*American International Journal of Business Management (AIJBM)*
*ISSN- 2379-106X, www.aijbm.com Volume 8, Issue 12 (December - 2025), PP 126-135*

# Antecedence of Due Diligence and its Effect on Money Laundering Risk Judgment

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**ABSTRACT***: This study examines the effects of training and technology dependency on Customer Due Diligence (CDD), as well as the impact of CDD on money laundering risk judgment among bank officers in Pekanbaru City, Indonesia. A quantitative method was used, which entailed the distribution of questionnaires to 120 bank branches, with a total target of 240 respondents. Of the questionnaires distributed, 92 were returned, and 81 of these were deemed valid for analysis. The collected data were then subjected to rigorous analysis using Structural Equation Modeling (SEM) with SmartPLS 4.0, a software designed to facilitate the study of complex data structures. The findings indicate that training and technology dependency exert a positive and significant influence on CDD, and CDD, in turn, demonstrates a positive and significant impact on money laundering risk judgment. These findings suggest that enhancing the quality of training and optimizing technology utilization can strengthen the implementation of CDD, which, in turn, can lead to more accurate and practical risk assessments to prevent money laundering.*

**KEYWORDS -** *Bank Officers, Customer Due Diligence, Money Laundering Risk Judgment, Technology Dependency, Training*

## I. INTRODUCTION

It has long been acknowledged that money laundering is one of the most pervasive illicit activities in the world. It presents significant risks to economic expansion, governance, and financial stability. The growing number of money laundering cases worldwide has raised concerns about the need for increased accountability and transparency among workers in both the public and private sectors. Money laundering poses a dire threat to the banking sector, which is crucial to financial transactions. To conceal their illicit origins, this process typically entails introducing illegal funds into the banking system, transferring them through several accounts, and incorporating them into legal financial flows (Arnone & Borlini, 2010). Such actions not only damage financial institutions' reputations but also exacerbate political unrest and impede long-term economic growth.

As in many other countries, the Republic of Indonesia continues to struggle with money laundering. Despite the enactment of Law No. 15 of 2002 concerning the Crime of Money Laundering and subsequent revisions through Law No. 25 of 2003, Law No. 11 of 2004, and Law No. 8 of 2010, international reports such as the International Narcotics Control Strategy Report (INCSR) still identify Indonesia as a key money laundering jurisdiction in the Asia-Pacific region. This persistent challenge underscores the inadequacies in internal oversight within financial institutions and the necessity for a more robust regulatory framework. In response to these developments, the Indonesian government established the Financial Services Authority (OJK) to supervise and regulate financial services comprehensively. The Indonesian Financial Services Authority (OJK) has implemented several initiatives, including POJK No. 12/POJK.01/2017 concerning the implementation of risk management, to enhance anti-money laundering (AML) and counter-terrorism financing programs. Furthermore, PPATK fulfills the role of Indonesia's Financial Intelligence Unit (FIU), entrusted with the responsibility of receiving, examining, and disseminating information regarding suspicious financial transactions to the appropriate law enforcement agencies.

The magnitude of this problem is evident in the increasing number of Suspicious Financial Transaction Reports (LKP) submitted by banking institutions and non-banking entities to the Financial Transaction Reports and Analysis Center (PPATK). From 2022 to early 2024, a total of 127,000 reports were submitted by banking institutions alone, thereby underscoring the pervasive use of financial institutions as intermediaries for illicit activities. These figures demonstrate that criminals exploit institutional infrastructure and individual actors both inside and outside banks to facilitate money laundering. Consequently, financial institutions are obligated to implement robust measures to effectively detect, monitor, and report suspicious transactions.

Two fundamental approaches have emerged as key to ensuring compliance with the standards set by Anti-Money Laundering (AML) regulations: the utilization of technological solutions and the implementation of comprehensive employee training programs. Advancements in financial technology (Fintech) have empowered financial institutions to construct automated monitoring systems, integrate voluminous data sets, and employ

machine learning algorithms to discern anomalies in financial transactions (Pratama et al., 2023). However, it is imperative to acknowledge that technological capabilities alone are inadequate to ensure the optimal functioning of these systems without the requisite human oversight. The implementation of ongoing training programs is imperative to ensure that bank employees possess the requisite knowledge and skills to identify suspicious activity, comprehend Anti-Money Laundering (AML) policies, and adhere to regulatory guidelines with consistency. Training has been demonstrated to enhance awareness and cultivate capacity. Consequently, this approach ensures that employees possess the capacity to interpret complex transaction patterns and make informed decisions.

Another critical component of Anti-Money Laundering (AML) compliance is Customer Due Diligence (CDD). This process necessitates that financial institutions verify the identities of their customers, assess the purpose of transactions, and monitor activities to ensure they align with the customer profile. CDD functions as an effective risk management instrument, serving to prevent financial institutions from being exploited for illicit financial transfers. By implementing CDD with rigidity, financial institutions can mitigate risks associated with high-risk customers and enhance their capacity to identify suspicious transactions. The integration of training, technology utilization, and CDD establishes a comprehensive framework for combating money laundering.

The objective of this study is to examine the effect between these three variables. Specifically, the present study examines the effect of training and technology utilization on customer due diligence (CDD), and the subsequent influence of CDD on banking professionals' money laundering risk assessments. In contrast to previous research, which has focused on a single variable, this study employs a more comprehensive approach by integrating various aspects of AML compliance. This integration enables a more nuanced understanding of how institutional practices and employee capabilities interact to influence risk assessments.

Theoretically, this study relies on frameworks developed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO, 2013), the Basel Committee on Banking Supervision (BCBS, 2012), Arens et al. (2020), and guidelines from the *Otoritas Jasa Keuangan* (OJK) (2021). These sources underscore the importance of internal control, effective supervision, audit practices, and risk management in protecting financial institutions from money laundering threats. It is imperative to align the research model with these recognized frameworks to ensure conceptual validity and practical significance.

This study has three objectives: first, to analyse the impact of training on customer due diligence (CDD); second, to investigate how technology adoption impacts CDD; and third, to evaluate the effect of CDD on money laundering risk assessment. The objective of this study is to provide empirical evidence to underpin the integration of training and technology into CDD practices. The ultimate goal of this integration is to enhance the accuracy of risk assessments conducted by bank officers.

This study has two primary objectives. From an academic perspective, this contribution significantly enhances the existing literature on AML compliance. The study presents a comprehensive model that combines training, technology, and CDD, offering a multifaceted approach to addressing this critical issue. In practice, this study provides insights for policymakers, regulators, and financial institutions in creating effective strategies to strengthen AML frameworks. The study emphasizes the significance of employee training and technological infrastructure, underscoring the necessity for sustained investment in human resources and technology to maintain the integrity of the banking sector. The objective of this research is to establish a foundation for developing more accurate and effective risk assessments, thereby assisting in the prevention and eradication of money laundering activities in Indonesia.

## II. LITERATURE REVIEW

### 2.1. Theoretical Review

#### 2.1.1. Pentagon Fraud Theory

Money laundering is a widespread financial crime that harms economic stability and trust in institutions. The Pentagon Fraud Theory (Crowe, 2011) is a complete explanation of why people commit fraud. It focuses on five main parts: opportunity, pressure, rationalization, competence, and arrogance. This theory builds on the Fraud Triangle and the Fraud Diamond. These earlier theories emphasize how psychological traits and systemic vulnerabilities work together to facilitate fraud. In the banking sector, these components are critical. Not having enough rules to control what happens in a company, and having a lot of complicated transactions, can lead to people acting unethically.

#### 2.1.2. PPATK

In Indonesia, the establishment of the *Pusat Pelaporan Analisis Transaksi Keuangan*-PPATK (Financial Transaction Reports and Analysis Center- INTRAC) demonstrates its compliance with international standards set by the Financial Action Task Force (FATF). PPATK is a Financial Intelligence Unit (FIU), meaning it is responsible for analyzing suspicious transactions and supporting law enforcement. Its role demonstrates the importance of multi-agency cooperation in combating money laundering.

### 2.1.3. Money Laundering Risk Judgment

The Money Laundering Risk Judgment (MLRJ) concept is grounded in judgment and decision-making (JDM) theory, which examines how individuals assess risk under uncertainty. Within the AML framework, MLRJ denotes a compliance officer's ability to discern suspicious patterns, implement regulatory guidelines, and reach informed decisions. The 2013 Financial Action Task Force (FATF) guidelines establish a set of risk indicators. However, implementing these indicators necessitates a synthesis of technical expertise and cognitive judgment.

### 2.1.4. Technology Dependency

It is essential to understand how technology reliance is a crucial factor in Anti-Money Laundering (AML) compliance. Advances in financial technology (RegTech) enable automatic monitoring, identity verification using biometric data, and analysis of large volumes of data (Pratama et al., 2023; Yahya, 2023). These tools make things more efficient, but they also create new risks. This means that schools and other institutions have to balance creating new stuff with following the rules. Integrating technology into the CDD process can improve effectiveness and reduce risks.

### 2.1.5. Training

Sinaga et al. (2021) explain that training is a planned process that helps employees perform their jobs more effectively by improving their knowledge, skills, and attitudes. This helps them perform their jobs effectively and efficiently in accordance with the company's standards. This definition shows that training has two important roles. It helps people develop and helps them do their best work. It also helps people apply their skills to achieve the organization's goals.

### 2.1.6. Customer Due Diligence

Finally, Customer Due Diligence is the process of identifying, verifying, and monitoring customers. A Financial Service Provider (FSP) conducts this process to ensure that transactions align with the profiles, characteristics, and transaction patterns of prospective customers, existing customers, or Walk-in Customers (WIC). The CDD process includes Enhanced Due Diligence (EDD) for high-risk individuals, such as those with Political Exposure (PEP). The goal of EDD is to prevent illegal financial activities across all customer categories. (Ononiwu et al., 2024) say that CDD practices must change to meet international standards and local regulatory requirements, especially in high-risk sectors such as banking.

## 2.2. Hypothesis Development

### 2.2.1. The Effect of Training on Customer Due Diligence

To help customers understand their finances and stay safe online, banks should regularly teach their employees about financial crime. In each session, employees learn about how money laundering works and the best ways to handle it.

This training program is designed to help you follow the Know Your Customer (KYC) and Customer Due Diligence (CDD) principles in an organized way. Banks use the Know Your Customer (KYC) guidelines to verify their customers' identities. They do this by checking official documents and other sources. They then use the Customer Due Diligence (CDD) process to do a more complete risk assessment. This includes activity profiles, account purposes, and transaction pattern monitoring. Each step in the verification process is reinforced to make sure that everything is thoroughly checked. This helps us find and fix any problems early on. (Bunga Ichwanda Solikha & Anas Firman Adi, 2025).

Therefore, training is expected to have a positive, significant effect on CDD by enhancing the precision, consistency, and reliability of customer risk assessments. Based on the above discussion, the following hypothesis is proposed:

H1: Training has a positive and significant effect on Customer Due Diligence

### 2.2.2. The Effect of Technology Dependency on Customer Due Diligence

To facilitate the prevention of money laundering, it is imperative first to develop the requisite technological infrastructure. Gaviyau & Sibindi (2023) found that financial technology (FinTech) companies consistently face regulatory uncertainty in areas such as electronic Know Your Customer (eKYC), onboarding, and Customer Due Diligence (CDD).

This phenomenon is partly attributable to the fact that many FinTech companies are not subject to the same regulatory framework as other companies. These companies utilize technological resources and frequently operate in multiple locations. As Navaretti et al. (2017) have noted, this regulatory arbitrage has significant ramifications for financial regulation and policy.

This arbitrage necessitates a flexible framework capable of accommodating novel concepts without compromising compliance standards. Technology provides the tools and systems necessary to implement CDD procedures quickly and accurately. CDD provides the regulatory context in which technology can operate.

Thus, technology dependency is expected to positively and significantly influence CDD, as it provides the infrastructure necessary for accurate and efficient compliance. Based on the above discussion, the following hypothesis is proposed:

H2: Technology Dependency has a positive and significant effect on Customer Due Diligence

### 2.2.3. The Effect of Customer Due Diligence on Money Laundering Risk Judgment

Recent studies have emphasized the need for continuous improvement and appropriate use of CDD to combat money laundering (Yusoff et al., 2023). As financial systems become increasingly digital and interconnected, the risks associated with illicit transactions also undergo evolution. Consequently, organizations are obliged to periodically revise their CDD frameworks to remain current with novel threats, legislative developments, and emergent technologies.

A dynamic approach to CDD has been demonstrated to facilitate institutional robustness and responsiveness to novel threats, while ensuring adherence to national and international standards. When implemented comprehensively and consistently, CDD enhances an institution's ability to identify high-risk customers, monitor suspicious activity, and take preventative action. Consequently, enhancing CDD practices is a strategic imperative for financial institutions committed to safeguarding their operations and contributing to the overarching anti-money laundering framework.

Therefore, CDD is expected to have a positive and significant effect on MLRJ, as it enhances the accuracy and reliability of risk assessments. Based on the above discussion, the following hypothesis is proposed:

H3: Customer Due Diligence (CDD) has a positive and significant effect on Money Laundering Risk Judgment

Based on the previous discussion, the conceptual framework of this study can be depicted as follows:

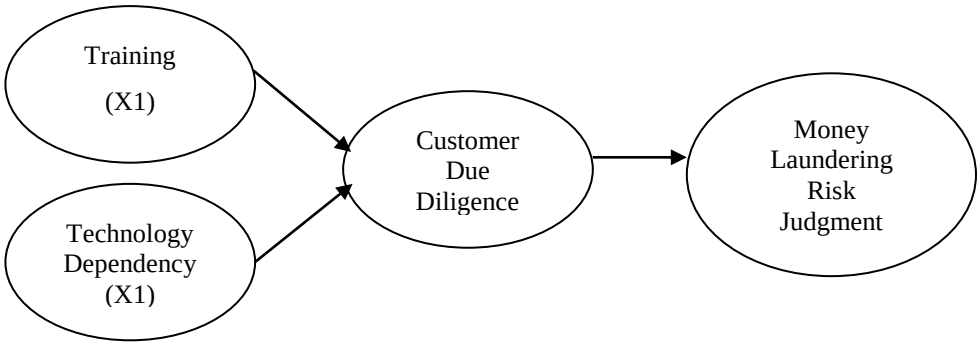


**Figure 1. Conceptual Framework**

## III. METHOD

This study used a quantitative research design, employing a survey, to examine the impact of training and reliance on technology on Customer Due Diligence (CDD). It also examined the subsequent effects of CDD on money laundering risk assessments among bank officials. A quantitative design was chosen because it allows for the measurement of relationships between variables using numerical data and statistical analysis. This provides objective evidence to test the proposed hypotheses.

The study population included bank employees and decision-makers in Pekanbaru City who are directly involved in assessing the risk of money laundering. This group includes people who work in the compliance unit, AML analysts, risk management officers, and bank executives responsible for overseeing the implementation of anti-money laundering (AML) strategies.

Due to the limited availability of precise data regarding the number of bank officials in Pekanbaru, a purposive sampling technique was employed to ensure that the respondents met specific criteria relevant to this study. Two questionnaires were disseminated to each of the 120 bank branches operating in Pekanbaru, yielding a total of 240 targeted respondents. Of these, 92 questionnaires were returned, and after validation, 81 were deemed suitable for analysis. This sample size is considered sufficient for Structural Equation Modeling (SEM) analysis using Partial Least Squares (PLS).

Primary data were collected through a structured questionnaire administered to bank officers. The questionnaire items were structured based on internationally recognized frameworks, including COSO (2013), BCBS (2012), Arens et al. (2020), and OJK regulations (2021). These sources played a crucial role in ensuring the instrument demonstrated theoretical validity and regulatory relevance.

The data analysis was carried out using Structural Equation Modeling (SEM) with a Partial Least Squares (PLS) approach, implemented through SmartPLS 4.0 software. The selection of SEM-PLS was made

based on its suitability for predictive causal modeling, its capacity to manage small sample sizes, and its ability to estimate advanced models with multiple constructs and indicators (Hair et al., 2019).

## IV. RESULTS AND DISCUSSION

### 4.1. Descriptive Statistics

This study explores the role of money laundering risk judgment, training, technology dependency, and customer due diligence. The following are descriptive statistics for each variable in this study.

**Table 1. Descriptive Statistics for Variable**

| Var. | Indicator | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|---|
| Training | X1.1 | 81 | 3 | 7 | 5.580 | 1.216 |
| | X1.2 | 81 | 3 | 7 | 5.741 | 1.163 |
| | X1.3 | 81 | 4 | 7 | 5.815 | 1.090 |
| Technology | X2.1 | 81 | 3 | 7 | 5.568 | 1.110 |
| Dependency | X2.2 | 81 | 1 | 7 | 5.469 | 1.134 |
| | X2.3 | 81 | 1 | 7 | 4.346 | 1.860 |
| | X2.4 | 81 | 2 | 7 | 5.383 | 1.348 |
| | X2.5 | 81 | 2 | 7 | 5.210 | 1.194 |
| Customer | Z.1 | 81 | 2 | 7 | 5.173 | 1.205 |
| Due | Z.2 | 81 | 1 | 7 | 4.840 | 1.494 |
| Diligence | Z.3 | 81 | 1 | 7 | 5.160 | 1.222 |
| | Z.4 | 81 | 2 | 7 | 5.073 | 1.222 |
| | Z.5 | 81 | 2 | 7 | 5.185 | 1.218 |
| MLRJ | Y.1 | 81 | 2 | 7 | 5.778 | 1.186 |
| | Y.2 | 81 | 2 | 7 | 5.222 | 1.379 |
| | Y.3 | 81 | 2 | 7 | 5.074 | 1.225 |
| Valid N | | 81 | | | | |

As shown in Table 5.2, the minimum score attained by respondents for each Training indicator (X1) was 3, and the maximum score was 7. For all three indicators, the mean scores exceeded their respective standard deviations. This finding implies that respondents generally provided consistent and positive responses, indicating a broadly shared perception that AML training is relevant, frequent, and effective. The calculated standard deviation is relatively low, indicating that the data are not significantly spread out and, instead, are concentrated around the mean.

For each Technology indicator (X2), the minimum score attained by respondents was 1, while the maximum score was 7. A visual examination of the data indicates that all indicators had mean scores exceeding their standard deviations. This finding suggests that respondents tend to respond consistently and that there is consensus among them regarding the use of technology in AML procedures. However, X2.3 displays a divergent pattern, as indicated by its standard deviation (1.860), which is considerably higher than the mean (4.346). This finding suggests greater variability in responses. This phenomenon may be indicative of varying levels of database integration across various agencies or roles.

For each indicator in the Customer Due Diligence (Z) category, the minimum attainable score is 1, and the maximum is 7. It is evident that all indicators have means that exceed their standard deviations. This finding suggests that the responses are relatively centered and reliable. However, Z.2 exhibited the lowest mean and the highest deviation. This finding suggests that public perception of the implementation of KYC principles is more varied.

In conclusion, for each indicator in the Money Laundering Risk Assessment (Y), the lowest possible score is 2, and the highest possible score is 7. All indicators demonstrate a mean value that exceeds one standard deviation above their respective means. This finding suggests that respondents generally concur on their capacity to recognize suspicious patterns and implement Anti-Money Laundering (AML) procedures. The responses do not exhibit significant dispersion, and the officers' capacity to make sound judgments is regarded as being consistent across the various groups.

### 4.2. Hypothesis Test Result

The hypothesis of this study was formulated based on a p-value less than 0.05, with a significance level of 5%. This was done to ascertain the direct effect of the independent variable on the dependent variable.

**Table 2. Path Coefficient**

| Variable | Original Sample (O) | Sample Mean (M) | Std. Deviation (STDEV) | T Statistics (O/STDEV) | P Values | Info. |
|---|---|---|---|---|---|---|
| Training – CDD | 0.417 | 0.410 | 0.115 | 3.633 | 0.000 | Ha1 |
| IT – CDD | 0.341 | 0.361 | 0.144 | 2.372 | 0.018 | Ha2 |
| CDD – Y | 0.294 | 0.333 | 0.102 | 2.894 | 0.004 | Ha3 |

Based on Table 2 above, it can be explained as follows:

(1) Ha1: Training has a positive and significant effect on Customer Due Diligence.

As shown in Table 3, the p-value is 0.000 < 0.05, indicating significance at the 5% level. The initial sample value (estimate) is 0.417, which suggests a 42% positive impact of training on customer due diligence. This finding confirms the hypothesis Ha1, which proposes that training enhances customer due diligence, as **accepted**.

(2) Ha2: Technology Dependency has a positive and significant effect on Customer Due Diligence.

As displayed in Table 3, the p-value obtained is 0.018 < 0.05 with a significance level of 5%. The original sample value (estimate) is 0.341, indicating a 34% positive effect of technology dependency on customer due diligence.

This means that the hypothesis Ha2, which states that technology dependency has a positive and significant influence on customer due diligence, is **accepted**.

(3) Ha3: Customer Due Diligence has a positive and significant effect on Money Laundering Risk Judgment.

As displayed in Table 3, the p-value obtained is 0.004 < 0.05 with a significance level of 5%. The original sample value (estimate) is 0.294, indicating a positive effect of 29% on customer due diligence on money laundering risk judgment.

This means that the hypothesis Ha3, which states that customer due diligence has a positive and significant influence on the judgment of money laundering risk, is **accepted**.

### 4.3. Discussion

#### 4.3.1. Training and Customer Due Diligence

The findings indicate that training had a substantial and statistically significant impact on CDD. This finding addresses the initial research question by substantiating that structured AML training enhances employees' job performance. The elevated mean score for training indicates that respondents perceive the training as pertinent and recurring. This perspective aligns with the findings of Bustami (2015) and Bahrin et al. (2022). The argument is made that training enhances employee skills and improves AML systems. In practice, continuous training ensures that employees possess the capacity to identify suspicious transactions and correctly execute CDD procedures. This helps enhance the company's resilience against money laundering activities.

4.3.2. Technology Dependency and Customer Due Diligence

The second hypothesis is verified, suggesting that dependence on technology influences CDD to a considerable extent. This study's findings demonstrate the efficacy of digital tools, including eKYC systems, automated monitoring, and RegTech solutions, in enhancing the effectiveness of compliance processes. While the observed effect size is moderate, the findings indicate that technology is a substantial factor contributing to CDD. A mean score suggests that while technology is available, its utilization is not uniformly distributed across institutions. This notion is further substantiated by the findings of Kurum (2023) and Gaviyau & Sibindi (2023). The debate surrounding technology adoption centers on the claim that it can enhance efficiency. However, the crux of the argument lies in the necessity of consistent utilization. In practice, financial institutions must ensure that technology is not only accessible but also straightforward for the public to utilize. This will maximize its impact on CDD.

#### 4.3.3. Customer Due Diligence and Money Laundering Risk Judgment

The third hypothesis indicates that CDD significantly affects MLRJ. This finding contributes to the primary research question by showing that detailed CDD practices are essential for conducting reliable risk judgment. The findings indicate that while CDD is widely implemented, there is still room for enhancement. This finding aligns with the observations reported by Christian et al. (2019) and Yusoff et al. (2025). It was noted that a well-defined plan enhances the efficacy of decision-making processes for detecting fraud and

complying with Anti-Money Laundering (AML) regulations. The low $R^2$ value for MLRJ indicates that assessments are complex and influenced by multiple external factors, including intuition, regulatory pressure, and organizational culture. However, the substantial impact of CDD suggests that it plays a pivotal role in determining risk assessments.

## V. CONCLUSION

### 5.1. Conclusions

This study explores the impact of training and technology dependency on Customer Due Diligence (CDD). It also assesses the impact of CDD on the judgment of money laundering risk among bank officers in Pekanbaru City. The findings support all three proposed statements. Firstly, the effect of training on CDD has been demonstrated to be positive and significant. This suggests that structured, ongoing AML training improves employees' ability to identify, verify, and assess customer risk. Secondly, the reliance on technology has been demonstrated to have a positive and significant impact on CDD. This suggests that the utilization of digital systems, such as eKYC, transaction monitoring, and RegTech solutions, enhances the efficiency and accuracy of customer verification and risk assessment. Thirdly, CDD has been demonstrated to have a positive and significant impact on the effectiveness with which the public can assess money laundering risk. This finding indicates that, if CDD procedures are implemented systematically, they have the potential to establish a foundation for more precise and reliable risk assessments. This study suggests that enhanced training and technology are associated with improved CDD quality. This, in turn, assists the public in making more accurate assessments of money laundering risk. Consequently, we can promote institutional integrity and adherence to Anti-Money Laundering (AML) regulations.

### 5.2. Limitations and Suggestions

However, this study's scope is limited in its failure to address several salient issues. First, respondents may have engaged in dishonesty when completing the self-report questionnaire. This phenomenon may result in response bias, whereby respondents tend to overestimate or underestimate their capabilities. Secondly, this study exclusively focuses on training, technology, and CDD. This study overlooked significant factors, including organizational culture, regulatory frameworks, and the company's decision-making processes. Thirdly, this study was conducted exclusively in the city of Pekanbaru. This may limit the extrapolation of the findings to other regions with different economic conditions, regulatory environments, and institutional practices.

Future research should utilize a variety of data types, integrating survey responses with objective data sources such as system logs, audit reports, or suspicious transaction records. Furthermore, combining interviews and observations can serve to mitigate bias. To enhance our understanding of individuals' assessment of money laundering risk, it is imperative to incorporate additional variables into our models. These variables may potentially encompass elements such as organizational support, the efficacy of law enforcement, or individual cognitive factors. In the future, additional research is necessary to encompass a broader range of cities, diverse banking institutions, and a more extensive spectrum of employment levels. This methodological approach is expected to enhance the representativeness and validity of the results obtained. This will facilitate a more profound comprehension of the mechanisms through which AML compliance is reinforced and the efficacy of risk assessment in the banking sector.

**ACKNOWLEDGEMENTS**

An acknowledgement section may be presented after the conclusion, if desired.

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