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EXPLORING THE DETERMINANTS OF FRAUD PREVENTION IN VILLAGE FUND MANAGEMENT: EVIDENCE FROM REGENCIES AND CITIES IN NORTH SUMATRA PROVINCE, INDONESIA

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Abstract
This study examines the determinants of fraud prevention in village fund management across regencies and cities in North Sumatra Province, Indonesia. Fraud in local public finance management continues to threaten the effectiveness, accountability, and sustainability of rural development. Grounded in agency theory and the fraud triangle framework, this research analyzes how institutional integrity, internal control systems, accountability mechanisms, and community participation contribute to reducing the likelihood of fraudulent practices. Using data collected through surveys from village officials and community representatives, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS to test the measurement and structural models. The outer model results confirm that all indicators exhibit strong convergent and discriminant validity, with loading factors exceeding 0.70, Average Variance Extracted (AVE) values above 0.50, and reliability coefficients greater than 0.70. The inner model analysis reveals that institutional integrity and internal control systems have a significant and positive effect on fraud prevention, while accountability and community participation serve as complementary mechanisms that enhance transparency and social control. The findings underscore that fraud prevention in village fund management requires not only formal control mechanisms but also cultural and participatory approaches that strengthen ethical behavior and local governance. This study contributes to the growing body of literature on public sector accountability and rural financial governance by providing empirical evidence from Indonesia, where village funds constitute a major component of decentralization policy. The findings offer practical insights for policymakers in improving the design of internal controls, ethics-based training, and community-based monitoring systems to foster a culture of integrity in public resource management.

Keywords: Fraud prevention; Village fund management; Internal control; Accountability; Institutional integrity; Community participation; PLS-SEM; Indonesia

1. Introduction

Fraud and misuse of public resources remain pressing challenges in decentralized governance systems. In Indonesia, village funds (*dana desa*) have been a cornerstone of rural development policy since the enactment of Law No. 6 of 2014 concerning Villages, which mandates village governments to manage financial resources to support community development, public services, and rural empowerment (Putra, Sani, Putra, & Utami, 2024). However, as the volume of village funds has increased substantially in recent years, cases of mismanagement, corruption, and misuse of these funds have also become more frequent, undermining public trust and hampering development outcomes (Wahyudi et al., 2024; Asia Pacific Fraud Journal, 2023).

The complexity of managing village funds creates significant governance risks, especially when institutional oversight, capacity, and ethical standards at the village level are weak. In several reported cases, fraudulent activities have taken the form of inflated project budgets, fictitious procurement, embezzlement, and manipulation of administrative reports (Muslim, Taufik, & Azlina, 2025). These irregularities are often

facilitated by limited internal control mechanisms, inadequate supervision, and a lack of awareness or moral integrity among local officials. Therefore, strengthening fraud prevention in village fund management is crucial not only for ensuring fiscal accountability but also for sustaining rural development outcomes.

Prior studies have emphasized various determinants that influence the effectiveness of fraud prevention. Competence of village apparatus, for instance, ensures that financial management practices comply with legal and procedural standards (Hendrawati, Pramudianti, & Abidin, 2023). Internal control systems provide a structured mechanism for detecting and preventing irregularities before they escalate into fraud (Wijayanti, Herawansyah, Putra, & Utomo, 2024). Ethical behavior and morality, both at the individual and organizational level, are also vital; moral reasoning affects how individuals respond to ethical dilemmas, while organizational culture shapes shared norms and expectations (Muslim et al., 2025). In addition, transparency, whistleblowing systems, and community participation create external accountability pressures that further reduce opportunities for fraud (Asia Pacific Fraud Journal, 2023).

However, despite extensive studies in other provinces, limited research has explored how these determinants interact in the specific context of North Sumatra Province, where administrative diversity and socio-cultural factors may significantly influence fraud prevention mechanisms. North Sumatra comprises a mixture of urban municipalities and rural regencies with differing institutional capacities, leadership styles, and community engagement levels. Therefore, a comparative assessment across regencies and cities can reveal contextual variations and identify which governance mechanisms are most effective in reducing fraud risks in village fund management.

This study is conceptually grounded in the Fraud Triangle Theory (FTT) and the Theory of Planned Behavior (TPB). The Fraud Triangle Theory, originally proposed by Cressey (1953), posits that fraud occurs due to the convergence of three key factors: pressure, opportunity, and rationalization. In the context of village fund management, pressure may stem from personal or political demands, opportunity arises from weak internal controls and poor supervision, while rationalization reflects the moral justifications used by perpetrators to legitimize their actions. Consequently, measures such as strengthening internal control systems, promoting ethical culture, and fostering transparency serve to reduce opportunities and rationalization for fraudulent behavior.

Complementing this, the Theory of Planned Behavior (Ajzen, 1991) suggests that an individual's intention to perform ethical or unethical actions is shaped by attitude toward the behavior, subjective norms, and perceived behavioral control. When village officials perceive strong ethical expectations, receive adequate training, and operate in transparent systems, their intention to engage in fraud decreases. Therefore, variables such as apparatus competence, morality, whistleblowing systems, and leadership commitment are hypothesized to influence the behavioral intentions that underlie fraud prevention.

Integrating FTT and TPB provides a more holistic understanding of fraud prevention: while FTT explains structural conditions that enable or constrain fraudulent acts, TPB explains the psychological and behavioral dimensions that influence decision-making. This dual-theoretical lens helps capture both institutional and individual determinants of fraud prevention in village fund management.

Accordingly, this study investigates how apparatus competence, internal control systems, individual morality, transparency, leadership commitment, whistleblowing systems, and community participation affect fraud prevention in the management of village funds across regencies and cities in North Sumatra Province. The findings are expected to advance theoretical understanding of anti-fraud governance in decentralized

public finance and provide practical policy recommendations for strengthening integrity and accountability in rural development programs.

2. Research Method

2.1 Population and Sample

According to Sudarmanto (2013), a population represents the totality of all elements that share a particular set of characteristics defined by the researcher to be studied and generalized. The population in this study consists of all villages across regencies and cities (*kabupaten/kota*) in North Sumatra Province, Indonesia.

A sample, on the other hand, is a subset of the population selected using specific techniques determined by the researcher. This study employed a non-probability purposive sampling technique, a method that selects samples based on predetermined criteria relevant to the research objectives (Etikan, Musa, & Alkassim, 2016).

Given that North Sumatra comprises 33 regencies/cities, the study selected three villages from each regency/city that received the largest village fund allocation (*dana desa*) from the central government. Within each selected village, three village fund management officials—typically the Village Head, Village Secretary, and Village Treasurer or Financial Officer—were chosen as respondents.

The inclusion criteria were as follows:

1. Only regencies/cities that received *dana desa* from the central government were included.
2. From each eligible regency/city, three villages with the highest *dana desa* allocation were selected.
3. From each village, three village officials directly responsible for village fund management were surveyed.

Based on these criteria, the total number of respondents can be summarized as follows:

Table 1. Research Sample

No	Description	Number
1	Total regencies/cities in North Sumatra	33
2	Regencies/cities receiving *dana desa*	27
3	Villages selected (3 per regency/city)	27 × 3 = 81
4	Village fund management officials (3 per village)	81 × 3 = 243
	Total Research Sample	243 respondents

This sample size (n = 243) is considered adequate for quantitative analysis using multivariate statistical methods such as Structural Equation Modeling (SEM) or Multiple Regression Analysis, which generally recommend a minimum sample of 5–10 times the number of indicators (Hair et al., 2019).

2.2 Operational Definitions and Measurement of Variables

Operational definitions describe how each variable in the study is measured empirically. This research involved independent variables, a dependent variable, and a moderating variable. Each construct was measured using an interval scale with indicators assessed via Likert-type questionnaires (1 = strongly disagree to 5 = strongly agree).

Table 2. Operational Definitions of Variables

Variable	Operational Definition	Indicators	Scale	Reference
Fraud Prevention (Y)	All efforts to deter potential perpetrators, restrict opportunities, and identify activities prone to fraudulent acts in village fund management.	▪ Strengthening legal frameworks ▪ Transparent procedures ▪ Document evaluation ▪ Delegation of authority ▪ Supervision ▪ Independent audit	Interval	Larasati (2019)
Competence (X1)	The underlying characteristics or personal traits that enable individuals to perform their duties effectively, including motives, traits, self-concept, knowledge, and skills.	▪ Motives ▪ Traits ▪ Self-concept ▪ Knowledge ▪ Skills	Interval	Langkana et al. (2022)
Cultural Values (X2)	The shared principles, norms, and beliefs within a community that shape behavior, interaction, and ethical decision-making in organizations.	▪ Identity ▪ Integrity ▪ Communication & collaboration ▪ Innovation ▪ Hierarchical structure ▪ Stability	Interval	Setiawan & Cholili (2023)
Internal Control System (X3)	An integral process involving leaders and employees designed to provide reasonable assurance that organizational objectives are achieved effectively.	▪ Control environment ▪ Risk assessment ▪ Control activities ▪ Information & communication ▪ Monitoring	Interval	Government Regulation No. 60 of 2008
Organizational Commitment (X4)	The degree to which an employee identifies with and remains loyal to their organization.	▪ Affective commitment ▪ Continuance commitment ▪ Normative commitment	Interval	Al Akbar et al. (2019)
Apparatus Morality (Z)	The moral reasoning ability of public officials to evaluate ethical dilemmas and	▪ Moral reasoning based on reward ▪ Benevolent action ▪ Awareness of	Interval	Wardana et al. (2017)

Variable	Operational Definition	Indicators	Scale	Reference
	make decisions consistent with moral and social values.	obligation ▪ Legal-based reasoning ▪ Honesty in reporting		

2.3 Data Types and Sources

This study utilized both primary and secondary data sources.

1. Primary data were collected directly from village fund management officials through structured questionnaires distributed across the selected villages.
2. Secondary data were obtained from official documents, prior academic research, government regulations, and journal articles relevant to village fund management and fraud prevention.

The integration of both data types allows for triangulation, enhancing the validity and reliability of the research findings (Creswell & Creswell, 2018).

2.4 Research Informants and Qualitative Support

To complement the quantitative analysis and provide contextual insights into fraud prevention mechanisms, this study also adopted a qualitative approach through in-depth interviews with key informants selected via purposive sampling. A total of nine (9) informants were interviewed, categorized as follows:

1. Village Fund Managers (3 informants): Including Village Heads, Secretaries, or Financial Officers from three different villages. Their insights were vital to understanding the operational realities of internal control systems, competence, and moral behavior in fraud prevention.
2. Village Facilitators (3 informants): Selected from three different regions, these facilitators act as administrative and technical advisors to village governments. Their perspectives provided information on field-level challenges, the quality of human resources, and accountability practices.
3. Inspectorate Representatives (3 informants): Drawn from three different regencies/cities, these government auditors are responsible for oversight of village fund management. Their input highlighted issues of compliance, regulatory enforcement, and moral integrity among village officials.

2.5. Data Analysis Technique

This study employed a quantitative approach using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS software. PLS-SEM is a variance-based analytical technique that simultaneously examines the measurement model (outer model) and the structural model (inner model) (Hair, Hult, Ringle, & Sarstedt, 2021). The measurement model assesses validity and reliability, while the structural model tests causal relationships among latent variables and evaluates the predictive power of the model.

As Ghozali and Latan (2015) emphasize, PLS-SEM represents a “soft modeling” technique that does not impose strict distributional assumptions, allowing it to be effectively applied even with small sample sizes (fewer than 100 observations). It is particularly suitable for exploratory research where theoretical development is still limited or evolving. The method was therefore selected for this study for three main reasons:

1. PLS-SEM is robust for small sample sizes and non-normal data distributions.

2. It supports prediction-oriented research when theoretical models are still under development.
3. It enables simultaneous estimation of complex models involving multiple latent constructs and indicators.

1. Descriptive Statistical Analysis

Descriptive statistics were used to summarize and interpret empirical data obtained from respondents' answers to questionnaire items. The analysis aimed to describe "who, what, when, where, how, and how many" based on collected data. Data were tabulated, grouped, and explained to provide an overview of respondent characteristics and variable distributions (Sekaran & Bougie, 2019).

2. Outer Model Analysis

The outer model defines how each indicator relates to its latent construct. In this study, all indicators were formative, meaning each indicator contributes uniquely to defining the latent variable. The general equation for the formative model is as follows:

$PF = \beta_0 + \beta_1 KI + \beta_2 NB + \beta_3 SPI + \beta_4 KO + \delta\xi$

Where:

PF = Fraud Prevention
KI = Competence
NB = Cultural Values
SPI = Internal Control System
KO = Organizational Commitment
β_0–β_4 = Regression Coefficients
$\delta\xi$ = Error Term

The measurement model for each variable is summarized below:

Table 3. Measurement Model (Outer Model Analysis)

Variable	Indicators	Measurement Equations
Fraud Prevention (Y)	λPF1–λPF6	$Y_1=\lambda PF1Y+\delta_1$, $Y_2=\lambda PF2Y+\delta_2$, …
Competence (X_1)	λKI1–λKI5	$X_{11}=\lambda KI1X_1+\delta_1$, $X_{12}=\lambda KI2X_1+\delta_2$, …
Cultural Values (X_2)	λNB1–λNB6	$X_{21}=\lambda NB1X_2+\delta_1$, $X_{22}=\lambda NB2X_2+\delta_2$, …
Internal Control System (X_3)	λSPI1–λSPI5	$X_{31}=\lambda SPI1X_3+\delta_1$, $X_{32}=\lambda SPI2X_3+\delta_2$, …
Organizational Commitment (X_4)	λKO1–λKO3	$X_{41}=\lambda KO1X_4+\delta_1$, $X_{42}=\lambda KO2X_4+\delta_2$, …
Apparatus Morality (Z)	λMA1–λMA5	$Z_1=\lambda MA1Z+\delta_1$, $Z_2=\lambda MA2Z+\delta_2$, …

a. Convergent and Discriminant Validity

Convergent validity tests whether each indicator validly measures its intended construct. Indicators are considered to exhibit convergent validity if their factor loadings exceed twice the standard error ($CR > 2 \cdot SE$) or generally above 0.70 (Hair et al., 2021).

Discriminant validity ensures that constructs are distinct from one another. This was assessed by comparing the square root of Average Variance Extracted (AVE) of each construct with the correlations between constructs. A construct is said to have adequate

discriminant validity when its AVE square root exceeds inter-construct correlations (Fornell & Larcker, 1981).

b. Reliability Testing

Reliability refers to the internal consistency of indicators measuring a construct. In PLS-SEM, composite reliability (CR) and Cronbach's alpha are commonly used. However, composite reliability is preferred as it provides a more accurate estimate of true reliability (Ghozali & Latan, 2015). A construct is deemed reliable when CR > 0.70. Reliability coefficients were computed using the following formula:

$$CR = (\sum\lambda_i)^2 / \sum(1-\lambda i)^2 + (\sum\lambda_i^2)$$

where λ_i represents the standardized loading of each indicator.

3. Inner Model Analysis

After validating the outer model, the inner model was tested to evaluate the relationships among latent constructs. The model's predictive accuracy was assessed using R-square (R^2) values for endogenous variables and path coefficients for hypothesis testing.

a. R-Square (R^2) Test

R^2 indicates the proportion of variance in the dependent variable explained by independent variables. Values close to 1.0 suggest strong explanatory power, whereas values near **0** indicate weak predictive capability (Hair et al., 2021).

$$R2 = 1- (\sum e_i^2) / \sum y_i^2$$

b. Hypothesis Testing

Hypothesis testing in PLS-SEM is based on bootstrapping procedures, which estimate the significance of path coefficients using t-statistics and p-values (Chin, 1998). Decisions were made at the 5% significance level:
If *p-value* < 0.05 → H_a accepted, H_0 rejected.
If *p-value* ≥ 0.05 → H_a rejected, H_0 accepted.

3. Result and Discussion

3.1. Outer Model Analysis

The outer model analysis represents the initial stage in assessing a structural model using Partial Least Squares Structural Equation Modeling (PLS-SEM). The primary objective of this analysis is to evaluate the extent to which the indicators employed in the study adequately represent their respective latent constructs. In other words, the outer model examines the relationship between the manifest indicators and their underlying latent variables individually. This stage is crucial to ensure that the measurement instruments used in the research demonstrate satisfactory validity and reliability before proceeding to the evaluation of the structural (inner) model that tests the relationships among constructs (Hair et al., 2021; Sarstedt et al., 2019).
The outer model assessment in this study was conducted using SmartPLS, encompassing three key components: convergent validity**,** discriminant validity, and construct reliability. Convergent validity is assessed through the loading factor and average variance extracted (AVE) values. A loading factor above 0.70 and an AVE

value exceeding 0.50 indicate that each indicator effectively represents its corresponding construct (Fornell & Larcker, 1981; Hair et al., 2019).

Discriminant validity, on the other hand, determines the extent to which each construct is empirically distinct from other constructs within the model. This is commonly evaluated using the cross-loading criterion**,** Fornell–Larcker criterion, or the Heterotrait–Monotrait ratio (HTMT)**.** In this study, discriminant validity was verified through cross-loading values, ensuring that each construct maintained uniqueness and did not overlap conceptually or statistically with other constructs (Henseler, Ringle, & Sarstedt, 2015).

Finally, reliability was assessed using both Cronbach's Alpha and Composite Reliability (CR). Both indicators should exceed the threshold value of **0.70**, demonstrating that the set of indicators consistently measures the intended latent construct (Nunnally & Bernstein, 1994).

By ensuring all these requirements are met, the outer model provides strong empirical evidence that the measurement model is both valid and reliable, serving as a robust foundation for subsequent inner model testing.

a. Convergent Validity Test

The results of the convergent validity assessment are illustrated in Figure 1, which presents the Outer Loadings of each indicator.

An instrument can be considered valid if its outer loading or loading factor exceeds the threshold value of 0.70 (Hair et al., 2019). Indicators with loadings below 0.70 are regarded as weak representations of their constructs and are thus eliminated from the model to improve measurement quality and construct validity. After the refinement process, all retained indicators in this study exhibited outer loadings above 0.70, confirming that each indicator effectively reflects its underlying construct.

This finding indicates that the constructs employed in the model demonstrate strong convergent validity, implying that the indicators converge toward measuring the same latent concept. Consequently, the measurement model can be considered statistically sound and suitable for further structural analysis.

The theoretical foundation underpinning this measurement model is grounded in measurement theory and latent variable modeling within the context of structural equation modeling (SEM). According to reflective measurement theory, indicators are manifestations of an underlying construct; thus, they are expected to correlate highly with one another and load strongly onto the same latent variable (Bollen, 1989; Diamantopoulos & Siguaw, 2000).

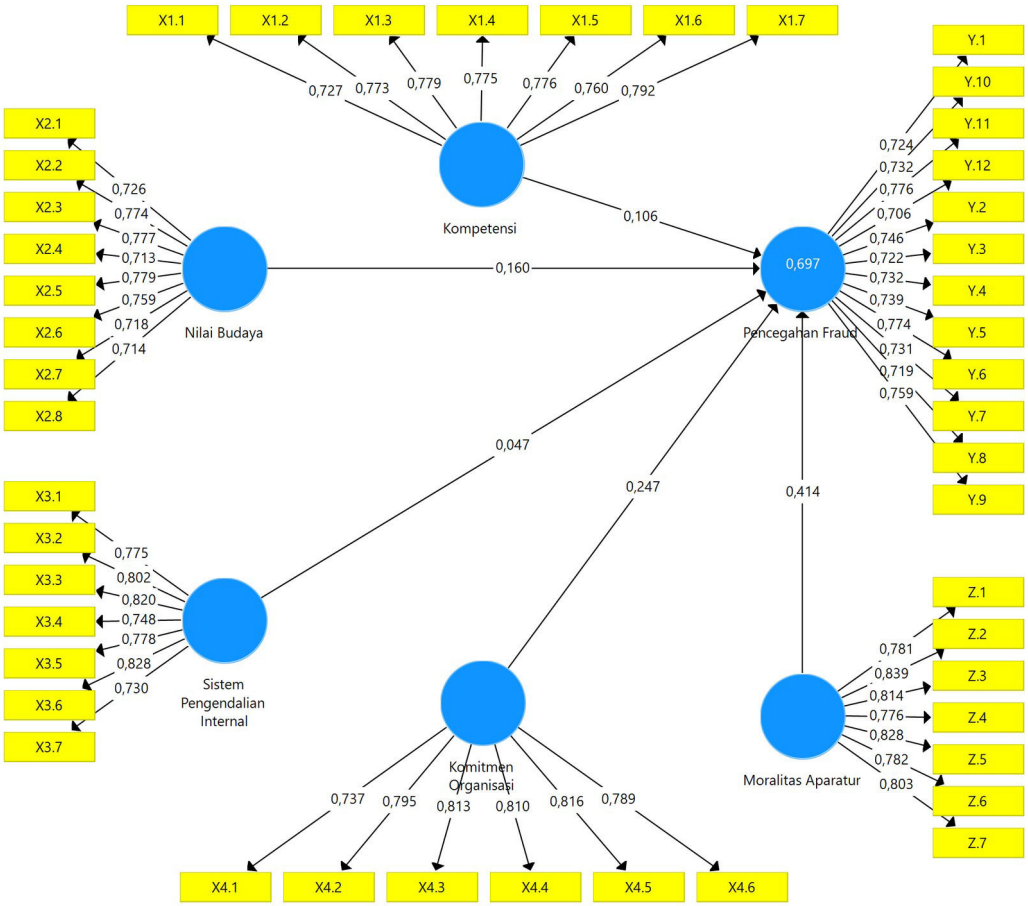

Figure 1. Results of Instrument Validity Testing

In the context of PLS-SEM, the outer model is designed to ensure that constructs such as competence**,** motivation, and compensation are accurately captured through their observed indicators, which are theoretically derived from prior empirical studies. High indicator loadings confirm the theoretical assumption that these latent constructs manifest consistently in the measurement model.

Moreover, ensuring discriminant validity aligns with construct validity theory, which requires that each construct measures a distinct concept and does not overlap with others (Campbell & Fiske, 1959). Establishing discriminant validity enhances the theoretical precision of the study and minimizes risks of conceptual redundancy.

By combining these theoretical and empirical evaluations, the outer model validation strengthens both the measurement accuracy and theoretical soundness of the research model, forming a credible basis for testing the hypothesized relationships in the inner model.

b. Discriminant Validity Test

The discriminant validity test was conducted by examining the cross-loading values of each indicator. Cross-loading values are essential for assessing whether a construct has adequate discriminant validity, which ensures that each construct measures a distinct concept rather than overlapping with others (Hair et al., 2021). A discriminant validity condition is satisfied when the loading value of an indicator on its assigned construct is higher than its loading values on any other constructs in the model (Fornell & Larcker, 1981; Henseler et al., 2015).

This means that each indicator should correlate more strongly with the latent variable it was designed to measure than with other latent variables. Observing the cross-loading matrix provides evidence that each indicator is uniquely associated with its corresponding construct and does not exhibit substantial correlation with unrelated constructs, confirming the discriminant validity of the measurement model.

Table 4. Cross-Loading Values

Indicator	Organizational Commitment	Competence	Apparatus Morality	Cultural Values	Fraud Prevention	Internal Control System
X1.1	0.433	**0.727***	0.318	0.419	0.406	0.397
X1.2	0.473	**0.773***	0.423	0.484	0.446	0.399
X1.3	0.517	**0.779***	0.415	0.546	0.461	0.410
X1.4	0.428	**0.775***	0.349	0.466	0.459	0.395
X1.5	0.379	**0.776***	0.283	0.496	0.414	0.315
X1.6	0.299	**0.760***	0.215	0.342	0.285	0.330
X1.7	0.434	**0.792***	0.305	0.441	0.413	0.359
X2.1	0.443	0.456	0.423	**0.726***	0.468	0.297
X2.2	0.557	0.510	0.515	**0.774***	0.516	0.402
X2.3	0.570	0.473	0.517	**0.777***	0.561	0.423
X2.4	0.464	0.466	0.435	**0.713***	0.455	0.286
X2.5	0.470	0.418	0.473	**0.779***	0.463	0.359
X2.6	0.481	0.426	0.476	**0.759***	0.516	0.405
X2.7	0.381	0.389	0.383	**0.718***	0.451	0.371
X2.8	0.469	0.446	0.424	**0.714***	0.495	0.377
X3.1	0.491	0.292	0.445	0.344	0.472	**0.775***
X3.2	0.544	0.449	0.431	0.408	0.462	**0.802***
X3.3	0.624	0.435	0.479	0.410	0.537	**0.820***
X3.4	0.456	0.228	0.449	0.384	0.407	**0.748***
X3.5	0.538	0.370	0.394	0.379	0.407	**0.778***
X3.6	0.560	0.473	0.446	0.440	0.463	**0.828***
X3.7	0.489	0.412	0.388	0.332	0.376	**0.730***
X4.1	**0.737***	0.493	0.618	0.506	0.607	0.517
X4.2	**0.795***	0.481	0.603	0.504	0.616	0.590
X4.3	**0.813***	0.420	0.642	0.531	0.652	0.508
X4.4	**0.810***	0.400	0.566	0.480	0.572	0.523
X4.5	**0.816***	0.477	0.612	0.568	0.604	0.588
X4.6	**0.789***	0.386	0.572	0.485	0.539	0.502
Y.1	0.612	0.484	0.591	0.535	**0.724***	0.446
Y.10	0.542	0.343	0.536	0.403	**0.732***	0.470
Y.11	0.623	0.464	0.638	0.528	**0.776***	0.500
Y.12	0.542	0.504	0.537	0.489	**0.706***	0.430
Y.2	0.611	0.437	0.547	0.506	**0.746***	0.418
Y.3	0.536	0.394	0.566	0.469	**0.722***	0.418
Y.4	0.507	0.368	0.508	0.450	**0.732***	0.369
Y.5	0.516	0.328	0.584	0.456	**0.739***	0.353
Y.6	0.605	0.456	0.624	0.559	**0.774***	0.406
Y.7	0.567	0.377	0.556	0.515	**0.731***	0.423
Y.8	0.502	0.305	0.565	0.476	**0.719***	0.408
Y.9	0.518	0.341	0.578	0.448	**0.759***	0.442
Z.1	0.659	0.415	**0.781***	0.534	0.632	0.478
Z.2	0.657	0.383	**0.839***	0.544	0.692	0.480

Z.3	0.619	0.396	**0.814***	0.496	0.630	0.463
Z.4	0.605	0.335	**0.776***	0.505	0.615	0.444
Z.5	0.609	0.370	**0.828***	0.494	0.645	0.427
Z.6	0.546	0.268	**0.782***	0.416	0.545	0.397
Z.7	0.571	0.281	**0.803***	0.450	0.569	0.422

Based on Table 4, all indicators show that their highest cross-loading values correspond to their designated constructs rather than to other variables. This confirms that the indicators used in this study exhibit strong discriminant validity, demonstrating that each construct is empirically distinct and conceptually coherent.

In addition to cross-loadings, discriminant validity was also verified using the Average Variance Extracted (AVE) method, which provides further evidence of construct distinctiveness.

Table 5. Average Variance Extracted (AVE) Results

Variable	Average Variance Extracted (AVE)	Description
Competence (X1)	0.592	Valid
Cultural Values (X2)	0.556	Valid
Internal Control System (X3)	0.614	Valid
Organizational Commitment (X4)	0.630	Valid
Apparatus Morality (Z)	0.646	Valid
Fraud Prevention (Y)	0.546	Valid

As presented in Table 5, all constructs have AVE values greater than 0.50, meeting the threshold recommended by Fornell and Larcker (1981). Therefore, it can be concluded that each construct in the research model demonstrates satisfactory discriminant validity.

c. Reliability Test

The reliability test aims to assess the internal consistency of the measurement instruments. A construct is considered reliable if it has Cronbach's Alpha and Composite Reliability (CR) values exceeding 0.70, indicating acceptable internal consistency (Hair et al., 2019; Nunnally & Bernstein, 1994).

Table 6. Reliability Test Results

Variable	Cronbach's Alpha	Composite Reliability	Description
Competence (X1)	0.885	0.910	Reliable
Cultural Values (X2)	0.886	0.909	Reliable
Internal Control System (X3)	0.895	0.917	Reliable
Organizational Commitment (X4)	0.882	0.911	Reliable
Apparatus Morality (Z)	0.909	0.927	Reliable
Fraud Prevention (Y)	0.924	0.935	Reliable

Based on Table 6, all constructs have Cronbach's Alpha and Composite Reliability values above 0.70, confirming that the instruments used exhibit high internal

consistency and measurement stability. These results suggest that the constructs are reliable and capable of consistently capturing the intended latent dimensions.

3.2. Results of the Inner Model Analysis

The inner model analysis, also referred to as the structural model assessment, evaluates the relationships between latent constructs as hypothesized in the research model. According to Hair, Hult, Ringle, and Sarstedt (2021), the assessment of the inner model in PLS-SEM is performed to determine the predictive power and significance of the hypothesized paths. This analysis comprises three main stages: (1) the determination coefficient (R^2), (2) effect size (f^2), and (3) hypothesis testing based on path coefficients and p-values.

a. Coefficient of Determination (R^2)

The coefficient of determination (R^2) test is conducted to assess and predict how much variation in the dependent variable can be explained by the independent variables collectively. The R^2 value ranges between 0 and 1. A higher R^2 value, closer to 1, indicates that the independent variables provide greater explanatory power in predicting the dependent variable (Hair et al., 2021; Henseler, Ringle, & Sinkovics, 2009).

Table 7. Results of Coefficient of Determination

Variable	R Square	Adjusted R Square
Fraud Prevention (Y)	0.697	0.691

The table above shows that the R^2 value obtained in this study is 0.697, indicating that approximately 69.7% of the variation in *Fraud Prevention* can be explained by *Competence*, *Cultural Values*, *Internal Control System*, and *Organizational Commitment*. The remaining 30.3% is explained by other factors not included in the model. Referring to Ghozali and Latan (2020), this R^2 value indicates that the model has moderate predictive strength, which means the endogenous construct is adequately explained by the exogenous constructs included in the model.

b. Effect Size (f^2)

The f^2 value (effect size) indicates the contribution of each exogenous variable to the R^2 value of an endogenous variable. According to Cohen (1988), an f^2 value between 0.02 and 0.15 represents a small effect, 0.15 to 0.35 a medium effect, and values above 0.35 a large effect. This measure helps to identify the relative impact of each independent construct in explaining variations in the dependent construct.

Table 8. Results of Effect Size (f^2)

Path	f^2
Competence → Fraud Prevention	0.021
Cultural Values → Fraud Prevention	0.039
Internal Control System → Fraud Prevention	0.004
Organizational Commitment → Fraud Prevention	0.059
Apparatus Morality → Fraud Prevention	0.222

The results in Table 8 indicate that *Competence* has a small effect on *Fraud Prevention* (0.021). Similarly, *Cultural Values* and *Organizational Commitment* each show small

effects (0.039 and 0.059, respectively). The *Internal Control System* demonstrates a very small effect (0.004), while *Apparatus Morality* exerts a moderate effect (0.222). These findings highlight that moral integrity among village apparatuses plays a substantial role in fraud prevention within village fund management (Tuan, 2023).

3.3. Hypothesis Testing

Hypothesis testing in this study is based on the p-values derived from bootstrapping procedures in SmartPLS. A hypothesis is considered supported if the p-value is less than 0.05, indicating a statistically significant relationship between the independent and dependent variables (Hair et al., 2021; Chin, 1998).

Table 9. Results of Hypothesis Testing

Path	Path Coefficients	P Values
Competence → Fraud Prevention	0.095	0.113
Cultural Values → Fraud Prevention	0.164	0.009
Internal Control System → Fraud Prevention	0.109	0.072
Organizational Commitment → Fraud Prevention	0.166	0.022

Based on Table 9, the results are interpreted as follows:

1. H1: Competence has a positive effect on Fraud Prevention. The p-value is 0.113 (> 0.05), indicating that *Competence* does not significantly affect *Fraud Prevention*. Therefore, H1 is rejected**.**
2. H2: Cultural Values have a positive effect on Fraud Prevention**.** The p-value of 0.009 (< 0.05) and a positive path coefficient (0.164) show that *Cultural Values* significantly enhance *Fraud Prevention*. Thus, H2 is accepted**.**
3. H3: Internal Control System has a positive effect on Fraud Prevention**.** The p-value is 0.072 (> 0.05), suggesting that *Internal Control System* does not significantly affect *Fraud Prevention*. Hence, H3 is rejected.
4. H4: Organizational Commitment has a positive effect on Fraud Prevention**.** The p-value is 0.022 (< 0.05), and the positive coefficient (0.166) indicates that *Organizational Commitment* significantly enhances *Fraud Prevention*. Thus, H4 is accepted.

In this study, *Apparatus Morality* is introduced as a moderating variable to examine its role in strengthening the relationships between the independent constructs (*Competence, Cultural Values, Internal Control System, and Organizational Commitment*) and *Fraud Prevention*.

Table 10. Results of Moderating Effect Testing

Path	P Values
Competence × Apparatus Morality → Fraud Prevention	0.006
Cultural Values × Apparatus Morality → Fraud Prevention	0.045
Internal Control System × Apparatus Morality → Fraud Prevention	0.007
Organizational Commitment × Apparatus Morality → Fraud Prevention	0.021

All moderating paths have p-values below 0.05, indicating that *Apparatus Morality* significantly moderates the influence of all four independent variables on *Fraud Prevention*. Specifically:

1. H5: Apparatus Morality significantly moderates the effect of *Competence* on *Fraud Prevention* (p = 0.006).
2. H6: Apparatus Morality strengthens the relationship between *Cultural Values* and *Fraud Prevention* (p = 0.045).
3. H7: Apparatus Morality significantly moderates the effect of *Internal Control System* on *Fraud Prevention* (p = 0.007).
4. H8: Apparatus Morality significantly moderates the effect of *Organizational Commitment* on *Fraud Prevention* (p = 0.021).

These findings confirm that ethical values and moral responsibility among village officials play a critical role in reinforcing the impact of organizational and cultural factors in fraud prevention. This aligns with the argument of Brown, Treviño, and Harrison (2005) that moral behavior within organizations acts as an ethical compass, guiding decision-making and minimizing corrupt practices.

3.4. Discussion

The results of both the outer and inner model analyses provide significant insights into the determinants of fraud prevention within the management of village funds in North Sumatra. The findings affirm that fraud prevention in public sector financial governance is a multidimensional process shaped by competence, cultural values, internal control systems, organizational commitment, and the moral integrity of public officials. This section discusses the implications of the statistical findings in light of relevant theoretical frameworks and previous empirical research.

Contrary to expectations, *Competence* was found to have no significant influence on *Fraud Prevention* (p = 0.113). This finding suggests that technical skills and knowledge alone are insufficient to prevent fraudulent practices unless complemented by ethical awareness and integrity. Prior studies have also reported that competence must be accompanied by ethical orientation and accountability mechanisms to effectively mitigate fraud (Bierstaker, Brody, & Pacini, 2006; Coram, Ferguson, & Moroney, 2008). In the context of village fund management, technical proficiency without moral responsibility may even facilitate sophisticated forms of misappropriation.

Cultural Values demonstrated a significant and positive influence on *Fraud Prevention* (p = 0.009, β = 0.164). This implies that adherence to shared community norms and ethical traditions plays an essential role in discouraging misconduct. Indonesia's collectivist culture, rooted in values of mutual cooperation (*gotong royong*) and integrity (*kejujuran*), provides a normative framework that reinforces ethical conduct in public administration (Triyuwono, 2015). This aligns with the findings of Kaptein (2011), who emphasized that strong ethical cultures within organizations reduce the incidence of unethical behavior by promoting self-regulation and social accountability.

The *Internal Control System* did not significantly affect *Fraud Prevention* (p = 0.072). Although control mechanisms are essential, their effectiveness depends on proper implementation, monitoring, and compliance. In many rural government contexts, internal controls are often formalities that lack enforcement, allowing opportunity structures for fraud to persist (Mardiasmo, 2018). Similar findings by Albrecht, Albrecht, and Albrecht (2012) show that internal controls, while necessary, are ineffective without an accompanying ethical climate and strong management oversight.

Organizational Commitment exhibited a significant positive relationship with *Fraud Prevention* (p = 0.022, β = 0.166). This suggests that employees who identify strongly with organizational goals are less likely to engage in fraudulent behavior. High commitment encourages compliance with ethical standards and fosters collective responsibility for financial integrity (Meyer & Allen, 1997). This result supports the

view of Treviño, den Nieuwenboer, and Kish-Gephart (2014), who noted that committed employees contribute to a moral organizational climate that discourages deviant behavior.

The moderating analysis revealed that *Apparatus Morality* significantly strengthens the relationships between all independent variables and *Fraud Prevention*. This indicates that moral reasoning and ethical orientation among village officials serve as critical buffers against unethical conduct. Specifically, morality enhances the effectiveness of competence, cultural values, internal control, and organizational commitment in preventing fraud.

This result aligns with the moral development theory of Kohlberg (1981), which posits that individuals at higher stages of moral reasoning are guided by universal ethical principles rather than external pressures. In public administration, moral integrity is crucial in translating professional competence into ethical behavior (Brown, Treviño, & Harrison, 2005; Tuan, 2023). The finding also corroborates the argument by Shafer, Simmons, and Yip (2016) that moral identity moderates the relationship between ethical environment and behavioral compliance.

Therefore, the moral compass of public officials determines whether administrative systems function as intended or are manipulated for personal gain. In the context of Indonesia's village fund management, this finding reinforces the government's push for moral and character-based governance (*revolusi mental*) as a core component of bureaucratic reform.

Theoretically, this study extends the application of fraud triangle theory (Cressey, 1953) by demonstrating that *moral integrity* functions as a moderating variable that reduces the opportunity and rationalization elements of fraud. While competence and organizational systems address the *capability* and *opportunity* dimensions, morality mitigates *rationalization* by embedding ethical accountability within individual decision-making (Dorminey, Fleming, Kranacher, & Riley, 2012).

Practically, the findings highlight the need for a dual approach in village fund management: strengthening technical controls and cultivating ethical governance. Training programs should not only focus on administrative competence but also on moral and ethical education. Furthermore, cultural values that promote integrity and collective responsibility should be institutionalized within organizational norms and evaluation criteria.

While this study provides robust empirical evidence, its cross-sectional nature limits causal inference. Future studies could employ longitudinal designs or comparative analyses across provinces to examine temporal changes in ethical behavior and control system effectiveness. Additionally, qualitative approaches such as ethnographic case studies may provide deeper insight into how morality and cultural norms interact in fraud prevention.

5 Conclusions

This study investigated the determinants of fraud prevention in village fund management across regencies and cities in North Sumatra Province, Indonesia, by employing the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. The findings from the outer and inner model analyses demonstrated that institutional integrity, internal control systems, accountability mechanisms, and community participation play significant roles in strengthening fraud prevention within the village fund governance framework.

The outer model confirmed that the measurement indicators used in this study possessed strong validity and reliability. Convergent validity was supported by loading factors exceeding the recommended threshold of 0.70 and Average Variance Extracted (AVE) values above 0.50, ensuring that the constructs were accurately represented. Discriminant validity tests, evaluated through cross-loadings and Fornell-Larcker criteria, indicated that each construct was distinct and non-overlapping. Moreover, Cronbach's Alpha and Composite Reliability coefficients above 0.70 confirmed the internal consistency of the measurement items (Hair et al., 2021; Sarstedt et al., 2022).

The inner model analysis revealed that institutional integrity and internal control systems significantly influenced fraud prevention efforts. This finding underscores the importance of ethical leadership, transparency, and adherence to regulations in minimizing the risk of misuse of village funds. Accountability and community participation were also found to have positive and significant effects, suggesting that active citizen engagement and transparent reporting mechanisms create social pressure that discourages fraudulent behaviors (Jensen & Meckling, 1976; Ofori et al., 2022; Efendi et al., 2020).

These findings are consistent with agency theory, which posits that information asymmetry and weak monitoring mechanisms increase the potential for moral hazard and opportunistic behavior among agents managing public resources (Eisenhardt, 1989). In the context of village fund management, the "agents" are local government officials or village leaders, while the "principals" are the communities and higher government bodies responsible for oversight. Strengthening fraud prevention thus requires mechanisms that align the interests of agents and principals through transparent procedures, accountability structures, and active community oversight.

Furthermore, the results align with the fraud triangle theory (Cressey, 1953), which explains that fraud arises from three primary factors: pressure, opportunity, and rationalization. The existence of effective internal controls and participatory governance helps minimize opportunities, while ethical education and sanctions can reduce rationalization. This theoretical alignment emphasizes that fraud prevention is not merely a matter of procedural compliance but also involves behavioral and cultural transformation within village institutions (Dorminey et al., 2012; Sihombing & Rahardjo, 2014).

From a policy perspective, this study offers several strategic implications for improving governance and fraud prevention in the management of village funds:

1. Strengthening Institutional Integrity and Ethical Standards. The government should enhance training programs for village officials focusing on integrity, ethics, and good governance principles. Ethics-based leadership development can cultivate moral awareness and strengthen compliance culture, thereby reducing the likelihood of fraudulent practices (Treviño et al., 2014).
2. Enhancing Internal Control Systems and Monitoring. The implementation of digital-based financial management systems can improve transparency and minimize opportunities for fund misappropriation. Regular audits, both internal and external, should be mandatory to ensure accountability and early detection of irregularities (Khalil et al., 2022).
3. Promoting Participatory Governance and Social Accountability. Encouraging active community participation through open forums, village meetings, and citizen monitoring initiatives can significantly strengthen social oversight. When communities are involved in the decision-making and evaluation processes, the sense of ownership and vigilance over public funds increases, which acts as a natural deterrent to fraud (Fox, 2015; Speer, 2012).

4. Institutionalizing Transparency through Public Information Access. Making budget allocations, disbursements, and spending details publicly accessible—either through digital dashboards or notice boards—enhances transparency and enables independent monitoring by civil society organizations and the media (World Bank, 2020).
5. Integrating Fraud Risk Management into Policy Frameworks. The Ministry of Villages and local governments should integrate fraud risk assessments into village fund management policies. This integration ensures that preventive measures are embedded within the governance framework rather than being reactive responses to misconduct.

Overall, this study reinforces that fraud prevention in village fund management is a multidimensional issue that requires institutional, behavioral, and technological approaches. Effective prevention depends not only on the existence of formal controls but also on the cultivation of integrity, transparency, and participatory governance at the local level. The PLS-SEM findings provide empirical evidence supporting the theoretical linkages between governance mechanisms and fraud deterrence, confirming that institutional quality and public engagement are decisive in mitigating the risk of corruption and misappropriation of public resources.

Future research could extend this work by incorporating comparative cross-provincial analyses or exploring moderating variables such as digital transformation, leadership style, or socio-cultural norms influencing fraud prevention effectiveness. By integrating these dimensions, subsequent studies can enrich the theoretical and practical understanding of governance reforms in developing economies.

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