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RegTech Adoption and Anti-Money Laundering System Effectiveness: Evidence from the Banking Sector of Pakistan.

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ABSTRACT

The increasing complexity of financial regulations and the growing threat of financial crimes have encouraged financial institutions to adopt Regulatory Technology (RegTech) to enhance compliance efficiency and strengthen anti-money laundering (AML) frameworks. However, despite increasing technological investment, the practical impact of RegTech on Anti-Money Laundering System Effectiveness (AMLSE) remains uncertain in many emerging economies, including Pakistan. This study investigates the role of RegTech in improving AMLSE within the Pakistani banking sector and explores the factors influencing its implementation. A qualitative exploratory research design was employed, using ten semi-structured interviews with AML and compliance professionals from commercial banks, Islamic banks, microfinance institutions, development finance organizations, and digital banks. The collected data were analyzed using thematic analysis to identify recurring patterns related to RegTech adoption, system integration, organizational readiness, and regulatory constraints (Arif, 2015; Jadoon et al., 2025). The findings reveal that while RegTech tools such as transaction monitoring systems, electronic Know Your Customer (eKYC), and automated regulatory reporting are widely implemented, their usage remains largely compliance-driven rather than strategically focused on proactive risk detection. Banks continue to rely heavily on rule-based monitoring systems that produce high false-positive rates and require substantial human oversight. Additionally, legacy infrastructure, limited staff expertise, and regulatory uncertainty constrain the adoption of advanced technologies such as artificial intelligence and predictive analytics. The study concludes that effective AML outcomes depend not only on the availability of RegTech tools but also on their depth of adoption, system integration, regulatory clarity, and organizational capability development.

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1. Introduction

The regulatory frameworks in the field of global financial activities have been tightening over the years, and such tightness is mainly caused by the frequent financial crises and the constant risk of illicit activities like money laundering (Arner, Barberis, and Buckley, 2017; Kurum, 2020; Arif, 2015). After the global financial crisis experienced in 2008, the regulators came up with a set of new standards that were geared towards enhancing the stability of the financial systems and enhancing the management of risks in the banking institutions (Jacobs, 2010; Ahmed et al., 2024). Nonetheless, these reforms also brought about a significant increment in the compliance requirements and operational costs of banks (Basel Committee on Banking Supervision [BCBS], 2010; Grassi and Lanfranchi, 2022). The European banks are said to, as an example, use between 2 and 4 percent of the total operating expenses to satisfy regulatory compliance requirements (European Commission, n.d.; Bakhos, Douaihy, and Rowe, 2023). On the same note, regulatory enforcement measures have imposed huge financial fines, with USD 200 billion of fines being paid by U.S. banks since the financial crisis (Financial Stability Board [FSB], 2019). It is against this context of increasing compliance costs and quick digitalization that Regulatory Technology (RegTech) has become a valuable instrument in enhancing the efficiency and effectiveness of regulatory compliance procedures (Anagnostopoulos, 2018; Butler and O'Brien, 2019).

RegTech is the practice of deploying new and high-level technological solutions in regulatory compliance, control, and reporting in financial institutions, namely, Artificial Intelligence (AI), Machine Learning (ML), and blockchain (Treleaven, 2015; Sarabdeen et al., 2024; Abbas & Arif, 2023). Among the most beneficial features of RegTech is the opportunity to assist organizations in dealing with complicated regulatory obligations and minimizing operational inefficiencies that may relate to the existence of conventional compliance systems (Becker et al., 2020; Deatherage, 2021). Specifically, RegTech has demonstrated great opportunities in improving banking integrity through assisting in compliance with regulatory financial laws such as the Anti-Money laundering (AML) laws set by various international bodies like the Financial Action Task Force (FATF) (FATF, 2021; Mahmoud et al., 2023). AML policies within the context of Pakistan have been slowly adjusted to international regulatory standards, yet there are still issues with unreliable enforcement practices and old technological infrastructure (Ghauri et al., 2024; Rafiq and Sohail, 2023). Despite the fact that financial institutions have started investing in new compliance technologies, the current empirical evidence does not give much insight into how RegTech can improve the strength of the anti-money laundering systems (AMLSE), especially in developing economies like Pakistan (Bahria & Islamabad, 2023; Miron, 2024).

The given work fills a significant knowledge gap in the literature as it focuses on the adoption and implementation of RegTech solutions in terms of AML compliance. The study will contribute to the further understanding of the impact of organizational and environmental variables on the RegTech implementation through a thorough academic research review (Tornatzky and Fleischer, 1990; Vasiljeva and Lukanova, 2016). Specifically, the review offers an orderly discussion of the regulatory environment, the increasing role of AI-powered transaction monitoring in AML practices, and the most

prominent issues regarding the adoption of the technologies in the Pakistani financial sector (Arner et al., 2017; Idenfo,2024).

2. Literature Review

The introduction of the Regulatory Technology (RegTech) can be closely associated with the increase in the price of financial regulation - and the complexity of financial regulation - after the kinds of financial crises of large-scale financial crises of the world. The banking crisis in 2008 exposed a broad financial malpractice in the United States due to the release of regulatory provisions in the legislation of the Wall Street Reform and Consumer Protection Act that tripled the volume of regulations demanded by the financial industry (U.S. Congress, 2010). These reforms are supposed to enhance financial stability, as well as financial consumer protection, but there were significant compliance costs to the financial institutions in the implementation process. Information on the regulated industry estimates that regulatory compliance costs are more than 12 percent of the operating expenses of the banks, with approximately USD 50 billion annually, with minor banks absorbing a larger portion of it and losing their competitive advantage (Arner et al., 2017; Arif, 2015).

With the rising regulatory requirements, rising expenses, and rising digital revolution in the financial markets, the industry was met by the corresponding rise in reliance on technology solutions. In this context, RegTech has been characterized based on technology-enabled innovation implemented on regulatory compliance, risk management, reporting, and supervision processes (Arner et al., 2017; Alshannag et al., 2025). Generally, RegTech solutions are perceived as a mediator between financial institutions and regulatory requirements and enhancements in efficiency, accuracy, transparency, and general reduction of costs. Corresponding with RegTech, on the regulatory side, Supervisory Technology (SupTech) is being developed, which is making it possible for regulatory supervisory authorities to enhance their policy-making procedures, licensing and supervisory operations and enforcement functions, and in some scenarios even automated imposition of penalties through superior data analytics and digital technologies (Broeders & Prenio, 2018). Although such advantages do exist, new problems with the use of RegTech technologies are also emerging, including the possibility of algorithmic bias, augmented cyber risks, and concerns about over-automation and depersonalization of compliance mechanisms.

2.1 RegTech and Anti-Money Laundering (AML) Compliance

The field of anti-money laundering (AML) compliance is likely one of the most significant and expensive directions of the RegTech utilization. Money laundering is a continuum and a severe issue of concern to the general financial stability mechanism of the world, compelling banks to invest more in new and more sophisticated technological solutions to enhance the security of the money laundering detection, monitoring, and reporting systems (FATF, 2021; Ahmed et al., 2024). The systematic analysis of the work on the current AML & RegTech Literature indicates that prior studies have directed their attention more towards concerns of the drawbacks of traditional regulatory tools, the system of rule-based transaction monitoring, and structural deficiencies of previous AML controls in banking institutions. Still, an important gap can also be found in this research: the absence of empirical

investigation efforts of surveyed RegTech solutions, particularly those that utilize the technologies of artificial intelligence (AI) and blockchain to achieve the effectiveness of the AML systems on the whole.

Alternatively, the research on money laundering prevention (MLP) points to the following three primary points of Regulatory Technology (RegTech): electronic Know Your Customer (eKYC), transaction monitoring (TM), and cost-and-time-efficiency (CT). Findings of empirical research on conventional and Islamic banking sectors on the effectiveness of such components, however, are mixed. Research performed on the banking sectors of both Bahrain and Indonesia suggests that transaction monitoring capabilities and cost/time-saving capabilities of RegTech play a significant role in enhancing the effectiveness of money laundering prevention procedures (Rahman et al., 2021; Mahmoud et al., 2023; Suryanto and Riduwan, 2020).

TLM and CT were also identified as statistically significant in MLP results, and a comparative analysis detected varied findings regarding the effectiveness of Islamic and conventional banks in the areas of effectiveness of transaction monitoring. Unlike that, the adoption of electronic Know Your Customer (eKYC) technologies, according to the same body of research, does not statistically significantly impact the effectiveness of money laundering prevention. The results are especially relevant as they allow concluding that although the trend towards the digitization of customer-bounding is increasing, the existing EKYC solutions, or even the deployment of their equivalent in the context of AML frameworks, are not as beneficial as expected, and do not bring the same breadth of quantifiable advantages, as automated transaction monitoring systems and real saving of time and bi-compliance costs (Rahman et al., 2021). As a result, although eKYC can have a contributory role in the process of digitalization, individually, it appears that its potential effectiveness in enhancing the effectiveness of AML is not as substantial as the rest of the RegTech functions.

2.2 Factors Affecting the Adoption of RegTech

This is due to the fact that it is necessary to understand what allows and/or prohibits a successful implementation of Regulatory Technology (RegTech) in order to maximize its efficiency when required to combat anti-money laundering (AML) through the application of regulatory technology. The resulting Technology-Organization-Environment (TOE) approach and systems theory are used to conduct a comprehensive stream of study on the determinants that have a powerful impact on the success of the adoption process of RegTech in the banking industry (Tornatzky and Fleischer, 1990; DeLone and McLean, 2003). In that setting, the adoption of RegTech is designed to mediate and control the overall AMLSE through control of the impact of technological, organizational, and environmental factors.

The empirical findings of these studies indicate that the enablers concerning technologies and organizations contribute significantly to the RegTech adoption and, consequently, are significant to the AMLSE. Factors such as compatibility with the system, perceived complexity, and integration capability are technological considerations that are quite essential in determining the success or failure

of RegTech solutions getting successfully integrated into the current banking systems. In the same line, organizational demands, including the goodwill of top management, employee willingness, financial, and human support, have been identified as being at the center stage in successful implementation. The analysis will proceed to confirm RegTech adoption as the primary path through which such technological and organizational conditions work to enhance AMLSE with the strategic value of internal capabilities in harmony with the state-of-the-art compliance technologies.

Technological and organizational enablers were determined to play an important positive role in the adoption of Regulatory Technology (RegTech) and the effectiveness of the overall AMLSE. These results assume that the proper technological infrastructure (i.e., compatibility of systems, easy complexity to use) and the proper organizational environment (i.e., managerial commitment, employee willingness, financial resources) define successful implementation of RegTech and consequent improvements in AML. The mediation analysis further indicates the centrality of the RegTech adoption as the technological and organizational factors influence increased results of the AMLSE in the migration, mainly due to its contribution towards the adoption behavior.

Barrier to adoption analysis presents a differentiated impact on a technological, an organizational, and an environmental perspective. The technological barriers proved to be an immediate impediment to the RegTech adoption, which decreases its adoption and applicability in its operation. Conversely, organizational barriers affected AMLSE indirectly, and therefore revealed that internal resistance, cultural mismatch, or organizational conflict can be used to curtail performance in a system, albeit with the provision of relevant technologies. Even though the decision to adopt RegTech during the medium term was observed to be influenced by environmental factors (push by regulations and attraction by external clusters), there was no statistically significant direct influence on the AMLSE.

2.3 Motivation for Adoption

Another important theme of the adoption framework is the complicated nature of conditions and driving forces behind the adoption of RegTech. Particularly, the efficiency improvement, competitive pressure, or regulatory compliance motivations were identified to mediate the relations between adoption facilitators and the eventual success of RegTech implementation. Not only does this multidimensional empirical model present very useful practical implications for policymakers, regulators, and financial institutions, but it can also serve as a sound foundation in future research regarding the adoption of RegTech and its contribution to providing resilience to AML compliance. Future Courses in Data, Technology, and RegTech.

Regulatory Technology (RegTech) is all about the interaction of data, technology, and regulation. Data is the pillar here, in that, as interchange and integration of information continue to grow, interconnected data ecosystems that create value in the eyes of regulators, financial institutions, and technology providers alike have emerged. In this ecosystem another significant source of benefit is the progress of data automation and transition to machine-readable regulation, which allows to simplify effective oversight by supervisory authorities (Supervisory Technology (SupTech)) that can

now retrieve regulatory data right out of institutional systems, and utilize this data in connection with external data sources to accomplish more successful oversight (Broeders & Prenio, 2018; Arner et al., 2017).

The solutions of RegTech are premised on a number of innovative technologies, which include artificial intelligence (AI), distributed ledger technology (DLT), blockchain, smart contracts, and application programming interfaces (APIs). The technologies facilitate a variety of operational activities of the regulated agency, such as, but not limited to, management of risk, regulatory reporting, continuous monitoring, compliance with its operations, and improvement of operational efficiency. Such tools have been found to enhance the effectiveness and efficiency of regulatory compliance processes, and this will allow concerned institutions to accommodate more complex regulatory requirements with ease and manage costs and threats (BIS, 2021).

Although these were the verified advantages, the literature indicates various key areas that future research could focus on so as to reinforce anti-money laundering (AML) structures. Specifically, subsequent empirical studies should be developed to check the efficiency of AML solutions based on AI, examine ethical and legal aspects of RegTech usage, and find the means of creating additional cooperation between the key stakeholders: banks, regulators, and RegTech providers (FATF, 2021). On the whole, this discussion refers to the role of RegTech to assist in reducing the cost of a compliance strategy and reducing the threat of financial crime; and to address the achievement of the acceptability of the strategy and ethical and technological factors that should be considered to optimize the effect of such innovations in sustaining a stable financial system.

3.Methodology

3.1 Research Design

This paper deploys a quantitative factulative cross-sectional research design to explore the issue of setting up Regulatory Technology (RegTech) to improve the AMLSE in the banking industry of Pakistan. An explanatory design will also work well as the study is aimed at determining causal connections between certain components of RegTech and AML outcomes, especially to learn why the presence of RegTech does not necessarily result in successful AML implementation. The study aims to study one of the least known fields in the developing economies, where RegTech solutions have become more accessible, yet their effects are mixed.

1 3.2 Population and Sampling

The participants of the study were the banking and financial professionals of Pakistan who are directly engaged in risk management, internal auditing, regulatory reporting, or anti-money laundering (AML) compliance. In order to obtain a representative sample between institutions of different levels of digital maturity and different degrees of regulation participation, participants were attracted from a heterogeneous group of organizations, such as commercial banks, Islamic banks, digital banks, microfinance institutions, SME banks, and development finance organizations.

The purposive sampling technique was used to sample those respondents who have first-hand experience with AML operations and the usage of RegTech. This method was necessary as the study demanded expert opinion, which was informed and not general. The purposive sampling method also assisted in the achievement of institutional diversity, which is key to explaining unequal adoption of the RegTech solutions in the banking industry in Pakistan**.**

2 3.3 Data Collection Procedures

The data collection was done through ten semi-structured interviews with AML professionals and compliance. The strategy enabled the respondents to provide more insightful details regarding their experiences with regard to the RegTech application, the issue of AML, compliance with regulations, human elements, and technological limitations. The interviews were either through the secured online communication sites or face-to-face, depending on the availability of the participants. Each of the interviews was carried out with the help of a casual outline, and it reflected the key details of the utilization of the RegTech tools, their adoption, the inclusion into a system, the capability to detect suspicious activity, and the potential areas of improvement. All interviews were ensured to have informed consent, and anonymity and confidentiality were assured. In cases where it became permitted, the interviews were tape-recorded and transcribed verbatim for accuracy and reliability concerns of the data collected.

3.4 Data Analysis Technique

Thematic analysis was the method used to analyze the interview data because the tool is most appropriate in revealing recurring patterns, relationships and meanings in qualitative data. The interview transcripts were fully examined and manually coded to determine themes that were associated with RegTech adoption, AMLSE, organizational preparedness, human management, and regulatory issues. The original codes were then divided into broad themes, such as partial adoption of RegTech, continued dependence on human judgment, misfit between technological systems and regulatory needs, improvement in operational efficiency, and the ongoing AML issues. A cross-case comparison was done to establish common trends within the various banking institutions so that the level of interpretation could be expanded.

The analysis has shown that in the banking industry of Pakistan, the use of RegTech solutions in the industry is steadily growing, but currently, most of them are implemented in compliance contexts, still not oriented to the improvement of the AMLSE. The participants of the interview reported that highly advanced technologies, like AI-based detection and predictive analytics, are not frequently used because of the presence of such factors as high false-positive rates, incomplete data systems, aging infrastructure, weak technical capability, and regulatory ambiguity. In turn, the current role of RegTech is that of a support compliance tool and not a risk-detecting mechanism. These results indicate that there is a considerable disconnect between the official implementation of the RegTech solutions and their subsequent effect on the performance of the AML systems, which requires further integration, enhancement of organizational capacities, and more articulate regulation.

3.5 Interview Insights and Thematic Analysis

The gap in research that was identified in this study is strongly supported using the ten interviews with AML and compliance professionals. The interviewees of various kinds of financial

institutions, such as commercial banks, Islamic banks, microfinance institutions, development finance institutions, and digital banks, consistently highlighted that the human factor is still critical in the process of making anti-money laundering (AML) decisions, despite the technology adoption increase. Smaller banks, especially microfinance banks and development finance institutions, are more dependent on manual review processes because of infrastructure constraints and the prohibitive cost of advanced RegTech solutions. Conversely, a higher volume of system development and operational efficiency in larger commercial and digital banks can be reported, but they also involve a substantial amount of human supervision in AML operations.

The responses in interviews also pointed out that Electronic Know Your Customer (eKYC) technologies are mostly used to onboard customers and not to monitor them continuously, whereas transaction monitoring systems are mostly used to enhance operational efficiency and not to accurately detect. The majority of institutions use rule-based monitoring, sanctions screening, and automated regulatory reporting that are commonly associated with high rates of false-positive alerts that need a lot of manual validation. Such new tools as artificial intelligence and predictive analytics are not yet fully implemented, with some digital advanced banks only testing pilot solutions.

The other theme that has continued to emerge is that in Pakistan, most of the uptake of RegTech has been influenced by the need to respond to regulatory pressure and not strategic innovation. Technological tools used by institutions are usually an attempt to match the State Bank of Pakistan (SBP) and global organizations like the Financial Action Task Force (FATF) regulations. Therefore, it is the case that today, RegTech is more of a compliance support tool as opposed to a proactive financial crime detection mechanism. The respondents also cited a number of obstacles to successful adoption, such as the inability of the legacy system to integrate with other systems, dispersed data infrastructures, insufficient technical skills of the employees, and regulatory ambiguity about advanced analytics systems. The cross-interview thematic analysis summarized below highlights the major patterns observed across the ten interviews.

3.6 Cross-Interview Thematic Analysis

Theme / Variable	Evidence from Interviews	Pattern Observed	Analytical Interpretation
AML Approach	Risk-based AML framework followed across all institutions	Uniform regulatory compliance approach	AML systems are compliance-oriented rather than innovation-driven
Role of Technology	Technology is described as supportive and assistive rather than autonomous	Technology is not a decision-maker	RegTech complements manual AML processes
Nature of RegTech Used	Rule-based transaction monitoring, sanctions screening, eKYC, reporting automation	Heavy reliance on legacy rule-based systems	Limited sophistication of RegTech tools
AI & Advanced Analytics	Mostly pilot stage or not implemented	Very low AI adoption	Technology gap between Pakistan and global AML practices
Pre-RegTech Challenges	High false positives, manual workload, and reporting delays	Similar issues across institutions	RegTech adoption initially reactive
Drivers of Adoption	Regulatory pressure, compliance costs, and reputational risk	Environmental pressure dominant	Adoption largely compliance-driven
Legacy System Integration	Difficult integration across traditional banks	Infrastructure limitations	Legacy systems restrict RegTech effectiveness
Impact on AML Effectiveness	Improvements described as moderate and incremental	No full AML optimization	Efficiency improvement rather than effectiveness
False Positive Reduction	Approx. 20–30% reduction reported	Partial improvement	Need for AI-based monitoring
Most Effective Component	Transaction monitoring systems	TM > eKYC > reporting automation	Monitoring more impactful than onboarding
Human Oversight	Human review required across all banks	Automation incomplete	AML officers remain essential
Risks Identified	Data privacy concerns, cyber risks, and algorithmic bias	Common across institutions	Explains regulatory caution toward AI
Organizational Readiness	Strong management support but limited staff expertise	Skills gap present	Human capital limits RegTech impact
Regulatory Environment	Unclear regulatory guidance for AI-based systems	High uncertainty	Policy barrier to innovation
Future Direction	AI-based monitoring, regulatory clarity, and data sharing	Strong consensus	Indicates unrealized potential of RegTech

Bank-Type Comparison

Bank Type	Level of RegTech Maturity	AML Effectiveness	Key Limitation
Large Commercial Banks	Medium	Moderate	Legacy systems and rule-based monitoring
Islamic Banks	Low–Medium	Moderate	Compliance complexity and technology uncertainty
Microfinance Banks	Low	Limited	Infrastructure and cost constraints
Development Finance Institutions	Very Low	Compliance-focused	Conservative systems and minimal monitoring

Mid-Sized Commercial Banks	Medium	Moderate	Skill gaps and fragmented systems
Digital / FinTech Banks	Relatively High	Higher	Regulatory ambiguity limits AI use
State-Owned Banks	Medium	Incremental improvement	Institutional resistance to change

Research Gap Mapping

Literature Expectation	Interview Reality	Identified Gap
RegTech improves AML effectiveness	RegTech mainly improves efficiency	Effectiveness gap
AI reduces false positives	AI rarely implemented	Technology gap
RegTech enables proactive AML	AML processes remain reactive	Strategic gap
Automation replaces manual review	Human judgment still dominant	Operational gap
Clear regulatory frameworks exist	Regulatory uncertainty persists	Policy gap
RegTech adoption is strategic	Adoption primarily compliance-driven	Institutional gap

Overall, the interviews reveal a clear gap between formal RegTech adoption and its practical contribution to AML effectiveness. Most institutions operate hybrid AML systems where automated monitoring tools support, but do not replace, human judgment (Hameed & Arif, 2021). These findings suggest that the effectiveness of RegTech depends not only on technological availability but also on organizational capabilities, system integration, regulatory clarity, and skilled personnel. By highlighting this gap, the study contributes to the understanding of RegTech adoption in emerging financial systems and offers practical insights for policymakers, regulators, and financial institutions seeking to strengthen AML frameworks.

4.Discussion

In this study, the researcher was trying to find out the reason, as to why the implementation of Regulatory Technology (RegTech) in the banking industry of Pakistan has not always led to positive results of Anti-Money Laundering System (AMLSE). The results were based on ten semi-structured, in-depth interviews with experts working in AML and compliance who provided insight into relevant perspectives that broaden the knowledge of the role of RegTech implementation in a developing country.

The results show that technological compliance is the driving force of RegTech in Pakistan as opposed to risk reduction. Most banks have applied simple and automated systems to monitor their transactions, but this is only as a result of compliance with the regulations they report their money laundering actions, and not as a result of trying to vigilantly identify the complex money laundering schemes. Interview answers affirmed that there was strong dependence on systems based on rules, which produce a high number of false positives, and that they need a lot of human supervision. This is a challenge to the assumption made in the existing literature, which says that an automatic implementation of RegTech will automatically increase AML effectiveness.

The second important conclusion is the lack of a significant role of electronic Know Your Customer (eKYC) systems. As mentioned regularly by interviewees, eKYC facilitates the onboarding of customers and very little of the seamless AML monitoring. It means that onboarding systems and

the continued monitoring of transactions are not interconnected in structure and not sufficiently integrated to allow banks to create complete customer risk profiles, undermining AML performance.

It is also noted that in AML, there is still a role of human judgment in decision-making despite the growing imperativeness of such decisions. In spite of the fact that automation makes the work more efficient, the manual review is an essential part of the end suspicious activity reporting. This dual nature is indicative of institutionalizing risk with respect to advanced analytics and regulatory conservatism, which highlights that RegTech implementation is not a strictly technological phenomenon but also an organizational change, which is influenced by the level of competency among the staff, institutional readiness, and regulatory transparency.

Another lesson gained during the interviews is a constant lack of alignment between technology and regulation. The issues regarding data sharing in real time, cooperation between banks, and regulatory approval of AI-based analytics were commonly perceived. These uncertainties strengthen shallow adoption and deter banks from using the full potential of RegTech. Therefore, there is still a lack of an integrated ecosystem of AML technologies in Pakistan, which leads to the skewed effectiveness of different financial institutions.

All in all, the results indicate that the degree of adoption maturity and the extent of system integration are the key factors, but not the availability of RegTech tools, one of the factors that has an impact on AML effectiveness. Based on the practitioner experience as the source of the analysis, this study offers context-specific evidence in describing the reasons for poor AML outcomes in the face of considerable technological expenditures.

4.1 Recommendations

In accordance with the results of the conducted study, a number of effective recommendations are put forward, considering the possibility to improve the efficacy of the RegTech-enabled AML frameworks in Pakistan. A national framework should be built by the regulators to help in clarifying the extent to which risk-based monitoring, artificial intelligence, and advanced analytics can be used in AML operations. This framework would offer banks predictability on the part of regulators, drive them towards greater technological integration relative to systems that rely on rules, and help to break down institutional inertia toward the adoption of more advanced tools.

Banks ought to focus on the proactive management of risks by the use of RegTech instead of the regulatory reporting only. This is achieved through the incorporation of client risk assessment, transaction monitoring, and behavioral analytics into the normal banking activities. It is necessary to develop interconnected tools that would interrelate transaction data, eKYC systems and customer behavior over time to increase the effectiveness of AML.

The proper utilization of RegTech needs well-trained staff. The results of interviews show that the competence of the staff is one of the primary limitations to the benefits of advanced technologies. The AML professionals should be trained by the banks on a continuous basis, with emphasis on

interpreting data, calibration of systems, and interpretation of the advanced analytics results. Human quality control in expert mode is essential in the minimization of false positives and the quality of detection.

Regulators are suggested to promote the use of controlled information-sharing mechanisms between banks in order to identify the trends of high risks and enhance AML performance across systems. Structured collaboration can enhance the effectiveness of AML without compromising data privacy, even in the case of no real-time data sharing. The ReTech wants, and Future initiatives are to aim at the adoption level and quality instead of just purchase. Banks are supposed to measure the extent to which RegTech is operationalized, trusted, and embedded into the AML processes. Integrating the measures of quality of adoption into the supervisory ratings can help the institutions move towards more valuable and productive use of technology.

5.Conclusion

This paper has discussed how Regulatory Technology (RegTech) can promote the effectiveness of the Anti-Money Laundering System Effectiveness (AMLSE) in the banking sector in Pakistan, and in this context, the paper examines the reasoning as to why RegTech has not always been able to lead to greater AML results. The study is based on the qualitative data from ten semi-structured interviews with AML and compliance specialists at different financial institutions as context-specific evidence in a developing economy, where RegTech implementation remains uncoordinated and inconsistent.

Results suggest that Pakistan is full of superficial applications of RegTech, which are adopted due to compliance matters, but are not taken as risk management measures. Although automation systems, eKYC providers, transaction monitoring solutions, and similar tools are used by most companies, they are mainly applied in the regulation of reporting and onboarding a new customer, but not to intercept a complex money laundering process before it occurs. High false identifications, incoherent and aged infrastructure, limited personnel capabilities, and regulatory ambiguity further limit the transformative potential of RegTech. Consequently, human judgment is the core of the AML decision-making process, which has preserved the existence of hybrid systems that are prone to manual analysis (Arif et al., 2023).

One of the contributions of the study is that the gap has been identified between the availability of RegTech and true effectiveness of AML. In sharp contrast to the expectations of most of the current literature, the mere usage of RegTech is not a guarantee of better results. Rather, the only way towards meaningful growth of AMLSE is total adoption which includes thorough system integration, organizational preparedness, experienced human management, and well-defined regulatory directions. The national absence of a single framework also makes matters worse by creating inconsistencies at the institutional level.

This research focuses on adoption maturity rather than the presence of technology, thereby providing empirical evidence on RegTech in a research area underrepresented in the literature. It shows that successful AML performance has to be organized in a coordinated way with the help of combining

technology and governance, developing human capacity, and supporting the process with regulation. Finally, what makes RegTech useful in Pakistan is its consideration, integration, and risk-focused use, not merely its deployment.

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