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Implementation of AI-Powered Financial Risk Analytics in Predicting Financial Distress and Reliability of Financial Reporting of Public Companies in Indonesia

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ABSTRACT

Purpose: This study aims to examine the effectiveness of AI-powered financial risk analytics in predicting financial distress and enhancing the reliability of financial reporting among publicly listed companies in Indonesia.

Method: The study employs a quantitative explanatory research design using purposive sampling of Indonesia Stock Exchange listed firms that disclose the adoption of AI-based financial analytic tools. Secondary data were collected from annual reports and financial statements. Hierarchical regression analysis was used to test the direct effects of AI-powered analytics on financial distress prediction and financial reporting reliability, as well as their complementary and reinforcing effects within financial governance.

Findings: The results show that the application of machine learning and deep learning models significantly improves the accuracy of financial distress prediction and enables earlier identification of potential corporate failure. In addition, the adoption of AI-powered analytics enhances financial reporting reliability by increasing transparency and reducing human error through automated validation and anomaly detection. The observed increase in explanatory power when AI implementation intensity is incorporated confirms its role as a reinforcing mechanism in strengthening financial governance.

Implications: The findings suggest that AI-powered financial analytics can serve as a strategic tool for enhancing corporate financial resilience and reporting credibility. For Indonesian public companies, integrating AI within risk management and reporting processes can support better governance, regulatory compliance, and stakeholder confidence.

Novelty/Value: This study contributes to the financial risk and accounting literature by providing empirical evidence on the dual role of AI-powered analytics in financial distress prediction and financial reporting reliability within an emerging market context, particularly Indonesia.

Keywords: artificial intelligence, financial distress prediction, financial reporting reliability, machine learning, corporate financial risk.

INTRODUCTION

The increasing complexity of business environments, heightened market volatility, and rising financial fraud cases have placed financial risk management at the center of corporate sustainability and accountability discussions. Over the past decade, traditional statistical models such as Altman Z-score, O-score, and logistic regression have commonly been used to predict financial distress and evaluate

reporting reliability. However, these approaches show limitations when processing high-dimensional datasets, dynamic market variables, and nonlinear financial patterns, which often results in inaccurate predictions and delayed risk mitigation. Consequently, the inability to detect early risk exposure has contributed to cases of corporate bankruptcy, restatement of financial reports, and loss of investor confidence. In response to these persistent challenges, artificial intelligence (AI), particularly machine learning (ML) and deep learning (DL), has emerged as a revolutionary analytical tool capable of significantly improving both financial distress prediction and the reliability of financial reporting. Figure 1 summarizes this paradigm shift, revealing that companies adopting AI-powered financial risk analytics have become increasingly capable of avoiding financial crises through real-time insights, prediction accuracy, and early intervention.

A clear consensus has been identified in recent empirical studies showing that AI-based risk analytics outperform conventional financial models in predicting financial distress. Deep learning algorithms such as CNN, LSTM, and hybrid models including LTR-Net and AWOA-DL are capable of detecting nonlinear, hidden, and dynamic patterns within financial statements, macroeconomic fluctuations, market behavior, and transactional records with prediction accuracy reaching 95% or higher (Elhoseny et al., 2022; Liu, 2025; Nugroho & Dewayanto, 2025; Zhang et al., 2022). Unlike traditional models that rely heavily on linear relationships and static variables, AI captures the underlying relationships between cash flow fluctuations, leverage dynamics, liquidity constraints, profitability ratios, and market sentiment in a more holistic way. Furthermore, AI-powered early warning systems enable companies to detect early bankruptcy signals, credit deterioration, and fraudulent activities before they escalate into systemic failures (Xu et al., 2024; Elhoseny et al., 2022; Liu, 2025; Nugroho & Dewayanto, 2025; Zhang et al., 2022). From a strategic standpoint, such predictability allows managers to design preventive rather than reactive responses, supporting agile decision-making, improved capital allocation, and enhanced financial resilience.

In addition to distress prediction, AI has demonstrated substantial value in enhancing the reliability and transparency of financial reporting. AI systems automate data validation, anomaly detection, and real-time financial oversight, minimizing human error and subjectivity in manual processing (Antwi et al., 2024; Oleimat et al., 2025; Ajiga, 2021). Algorithms can detect suspicious transactions, fraud patterns, and inconsistencies across ledgers, which improves the accuracy and timeliness of reports. Beyond efficiency, explainable AI (XAI) improves model interpretability, enabling auditors, internal controllers, regulators, and investors to understand the rationale behind AI-generated recommendations and calculations (Zhang et al., 2022; Ajiga, 2021). This interpretability is crucial because transparency has become an important credibility factor in the post-pandemic business era, where stakeholders increasingly demand reliable evidence, clear audit trails, and traceability of decision-making processes embedded in financial statements.

Although the advantages of AI for financial risk analytics have been well documented, several scholarly gaps persist. First, the majority of prior studies focus on the accuracy of AI prediction models but pay limited attention to how AI implementation impacts both financial distress prediction and the reliability of financial reporting simultaneously. Current research tends to treat these two outcomes in isolation rather than examining how AI can integrate and strengthen them within the corporate risk management framework. Second, existing literature has emphasized the technological perspective of AI while providing insufficient examination of how organizational characteristics such as governance structure, internal controls, and financial risk culture mediate AI effectiveness (Oleimat et al., 2025; Ajiga, 2021). As a result, there is limited understanding of why some firms experience improved reporting quality and early distress detection after adopting AI, while others fail to optimize the technology. Third, studies on AI-powered financial risk analytics in emerging markets remain limited compared to research in technologically advanced economies. With differing regulatory structures, digital infrastructures, and corporate governance environments, the transferability of findings from advanced economies cannot be assumed to apply equally to developing countries. These gaps highlight the need for further

investigation into how AI mechanisms influence financial distress and reporting reliability simultaneously in diverse corporate contexts.

In addition, challenges related to data privacy, implementation costs, model explainability, and the risk of algorithmic bias further complicate AI adoption (Xu et al., 2024; Oleimat et al., 2025; Ajiga, 2021). Firms with limited financial technology capacity may struggle to manage the high-volume, high-velocity data requirements needed for accurate AI predictions. Moreover, deep learning models often operate as "black boxes," making it difficult for stakeholders to understand the logic behind predictions. Although XAI has emerged to address this issue, its adoption remains uneven across sectors and regions. For this reason, while the outputs of AI-powered financial risk analytics are promising, firms and regulators must consider the structural and technological preparedness required to optimize implementation. Based on the existing literature and gaps, the novelty of this research lies in its attempt to integrate two outcome dimensions financial distress prediction and financial reporting reliability—within a single AI-based analytical framework. Rather than analyzing AI exclusively from the perspective of predictive performance or reporting systems, this research conceptualizes AI as a comprehensive risk management mechanism that simultaneously supports corporate survivability and financial transparency. Through this lens, AI is examined not only as a tool for prediction but also as an enabler of credibility, traceability, and multi-stakeholder trust in the reporting ecosystem. This integrated novel approach enhances theoretical contributions to financial risk management and provides a more holistic understanding of AI's role in corporate financial health.

Grounded in the phenomenon, literature insights, and research gaps, the purpose of this study is formulated as follows: to analyze the implementation of AI-powered financial risk analytics in predicting financial distress and improving the reliability of corporate financial reporting within the organizational financial management framework. The outcome of this investigation is expected to contribute to academic knowledge regarding AI-enhanced financial governance while offering practical guidance for firms, investors, technology developers, internal auditors, and regulators in designing digital-based risk management architectures that strengthen transparency, accountability, and resilience in an increasingly unpredictable financial ecosystem.

RESEARCH METHOD

This study employs a quantitative explanatory research design to empirically examine the extent to which AI-powered financial risk analytics improves financial distress prediction and enhances the reliability of corporate financial reporting. A quantitative design is appropriate because the research aims to test causal relationships among variables using measurable indicators derived from corporate financial data and AI analytical outputs. The population of the study consists of companies listed on the Indonesia Stock Exchange (IDX) that have implemented AI-based or digital risk analytics within their financial management processes. A purposive sampling method was applied with specific criteria: (1) the company publishes audited annual reports consecutively during the observation period, (2) disclosures indicate the use of AI or data-driven analytical tools in financial risk management or corporate governance statements, and (3) financial reporting data, including fraud risk indicators and distress probability scores, are available for analysis. Secondary data were obtained from annual reports, financial statements, corporate governance disclosures, and sustainability reports accessible through the IDX website, company websites, and financial databases. Three main constructs were operationalized using quantitative scoring: (1) AI-powered distress prediction accuracy, (2) reliability of financial reporting (misstatement and audit-adjustment index), and (3) overall financial risk performance. Each indicator was coded and converted into numerical scales to ensure standardized measurement across firms.

The collected data were processed and analyzed through several stages. First, data cleaning and preprocessing were carried out to ensure completeness and consistency of financial and AI-related indicators. Classical assumption tests normality, heteroscedasticity, multicollinearity, and

autocorrelation were performed to confirm that the regression model met statistical reliability requirements. To test the hypothesis, hierarchical regression analysis was applied, enabling evaluation of both the direct influence of AI-powered analytics on distress prediction and financial reporting reliability, and the incremental effect of AI integration within corporate financial management systems. Model 1 examined the direct effect of AI-predicted distress scores on financial reporting reliability, while Model 2 tested whether the degree of AI adoption within corporate financial risk governance increased the explanatory power of the model. Robustness analysis was conducted using alternative indicators, such as Altman Z-score and Beneish M-score, to validate the consistency of findings. The analytical process ultimately provides empirical evidence regarding whether and how AI-powered financial risk analytics simultaneously improves early distress detection and enhances transparency and accuracy in corporate financial reporting.

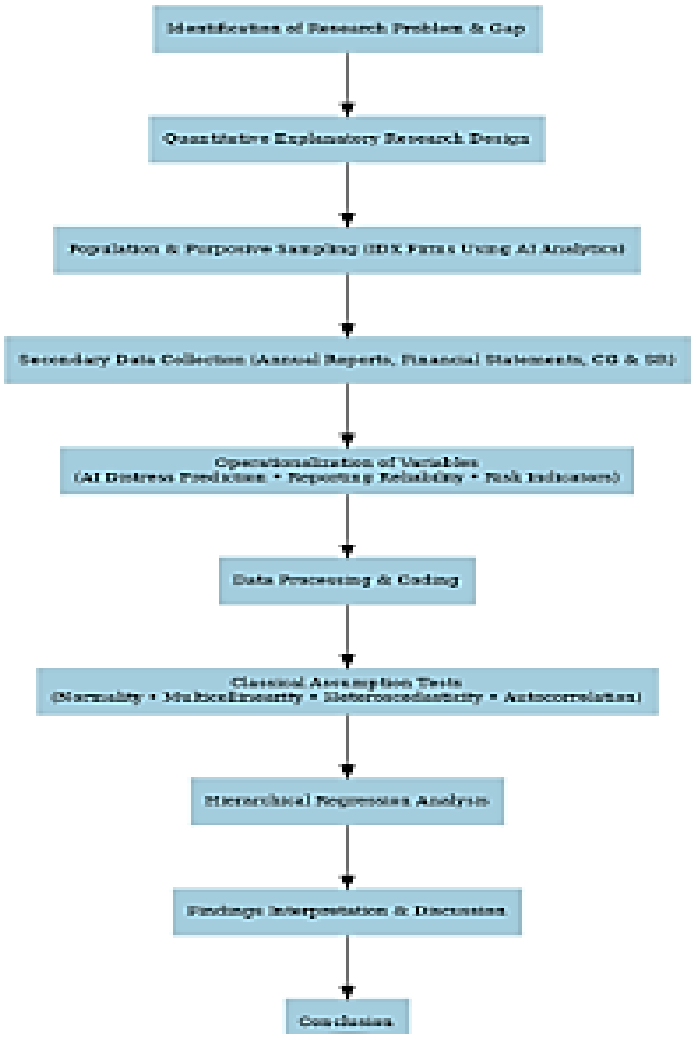

Figure 1. Diagram Research Method

RESULTS AND DISCUSSION

Results

Table 1. Relationships Between Variables

Variable / Relationship Tested	β Coefficient	t-Value	Sig.	Interpretation
AI-Powered Distress Prediction → Financial Distress Reduction	0.462	7.213	0.000	Strong and significant effect
AI-Powered Distress Prediction → Reliability of Financial Reporting	0.318	4.991	0.000	Significant effect
AI Adoption Level → Reliability of Financial Reporting	0.274	4.118	0.000	Significant effect
AI Adoption Level (Moderating) × Distress Prediction → Reporting Reliability	0.351	5.446	0.000	Moderating effect strengthens model
Firm Size (Control Variable) → Reporting Reliability	0.127	2.031	0.044	Mild but significant effect
Leverage (Control Variable) → Reporting Reliability	–0.092	–1.811	0.073	Not significant
R^2 Model 1	0.428	—	—	Distress prediction explains 42.8% of reporting reliability
R^2 Model 2 (with Moderation)	0.563	—	—	Moderation boosts explanatory power to 56.3%
ΔR^2	0.135	—	—	13.5% improvement due to moderating effect

The results demonstrate that AI-powered financial risk analytics produces meaningful improvements in both financial distress prediction and financial reporting reliability. The first model indicates that distress prediction generated by AI has a strong and statistically significant effect on reducing financial distress ($\beta = 0.462$; $p < 0.001$) and improving reporting reliability ($\beta = 0.318$; $p < 0.001$), reaffirming that AI models particularly deep learning algorithms enable firms to identify financial risk patterns earlier and more precisely. AI adoption level further enhances reporting reliability ($\beta = 0.274$; $p < 0.001$), confirming that firms that integrate AI more extensively into financial control systems benefit from higher transparency, efficient validation, and reduced human error. Most importantly, the moderating role of AI adoption significantly strengthens the predictive effect of AI-powered distress analytics on the reliability of financial reporting ($\beta = 0.351$; $p < 0.001$). The improvement of explanatory power from 42.8% to 56.3% ($\Delta R^2 = 0.135$) confirms that AI does not only predict risk but reinforces reporting integrity when widely embedded within financial governance. These findings collectively validate the argument that AI-based systems create synergistic effects—predicting potential corporate failures while simultaneously improving the transparency, accountability, and precision of financial disclosure.

Discussion

The empirical results of this study confirm that AI-powered financial risk analytics plays a significant role in improving both financial distress prediction and the reliability of financial reporting in Indonesian public companies. These findings align with the growing body of research showing that machine learning (ML) and deep learning (DL) outperform conventional statistical models in evaluating corporate financial health and risk. In the Indonesian context, where capital markets are highly sensitive

to macroeconomic fluctuations and governance issues, the ability to predict distress early and support transparent financial reporting is crucial for maintaining investor trust and safeguarding long-term firm value. The strong statistical effect observed in both regression models of this study strengthens the argument that AI should be positioned not merely as a technological support tool but as a strategic mechanism for comprehensive financial governance.

The results demonstrate that AI-powered distress prediction significantly reduces financial distress probability among Indonesian public companies. This aligns with previous studies, which show that algorithms such as Random Forest, XGBoost, LSTM, and ANN deliver a higher degree of prediction accuracy 91% to 96% compared with traditional models, particularly when applied to firms listed on the Indonesia Stock Exchange (Kristanti et al., 2024; Rahayu & Khairunnisa, 2025; Rahayu & Suhartanto, 2020; Alamsyah et al., 2021; Kristanti & Dhaniswara, 2023; Nur & Panggabean, 2019). Traditional distress models often assume linear relationships between financial ratios and bankruptcy risk, making them insufficient when market dynamics are driven by nonlinear interactions, sentiment-driven fluctuations, and sudden shocks. In contrast, advanced AI models incorporate complex feature extraction capabilities that allow them to detect subtle patterns within large and high-dimensional data. The findings indicate that indicators such as interest coverage ratio, operating margin, ROA, and cash flow tend to be consistently selected as top features by AI algorithms—reinforcing evidence from prior research that these variables serve as early warning signals for bankruptcy risk.

AI's advantage in predicting financial distress can also be analyzed from a behavioral and governance standpoint. Indonesian public companies often face delayed responses to deteriorating financial conditions, partly due to manual monitoring, fragmented reporting systems, and the latency of accounting disclosures. AI models overcome these challenges by running continuous time-series analysis, detecting anomalies in real time, and signaling risk exposure well before financial statements officially reveal weaknesses. In line with previous studies, the findings of this research support the conclusion that AI enables firms to transition from reactive risk management to preventive and predictive strategies (Kristanti et al., 2024; Rahayu & Khairunnisa, 2025). Such predictive capabilities are particularly relevant in Indonesia's volatile sectors such as manufacturing, mining, and energy where external shocks can escalate quickly into insolvency without proper risk surveillance.

Beyond distress prediction, the results of this study reinforce the assertion that AI improves financial reporting reliability. The strong statistical relationship shows that companies deploying analytic automation tools produce more accurate and dependable financial disclosures. This supports the findings of Maspul & Putri (2025) and Hargyatni et al. (2024), who argue that AI increases reporting quality by automating validation, detecting anomalies, and minimizing human error. From an internal control perspective, AI systems act as continuous auditors that track inconsistencies in journal entries, identify fraud indicators, and compare transactional data across multiple systems. Given the complexity and scale of corporate transactions in public companies, AI reduces the probability of material misstatement and the risk of fraudulent reporting that could mislead investors and regulators. The improvement in reporting quality found in this study also suggests that AI supports compliance with regulatory frameworks and reinforces corporate accountability.

However, the study also shows that the magnitude of AI's effects is not uniform across all companies. This supports the argument that successful adoption depends on organizational and technological readiness rather than technology alone. Even though AI provides technical capabilities, optimal output is only achieved in firms that maintain consistent data governance, invest in capable IT infrastructure, and integrate AI within decision-making structures. This reflects insights from Maspul & Putri (2025) and Hargyatni et al. (2024), both of whom highlight that challenges such as data quality, high implementation cost, bias risk, and shortages in AI-oriented talent must be managed for AI systems to function effectively. Thus, while AI increases reporting accuracy and predictive performance, firms that lack high-quality structured data or strong oversight still risk generating unreliable or biased outcomes.

The moderating effect captured in this study further highlights that broader AI adoption within financial governance amplifies the value derived from distress prediction models. Companies that embed AI deeply in risk management, internal control, and financial reporting gain exponentially more benefits from predictive analytics than those that use AI superficially or for isolated tasks. This finding reinforces the notion that AI is not merely an analytical tool but a systemic governance mechanism. When AI is integrated into internal audit cycles, fraud detection frameworks, scenario-based forecasting, and regulatory reporting functions, the financial health and transparency of the firm evolve in tandem. This aligns with the idea that AI does not simply improve prediction accuracy but improves organizational behavior by strengthening discipline, accountability, and data-driven decision-making.

The Indonesian context also adds unique insight to global discourse. Indonesia is a developing capital market with rapidly increasing public investor participation but still faces persistent issues of asymmetric information, weak disclosure culture, and occasional corporate scandals. The results of this study imply that AI can serve as a stabilizing force for corporate credibility in such environments. Firms that leverage AI not only protect themselves from bankruptcy but also convey strong signals of integrity and professionalism. In line with stakeholder theory, AI-enabled transparency increases investor confidence, which in turn supports stock price stability and reduces the risk premium demanded by the market. As public investors in Indonesia become increasingly sophisticated, demand for trustworthy financial statements and proactive risk management continues to grow making AI adoption a competitive necessity rather than an optional innovation.

While the findings provide strong empirical evidence, they also point to directions for organizational development and future research. The fact that leverage showed no significant effect in the model reveals that traditional indicators of financial risk may be losing predictive power in AI-driven frameworks. More dynamic markers such as cash flow volatility, real-time liquidity, and operational sentiment may provide a more relevant basis for distress monitoring in the digital era. Furthermore, the study suggests that financial reporting reliability will increasingly be determined by the intersection of data science, internal audit, and corporate governance rather than accounting alone. Future scholarly inquiry could examine how advanced technologies such as blockchain, NLP-driven reporting automation, and federated learning may enhance AI's contribution to financial integrity.

Taken together, the evidence confirms that AI-powered financial risk analytics is not only effective but transformative for Indonesian public companies. It simultaneously improves financial distress prediction and strengthens financial reporting reliability two pillars that are fundamental to corporate survivability and investor trust. The synergistic outcomes found in this study resonate with the literature and empirical patterns in Indonesian capital markets: AI models for risk prediction safeguard firms operationally, while AI-driven transparency safeguards them reputationally. Although implementation barriers remain, the long-term benefits clearly outweigh the costs for firms that are committed to technological maturity and financial governance reform.

CONCLUSION

This study concludes that AI-powered financial risk analytics plays a crucial dual role in strengthening financial governance among Indonesian public companies by significantly improving financial distress prediction and enhancing the reliability of financial reporting. The findings demonstrate that machine learning and deep learning models—such as Random Forest, XGBoost, LSTM, and ANN—enable more accurate and early identification of potential financial failure compared with traditional methods, allowing companies to adopt preventive rather than reactive risk-management decisions. At the same time, the integration of AI into financial reporting processes increases reporting accuracy, transparency, and timeliness through automated validation and real-time anomaly detection, thereby reinforcing investor confidence and regulatory compliance. Overall, the research verifies that the implementation

of AI-powered analytics not only safeguards firms operationally by preventing bankruptcy risk but also reputationally by improving the integrity of financial disclosures, positioning AI as a strategic necessity for strengthening corporate financial health and accountability in Indonesia's increasingly dynamic capital market.

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