NAVIGATING COMPLIANCE: REGULATORY TECHNOLOGY'S ROLE IN ANTI-MONEY LAUNDERING IN INDONESIA BANKING

The financial sector system is unlawfully used for money laundering, which causes massive losses for the state and country. An essential component of successfully combating money laundering is regulatory technology (RegTech). This study aims to investigate the impact of implementing Electronic Know Your Customer (e-KYC), transaction monitoring (TM), cost and time efficiencies (CTE), regulatory compliance (RC), and technology information infrastructure (ITI), in money laundering preventing (MLP) in the banking sector in Indonesia. A quantitative method is used to explore the interplay of variables. The research sample consists of 50 owners of BRI Link agents. Data analysis is conducted using a linear regression model. The study's findings underscore the significant influence of TM, CTE, RC, and ITI on the effectiveness of PML, with CTE emerging as the most influential driver. Despite a moderately positive correlation among these factors, the e-KYC provided by regulatory technology (RegTech) does not exert a substantial impact on MLP. The implications of this research suggest that the adoption of RegTech, positively contributes to MLP efforts in banking institutions, highlighting the importance of utilizing technology and regulations to enhance Anti Money Laundry (AML) measures.
Keywords: regulatory technology; money laundering; preventing; banking
JEL: M40, M41

1. Introduction

The act of using cash to enable the blending of legal and illicit funds in order to conceal the source of these funds is known as money laundering, a crime that has spread around the world (Kurniawan, 2023). This phenomena happens in tandem with the rise in global trade, the development of the financial system, the lowering of obstacles to financial transactions, and global travel. Financial institutions are the primary tool used by money launderers to clean up their proceeds (Ofoeda, Agbloyor and Abor, 2024).

As digitization becomes imperative across industries, the rapid advancement of technology compels the financial sector to adapt. The rising prevalence of "digital customers" necessitates a shift in products and services to meet evolving demands. This is leading to the introduction of new businesses, financial products, and instruments with cutting-edge technology (Machkour and Abriane, 2020).

RegTech referred to as regulatory technology, is any technology that helps organizations comply with the requirements of regulatory bodies. RegTech solutions help businesses remain abreast of emerging regulations and cybercrime issues. Modern technologies like big data, machine learning, artificial intelligence, and cloud computing have made regulatory compliance easier for businesses to achieve through automated methods that lower the possibility of human error (Teichmann, Boticiu and Sergi, 2022).

Many believe that RegTech holds significant promise for streamlining and enhancing the regulatory compliance process (Yang and Tsang, 2018). An efficient Anti Money Laundering & Prevention of Terrorism Funding (APU-PPT) system requires the application of RegTech, which can assist by offering dependable, safe, and affordable regulatory solutions for the use of digital technology, particularly in FinTech (Zabelina, Vasiliev and Galushkin, 2018; Karsh and Abufara, 2020). RegTech can stop terrorist financing and money laundering by regulating transactions and confirming the identities of its clients (Zabelina, Vasiliev and Galushkin, 2018). RegTech are identified: electronic know your customer (e-KYC), transaction monitoring (TM), and cost and time efficiency (CTE) (Turki *et al.*, 2020).The advent of RegTech, or regulatory technology, is a novel technological solution that may assist an organization's compliance role (Freij, 2020; Singh *et al.*, 2022).

In an attempt to stop money laundering, it is crucial that there are many reports of suspicious financial transactions made to the bank and that RegTech be present to identify risks and financial technology systems. Miller & Rosen (2017) state that legislators still face difficulties in identifying and addressing legislative loopholes and novel money laundering techniques that criminals use, even in the face of domestic rules and law enforcement procedures. The economy and its security may be threatened by money laundering operations. The primary issue is that money laundering undermines the integrity of the financial system, results in a loss of control over an economy's policies, distorts the market, creates investment volatility, and lowers government tax revenues (Chen *et al.*, 2018).

RegTech and the efficacy of MLP in developing country banking sectors, however, have not been the subject of many studies (Turki *et al.*, 2020). Although a lot of research has been done on money laundering, little is known about how it relates to regulatory technology, or RegTech. Certain academics stress that banks need to be aware of their clients' actions, including their business ventures and financial sources. As per the documents provided by the Bank for International Settlement in 2017, the adoption of e-KYC holds promise in mitigating money laundering. Furthermore, (Turki *et al.*, 2020) demonstrated how RegTech might increase the efficacy of MLP by utilizing transaction monitoring factors and cost and time efficiency.

According to Singh et al. (2022), which indicate that employing smart technology solutions can help comply with regulations, minimize risk, and succeed in preventing financial crimes, the use of regtech can help fulfill requirements to comply with laws. Because it may assist in providing regulatory solutions that are dependable, safe, and economical, regulatory technology is crucial for an anti-money laundering system (Karsh and Abufara, 2020). In addition, regulatory technology can reduce the time and expense associated with anti-money laundering actions, according to Turki et al. (2020). RegTech offers integrated security, scalability, adaptability, and automation options.

Regulatory compliance, the adherence to rules, standards, and laws governing organizations and individuals, is crucial not only for ensuring ethical operation and mitigating legal risks but also for its impact on MLP. By complying with regulations, organizations establish robust systems that can help detect and prevent suspicious financial activities, thereby contributing to anti-money laundering efforts. Compliance frameworks often include measures for due diligence, customer identification, and transaction monitoring, which are essential components in identifying and reporting potentially illicit financial transactions. Therefore, regulatory compliance plays a vital role in combating money laundering by fostering transparency, accountability, and effective regulatory oversight within financial systems (Asmawanti *et al.*, 2020; Dewata *et al.*, 2020; Mulya and Fauzihardani, 2022; Wheeler, 2022; Farnham, 2023; Rohma, 2023; Yoland, 2023).

The rapid advancement of information technology (IT) in the globalization era has empowered businesses to expand their market reach and pursue greater profitability, particularly with the emergence of online-based enterprises reliant on technological transactions. In addition to its operational benefits, IT infrastructure (ITI) also plays a significant role in preventing money laundering. ITI enable organizations to implement robust financial monitoring and transaction tracking mechanisms, crucial components of anti-money laundering efforts. Furthermore, ITI encompasses software, hardware, and services within an organization, each contributing to its operational efficiency and effectiveness (Savitri, 2021; Fitria, Nurisnaini Putri and Putri Zahrani, 2022; Pramudya, 2023).

The novelty of this research lies in its approach to examining the joint influence of RC and ITI as predictor factors in preventing money laundering. By analyzing these factors together, the study provides insights into how adherence to regulations and the use of ITI contribute to effective anti-money laundering measures. This holistic approach offers valuable implications for policymakers, regulatory authorities, and financial institutions seeking to enhance their strategies for combating money laundering.

2. Literature Review

2.1 Regulatory Technology

Regulatory technology (RegTech) is defined as a subset of financial technology aimed at efficiently and effectively delivering regulatory requirements. It encompasses technological solutions addressing regulatory compliance, system design, and compliance problems across various sectors (Butler and Brooks, 2018; Weber and Baisch, 2018; Johansson *et al.*, 2019) The word "Regtech" was used to describe the application of innovation and technology to achieve solutions (Silverberg *et al.*, 2016; Anagnostopoulos, 2018; Arner, Barberis and Buckley, 2018). According to (Brody *et al.*, 2017; Neal, 2019), businesses that leverage technology to assist regulatory management and comprehend how regulations are evolving

in conjunction with possible innovation opportunities may find themselves at a competitive advantage in the future. Regtech aids businesses in carrying out their regulatory responsibilities. Companies can control and sustain both financial and non-financial risks with the help of this (Butler and O'Brien, 2019).

According to Baxter (2016), Regtech is the use of technology for regulatory purposes. RegTech is a collection of regulatory technologies that support businesses in adhering to changing legal requirements and offer dependable, secure, and cost-effective ways for financial institutions to increase their productivity (Zabelina, Vasiliev and Galushkin, 2018). Because regulatory assessments of contemporary financial activities are becoming more complex and require automation assistance for analysis, RegTech can assist banks in reducing errors that typically arise in manual processes that impact time and staffing levels (Kurum, 2023).

Developed as a means of assisting the compliance function through improved internal process efficiency (Anagnostopoulos, 2018; Freij, 2020), cooperation with regulators for reporting, and system integration and simplification, RegTech is an information technology (Zabelina, Vasiliev and Galushkin, 2018). RegTech has developed over the period from the 1990s to the present and can be divided into three phases (Fajri and Urumsah, 2023). These are as follows: (1) RegTech 1.0, which concentrated on risk assessment from the 1990s to the 2000s prior to the global crisis in 2008; (2) RegTech 2.0, which concentrated on know your customer (KYC) for AML compliance from the 2010s or after the financial crisis; (3) Beginning in 2018, RegTech 3.0 concentrated on know your data (KYD) in financial crime compliance (FCC) by employing data analytics to identify possible hazards (Teichmann, Boticiu and Sergi, 2022).

Financial regulators' suggestions, which support the use of technology in the AML space to improve institutional cohesion and coherence, gave rise to the RegTech movement (Butler and Brooks, 2018). In order to address financial problems and risks, (Arner, Barberis and Buckley, 2018) highlight the necessity of RegTech due to its ability to help financial institutions adapt to regulatory complexities, manage compliance burdens effectively, and ensure responsiveness to rapidly changing regulations. RegTech provides value to both financial institutions and regulators by facilitating detailed data reporting, analysis, compliance management, and understanding of novel products and transactions.

Anichebe (2020) and Yuen (2018) agree that these regulatory technologies should be developed and used in order to comply with AML/CFT legislation. According to Meiryani et al. (2023), RegTech is still crucial for successfully reducing money laundering. A regulatory framework that considers cryptocurrency assets has been developed gradually in accordance with suggestion 15, and it is presently in use in Malta (Buttigieg *et al.*, 2019). Nonetheless, a number of developing nations continue to lag behind and admit the presence of emerging hazards and regulatory arbitrages (Anichebe, 2020).

2.2 Know-Your-Customer (KYC)

The term "Know Your Customer" (KYC) describes the process by which a commercial bank verifies the identity, background, and other details of a potential or existing customer's source of wealth. It is a straightforward yet effective expression in the financial industry. Commercial banks may manage risks more responsibly thanks to KYC standards, which help them get to know and understand their clients and financial operations better (Batan, 2021). By providing banks with information, KYC can be a useful tool for risk assessment (Chen, 2020). By implementing KYC, banks can help lower threats including money laundering, terrorist financing, and financial fraud (Kurniawan, 2023).

The KYC describes a series of thorough procedures that banks, credit unions, retailers, and other businesses must follow regarding clients before conducting business with them. The purpose of these procedures is to prevent identity theft. Card fraud and application fraud are two types of scams caused by identity fraud. As KYC regulations are established and regulated by government organizations, these regulations often become crucial components in company management (Pratt, 2022).

An effective KYC framework requires four key components to succeed. First, to determine identity authenticity, customer identification uses various procedures, including multifactor authentication and verification of official documents. Second, with rule-based detection services tailored to prevent false positives, customer orientation must be effective in allowing real customer activities while blocking potential fraud. Third, transaction monitoring requires checking millions of data points, comparing payment details with stolen credit card information, and identifying gaps in patron behavior. Lastly, to combat fraudsters attempting to circumvent KYC regulations or create new techniques, sustainable risk management is required (Pratt, 2022).

Chen et al. (2018) state that there are various facets of KYC that can help lessen the issue of money laundering. When used in anti-money laundering, regtech typically supports antiquated IT systems, enhances risk mitigation, and modernizes KYC procedures (Vaithilingam, Nair and Thiyagarajan, 2015). Kurum (2023) asserts that financial institutions' ability to battle crime and financial risk is largely dependent on their use of cutting-edge technology, and that there is a direct link between the sophistication of money laundering techniques and the extent of their compliance processes.

E-KYC is thought to have the potential to inspire. Monitoring approaches based on money laundering have been used to keep an eye on money laundering (Chao *et al.*, 2019). Automated monitoring systems are among the preventive measures that governments from different nations use to combat money laundering (Tertychnyi *et al.*, 2022). The earlier money laundering activities are discovered, the sooner financial institutions can take action to stop money laundering from happening. With machine learning technology, banks can monitor transactions with more efficient systems, controls, and procedures (Chen *et al.*, 2018). Turki et al. (2020) demonstrated how RegTech might increase the efficacy of MLP.

2.3 Transaction Monitoring (TM)

TM helps detect abnormal transaction activities in customer transactions, a task assigned profits in banks that handle millions of daily transactions (Turki et al., 2020). Financial institutions can successfully identify risky or suspicious transactions in real-time by implementing TM systems focused on fraud, responsible gambling, and MPL (ComplyRadar, 2021). A crucial part of the risk management plan for financial service organizations is TM. To detect money laundering, fraud, and other financial crimes, maintain compliance with regulatory standards, and protect the company and its clients from unethical behavior, these procedures require continuous monitoring and analysis of financial transactions. TM systems are capable of recognizing suspicious activities and taking necessary actions using sophisticated analytical tools and algorithms (FullCircl, 2023).

TM is a crucial procedure for determining if a transaction is fair; without bank monitoring, it will be challenging to spot questionable transactions. TM feature has a favorable impact on attempts to stop money laundering (Turki *et al.*, 2020). TM enables organizations to take a risk-based approach. This involves basing monitoring on predetermined guidelines that take into account the type of transactions the customer conducts as well as the risk profile that was created during the customer due diligence process (AML UAE, 2023).

TM is becoming a standard feature of most FCC frameworks utilized by the financial sector. TM has become the primary MLP control for many in the industry. The amount of money that has been thrown at it is staggering (Redhead, 2021). Market data indicates that TM is a major player in the global MLP, which is growing at an astounding rate. A recent analysis projects that the market size would rise from USD 2.2 billion in 2020 to USD 4.5 billion in 2025 (Research And Markets, 2020).

Monitoring strategies based on money laundering have been used to keep an eye on money laundering (Chao *et al.*, 2019). Automated monitoring systems are one of the preventive measures that governments from different nations use to combat money laundering (Tertychnyi *et al.*, 2022). The earlier money laundering activities are discovered, the sooner financial institutions can take action to stop money laundering from happening. With machine learning technology, banks can monitor transactions with more efficient systems, controls, and procedures (Chen et al., 2018).

2.4 Cost and Time Efficiencies (CTE)

CTE in the context of RegTech implementation refer to the optimization of financial resources and time allocation when integrating technological solutions to streamline compliance processes within regulated industries. Cost Efficiency denotes the ability of a RegTech solution to deliver effective compliance outcomes while minimizing the associated financial expenditure (Deloitte, 2023). Time efficiency in RegTech implementation refers to the ability of the technology to expedite compliance processes, reduce time-to-market for products or services, and enhance overall operational agility (Tookitaki, 2023).

The comparison between projected project costs and time with project costs and time after acceleration using additional labor and overtime alternatives is known as project cost and time efficiency. While there is no exact method to calculate it, cumulative indirect costs tend to increase with project completion delays (Saragi and Situmorang, 2022). Planning for CTE is crucial in construction projects. Project managers can achieve maximum profitability and timely completion through effective use of time and resources (Suryanto, 2018). Meiryani et al. (2023) discovered that CTE of banks may monitor, report, and comply with legislation related to the MLP more easily and quickly.

2.5 Regulatory Compliance

RC or adherence to regulations, refers to an organization's or individual's compliance with prevailing rules, standards, and laws. The primary goal of RC is to ensure that business activities and individuals operate within the framework of applicable laws, minimizing the risk of violations and legal sanctions. This encompasses various aspects, ranging from environmental laws to information security and employment regulations (Yoland, 2023).

There are two types of compliance obligations: compliance requirements involve adherence to regulations, laws, accounting standards, industry standards, and others. Compliance commitments involve voluntary adherence to specific obligations (self-regulation), thereby creating demands that must be met. These obligations are known as "Business Ethics and Conduct" (Wheeler, 2022). Violations of statutory laws are more commonly referred to as compliance risk, while breaches of specific agreements are often termed Legal Risk; both, in practice, lack fixed definitions or boundaries (Wheeler, 2022). Regulations or rules adhered to by a government entity can ensure that designed accountability reports are accurate and proportional (Mulya and Fauzihardani, 2022; Rohma, 2023).

RC can drive the realization of a work program so that when government compliance with regulations is high, an organization's goals in achieving good performance can be met. Compliance with regulations or legislation is an expression of organizational compliance with policies established by state apparatuses constantly so that the government can achieve good performance accountability (Dewata *et al.*, 2020). Through this adherence, the government can enhance the success of its organizational performance (Asmawanti *et al.*, 2020).

RC requirements is crucial at many levels. An organization fulfilling its regulatory obligations signals to customers and stakeholders that it operates ethically, with integrity, and in accordance with the laws and regulations governing it. Additionally, the number of laws, regulations, standards, and industry requirements has increased exponentially in recent years. Simply put, regulations now touch every sector and every business area in the current corporate landscape. Apart from increasing the number of requirements to be met, the

constantly changing nature of regulations makes it increasingly important for companies to maintain strong compliance programs. Tracking current requirements and ensuring compliance throughout the organization is a significant challenge (Farnham, 2023).

2.6 Information Technology Infrastructure

Information technology (IT) aids in creating, modifying, storing, communicating, and disseminating information, facilitating rapid access to information for humans. IT is supported by infrastructure, including the Information Technology Infrastructure Capability, which facilitates smooth information dissemination processes (Pramudya, 2023). IT infrastructure serves as the foundation for IT capabilities, encompassing technical components (equipment, software, cabling) and human expertise necessary to provide reliable services. The effectiveness of IT infrastructure varies across organizations, depending on the quality of human expertise in developing and implementing IT, known as IT flexibility. Flexibility empowers organizations to effectively control external environments, contributing to competitive positioning.

IT infrastructure is integral to companies, and an excess or shortage of IT infrastructure can lead to losses. IT is a critical resource for organizations to excel in global competition (Fitria, Nurisnaini Putri and Putri Zahrani, 2022). IT infrastructure includes software, hardware, and services within an organization. Software comprises programs used to run specific applications on computers, while hardware consists of physical tools for inputting, collecting, processing, and storing data in the form of information, such as servers (Fitria, Nurisnaini Putri and Putri Zahrani, 2022). Understanding the effects of money laundering on IT infrastructure requires an interdisciplinary approach (Kavuri and Milne, 2019; Nejad, 2022). According to previous regulations, in the current age of technological advancements, the approach to MPL should prioritize risk assessment rather than strict rule adherence (Naheem, 2018; ElYacoubi, 2020; Shust and Dostov, 2020).

2.7 Money Laundering

Using elements of production is rewarded for economic actors (Littrell, 2022). In accordance with the economic performance statistics, rewards obtained through legal or illicit means must still be taken into consideration (Gaviyau and Sibindi, 2023). But because revenue sources are being falsified, it is still challenging to account for monies obtained unlawfully (Sotande, 2018; Clarke, 2021).

Money launderers prefer to use financial services as the ideal medium for laundering. FATF recommendations are universally acceptable guiding standards in the regulatory design to counter money laundering. The implementation is country dependent, though drawing from the FATF recommendations. Accordingly, each country is supposed to come up with

customised legislation and implementation thereof. Failure to implement results in the country being used as a conduit for money laundering and terrorism funding, which goes against the global shared objective. AML/CFT weaknesses affect the financial system's integrity and national security (Teichmann & Wittmann, 2023).

Other approaches have been prompted by the shortcomings of the conventional three-stage method as well as changing trends. The three-stage approach is criticized for oversimplifying contemporary money laundering, especially in light of the possibility of transactions taking place without actual monetary movement (Naheem, 2018). Choo et al. (2014) draw attention to this model's neglect of electronic money laundering. There have been reported cases of money laundering that went unnoticed even when the standard three-step procedure was followed. Money laundering is a complex and dynamic concept that includes any financial transaction or connection including advantages obtained via illegal activity (Naheem, 2019).

H1: eKYC positively impacts the MLP.
H2: TM positively impacts the MLP.
H3: CTE positively impacts the MLP.
H4: RC positively impacts the MLP.
H5: ITI positively impacts the MLP.

Figure 1. Conceptual Framework
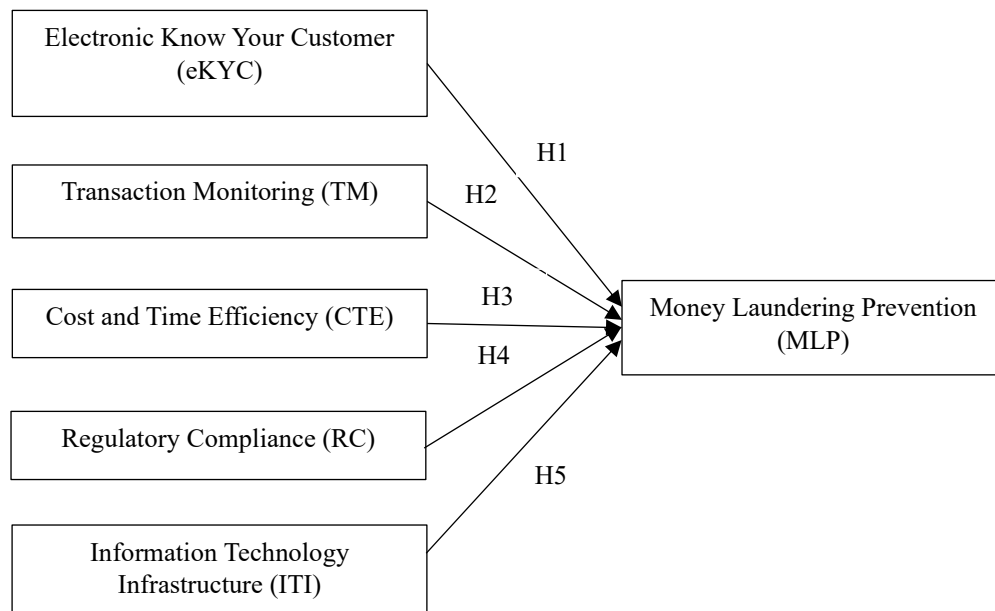
3. Methodology

The basic data used in this research was collected through a questionnaire, and the respondents are Indonesian citizens who own a BRI Link business. For this research, 50 BRI Link business owners were used as the sample size. All information was collected via an online survey in February 2024. Google Forms were used to distribute the survey to respondents online.. A Likert scale will be used in the second part of the questionnaire, with number one indicating "Strongly Disagree (STS)" and number five indicating "Strongly Agree (SS)".

Table 1. Results of the Distribution of Research Questionnaires

Respondent Description	Number	Persentage
Total respondents contacted	70	100%
Number of respondents who did not respond	8	11%
Number of respondents who could not be processed	12	17%
Number of respondents who could be processed	50	72%

Table 1 presents the results of the distribution of research questionnaires, providing insights into the response rate and processing capability of the survey. Out of the total 70 respondents contacted, 8 respondents did not provide any response, indicating an 11% non-response rate. Additionally, 12 respondents could not be processed, representing 17% of the total contacted. This suggests potential challenges in reaching and engaging certain segments of the target population. However, the table also indicates that 50 respondents were successfully processed, accounting for 72% of the total contacted. This highlights a relatively high processing rate, indicating the feasibility of collecting and analyzing data from a substantial portion of the sample population. Overall, Table 1 offers valuable insights into the effectiveness of the survey outreach efforts and the feasibility of data collection for the research study.

The validity of the research instrument is defined as the degree to which an empirical indicator and conceptual definition of the construct that the indicator is intended to measure are deemed to be fit (Neuman, 2013). Cronbach Alpha was used to gauge the survey data's dependability. A model reflective indicator is used to measure these characteristics.

RegTech is the independent variable that can be quantified using eKYC, TM, and CT. In order to reduce errors typically seen in manual processes, electronic knowledge and identity verification, or eKYC, is used to identify and verify customers online (Perlman and Gurung, 2019; Turki *et al.*, 2020; World Bank, 2021). TM is among the measures banks can take to keep an eye on and identify financial activity in order to maintain the safety of the services'

cyber security (Repin, Mikhalsky and Pshehotskaya, 2017). According to (Turki *et al.*, 2020), CT is the process of improving a product or process to perform more efficiently while also saving money and time. RegTech is an independent variable in this study that is quantified using five indicators from eKYC, five indications from TM, and five indicators from CT. The MLP (five indicators) dependent variable was used in this investigation (Turki *et al.*, 2020). RC uses five main indicators adopted from research (Yoland, 2023), and ITI uses five main indicators adopted from research (Prmudya, 2023).

4. Data Analysis and Results

The data collected through the distribution of questionnaires to BRI Link agents are discussed in this section. Table 2 summarizes the results based on gender, age, experience, and position.

Table 2. Demographic Data

	Category	N = 50	Percentage
Gender	Male	32	64%
	Female	18	36%
	Total	50	100%
Age	< 30 years	7	14%
	30-40 years	20	40%
	41-50 years	12	24%
	> 50 years	11	22%
	Total	50	100%
Business experience	< 5 years	44	88%
	5-10 years	6	12%
	Total	50	100%
Education	High School	9	18%
	Diploma	11	22%
	Bachelor	21	42%
	Master	9	18%
	Total	50	100%

Table 2 provides demographic data of the respondents, offering insights into their gender, age distribution, business experience, and educational background. Regarding gender, the majority of respondents were male, constituting 64%, while females accounted for 36% of the sample. In terms of age, the largest proportion of respondents fell within the 30-40 years category, comprising 40% of the sample, followed by those aged 41-50 years (24%) and those over 50 years old (22%). Notably, individuals aged under 30 years constituted the smallest proportion at 14%. Concerning business experience, the majority of respondents had less

than 5 years of experience, making up 88% of the sample, while only 12% had 5-10 years of experience. Regarding education, the majority of respondents held a Bachelor's degree (42%), followed by those with a Diploma (22%), a Master's degree (18%), and those with a High School education (18%). Overall, Table 2 provides valuable insights into the demographic profile of the respondents, which may have implications for the interpretation of the study's findings and the target audience of potential interventions or strategies.

4.1 Reliability and Validity Test

The findings of the validity and reliability tests conducted on the survey used in this investigation are displayed in Table 3. checking for reliability with the Cronbach alpha technique. If the alpha coefficient of the questionnaire is 0.70, it is deemed reliable (Hair et al., 2014). Additionally, according to (Duncan *et al.*, 2018), validity is evaluated using the following criteria: (1) item-to-item is equal to or greater than 0,20; and (2) item-to-total is equal to or greater than 0,50.

Table 3. Cronbach Alpha

Item	Cronbach Alpha	Coreelation >0.2		Coreelation >0.5	
		Min	Max	Min	Max
eKYC	0.845	0.183	0.545	0.378	0.696
TM	0.903	0.288	0.809	0.494	0.812
CTE	0.873	0.327	0.624	0.577	0.794
RC	0.856	0.287	0.934	0.453	0.983
ITI	0.916	0.372	0.832	0.665	0.885
MLP	0.947	0.594	0.824	0.716	0.867

Table 3 presents the results of validity and reliability tests conducted on the survey instrument utilized in this investigation, primarily focusing on the Cronbach Alpha technique for assessing reliability. According to Hair et al. (2014), a questionnaire with an alpha coefficient of 0.70 or higher is considered reliable. The analysis reveals that all items demonstrate strong internal consistency, with Cronbach Alpha values ranging from 0.845 to 0.947, exceeding the threshold for reliability. Furthermore, Duncan et al. (2018) suggest criteria for evaluating validity, including item-to-item and item-to-total correlations. According to these criteria, correlations equal to or greater than 0.20 and 0.50, respectively, are indicative of adequate validity. In Table 3, the correlations for each item range from 0.183 to 0.594 for item-to-item and from 0.378 to 0.867 for item-to-total. Notably, all items meet the validity criteria, demonstrating significant correlations both within their constructs and with the overall questionnaire.

Findings from Table 3 underscore the reliability and validity of the survey instrument utilized in this investigation. The high Cronbach Alpha coefficients indicate strong internal

consistency among the questionnaire items, while the significant correlations confirm the validity of the instrument. These results enhance the credibility and robustness of the survey data collected for the study, providing assurance regarding the accuracy and validity of the research findings.

4.2 Research Data Descriptive Statistics

The descriptive statistics presented in Table 4 offer valuable insights into the research data, providing a comprehensive overview of key variables within each organization. The table outlines the number of research participants (N) for each variable, along with their respective minimum and maximum values, mean, and standard deviation.

Tabel 4. Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Dev.
eKYC	50	2	10	8.92	1.708
TM	50	5	20	19.43	2.943
CTE	50	10	25	22.56	3.124
RC	50	2	25	18.77	2.822
ITI	50	2	25	14.48	3.586
MLP	50	7	25	22.92	3.675

For the eKYC variable, which pertains to eKYC processes, respondents reported a mean score of 8.92, with a range from 2 to 10 and a relatively low standard deviation of 1.708. This suggests that, on average, respondents rated their eKYC processes quite favorably, with minimal variability in responses. Similarly, the TM variable, representing TM systems, yielded a mean score of 19.43, ranging from 5 to 20, and a standard deviation of 2.943. This indicates positive perceptions of TM, with moderate variability among responses. The CTE variable, displayed a mean score of 22.56, ranging from 10 to 25, and a standard deviation of 3.124. Respondents generally rated their CTE favorably, with some variability in responses. Regarding RC, respondents s reported a mean score of 18.77, with ratings ranging from 2 to 25 and a standard deviation of 2.822. This suggests varying perceptions of RC across organizations, with a moderate level of variability in responses. For the ITI variable, which represents Information Technology Infrastructure, organizations reported a mean score of 14.48, with ratings ranging from 2 to 25 and a standard deviation of 3.586. This indicates a moderate level of satisfaction with ITI, accompanied by notable variability in responses. Finally, the MLP variable, pertaining to MLP measures, yielded a mean score of 22.92, ranging from 7 to 25, with a standard deviation of 3.675. Respondents rated their MLP measures quite high, with a fair amount of variability among responses.

4.3 Hypothesis Testing

Typically, multicollinearity issues between variables are checked using Pearson correlation analysis. The multicollinearity test of the independent variables reveals that there is a substantial correlation between the variables since these variables have a reasonably high value of > 4.00. Table 7 displays the results, indicating that each variable has a significant association with every other variable at the 1% significance level. Nonetheless, the three independent variables' variance inflation factor (VIF) values are less than 10, indicating that they are unaffected by multicollinearity symptoms (Hair et al., 2014).

Table 5. Pearson Correlation Matrix

	MLP	eKYC	TM	CTE	RC	ITI
MLP	1					
eKYC	0.678***	1				
TM	0.826***	0.676***	1			
CTE	0.776***	0.628***	0.782***	1		
RC	0.652***	0.681***	0.688***	0.865***	1	
ITI	0.704***	0.717***	0.729***	0.761***	0.719***	1

Table 5 presents the Pearson Correlation Matrix, revealing the relationships between the variables MLP, eKYC, TM, CTE, RC, and ITI. The correlation coefficients indicate strong positive correlations between most variables, with coefficients ranging from 0.628 to 0.865, all significant at the 1% level. Specifically, MLP shows strong correlations with TM (0.826), CTE (0.776), and RC (0.652). Similarly, eKYC exhibits substantial correlations with TM (0.676), CTE (0.628), and RC (0.681). Moreover, TM demonstrates strong associations with CTE (0.782) and RC (0.688). These findings suggest interdependence among the variables, highlighting potential patterns and connections within the dataset. Overall, the analysis of the Pearson Correlation Matrix underscores the importance of considering the relationships between variables in understanding the dynamics of the studied phenomena. This indicates a substantial influence of the independent variables on MLP, highlighting their concurrent impact on MLP efforts within the study's context.

Table 9 presents the results of the ANOVA regression analysis, which is used to determine whether the regression model as a whole is statistically significant in explaining the variation in the dependent variable. In this case, the dependent variable is MLP, and the independent variables include various factors related to RegTech.

Table 6. Model Summary

R	R^2	Adjusted R^2	Std. Error of Estimates
0.874	0.782	0.766	1.783

The significance level, indicated by the p-value, is reported as 0.000. This value signifies that the regression model is highly statistically significant, as it is well below the conventional threshold of 0.05. In other words, there is strong evidence to suggest that the relationship between RegTech and MLP, as examined in this study, is not due to random chance. Instead, it indicates a genuine and meaningful relationship between these variables.

Table 7. Anova Regression

	Sum of Squares	Df	Mean Square	F	Sig
Regression	623.667	2	213.556	76.782	.000
Residual	243.768	100	2.835		
Total	867.435	102			

Table 7 displays the results of the ANOVA regression analysis conducted to assess the overall significance of the regression model in explaining the relationship between the variables. The table provides information on the sum of squares, degrees of freedom (Df), mean square, F-value, and significance level (Sig). The regression model's sum of squares for the regression and residual components are reported as 623.667 and 243.768, respectively, contributing to the total sum of squares of 867.435. With 2 degrees of freedom for the regression and 100 degrees of freedom for the residual, the mean square for the regression is calculated as 213.556, while the mean square for the residual is 2.835.

The F-value, calculated as the ratio of the mean square of the regression to the mean square of the residual, is reported as 76.782. This F-value indicates the extent to which the regression model explains the variance in the dependent variable relative to the variance not explained by the model. The significance level (Sig) of 0.000 indicates that the regression model is highly statistically significant. This means that the relationship between the independent and dependent variables, as captured by the regression model, is unlikely to be due to random chance. Instead, it suggests a meaningful and reliable relationship between the variables.

Table 8. Determinant Coefficient

Model	Unstandardized Coeffcients		Standardized Coefficients	t	Sig.	VIF
	B	Std. Error	Beta			
(Constant)	2.895	1.389		2.002	0.045	
eKYC	-0.023	0.175	-0.010	-0.145	0.943	1.856
TM	0.679	0.154	0.587	5.365	0.000***	3.376
CTE	0.365	0.114	0.365	3.764	0.001***	2.832
RC	0.567	0.156	0.485	4.856	0.000***	3.376
ITI	0.387	0.182	0.377	3.465	0.001***	2.832

Table 8 presents the determinant coefficients of the model, providing insights into the relationships between the independent variables (eKYC, TM, CTE, RC, ITI) and the dependent variable. The unstandardized coefficients reveal the magnitude of the effect of each independent variable on the dependent variable. Notably, TM demonstrates the highest unstandardized coefficient (B = 0.679), followed by RC (B = 0.567), CTE (B = 0.365), and ITI (B = 0.387). These coefficients indicate the strength and direction of the relationships. Additionally, the standardized coefficients (Beta) offer a means to compare the relative importance of each independent variable. TM exhibits the highest standardized coefficient (Beta = 0.587), suggesting it has the most substantial impact on the dependent variable. Moreover, all independent variables show statistically significant associations with the dependent variable, as indicated by their respective t-values and significance levels ($p < 0.001$). The variance inflation factor (VIF) values, ranging from 1.856 to 3.376, suggest no issues of multicollinearity, further validating the reliability of the model.

Discussion

The test results prove that eKYC has no influence on MLP, according to the findings of testing hypothesis 1. This is demonstrated in Table 10, where the value of eKYC is 0.901 > 1% (0.01) level of significance. This suggests that eKYC procedures do not play a significant role in influencing MLP efforts. The significance level of 1% (0.01) was chosen for testing, and the obtained p-value of 0.901 exceeds this threshold, indicating that the relationship between eKYC and MLP is not statistically significant. This finding underscores the importance of further investigation into other factors that may contribute to MLP effectiveness, emphasizing the need for a comprehensive approach to anti-money laundering efforts beyond solely relying on eKYC procedures.

The findings of this study support the ongoing importance of RegTech in effectively combating money laundering, as highlighted by Meiryani et al. (2023). The development of regulatory frameworks tailored to address emerging challenges, is a positive step, exemplified by the regulatory framework (Buttigieg et al., 2019). However, it's evident that some developing nations are still facing challenges in implementing comprehensive regulatory measures, as noted by Anichebe (2020), underscoring the need for continued efforts to address regulatory gaps and emerging risks.

Furthermore, the study underscores the potential of E-KYC systems to enhance anti-money laundering efforts, as suggested by Chao et al. (2019). By utilizing monitoring approaches based on money laundering and implementing automated monitoring systems, governments can enhance their ability to detect and prevent illicit financial activities, as emphasized by Tertychnyi et al. (2022). Early detection of money laundering activities is crucial, and the integration of machine learning technology in banking systems, as discussed by Z. Chen et al. (2018), offers a promising avenue for improving the efficiency of transaction monitoring and enhancing preventive measures. Additionally, the study supports the notion that RegTech

can enhance the effectiveness of MLP measures, as demonstrated by Turki et al. (2020), suggesting that technological innovations play a vital role in strengthening regulatory compliance and combating financial crimes.

This finding is consistent with (Turki *et al.*, 2020), who claims that although bankers may believe that non-electronic KYC procedures are sufficient, enhancing the efficacy of eKYC MLP through the use of advanced RegTech algorithms is not thought to have a significant impact. Furthermore, these findings can suggest that bankers outside of risk management are less conscious of the disruptive effects of cutting-edge technology like blockchain on the efficacy of KYC (Lootsma and Brussels, 2017; O'Reilly and Khrisna, 2017).

Additionally, testing hypothesis 2 demonstrates that, at the 1% level, TM has a considerable impact on MLP. This suggests that effective transaction monitoring systems play a crucial role in detecting and preventing suspicious financial activities, contributing significantly to overall anti-money laundering initiatives. As such, financial institutions should prioritize the implementation and enhancement of robust transaction monitoring mechanisms to strengthen their anti-money laundering capabilities and safeguard against illicit financial activities.

By detecting, evaluating, and minimizing human screening and checking procedures, machine learning technology with strong systems, controls, and practices helps the Bank minimize the risk of money laundering activities (Chen *et al.*, 2018). Distractions caused by the intersection of finance and technology include the interaction of high-tech innovations, incomplete information, volatility and risk, market imperfections, and regulatory issues. RegTech assists in transaction monitoring by utilizing near real-time data capabilities, automating sophisticated algorithmic processes, and connecting advanced analytics and models with rapidly advancing artificial intelligence (AI) (Anagnostopoulos, 2018).

The findings of this study support the ongoing importance of RegTech in effectively reducing money laundering, as highlighted by Meiryani et al. (2023). The use of monitoring strategies based on money laundering, as noted by Chao et al. (2019), underscores the significance of proactive surveillance in detecting and preventing illicit financial activities. Automated monitoring systems, as discussed by Tertychnyi et al. (2022), are recognized as crucial preventive measures adopted by governments worldwide to combat money laundering. Early detection of money laundering activities is emphasized as a key strategy, allowing financial institutions to intervene promptly and prevent further illicit transactions. The integration of machine learning technology, as outlined by Chen et al. (2018), offers promising advancements in transaction monitoring, enabling banks to implement more efficient systems and controls to identify suspicious activities effectively. These findings highlight the pivotal role of technological innovations, particularly RegTech and machine learning, in enhancing monitoring capabilities and bolstering efforts to combat money laundering effectively.

According to the three research hypotheses, CTE affects the MLP. This supports hypothesis three, which indicates that CTE have a substantial impact on MLP. This indicates that efficient allocation of resources and time management play a crucial role in enhancing MLP efforts within the banking sector. The results affirm the importance of prioritizing CTE measures in anti-money laundering strategies to effectively combat financial crimes. Financial institutions should focus on implementing efficient processes and technologies to optimize resource allocation and streamline operations, thereby bolstering their ability to prevent and detect money laundering activities.

The findings of this study support the importance of project CTE in construction projects and other sectors (Saragi & Situmorang, 2022; Suryanto, 2018). CTE refers to the comparison between projected project costs and time with those after acceleration using additional labor and overtime alternatives. The study underscores the significance of planning for CTE, as project completion delays often lead to increased cumulative indirect costs. Moreover, Meiryani et al. (2023) found that banks with higher CTE may be better equipped to monitor, report, and comply with legislation related to Money Laundering Prevention (MLP) more efficiently. This suggests that improving CTE not only enhances project profitability and timely completion in construction projects but also facilitates regulatory compliance and risk management in the banking sector.

According to this study, RegTech offers solutions for integrating automation, scalability, adaptability, and transaction security, which can cut down on expenses and time spent on MLP activities. This complies with bank rules about anti-money laundering specifications, which call for the use of cutting-edge and reasonably priced technology (Bank for International Settlement, 2017). O'Reilly & Khrisna (2017) claim that the use of RegTech enables banks to analyze vast volumes of data more affordably, promptly, and accurately.

This research indicates that while there is a moderately favorable association between these variables, e-KYC offered by RegTech does not have a substantial influence on MLP. The result of this study is not entirely in line with the findings of Meiryani et al. (2023), which emphasize the crucial role of RegTech in reducing money laundering. While Meiryani et al. underscore the significance of RegTech, the study acknowledges that a regulatory framework for cryptocurrency assets has been gradually developed and implemented in certain jurisdictions (Buttigieg et al., 2019). However, the study also highlights that many developing nations are still struggling to address emerging hazards and regulatory challenges, indicating a discrepancy in regulatory progress across different regions (Anichebe, 2020). Additionally, the study mentions the potential of E-KYC and automated monitoring systems in combating money laundering, as noted by Chao et al. (2019) and Tertychnyi et al. (2022), respectively. While these technological advancements offer promising solutions, the study's findings suggest that there may still be gaps in regulatory compliance and effectiveness, particularly in detecting and preventing money laundering activities in the financial sector. Thus, while RegTech and technological innovations show promise in enhancing Money Laundering

Prevention (MLP), there may be challenges and limitations in their implementation and efficacy, as suggested by Turki et al. (2020).

This report makes a number of policy recommendations that regulators, policy makers, and other interested parties can implement. The study's findings suggest that eKYC has little bearing on MLP. The financial system is beginning to transition from the KYC concept to a KYD approach, according to Arner et al. (2018). This requires the evolution of a new regulatory paradigm that covers everything from digital identification to data sovereignty. It is also intended that the regulator will have a framework for clear regulations and be adaptable enough to change with the market. Innovation should not be viewed as only a regulatory endeavor; the Bank and the Regulator must work together.

The FATF has recommended that the regulatory framework should balance financial integrity and financial inclusion. This will ensure that KYC requirements support the growth of responsible mobile money services in emerging markets. The endeavor should align with the FATF's recommendation. Additionally, it's critical to integrate and match the data with information from government sources in order to obtain better KYC. In the future, regulators may be more influenced by RegTech solutions when creating AML guidelines for financial institutions. Kurum (2023) states that prior research indicates that stakeholders have the most influence since regulators (the government) exert pressure on financial institutions through stringent laws pertaining to the battle against financial crime.

Conclusion

The primary objective of this study is to explore the relationship between MLP and RegTech. To achieve this aim, five independent variables — eKYC, TM, CTE, RC, and ITI— are utilized as proxies for RegTech, while MLP serves as the dependent variable. The study's findings, obtained at a significance level of 0.01 (1%), reveal that two independent RegTech variables—TM and CTE— and — RC and ITI — exert a highly significant influence on the effectiveness of MLP. Particularly noteworthy is the significant impact of CTE, which emerges as the most influential driver of MLP efficacy. This study suggests that although there is a moderately positive correlation among these factors, the e-KYC provided by RegTech does not exert a significant impact on MLP.

The study suggests that RegTech, particularly in terms of its capacity to handle big data in real time, plays a crucial role in enhancing the efficiency of MLP. By leveraging advanced technological solutions, RegTech facilitates swift and accurate screening of large volumes of transactions, thereby reducing costs and improving the accuracy of MLP efforts. These findings underscore the importance of RegTech in enhancing the effectiveness of MLP measures. By leveraging technological innovations, organizations can streamline their compliance processes, mitigate risks, and bolster their ability to combat financial crime

effectively. This highlights the critical role of RegTech in promoting financial integrity and regulatory compliance within the banking and financial sectors.

The findings of the study carry significant implications for policymakers and financial institutions seeking to bolster their MLP strategies. Firstly, the study underscores the pivotal role of RegTech in fortifying anti-money laundering measures. It emphasizes the necessity for financial institutions to invest in advanced technological solutions to streamline compliance processes and elevate effectiveness in combating financial crimes. Moreover, the study highlights the importance of TM, CTE, RC, and ITI as critical determinants of MLP efficacy. Policymakers and financial entities are urged to prioritize the adoption of robust transaction monitoring systems and cost-effective technologies to fortify their anti-money laundering capabilities. Furthermore, by leveraging RegTech solutions, organizations can enhance compliance measures and better adhere to regulatory standards. This entails augmenting data analytics capabilities, implementing real-time monitoring systems, and automating screening processes to swiftly identify suspicious transactions.

Consequently, the study suggests that RegTech, RC, and ITI adoption can mitigate financial crime risks by facilitating faster and more accurate detection of illicit activities, thereby safeguarding the integrity of the financial system and bolstering trust in the banking sector. Lastly, it emphasizes the strategic investment in ITI and talent development as crucial for maximizing the benefits of RegTech adoption. Continuous training programs, collaboration with technology partners, and vigilance towards emerging threats and regulatory changes are vital for ensuring sustained effectiveness in MLP efforts. Overall, the study underscores the transformative potential of RegTech in fortifying MLP measures and advocates for proactive steps towards its implementation within the financial industry.

Future research could focus on longitudinal studies to assess the long-term impact of RegTech adoption on MLP efficacy. Exploring the role of emerging technologies like artificial intelligence and blockchain in enhancing detection capabilities, as well as investigating regulatory and ethical implications, would provide valuable insights. Additionally, comparative studies across jurisdictions could identify best practices for effective RegTech adoption. Addressing these areas could advance understanding and inform strategies for combating financial crime more effectively.

References

AML UAE (2023) *Following the Money Trail : Transaction Monitoring in the War Against Money Laundering*, *amluae.com*.

Anagnostopoulos, I. (2018) 'Fintech and regtech: Impact on regulators and banks', *Journal of Economics and Business*, 100(1), pp. 7–25. doi:https://doi.org/10.1016/j.jeconbus.2018.07.003.

Anichebe, U. (2020) 'Combating Money Laundering in an Age of Technology and Innovation', *SSRN Electronic Journal*, 1(1), pp. 1–36. doi:10.2139/ssrn.3627681.

Arner, D.W., Barberis, J.N. and Buckley, R. (2018) 'RegTech: Building a Better Financial System', *Handbook of blockchain, digital finance, and inclusion*, 1(1), pp. 359–373. doi:https://doi.org/10.1016/B978-0-12-

810441-5.00016-6.

Asmawanti, D. *et al.* (2020) 'Dimensi Akuntabilitas Kinerja Instansi Pemerintah Daerah', *Journal of Applied Accounting and Taxation*, 5(1), pp. 85–94. doi:10.30871/jaat.v5i1.1850.

Bank for International Settlement (2017) *Basel Committee on Banking Supervision Consultative Document Sound Practices for the Management and Supervision of Operational Risk*.

Batan, A. (2021) *A Quick Overview of Know Your Customer (KYC) in Financial Industry*. doi:10.13140/RG.2.2.22214.19528.

Baxter, L.G. (2016) 'Adaptive financial regulation and regtech: A concept article on realistic protection for victims of bank failures', *Duke Law Journal*, 66(3), pp. 567–604.

Brody, M. *et al.* (2017) 'Three financial regulators issue reports on product and service innovations', *Journal of Investment Compliance*, 18(1), pp. 84–91. doi:https://doi.org/10.1108/JOIC-02-2017-0005.

Butler, T. and Brooks, R. (2018) 'On the role of ontology-based RegTech for managing risk and compliance reporting in the age of regulation', *Journal of Risk Management in Financial Institutions*, 11(1), pp. 19–33.

Butler, T. and O'Brien, L. (2019) 'Understanding RegTech for Digital Regulatory Compliance: FinTech and Strategy in the 21st Century', in Lynn, T. et al. (eds) *Disrupting Finance*. Cham, Switzerland: Palgrave Studies in Digital Business & Enabling Technologies, pp. 85–102.

Buttigieg, C.P. *et al.* (2019) 'Anti-money laundering regulation of crypto assets in Europe's smallest member state', *Law and Financial Markets Review*, 13(4), pp. 211–227. doi:https://doi.org/10.1080/17521440.2019.1663996.

Chao, X. *et al.* (2019) 'Behavior monitoring methods for trade-based money laundering integrating macro and micro prudential regulation: A case from China', *Technological and Economic Development of Economy*, 25(6), pp. 1081–1096. doi:10.3846/tede.2019.9383.

Chen, T.-H. (2020) 'Do you know your customer? Bank risk assessment based on machine learning', *Applied Soft Computing*, 86(1), p. 105779. doi:https://doi.org/10.1016/j.asoc.2019.105779.

Chen, Z. *et al.* (2018) 'Machine learning techniques for anti-money laundering (AML) solutions in suspicious transaction detection: a review', *Knowledge and Information Systems*, 57(2), pp. 245–285. doi:https://doi.org/10.1007/s10115-017-1144-z.

Choo, H.C. *et al.* (2014) 'Anti-money laundering and its effectiveness', *Malaysian Accounting Review*, 13(2), pp. 109–124.

Clarke, A.E. (2021) 'Is there a commendable regime for combatting money laundering in international business transactions?', *Journal of Money Laundering Control*, 24(1), pp. 163–176. doi:https://doi.org/10.1108/JMLC-05-2020-0057.

ComplyRadar (2021) *Transaction Monitoring Solutions And Why Your Business Cannot Do Without One*, *complyradar.com*. Available at: https://complyradar.com/2021/03/15/complyradar-transaction-monitoring-solutions-and-why-your-business-cannot-do-without-one/ (Accessed: 24 February 2024).

Deloitte (2023) *RegTech – Gaining momentum Driving efficiency in risk and compliance*.

Dewata, E. *et al.* (2020) 'Ketaatan pada Peraturan Perundangan, Sistem Pelaporan dan Akuntabilitas Kinerja Instansi Pemerintah', *Jurnal Riset Akuntansi dan Keuangan*, 8(3), pp. 541–550.

Duncan, P. *et al.* (2018) 'Development and validation of the Multimorbidity Treatment Burden Questionnaire (MTBQ)', *BMJ Open*, 8(4), pp. 1–10. doi:10.1136/bmjopen-2017-019413.

ElYacoubi, D. (2020) 'Challenges in customer due diligence for banks in the UAE', *Journal of Money Laundering Control*, 23(2), pp. 527–539. doi:https://doi.org/10.1108/JMLC-08-2019-0065.

Fajri, K.F. and Urumsah, D. (2023) 'Prevention Of Crypto-Laundering Through Regulatory Technology (Regtech): A Guideline Framework For Evaluation Studies In Indonesia', *Conference on Economic and Business Innovation (CEBI)*, 3(1), pp. 305–315. doi:10.31328/cebi.v3i1.317.

Farnham, K. (2023) *Regulatory compliance 101: Definition, requirements & solutions*, *Diligent*. Available at: https://www.diligent.com/resources/blog/what-is-regulatory-compliance.

Fitria, N.I., Nurisnaini Putri and Putri Zahrani (2022) 'Literature Review Determinasi Infrastruktur Ti: Telekomunikasi, Internet Dan Brainware', *Jurnal Manajemen Pendidikan Dan Ilmu Sosial*, 3(2), pp. 561–572. doi:10.38035/jmpis.v3i2.1119.

Freij, Å. (2020) 'Using technology to support financial services regulatory compliance: current applications and future prospects of regtech', *Journal of Investment Compliance*, 21(2), pp. 181–190. doi:https://doi.org/10.1108/joic-10-2020-0033.

FullCircl (2023) *Transaction Monitoring (TM)*, *FullCircl*.

Gaviyau, W. and Sibindi, A.B. (2023) 'Global Anti-Money Laundering and Combating Terrorism Financing Regulatory Framework: A Critique', *Journal of Risk and Financial Management*, 16(7). doi:10.3390/jrfm16070313.

Johansson, E. *et al.* (2019) 'Regtech-a Necessary Tool To Keep Up With Compliance and Regulatory Changes?', *ACRN Journal of Finance and Risk Perspectives*, 8(1), pp. 71–85.

Karsh, S.A. and Abufara, Y. (2020) 'The New Era of Financial Technology in Banking Industry', *Journal of Southwest Jiaotong University*, 55(4). doi:10.35741/issn.0258-2724.55.4.54.

Kavuri, A.S. and Milne, A. (2019) 'Fintech and the Future of Financial Services: What Are the Research Gaps?', *SSRN Electronic Journal*, 1(1), pp. 1–84.

Kurniawan, V. (2023) 'The Role of Regulatory Technology & Bankers to Prevent Money Laundering in Bank', *JBMO Jurnal Bisnis, Manajemen, dan Perbankan*, 9(1), pp. 43–52. doi:10.21070/jbmp.v9vi1.1660.

Kurum, E. (2023) 'RegTech solutions and AML compliance: what future for financial crime?', *Journal of Financial Crime*, 30(3), pp. 776–794. doi:https://doi.org/10.1108/JFC-04-2020-0051.

Littrell, C. (2022) 'Biases in National Anti-Money Laundering Risk Assessments', *SSRN Electronic Journal*, 1(1), pp. 1–10.

Lootsma, Y.J. and Brussels, I. (2017) *From Fintech to Regtech: The possible use of Blockchain for KYC YVONNE*, *static1.squarespace.com*.

Machkour, B. and Abriane, A. (2020) 'Industry 4.0 and its implications for the financial sector', *Procedia Computer Science*, 177(1), pp. 496–502. doi:10.1016/j.procs.2020.10.068.

Meiryani, M., Soepriyanto, G. and Audrelia, J. (2023) 'Effectiveness of regulatory technology implementation in Indonesian banking sector to prevent money laundering and terrorist financing', *Journal of Money Laundering Control*, 26(4), pp. 892–908. doi:10.1108/JMLC-04-2022-0059.

Miller, R.S. and Rosen, L.W. (2017) *Anti-Money Laundering : An Overview for Congress*.

Mulya, H.G. and Fauzihardani, E. (2022) 'Pengaruh Kejelasan Sasaran Anggaran, Pengendalian Akuntansi dan Sistem Pelaporan terhadap Akuntabilitas Kinerja Instansi Pemerintah dengan Kepatuhan Terhadap Regulasi sebagai Variabel Pemoderasi', *Jurnal Eksplorasi Akuntansi*, 4(1), pp. 192–212. doi:10.24036/jea.v4i1.463.

Naheem, M.A. (2018) 'TBML suspicious activity reports – a financial intelligence unit perspective', *Journal of Financial Crime*, 25(3), pp. 721–733. doi:https://doi.org/10.1108/JFC-10-2016-0064.

Naheem, M.A. (2019) 'Anti-money laundering/trade-based money laundering risk assessment strategies – action or re-action focused?', *Journal of Money Laundering Control*, 22(4), pp. 721–733. doi:https://doi.org/10.1108/JMLC-01-2016-0006.

Neal, R.W. (2019) *How regtech is changing compliance at financial firms*, *Investment News*.

Nejad, M.G. (2022) 'Research on financial innovations: an interdisciplinary review', *International Journal of Bank Marketing*, 40(3), pp. 578–612. doi:https://doi.org/10.1108/IJBM-07-2021-0305.

Neuman, W.L. (2013) *Social Research Methods: Qualitative and Quantitative Approaches (Seventh Ed)*. Harlow: Pearson Education Limited.

O'Reilly, M. and Khrisna, D. (2017) *Regulatory productivity: Is there an answer?*

Ofoeda, I., Agbloyor, L. and Abor, J.Y. (2024) 'Financial sector development, anti-money laundering regulations and economic growth', *International Journal of Emerging Markets*, 19(1), pp. 191–210. doi:https://doi.org/10.1108/IJOEM-12-2021-1823.

Perlman, L. and Gurung, N. (2019) 'Focus Note: The Use of eKYC for Customer Identity and Verification and AML', *SSRN Electronic Journal*, 1(1), pp. 1–28. doi:10.2139/ssrn.3370665.

Pramudya, D.A. (2023) *IT Infrastructure*, *Binus University*. Available at: https://sis.binus.ac.id/2023/01/10/it-infrastructure/.

Pratt, J. (2022) *Know your customer*, *Quality World*.

Redhead, M. (2021) 'The Future of Transaction Monitoring: Better Ways to Detect and Disrupt Financial Crime', *SSRN Electronic Journal*, 1(1), pp. 1–57. doi:10.2139/ssrn.3865131.

Repin, M., Mikhalsky, O. and Pshehotskaya, E. (2017) 'Architecture of Transaction Monitoring System of Central Banks Scenario Probabilistic Logic Models for Detecting Fraud Activity via Payment Systems of Central Banks', *Advances in Engineering Research*, 133(1), pp. 654–658.

Research And Markets (2020) *Anti-money Laundering Market by Component, Solution, Deployment Mode, End-user, and Region - Global Forecast to 2025*, *businesswire.com*.

Rohma, F.F. (2023) 'Efektivitas Informasi dan Komunikasi dalam Memitigasi Tendensi Kecurangan Pengadaan Barang dan Jasa', *Jurnal Akuntansi dan Keuangan*, 12(1), p. 1.

Saragi, T.E. and Situmorang, R.U.A. (2022) 'Optimasi Waktu Dan Biaya Percepatan Proyek Menggunakan Metode Time Cost Trade Off Dengan Alternatif Penambahan Tenaga Kerja Dan Jam Kerja (Lembur) (Studi Kasus : Pembangunan Gedung Convention Hall Kab. Deli Serdang)', *Construct : Jurnal Teknik Sipil*, 1(2), pp. 53–69.

Savitri, S.I. (2021) 'IT Competency: Studi Adaptasi Kinerja Program Keluarga Harapan Pada Dinas Sosial Kabupaten Malang', *Jurnal Bisnis Net*, 4(1), pp. 67–73.

Shust, P.M. and Dostov, V. (2020) 'Implementing innovative customer due diligence: proposal for universal model', *Journal of Money Laundering Control*, 23(4), pp. 871–884. doi:https://doi.org/10.1108/JMLC-01-2020-0007.

Silverberg, K. *et al.* (2016) *RegTech in Financial Services: Technology Solutions for Compliance and Reporting*,

Institute of International Finance (IIF).

Singh, C. *et al.* (2022) 'Can machine learning, as a RegTech compliance tool, lighten the regulatory burden for charitable organisations in the United Kingdom?', *Journal of Financial Crime*, 29(1), pp. 45–61. doi:https://doi.org/10.1108/JFC-06-2021-0131.

Sotande, E. (2018) 'The regime against money laundering: a call for scientific modelling', *Journal of Money Laundering Control*, 21(4), pp. 584–593. doi:https://doi.org/10.1108/JMLC-11-2017-0066.

Suryanto, S. (2018) 'Efisiensi Biaya Dan Waktu Pelaksanaan Proyek Dengan Metode Crashing (Studi Kasus : Proyek Pekerjaan Pembangunan Gedung Inspektorat Kota Yogyakarta)', *Fakultas Teknik Universitas Muhammadiyah Yogyakarta*, pp. 1–3.

Teichmann, F., Boticiu, S. and Sergi, B.S. (2022) 'RegTech - Potential Benefits and Challenges of Businesses', *Technology in Society*, 1(1). doi:https://doi.org/10.1016/j.techsoc.2022.102150.

Teichmann, F.M.J. and Wittmann, C. (2023) 'Money laundering in the United Arab Emirates: the risks and the reality', *Journal of Money Laundering Control*, 26(4), pp. 709–718. doi:https://doi.org/10.1108/JMLC-01-2022-0014.

Tertychnyi, P. *et al.* (2022) 'Time-aware and interpretable predictive monitoring system for Anti-Money Laundering', *Machine Learning with Applications*, 8(1), pp. 1–11. doi:10.1016/j.mlwa.2022.100306.

Tookitaki (2023) *RegTech (Regulatory Technology): Transforming Compliance in Finance*, *tookitaki.com*.

Turki, M. *et al.* (2020) 'The regulatory technology "RegTech" and money laundering prevention in Islamic and conventional banking industry', *Heliyon*, 6(10), p. e04949. doi:10.1016/j.heliyon.2020.e04949.

Vaithilingam, S., Nair, M. and Thiyagarajan, T. (2015) 'Managing Money Laundering in a Digital Economy', *Journal of Asia-Pacific Business*, 16(1), pp. 44–65. doi:https://doi.org/10.1080/10599231.2015.997626.

Weber, R. and Baisch, R. (2018) 'FinTech–eligible safeguards to foster the regulatory framework', *Journal of Financial Regulation and Compliance*, 33(1), pp. 335–50.

Wheeler, E. (2022) *Regulatory Compliance, Security Risk Management: Building an Information Security Risk Management from the Ground Up. Syngress.*, *Binus University*. Available at: https://sis.binus.ac.id/2022/03/09/regulatory-compliance/.

World Bank (2021) *Principles on Identification for Sustainable Development*. Washington, DC: World Bank Group.

Yang, Y.-P. and Tsang, C.-Y. (2018) 'RegTech and the New Era of Financial Regulators: Envisaging More Public-Private Partnership Models of Financial Regulators', *University of Pennsylvania Journal of Business Law*, 21(2), pp. 354–404.

Yoland (2023) *Mengapa Regulatory Compliance Penting untuk Bisnis Anda?*, *GRC Indonesia*. Available at: https://grc-indonesia.com/mengapa-regulatory-compliance-penting-untuk-bisnis-anda/.

Yuen, A. (2018) 'Regtech in the smart banking era - a supervisor's perspective', in *HKIB Annual Banking Conference*, pp. 1–4.

Zabelina, O.A., Vasiliev, A.A. and Galushkin, S. V. (2018) 'Regulatory Technologies in the AML/CFT', *KnE Social Sciences*, 3(2), pp. 394–401. doi:10.18502/kss.v3i2.1569.