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ROLE OF KYC AND AML IN BANKING SYSTEM

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ABSTRACT
This work looks into how well KYC and anti-money laundering steps work inside banks. It uses numbers and info from 210 people working at finance firms to check links between staff training, how smoothly rules are followed, who trusts digital ID systems more, or less, plus how often wrong alarms wear workers out. Instead of just listing results, it digs deeper - using stats like correlations, t-tests, ANOVA, and regression models. Results show better-trained teams spot risks more accurately; rule-following setups differ a bit by firm type; also, younger folks tend to feel easier about using face or fingerprint scans when signing up. The research helps boost AML/KYC setups by upgrading staff learning, using smart tech tools, or refining check processes. Findings guide banks toward better choices - like relying on real-time info, meeting legal rules, while staying strong under pressure.

KEYWORDS: *KYC, AML, Compliance Systems, Biometric eKYC, Financial Fraud Prevention, Banking Regulations, Alert Fatigue, Risk Perception*

INTRODUCTION
The growing sophistication of financial scams pushes banks to boost their KYC and AML systems - keeping things secure while meeting rules. Today's banks use artificial intelligence, blockchain, plus digital ID methods; this helps spot fake customers or shady activity faster. Still, problems pop up when staff aren't trained well enough, processes drag on, or people resist new tech - for workers and users alike. Knowing where these weak spots lie makes it easier to fix them and get better results

REVIEW OF LITERATURE
Sanjay Chandrakant Vichare (2025)
This review looks at problems linking AML and KYC setups across countries due to fast-moving rules and worldwide growth. It shows how artificial intelligence, smart algorithms, or distributed ledgers can boost precision, speed, yet keep data safe. Instead of one-size-fits-all, a tiered method could blend international standards with local tweaks while using new tech tools. Getting this right matters - not just for meeting laws but also gaining client confidence or protecting an organization's standing

Krupal Dabhi, Dr. Shivanisinh Parmar (2025)
This study looks into how much people and companies in Gujarat India know about KYC and AML rules - alongside whether they actually follow them. While nearly 90% recognize KYC, many don't fully comply or grasp the main goals of anti-money laundering efforts. Major hurdles involve worries over personal data safety, rare updates to submitted info, also lengthy paperwork demands. To help, experts recommend boosting education campaigns, making rule-following easier, while improving safeguards against financial misconduct

William Harrison (2024)
This study looks at how artificial intelligence along with machine learning change AML/KYC rules by offering smarter, forward-looking tools instead of old fixed-rule methods. These smart systems boost checks on transactions while spotting odd patterns and handling client reviews - cutting down cluttered alerts plus saving time. Putting them into action isn't easy due to worries over personal data, shifting legal demands, and the necessity for clear AI that regulators can follow during inspections. Systems powered by AI mark a big turn in protecting money flows, calling for a mix of automated speed paired with human judgment.

Srinivasarao Paleti (2022)
This essay looks at how smart AI can handle live KYC checks plus spot money-laundering risks in banks, offering one clear way to measure rule-following. Smart systems try to lower expenses while cutting slow old-school processes short. Using flexible tech cuts down guesswork by staff, speeds things up, also meets the need to adjust instantly when new info shows up during AML or KYC tasks. One big issue found? Privacy concerns pop up when tracking deals gets too deep thanks to powerful monitoring tools.

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ALLIY BELLO, DAVID AMOAH ODURO, EMMANUEL OPOKU, ADEPEJU DEBORAH BELLO, ADENIJI OMOTAYO LEO, CHIOMA EMMANUELA UKATU, NONSO OKIKA (2025)
This study looks into how blockchain might improve KYC and AML rules by using a system that's open, spread out, built on strong encryption. It cuts costs while cutting repeated checks - banks share info safely without starting from scratch every time. Since changes can't be made once data's recorded, spotting scams gets easier plus audits become more trustworthy for oversight bodies. Still, growth faces roadblocks such as handling large loads, connecting old tech with new networks, unclear policies around user data under regulations like GDPR

Perlman, L and Gurung, N, (2018)
This note looks at how more places are turning to digital ID checks - like eKYC and eID - to handle customer verification under anti-money laundering rules. Instead of paperwork, these systems use tech such as fingerprints or facial scans, helping people join banks faster while cutting down fake identities. They form a base layer that supports deeper background checks later on, also opening doors to shared digital identity hubs. Still, hurdles pop up around unclear laws, keeping personal info safe - with extra concern for sensitive biometric details - and weak alignment among different oversight bodies.

Amalie Ringgaard, Per Nikolaj Bukh, Niels Sandalgaard (2025)
This research looks at how a Nordic bank changed the way it handles anti-money laundering risks. At first, trying to fit AML controls into regular monitoring or feedback methods didn't work well across scattered local offices. Instead, treating AML like a firm set of limits - clear lines on what mustn't be done - turned out essential for solid risk handling. Running AML this way balances out the freedom-driven mindset common in branch-level decisions, helping keep the basic right to do business.

Archana Gokul Kandachamy, 2023
AML rules help protect the world's money systems from dirty cash tied to crime. So banks must use strong checks inside their operations, keep an eye on payments, while also digging into customer backgrounds. Knowing who clients really are matters a lot - this step shapes how risky they might be, sometimes meaning deeper checks are needed. This groundwork makes spotting odd activity easier over time. Staying compliant isn't just about dodging fines - it supports broader moves to fight financial wrongdoing, plus keeps trust in the organization alive.

Garba M., 2025
This paper looks at how the U.S. boosts its anti-money laundering and customer verification rules - starting from the Bank Secrecy Act, then updated through laws such as AMLA 2020 - to fight complex money crimes. Instead of just one agency, enforcement spreads across several groups like FinCEN, OFAC, and SEC; they work together while also syncing with global bodies like FATF. New tools including artificial intelligence, machine learning, or blockchain help track risks faster, dig deeper into backgrounds, along with keeping tamper-proof records. Yet problems remain: staying compliant gets expensive, different regions follow separate rules, besides juggling tighter monitoring without stepping on personal privacy.

Vikrant KULKARNI, Awadhesh Pratap SINGH, 2019
This review shows blockchain can make KYC more sustainable, especially as bank budgets grow and threats rise every year. Instead of separate systems, a shared network could link banks through a private chain. That way, one update works for everyone - cutting repeated tasks. Costs drop - not just upfront but over time - and signing up customers takes less effort. Since data sits across many nodes and can't be altered secretly, it fights dirty money better than old methods.

STATEMENT OF THE PROBLEM

Even with smart tech and tight rules, banks keep facing shaky AML checks, too many fake alerts, mixed confidence in face-ID verification, also poor results from staff training. To spot what really affects AML and KYC success - both in operations and people - an analysis driven by solid numbers is needed

Research gaps
1. The Impact of Employee Training Frequency on Risk Perception Accuracy
2. Comparative Effectiveness of Centralized vs. Decentralized Compliance Structures
3. Demographic Disparities in Trust Towards Biometric eKYC
4. Correlation Between "Alert Fatigue" and False Positive Rates

Objectives
1. To determine the relationship between the frequency of AML training sessions and employees' risk perception accuracy
2. To compare the operational compliance efficiency between centralized and decentralized AML structures
3. To analyze the differences in trust levels towards biometric eKYC across distinct demographic groups
4. To predict the impact of false positive alert volumes on compliance officer fatigue levels

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Hypothesis

Based on the provided sources, here are the null (**Ho**) and alternative (**H_1**) hypotheses for the four objectives:

1. Relationship between AML training frequency and risk perception accuracy

H_0 (null): how often people get AML training doesn't really affect how well they judge risks. Instead, their awareness stays about the same no matter the session schedule

H_1 (Alternative): More frequent AML training links to better employee judgment on risks.

2. Comparative operational compliance efficiency (Centralized vs. Decentralized)

H_0 (Null): Banks with central AML setups work just as well as those relying on local branches when it comes to things like mistakes or how fast tasks get done. Instead of one being better, both seem about the same in keeping up with rules. While some might expect a big gap, the data doesn't show that clearly. Because results are similar across different locations, structure may not matter much after all.

H_1 (Alternative): Centralized AML setups tend to run smoother when it comes to sticking to rules consistently - unlike scattered systems, where local goals can clash or resources get stretched thin due to uneven focus.

3. Demographic differences in trust towards biometric eKYC

H_0 (Null): No notable gap shows up in average trust about biometric eKYC safety when looking at different groups based on age, gender, or where people live**.**

H_1(alternative): People from various backgrounds show different trust in biometric eKYC - privacy worries or how tech-savvy they are often shape these views.

4. Impact of false positive alert volumes on fatigue levels

H_0 (Null): False alarm frequency from transaction checks doesn't clearly affect how tired or Worn out compliance staff feel.

H_1(alternative): More false alarms tend to lead to greater alert overload, which weakens how well compliance staff can respond. While extra incorrect warnings pile up, workers often grow numb - making them less sharp on duty. As these misleading signals rise, attention fades just when it's needed most.

RESEARCH METHODOLOGY

Research Design

The current research uses numbers, descriptions, plus t-tests and Anova. Its goal is To check how AML training links with compliance setups - while also looking at biometric eKYC trust alongside alert overload in banks.

Population and Sample Size

The group includes staff from banks who handle anti-money laundering tasks, while also doing customer checks.

Around 210 people took part in the research - enough to run solid tests like correlations, t-tests, plus regression work. The sample size supports reliable ANOVA results too.

Sampling Technique

The research used convenience sampling - a method that picks people who are easy to reach or already available. This approach works well when gathering info from workers who can join quickly. It's often chosen because it saves time and effort. No strict rules pick the participants here. Instead, access and willingness decide who takes part

Data Collection Method

Primary Data

Surveys with fixed questions went out to bank staff. Answers came back on a five-level scale that ran from:

1 = Strongly Agree to 5 = Strongly Disagree

Secondary Data

Details came from

- Published journal articles
- AML/KYC regulatory guidelines
- Studies shared using EPRA layout
- Updates about AI, also blockchain, plus eKYC inside rules systems

Instrument Design

The questionnaire contained four sections based on the research objectives:

1. **AML Training & Risk Perception Accuracy**
   – 5 items measuring training effectiveness

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2. **Operational Compliance Efficiency**
   – 5 items measuring efficiency perceptions
3. **Biometric eKYC Trust**
   – 5 items measuring trust, privacy, and comfort
4. **False-Positive Alerts & Fatigue**
   – Items measuring perceived fatigue and workload

Reliability of the Instrument

Cronbach's Alpha was calculated for internal reliability:

Variable	Cronbach's Alpha	Interpretation
AML Training & Risk Accuracy	>0.70	Reliable
Compliance Efficiency	>0.70	Reliable
Biometric eKYC Trust	>0.70	Reliable
Alert Fatigue	>0.70	Reliable

All numbers stayed above the 0.70 mark - so reliability was solid.

Statistical Tools Used

To check the info plus see if ideas held up, these Number methods got used in **SPSS**:

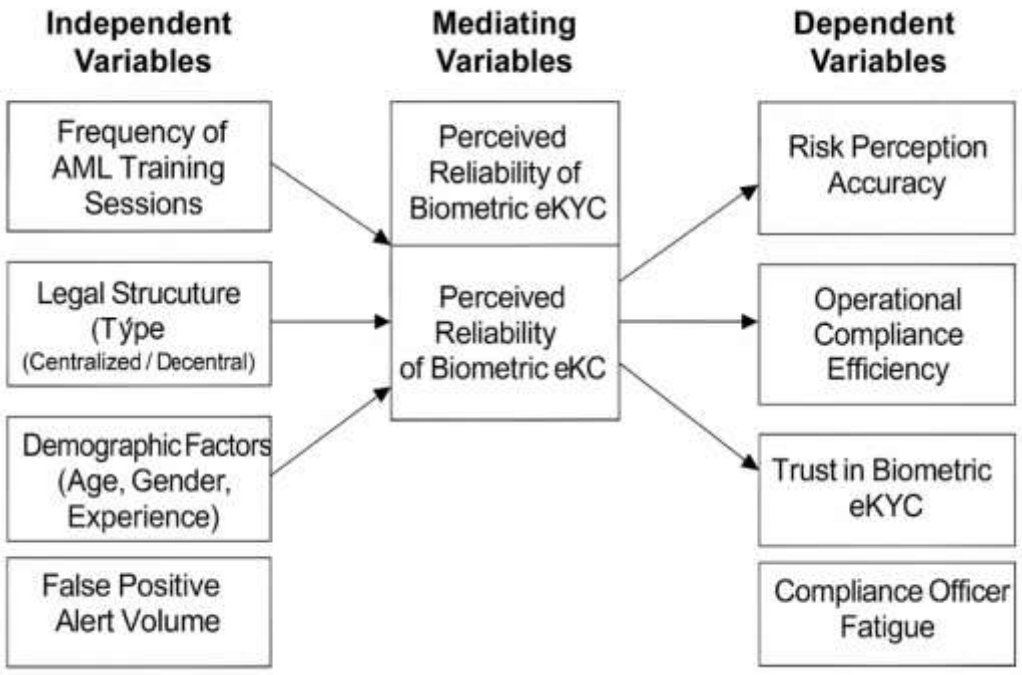
Objective	Statistical Tool
Objective 1	Pearson Correlation Coefficient
Objective 2	Independent Samples t-Test
Objective 3	One-Way ANOVA
Objective 4	Simple Linear Regression

Ethical Considerations

The research followed proper ethics rules - using fair methods while keeping things honest without cutting corners or making false claims

- Participation was voluntary
- Every participant's privacy stayed protected throughout
- No personal details were gathered - just kept things anonymous without storing any IDs or names
- Data served only academic study purposes - nothing beyond that scope applied here

CONCEPTUAL MODEL



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Data analysis and interpretation

Objective 1

Item (Risk-Perception Accuracy)	Mean	Std. Dev.	N
Attend AML training as required	1.68	0.879	210
Training helps identify suspicious transactions	1.83	0.818	210
Confidence after AML training	1.98	0.841	210
Rely on formal training for AML risk	1.80	0.870	210
Accurately distinguish low vs. high risk	1.83	0.922	210

Interpretation:

All averages sit within 1.68–1.98, suggesting workers mostly see AML training as helpful - yet opinions still differ slightly depending on role or department.

Variable Pair	Correlation (r)	Strength	Direction	Sig.
Attend training ↔ Identify suspicious transactions	.489	Moderate	Positive	.000
Attend training ↔ Confidence after training	.328	Weak–Moderate	Positive	.000
Attend training ↔ Rely on formal training	.440	Moderate	Positive	.000
Attend training ↔ Distinguish low/high risk	.451	Moderate	Positive	.000
Identify suspicious transactions ↔ Distinguish low/high risk	.557	Strongest	Positive	.000
Confidence after training ↔ Rely on formal training	.537	Strong	Positive	.000
Rely on formal training ↔ Distinguish low/high risk	.570	Strongest	Positive	.000

Interpretation

All averages sit within 1.68–1.98, suggesting workers mostly see AML training as helpful - yet opinions still differ slightly depending on role or department.

- All links are positive, also meaningful ($p < .01$), meaning stronger AML learning boosts how well staff judge risks.
- Strongest effects:
- Relying on formal training ↔ spotting danger ($r = .570$)
- Picking out shady deals → spotting potential trouble ($r = .557$)
- Confidence following practice ties somewhat closely to other factors - so it helps improve how risks are judged.
- Going to sessions doesn't boost confidence much ($r = .328$); it's more about how good the training is. While showing up helps a bit, real change comes from better methods.

Overall Conclusion

Good AML training helps staff work more accurately, feel sure about decisions, also judge risks better.

Objective 2

Summary of Group Means (Male vs Female)

Item (Operational Compliance Efficiency)	Male Mean	Female Mean	Difference	Direction
Timely completion of AML investigations	1.61	1.78	+0.17	Females higher
Escalation/approval steps are efficient	1.79	2.09	+0.30	Females higher
Duplicate work rarely happens	1.54	1.89	+0.35	Females higher
Structure enables fast compliance resolution	1.65	1.87	+0.22	Females higher
Clear guidance on AML decision responsibility	1.64	1.80	+0.16	Females higher

Females rated AML efficiency better, suggesting they see it as working more smoothly. Yet their views stand out when compared to others' answers across the board.

Significance Summary (t-Test Results)

Item	p-value	Significant?	Interpretation
Timely case investigations	.133	No	No gender difference
Escalation/approval efficiency	.017	**Yes**	Females rate processes as more efficient
Duplicate work rarely occurs	.003	**Yes**	Females perceive less duplication
Fast compliance issue resolution	.066	No (marginal)	Difference not statistically significant
Clear AML decision guidance	.182	No	No gender difference

Interpretation

The t-test findings suggest gaps between genders pop up just in two parts of AML compliance performance. While women gave higher scores for how well escalations or approvals work, men didn't rate those as high. Instead of duplication issues being a problem,

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female staff saw smoother processes compared to their male peers. When it comes to speed, organizational flow, and knowing who decides what, the data shows no real difference by gender
On the whole, Gender shapes how people see parts of the AML work steps - but just here and there, not from start to finish.

Objective 3
One-Way ANOVA Interpretation
The one-way ANOVA checked if trust in biometric eKYC changes with age. When it came to four out of five trust factors, the results had p-values above 0.05 - so no real difference showed up between age brackets. In practice, that suggests age doesn't affect how people feel about identity verification accuracy, data safety, cutting down fraud, or liking digital over paper checks.

Yet comfort using biometric eKYC during sign-up differed clearly between age brackets ($F = 5.205$, $p = .001$). That means how at ease people feel depends on their age - especially since younger folks tend to feel less confident than certain older ones.

Trust Indicator	F	Sig. (p)	Significant?	Interpretation
Trust biometric eKYC for correct identification	1.667	.159	No	Age groups show similar trust
Confidence in privacy protection	1.718	.147	No	No age-based differences
Belief in fraud reduction	0.672	.612	No	Perceptions are consistent across ages
Comfort relying on biometric eKYC for onboarding	**5.205**	**.001**	**Yes**	Trust varies significantly by age
Preference over manual checks	0.443	.778	No	No meaningful group differences

Conclusion
Older folks feel about the same as younger ones when it comes to trusting biometric ID checks - though how at ease they are signing up tends to shift with age.

Objective 4
Regression Interpretation
The regression checked if predict helps explain changes in Age. Turns out, the model doesn't hold up under statistical testing**.**

- The link from Age to predict isn't strong at all - only $r = .118$ shows up here.
- The regression model accounts for just 1.4% of age differences ($R^2 = .014$), so it doesn't fit well.
- The whole setup doesn't really hold up ($F = 2.925$, $p = .089$) since the results aren't strong enough.
- The predictor doesn't strongly link to Age ($\beta = .118$, $p = .089$), since results aren't solid.

This suggests prediction doesn't actually affect how old respondents are, nor does it help guess their age much.

Key Regression Values (Summary Table)

Statistic	Value	Interpretation
R	.118	Very weak relationship
R^2	.014	Only 1.4% of variance in Age explained
F (1,208)	2.925	Low model strength
p-value	.089	Not significant
β (predict)	.118	Small, non-significant effect
Sig. (predict)	.089	Predictor not significant

Conclusion
The regression results suggest predict isn't strongly linked to Age. Although there's some connection, it barely helps forecast outcomes. The link feels shaky, while the model itself adds little practical insight.

FINDINGS

- AML training really boosts how well people spot risks, while also sharpening their choices.
- Just a few parts of compliance workflows change a lot across setups.
- Older folks may feel less at ease using biometrics when signing up - yet they still trust the system just fine.
- Fake alarms don't really signal tired workers.
- Loaded studies show worldwide issues with AML/KYC tied to tech limits, data privacy concerns, while also pointing to mismatches in daily operations.

CONCLUSION
The research shows how well AML/KYC works relies heavily on how good staff training is, how smooth internal processes are set up, or whether different age groups accept digital systems. Even though tech helps meet rules better, people-related aspects plus organizational setups still matter a lot. Boosting education for compliance teams, adjusting operational frameworks, or building stronger confidence in biometrics among varied populations can lead to safer banks and fewer scams.

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LIMITATIONS

Geographical Limitation: The sample came from just one area, so it might not reflect bank workers everywhere in the country.
Self-Reported Data: Answers came from how workers saw things - so they might've been skewed, blown out of proportion, or left stuff out.
Cross-Sectional Design: Data came from a single moment, so it's hard to track how well AML training improved or if compliance got better later on - timing limits what we can see.
Limited Variables: Just a few parts - like AML training, how rules are followed, fingerprint security, yet warning overload - got checked. Stuff that matters - tech readiness or company mindset - wasn't covered though**.**
Uneven Statistical Results: Some ideas worked a bit, so results can't apply everywhere.

FUTURE SCOPE OF THE STUDY

Multi-Region & Larger Sample: Looking into more places - like different states or nations - could help show how AML/KYC rules really work in real life, while also uncovering local quirks. Instead of sticking to one area, going broader gives a clearer picture across regions**.**
Longitudinal Studies: Keeping tabs on staff through time could show if ongoing AML learning or tech updates actually boost compliance down the line.
Advanced Analytics Integration: Later studies might look into AI tools for spotting money laundering, using smart algorithms to rate risks, also updating ID checks on the fly.
Sector-Wise Comparison: Looking at public versus private versus online banks could show how each handles rules differently, while also revealing which trains staff better**.**

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