financial and/or asset management, and to have knowledge of the processes covered by the constructs. The data file contains 126 recorded responses. The sampling technique used during fieldwork is not documented in the project records, so no particular technique (purposive, probability, or census) is claimed. Because the technique is unknown and no respondent profile is available (Section 3.3), the representativeness of the respondents cannot be evaluated. This matters, because perceptions of finance, asset management, and SIPD may differ between functions such as asset custodians, treasurers, SIPD operators, and commitment officers. Statistical power is weaker than the nominal n suggests. Under the inverse square root method (Kock & Hadaya, 2018), at $\alpha = 0.05$ and 80% power, 126 independent cases would detect path coefficients of about 0.22 or larger ($2.486/\sqrt{126}$). Only 54 response patterns are unique, however (Section 4.1). If the

repeated rows are not independent cases, the information in the data set is closer to 54 observations, for which the minimum detectable coefficient is about 0.34. The position is worse for interaction effects, which in field research are typically very small (Aguinis et al., 2005), so a confirmatory test should be planned for f^2 of about 0.02 or less. Using the F test for an R^2 increase in multiple regression as an approximation ($\alpha = 0.05$, power = 0.80, seven predictors; Faul et al., 2009), detecting one interaction term requires about 395 independent cases at $f^2 = 0.02$ and about 787 at $f^2 = 0.01$, and the joint test of the three interaction terms requires about 550 cases at $f^2 = 0.02$. The pilot falls far short of these figures and cannot be used to judge whether SIPD conditions the relationships.

3.3. Data collection and measures

Primary data were collected with a structured paper questionnaire in which respondents rated statements on five-point Likert scales (1 = strongly disagree to 5 = strongly agree). Each construct was measured by four indicators (Table 1). Data collection was coordinated with the heads of the participating work units, and the questionnaires were distributed by students. The questionnaire opened with a statement of the purpose of the study and an assurance that answers would be kept confidential and used only for academic purposes, and it contained a short identity section (name, sex, age, role in SIPD-related work, tenure, and agency). These identity fields were not transferred to the analysis file, so a respondent profile by role, tenure, agency, or SIPD involvement cannot be reported; it can be added only if the original questionnaires are recovered and re-entered. For context, a five-question interview guide was prepared for key informants, namely the head or secretary of the regional financial and asset agency (BKAD) and the SIPD coordinator or administrator. It asked about SIPD use in asset management, inter-agency integration of asset data, accountability and reporting after SIPD adoption, factors that determine success, and policy needs. The notes taken during these conversations, however, do not identify which informant gave which answer, and they were not coded. They are therefore used only as background on the institutional setting and not as evidence for, or triangulation of, any statistical result. Ethics information is reported in the Ethics statement at the end of the article.

The questionnaire was developed in three stages. First, items were drafted directly from the theoretical definition of each construct (Section 2) and informed by indicators used in related studies, including asset-management items adapted from Tirayoh et al. (2021) and Dharma et al. (2023), and governance and accountability items informed by Dallagnol et al. (2023). Second, item wording was reviewed internally by the research team for clarity, redundancy, and fit with the terminology used in Baubau City government practice. Third, the instrument was administered to respondents as part of the regular data collection process; a separate pilot test and external expert review were not conducted before full administration, which is acknowledged as a limitation in Section 7 and is the reason this study treats its indicators as an initial rather than a finalized instrument.

Table 1. Operationalization of constructs

Construct	Indicators (code)
Public finance (X1)	X1.1 Realistic and accountable budget preparation; X1.2 Transparency of budget and asset realization; X1.3 Accountability for the use of resources; X1.4 Asset control
Government governance (X2)	X2.1 Policy openness; X2.2 Clarity of responsibility; X2.3 Stakeholder involvement; X2.4 Inter-agency (OPD) coordination

Construct	Indicators (code)
Regional asset management (X3)	X3.1 Needs planning; X3.2 Recording and administration; X3.3 Maintenance and security; X3.4 Valuation and reporting
SIPD utilization (Z)	Z.1 Ease of use; Z.2 Data reliability; Z.3 Module integration; Z.4 Decision support
Digital regional asset governance (Y)	Y.1 Inter-agency asset data integration; Y.2 Digital accountability; Y.3 Asset benefits for public services; Y.4 Institutional readiness

Source: Authors' instrument, 2026.

3.4. Measurement quality and methodological considerations

Two design features were intended to support measurement quality: respondents were restricted to officials with a functional connection to financial or asset management, and items referred to concrete practices, such as budget realization or asset recording, rather than to general attitudes. Neither feature removes the main threat. All constructs were rated by the same officials, in one questionnaire, at one point in time, and respondents were in effect asked to evaluate several closely related aspects of their own organization. This design invites common method variance, consistency motifs, and a socially desirable tendency to report that one's own agency performs well (Podsakoff et al., 2003). Two post hoc diagnostics point the same way. In an unrotated principal component analysis of the 20 items, the first component accounts for 51.3% of the total variance, above the 50% level usually treated as a warning sign in Harman's single-factor test. Full collinearity VIFs computed from unit-weighted construct scores range from 7.8 to 21.8, far above the 3.3 threshold proposed by Kock (2015). Neither test can separate method variance from genuine construct overlap or from the data problems described in Section 4.1, and post hoc tests on a single-source survey are weak evidence in any case (Podsakoff et al., 2003). The more important consequence concerns design: the confirmatory study needs predictor and outcome measures from different sources or at different times (Section 7). Representativeness is also limited, because the sampling technique was not documented and the data come from one city government.

3.5. Data analysis

The data are analyzed with partial least squares structural equation modeling (PLS-SEM; Hair et al., 2022) in SmartPLS 4 (Ringle et al., 2024). PLS-SEM suits the study because the model contains several latent constructs with indicators, direct paths, and simultaneous interaction effects. Following the reporting guidance of Ringle et al. (2023), the measurement and structural models are evaluated separately. The measurement model is assessed with outer loadings (0.70 or above preferred, but low-loading indicators are not deleted automatically), Cronbach's alpha, rho_A, and composite reliability (rho_C), average variance extracted (AVE ≥ 0.50), and the heterotrait–monotrait ratio (HTMT; values below 0.90 support discriminant validity). The structural model is assessed with variance inflation factors (VIF), R^2, effect size (f^2), and path coefficients. Hypotheses are tested by bootstrapping with 5,000 subsamples, two-tailed, at the 5% level. The structural model with three interaction terms is:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 Z + \beta_5 (X_1 \times Z) + \beta_6 (X_2 \times Z) + \beta_7 (X_3 \times Z) + \varepsilon \quad (1)$$

where Y is digital regional asset governance, X1 is public finance, X2 is government governance, X3 is regional asset management, and Z is SIPD utilization. Under H5–H7, a positive and significant interaction coefficient would indicate that higher SIPD utilization strengthens the relationship. In view of the audit results, the outputs from the pilot are

reported only to illustrate the measurement and structural conditions in the data. They are not used to accept or reject hypotheses, to rank predictors, or to support policy priorities.

4. Result and Discussion

4.1. Data audit

The data file contains 126 rows and 20 indicators, with values from 2 to 5 and no missing data. It is identical to the indicator matrix used as SmartPLS input. Because several patterns looked implausible, the matrix was audited row by row; Table 2 lists each check, what it found, and what was done. Three findings stand out. First, the duplicated respondent numbers are a numbering error rather than repeated respondents. Every number ending in 3 had been entered as the next number ending in 4 (3 as 4, 13 as 14, and so on), and numbers 30–39 had been entered as 40–49. Rows that share a number contain different answers, so the rows were re-indexed 1–126 without changing any value. Second, the repetition of response patterns is not explained by uniform answering alone. Of the 72 rows that repeat an earlier row, 26 are uniform strings (all 4s or all 5s), but 46 are non-uniform strings that recur two to fifteen times. Third, indicator columns of different constructs are identical or almost identical, and the overlap follows a regular offset across the item order; X1.1 matches Z.4 in 99.2% of rows, for example, and X1.2 matches Y.1 in 99.2%. A pattern of this kind is hard to reconcile with independent answers to differently worded items, and errors made while transcribing or arranging the responses in the spreadsheet cannot be ruled out.

Table 2. Data audit trail

Check	Finding	Action and status
Correspondence with SmartPLS input	Data file and SmartPLS indicator matrix are identical (126 × 20)	Confirmed; one source file retained with a change log
Range and missing values	Values 2–5; no missing data	No action needed
Respondent numbering	22 numbers absent and 20 recorded more than once (numbers ending in 3 entered as ending in 4; 30–39 entered as 40–49); rows sharing a number differ	Re-indexed 1–126; no response value changed
Complete duplicate rows	54 unique patterns; 72 rows repeat an earlier row (26 uniform, 46 non-uniform)	Not deleted; flagged for verification against questionnaires
Uniform responding	28 rows without variation (15 all 5s, 13 all 4s)	Flagged; retained pending verification
Identical items across constructs	X1.4 = X3.1, X2.1 = X3.2, and X2.3 = X3.4 in all rows; 27 further cross-construct pairs match in 96.8–99.2% of rows	Treated as a probable data-handling error; to be checked against source records
Earlier descriptive statistics	Item means of 8.33–8.63 reported earlier cannot be reproduced	Withdrawn; recomputed from the source file
Verification against original questionnaires	Not yet completed at the time of revision	Matrix treated as unverified; verification or new data collection precedes any confirmatory analysis

Source: Authors' audit of the research data file, 2026.

These findings mean that the independence of observations and the authenticity of several indicator columns cannot be assumed. Sensitivity analyses that removed complete duplicates or uniform rows did not resolve the problem: correlations among construct scores stayed between 0.81 and 0.93. Case deletion is therefore not a legitimate remedy, and the present matrix is not treated as empirical evidence for the hypotheses. Row-by-row verification against the original questionnaires had not been completed at the time of this revision, so the matrix is treated as unverified. Until every row is matched to its source record, or new data are collected, the response matrix remains unverified. The loadings, reliability figures, coefficients, R^2, and significance tests reported in Sections 4.2 and 4.3 are therefore illustrations of why the present data set is unsuitable for confirmatory inference. They are not empirical findings about digital asset governance, and no substantive inference is drawn from them. Descriptive statistics recomputed from the source file give item means between 4.21 and 4.37 (SD 0.49–0.75) and construct means between 4.30 and 4.31 (SD 0.43–0.47). The narrow spread of means near the top of the scale is itself consistent with the general favorable-evaluation tendency discussed in Section 3.4.

4.2. Measurement model

Twelve of the 20 indicators have outer loadings of at least 0.70, and eight fall below (Table 3). The eight are not deleted, because composite reliability and AVE are adequate and each indicator remains conceptually relevant; deleting items would in any case not address the problems described in Section 4.1. Within public finance, transparency (X1.2) and accountability (X1.3) load highest; within government governance, inter-agency coordination (X2.4) and stakeholder involvement (X2.3); within asset management, needs planning (X3.1) and valuation and reporting (X3.4); within SIPD utilization, ease of use (Z.1) and data reliability (Z.2); and within digital asset governance, data integration (Y.1) and digital accountability (Y.2). The relatively low loading of institutional readiness (Y.4 = 0.606) suggests that readiness behaves partly as an antecedent rather than an outcome, as discussed in Section 2.5.

Table 3. Outer loadings

Construct	Indicator 1	Indicator 2	Indicator 3	Indicator 4
Public finance	X1.1 = 0.649	X1.2 = 0.848	X1.3 = 0.833	X1.4 = 0.709
Government governance	X2.1 = 0.583	X2.2 = 0.662	X2.3 = 0.831	X2.4 = 0.867
Regional asset management	X3.1 = 0.782	X3.2 = 0.636	X3.3 = 0.624	X3.4 = 0.792
SIPD utilization	Z.1 = 0.786	Z.2 = 0.733	Z.3 = 0.688	Z.4 = 0.662
Digital asset governance	Y.1 = 0.817	Y.2 = 0.796	Y.3 = 0.718	Y.4 = 0.606

Source: SmartPLS 4 output, 2026.

Reliability and convergent validity meet conventional thresholds (Table 4). Composite reliability (rho_C) ranges from 0.803 to 0.847 and all AVE values exceed 0.50. Cronbach's alpha for SIPD utilization (0.690) and asset management (0.675) is slightly below 0.70, and rho_A is 0.700–0.706 for these constructs. AVE for SIPD utilization (0.517) and asset management (0.508) is close to the threshold. These results show only that the items within each block move together; they say nothing about whether the blocks differ from one another.

Table 4. Construct reliability and validity

Construct	Cronbach's α	rho_A	rho_C	AVE
Public finance	0.761	0.786	0.847	0.584
Government governance	0.724	0.759	0.829	0.555
Regional asset management	0.675	0.700	0.803	0.508
SIPD utilization	0.690	0.706	0.810	0.517
Digital asset governance	0.719	0.738	0.826	0.546

Source: SmartPLS 4 output, 2026.

Discriminant validity fails completely (Table 5). All ten HTMT values lie between 1.230 and 1.397, above the 0.90 criterion and also above 1.00 (Henseler et al., 2015). An HTMT above 1 means that, on average, items of different constructs correlate more strongly with one another than items of the same construct do. The highest value is between asset management and SIPD utilization (1.397), which are meant to capture the quality of the asset life cycle and the quality of system use. Given the identical columns in Table 2 and the single-factor result in Section 3.4, the most plausible reading is that the instrument captured one general perception of organizational quality rather than five distinct conditions. The five constructs therefore cannot be treated as empirically distinct in these data.

Table 5. Heterotrait–monotrait ratio (HTMT)

Construct	PF	GG	AM	SU
Government governance (GG)	1.254			
Regional asset management (AM)	1.294	1.320		
SIPD utilization (SU)	1.267	1.320	1.397	
Digital asset governance	1.230	1.265	1.349	1.311

Notes: PF = public finance. All values exceed the 0.90 criterion.
Source: SmartPLS 4 output, 2026.

4.3. Structural estimates as diagnostic illustrations

Structural collinearity is severe (Table 6). Every inner VIF exceeds 10 (10.380–15.679), with the highest values for the interaction terms. At this level the model cannot separate the unique contributions of public finance, government governance, asset management, and SIPD utilization, and whether a particular coefficient reaches significance may reflect shared variance rather than any substantive difference between predictors. The R^2 of digital asset governance is 0.947 (adjusted $R^2 = 0.944$). Read together with HTMT above 1 and VIF above 10, this value is better explained by constructs that measure overlapping perceptions of general organizational quality than by a strong explanatory model. The f^2 values in Table 6 are reported for completeness and are not used to compare predictors.

Table 6. Inner VIF and effect size (f^2)

Predictor of Y	VIF	f^2
Public finance	11.856	0.142
Government governance	10.380	0.042
Regional asset management	11.815	0.275
SIPD utilization	11.201	0.024
SIPD × Public finance	15.679	0.002

Predictor of Y	VIF	f^2
SIPD × Government governance	13.019	0.002
SIPD × Regional asset management	12.572	0.000

Source: SmartPLS 4 output, 2026.

Table 7 and Figure 2 report the bootstrapped estimates. In the pilot data, the paths from public finance and regional asset management have p-values below 0.05, the paths from government governance and SIPD utilization do not, and none of the interaction terms comes close to significance. For the reasons given in Sections 4.1 to 4.3, these results are not treated as hypothesis decisions. The last column of Table 7 describes the provisional statistical pattern only, and none of the seven hypotheses is regarded as supported or rejected by this study.

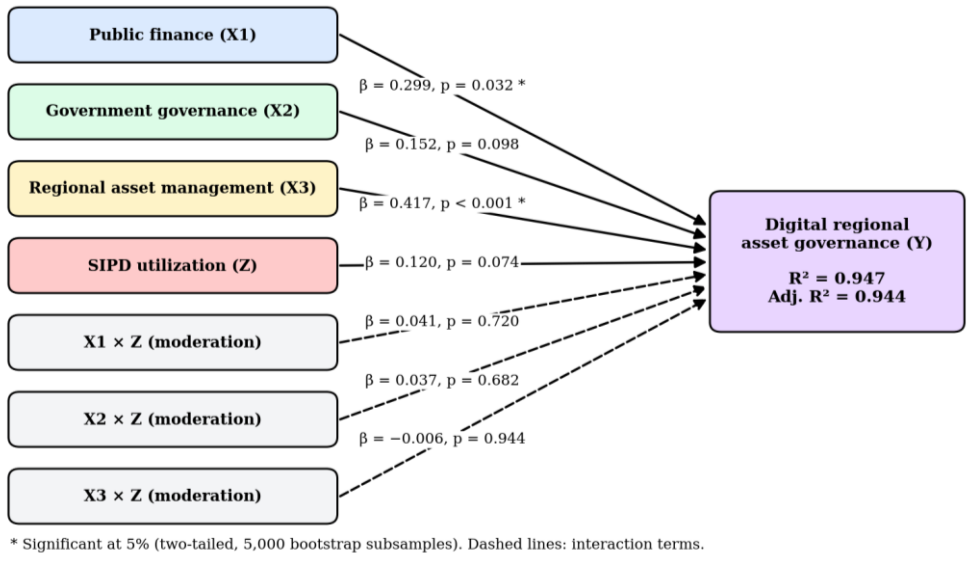
Table 7. Provisional bootstrapping results (diagnostic, not hypothesis tests)

Hyp.	Path	β	t	p-value	Provisional pattern
H1	Public finance → Y	0.299	2.144	0.032	p < 0.05; not interpretable
H2	Government governance → Y	0.152	1.655	0.098	n.s.; inconclusive
H3	Asset management → Y	0.417	4.508	<0.001	p < 0.05; not interpretable
H4	SIPD utilization → Y	0.120	1.785	0.074	n.s.; inconclusive
H5	SIPD × Public finance → Y	0.041	0.358	0.720	n.s.; underpowered
H6	SIPD × Government governance → Y	0.037	0.410	0.682	n.s.; underpowered
H7	SIPD × Asset management → Y	−0.006	0.071	0.944	n.s.; underpowered

Notes: Y = digital regional asset governance; two-tailed, 5,000 subsamples. Because of the data conditions in Section 4.1, the estimates are diagnostic and are not used to accept or reject hypotheses.

Source: SmartPLS 4 output, 2026.

Figure 2. Provisional estimates of the structural model (diagnostic)



Source: Authors' SmartPLS 4 results, 2026.

The estimates in Table 7 are not discussed as findings. Section 4.4 explains why none of the direct paths can be interpreted, and Section 4.5 does the same for the interaction terms.

4.4. Why the direct paths cannot be interpreted

Two direct paths (public finance and regional asset management) have p-values below 0.05, and two (government governance and SIPD utilization) do not. None of these differences can be interpreted. Every predictor has an inner VIF above 10 and an HTMT above 1 with every other construct, and three asset-management indicators are identical to indicators of public finance and government governance in all rows (Table 2). Under these conditions the model cannot attribute variance uniquely to any foundation. A significant path may only reflect where shared variance happened to be allocated, and a non-significant path may hide a real effect. The paths for government governance (0.152) and SIPD utilization (0.120) are, in addition, below the minimum detectable size even if all 126 rows were independent (Section 3.2). The literature reviewed in Section 2 gives reasons to expect each foundation to matter, but the pilot adds no evidence for or against any of them. The interpretation in the earlier version of the manuscript, in which asset management was described as the most influential foundation, has been withdrawn.

Informants described SIPD as being used mainly for reporting and not yet for asset administration, which still relied on spreadsheets and the SIMDA BMD application. This is background on the setting. It is reported because it bears on how SIPD utilization should be measured in the confirmatory study, not as evidence about any path.

4.5. Interaction terms

None of the interaction terms is significant, and their coefficients are close to zero ($\beta = 0.041$, 0.037, and −0.006; $f^2 = 0.000$–0.002). These values carry no information about H5–H7. Interaction effects in field data are usually small, the pilot would need several hundred independent cases to detect them (Section 3.2), and the interaction VIFs (12.572–15.679) are the highest in the model. The directional hypotheses on SIPD as a conditional enabler therefore remain untested, and the pilot is not used to refine or challenge technology–organization complementarity (Fan & Pan, 2023).

Several alternative roles for SIPD are theoretically plausible and can be specified before new data are collected: SIPD as an antecedent of information quality, as a mediator that carries governance effects to digital outcomes, as a component of a higher-order digital capability together with organizational resources, or as an enabler whose effect differs across agencies. A necessary-condition analysis would be the appropriate test of the weakest-link version of the proposition. None of these should be estimated before discriminant validity has been established with a re-specified instrument.

5. Practical and Policy Implications

Because the data set has not been verified, the implications are divided into two groups. The first contains observations that do not depend on the coefficient estimates. The second contains managerial propositions that follow from the conceptual model and the institutional setting but have not been tested. Neither group draws on the relative size of coefficients, and nothing in this section should be read as a statistically based priority for public finance, asset management, or any other foundation.

Evidence-supported observations. The strongest practical lesson of the study is methodological and organizational. The pilot showed that a single-source perception survey of officials did not distinguish financial, governance, asset-management, and system-use

conditions, and that a response file can carry duplicated records and duplicated columns unnoticed until the analysis stage. Agencies and researchers who use survey scores to evaluate digital governance should therefore verify the underlying records against their sources, keep an audit trail of every correction, and define construct boundaries clearly enough that different questions measure different things, before such scores are used to set priorities. The same logic applies to the asset data themselves. According to the informants, asset administration in Baubau City still ran on spreadsheets and SIMDA BMD at the time of the study, with a move to e-BMD planned. Any migration of records between systems is a point at which existing inconsistencies can be carried over, so verifying asset records before migration is a prudent step regardless of the survey results.

Provisional managerial propositions. The conceptual model suggests several propositions that local governments may consider but that this study has not tested. First, if SIPD is a conditional enabler, adding system modules may achieve little for asset governance unless budgeting, accountability, and asset-recording practices are already orderly, so the sequencing of digitalization deserves examination. Second, a reconciliation protocol between existing asset records and SIPD or e-BMD, involving the regional financial and asset agency, the units that hold the assets, and internal oversight, would give coordination a concrete and auditable form. Third, assigning explicit data ownership and validation responsibility for changes to asset data may help translate governance principles into practice. Fourth, SIPD performance might be judged by interoperability, reconciliation results, and the use of information in decisions rather than by account activity or reporting completion. These propositions are offered for discussion and for testing in the confirmatory study, not as recommendations derived from the pilot estimates.

6. Conclusion and Suggestion

This study proposed a public value-based model of digital local government asset governance and used a pilot survey in Baubau City to assess whether the model could be tested with the instrument developed for it. The pilot answers that question in the negative. Reliability and convergent validity met conventional thresholds (rho_C 0.803–0.847; AVE 0.508–0.584), but discriminant validity failed for every pair of constructs (HTMT 1.230–1.397), structural collinearity was severe (VIF 10.380–15.679), and the data file contained repeated response patterns and indicator columns that were identical across constructs. Under these conditions the provisional path estimates, including the R^2 of 0.947, cannot be interpreted as support for or against any of the seven hypotheses.

The contribution of the study therefore rests on three elements. The first is conceptual: a model in which SIPD functions as a conditional enabler, with directional hypotheses stating that greater SIPD utilization strengthens the contribution of financial, governance, and asset-management foundations to digital asset governance. These hypotheses are grounded in public value theory and technology–organization complementarity and remain untested. The second is the data-audit procedure, which shows how duplicated records, duplicated columns, and numbering errors can be detected and documented before any estimation. The third is a set of lessons for redeveloping the instrument: the reflective specification of heterogeneous constructs, items whose meanings overlap across constructs, reliance on a single source, and the absence of an audit trail all contributed to the failure of the pilot. Section 7 turns these lessons into a measurement-development roadmap.

The immediate priority is to verify every row of the data file against the original questionnaires and to document each correction or, if verification is not possible, to collect new data with the re-specified instrument. The model should be re-estimated only after the audit shows that the observations are independent and the measurement model shows acceptable discriminant validity.

7. Limitations and Future Research

The study has limitations in four areas. On data integrity, the response file contains repeated response patterns and indicator columns that are identical across constructs, so the independence of observations and the authenticity of columns are unverified. On measurement, the instrument was not piloted or reviewed by external experts before administration, all constructs were modeled reflectively although two of them are better treated as formative higher-order constructs, and discriminant validity failed. On design, all measures came from the same respondents at one time, which leaves common method variance and socially desirable responding as plausible explanations for the high construct correlations, and the sampling technique was not documented. On scope, the study covers one city government, the interview material is incomplete and unattributed, and statistical power is far below what the small interaction effects implied by the moderation hypotheses require. Any statement about the size or ranking of effects in this model must wait for a verified data set.

The confirmatory study is planned around these limitations (Table 8). First, the data file will be rebuilt from source records, each row will carry a verifiable identifier, and every correction will be logged. Second, the instrument will be redeveloped. Items will be rewritten to remove overlapping meanings, particularly between financial accountability and asset management, between inter-agency coordination and digital integration, and between SIPD utilization and digital governance outcomes; the item pool will be reviewed by external experts in public financial and asset management; cognitive interviews with a small group of officials will check how the items are understood (Willis, 2005); and a pilot test will precede full administration (MacKenzie et al., 2011). Third, data sources will be separated. SIPD utilization can be measured among system users or, where available, from system logs; asset-management quality can be supported by administrative records such as asset registers and reconciliation reports; and digital-governance outcomes can be assessed through audit, reconciliation, integration, or reporting indicators rather than self-report alone. Where survey measures remain necessary, predictors and outcomes will be collected at different times, with procedural remedies such as anonymity assurances and separated item blocks (Podsakoff et al., 2003). Fourth, the sample will be sized for small interaction effects, which will require several local governments in Southeast Sulawesi and possibly elsewhere in Eastern Indonesia rather than a single city. Fifth, the qualitative component will follow a semi-structured protocol with a transparent informant profile, a coding procedure, and comparison with official documents, so that it can serve as triangulation rather than background. Finally, theory-based alternative specifications, including SIPD as an antecedent or mediator and a necessary-condition analysis of the weakest-link proposition, will be tested only after the measurement model has been shown to be adequate.

Measurement-development roadmap. The architecture in Section 2.5 is a proposal, and the confirmatory study treats it as one. It will be developed in four steps. The first is operationalization. Each lower-order dimension will be defined in one sentence and measured

by at least three reflective items written for that dimension alone. For regional asset management the dimensions are needs planning, recording and administration, maintenance and security, and valuation and reporting; for digital regional asset governance they are inter-agency data integration, digital accountability, and service benefits. Items will be drafted from the regulations governing regional property management and from prior instruments, and any item that refers to another dimension or construct will be discarded at this stage. Each higher-order construct will also receive one global item that describes the construct as a whole, for use in the redundancy analysis.

The second step concerns content validity. A panel of experts in public financial and asset management will rate whether each item is essential to its dimension, and items will be retained according to Lawshe's (1975) content validity ratio before the cognitive interviews and the pilot test described above. The third step assesses the lower-order constructs. As reflective measures, they will be evaluated through outer loadings, composite reliability, AVE, and HTMT, and every pair of dimensions must show acceptable discriminant validity (Henseler et al., 2015) before any higher-order construct is formed.

The fourth step assesses the formative higher-order constructs, which will be estimated with the two-stage approach (Sarstedt et al., 2019). Convergent validity will be examined through redundancy analysis, in which each higher-order construct is related to its global item and a path of about 0.70 or more is taken as adequate (Cheah et al., 2018). Collinearity among the dimensions will be checked with VIF values, where values below 3 are preferred and values above 5 indicate a critical problem. The outer weights will be tested for significance and relevance; a dimension with a non-significant weight will be kept if its outer loading is at least 0.50 or if removing it would narrow the content of the construct (Hair et al., 2022). Finally, content coverage will be checked against the dimension definitions, so that no dimension is dropped for statistical reasons alone. The structural hypotheses H1–H7 will be tested only after both higher-order constructs pass these checks.

Table 8. Pilot specification and planned confirmatory design

Element	Pilot (this study)	Confirmatory design
Study status	Diagnostic pilot	Confirmatory test of H1–H7, with H5–H7 stated directionally
Public finance	Reflective; four items including asset control (X1.4)	Reflective; X1.4 moved to asset management; items reworded to avoid asset content
Government governance	Reflective; four items	Reflective; coordination item reworded to describe institutional practice rather than data integration
Regional asset management	Reflective; four items	Reflective–formative higher-order construct; four life-cycle dimensions with at least three reflective items each; assessed by redundancy analysis, outer weights, and VIF
SIPD utilization	Reflective; four self-report items	Reflective first-order construct on quality of use; user-level or system-log data where available

Element	Pilot (this study)	Confirmatory design
Digital asset governance	Reflective; four items including institutional readiness	Reflective–formative higher-order construct (integration, digital accountability, service benefits); readiness modeled as antecedent or control; assessed by redundancy analysis, outer weights, and VIF
Data sources	One source, one point in time	Officials, system users, and administrative records; temporal separation of predictors and outcomes
Instrument development	Internal review only	Expert review, cognitive interviews, and pilot test
Sample	126 rows (54 unique patterns); one city	At least 395 independent cases (f^2 = 0.02, power 0.80); several local governments
Data audit	Post hoc	Source verification and correction log before analysis
Qualitative component	Unattributed notes; background only	Semi-structured protocol, informant profile, coding, and document triangulation

Source: Authors' design, 2026.

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Ethics statement

The pilot was carried out under the internal research scheme of Politeknik Baubau (Penelitian Unggulan Mikro, 2026), and the research report was approved by the institution's Centre for Research and Community Service (PPPM). The Director of Politeknik Baubau applied for a research permit on 30 June 2026 (letter No. 7212/PL.B/D.A3/PM/VI/2026). Following a recommendation from the Baubau City Agency for National and Political Unity (Badan Kesatuan Bangsa dan Politik, No. 070/986, 27 July 2026), the Baubau City Investment and One-Stop Integrated Service Agency (DPMPTSP) issued a research permit (No. 500.16.7.4/2325/DPMPTSP, 27 July 2026). The permit was addressed to the heads of the city's regional government agencies, named the Director of Politeknik Baubau as the responsible party, and covered the research period from 1 July to 30 October 2026. The questionnaires were administered after the permit had been issued, within this authorized period. Data collection was coordinated directly with the heads of the participating work units of the Baubau City Government. The paper questionnaire opened with a statement of the purpose of the study and an assurance that answers would be kept confidential and used only for academic purposes, and completing it was treated as consent. The project records contain no ethics committee decision (either approval or exemption) and no signed consent forms; neither is therefore claimed for the pilot. Identity fields on the form were not entered into the analysis file, no individual or work unit is identified in this article, and results are reported only in

aggregate. Copies of the permit application and the research permit are available from the authors, together with any further institutional documentation the editor requires. For the confirmatory study, the protocol will be submitted for ethics review, a research permit will be obtained from each participating local government, and a written informed-consent statement will open the questionnaire.

Data availability statement

The anonymized pilot response file, the audit log describing each check and correction, and the SmartPLS output are available from the corresponding author on reasonable request. Because the pilot data have not been verified against the original questionnaires, they should not be reused as evidence for the hypotheses.

Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used **Claude (Anthropic)** to translate the research report into English, restructure it into the journal manuscript template, and assist in drafting the revisions requested by the reviewers, including the data-audit computations reported in Section 4.1. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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