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*Mediating Effect of Operational Efficiency on the
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Mwenda Mercy KATHURE

Prof. Joseph MASINDE

Prof. Andrew MUGUNA

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Mediating Effect of Operational Efficiency on the Relationship between Liquidity Risk Management and Financial Performance of Commercial Banks in Kenya

By: Mwenda Mercy KATHURE¹, Prof. Joseph MASINDE² and Prof. Andrew MUGUNA³

Abstract

The ability of commercial banks to manage liquidity risk while efficiently managing resources is important for strengthening financial performance. However, managing liquidity risk may involve costs and operational trade-offs that shape the degree to which liquidity risk strategies translate into improved financial outcomes. This study therefore examined the mediating effect of operational efficiency on the relationship between liquidity risk management and financial performance of commercial banks in Kenya. The study was anchored on the Resource-Based View Theory and Shiftability Theory. Underpinned by the positivism research philosophy, the study adopted mixed research design. Secondary data was derived from published audited annual financial statements of 32 licensed commercial banks operating in Kenya, from 2020 to 2024. The mediating effect of operational efficiency was assessed using bootstrap method, indicating no statistically significant mediation effect. The study recommends that commercial banks should manage liquidity risk without relying on improvements in operational efficiency as the transmission mechanism.

Keywords: Liquidity risk management, Operational Efficiency, Financial Performance, Commercial Banks.

1. INTRODUCTION

Commercial banks play a vital role in the financial system by mobilizing savings, allocating capital, facilitating payments and supporting investments across the economy (Kuziev, 2026). Their capacity to undertake these functions optimally, commercial banks partly depend on maintaining ample liquidity and ensuring efficient utilization of financial resources (Ratemo & Ndebe, 2021). Liquidity makes it possible for financial institutions to meet their obligations as they fall due and promote depositors and stakeholders' confidence (CBK, 2024). Nevertheless, holding excessive liquid assets may generate lower returns from creating opportunity costs which is brought about by retaining resources that are highly liquid (Matunda et al., 2024). Amira et al., (2023) argues that effective management of liquidity requires that deposit taking institutions to balance adequate liquidity with pursuit of financial performance.

¹PhD Candidate, Department of Business Administration, Chuka University, P.O. BOX 109-60400, Chuka, Kenya, e-mail: mmwenda.pt@chuka.ac.ke, ORCID: 0009-0008-7634-2142

²Associate Professor, Department of Management Science, Chuka University, e-mail: jmasinde@chuka.ac.ke, ORCID: 0009-0002-5070-3815

³Associate Professor, Department of Business Administration, Chuka University, e-mail: amuguna@chuka.ac.ke, ORCID: 0009-0001-8643-4210

Cook (2025) indicated that liquidity risk management is the proactive process of ensuring a company has the cash on hand to meet its financial obligations as they come due. Commercial banks are required to maintain sufficient liquid assets to meet deposit withdrawals, loan payments and other short-term obligations without constraining income-generating activities (CBK,2024).

Empirical evidence from Uk, suggested that liquidity risk management is crucial for stability however, excessive LCR correlates negatively with ROA, ROE and NIM in Uk banks (Eltweri et al., 2024)). On the other hand, Bilal et al., (2024) found that liquidity risk positively affected financial performance of Gulf Cooperation Council (GCC) banks. Commercial banks of the Sub-Saharan Africa and other developing regions face unique risk management challenges. Beck et al., (2023) argues that financial markets in these regions are relatively shallow, limited by interbank market depth and reliance on customer deposits as primary funding sources. The COVID-19 pandemic exposed structural weaknesses in liquidity buffers across African banking systems, prompting regulatory interventions so as to preserve bank resilience (World Bank, 2023). Yahaya et al., (2021) documented a significant negative relationship between liquidity risk and bank performance across six Saharan African countries. Ibebi & Ule (2024) for Nigeria and Shisia et al., (2025) for Kenya found that certain liquidity measures positively influence financial performance when optimally managed. Nyagah et al., (2024) reported a positive influence of liquidity risk management on financial performance of commercial banks in Kenya. On the other hand, a study on the influence of liquidity risk management on financial performance of commercial banks in Kenya reported that liquidity risk management has a negative effect on financial performance measured either by ROA or ROE (Amira et al., 2023). These differences provide evidence that the relationship between liquidity risk management and financial performance may be influenced by other organizational mechanisms and contextual factors.

Operational efficiency may be one of the factors that explain how liquidity risk management translates into financial performance. Marimira and Gumel (2025) describe operational efficiency as an organization's ability to balance between inputs and outputs, that, when healthy, helps business cut down on unnecessary costs while increasing revenue. Operational efficiency serves as a transmission channel between liquidity risk management and financial performance of commercial banks. Liquidity risk managements constructs such as maintaining adequate liquidity

buffers, cash flow forecasting, contingency funding plan and compliance with the regulatory liquidity ratios enables banks to manage their funding sources and cash flows more effectively (Triki & Bouaziz, 2020). When liquidity resources are properly planned and allocated, banks reduce funding costs, avoid emergency borrowing and minimize idle resources (Marimira & Gumel, 2025). This improves operational efficiency, which in turn improves the financial performance of commercial banks.

The study by Jatmiko (2025) focused on operational efficiency and liquidity risk management, implications for the financial performance of the Jakarta regional development bank. Using multiple regression approach, the variables tested included BOPO (operating costs to operating income), NPLs (Non-Performing Loans), LDR (Loan to Deposit Ratio) and reserve requirements (minimum required current account). The research found that BOPO and NPLs had a significant negative influence on ROE, while LDR and reserve requirements had a significant positive influence. The research concluded that operational efficiency and risk management are very important in increasing bank profitability. However, the previous research examined the direct influence of operational efficiency and risk management on financial performance of Jakarta regional development commercial banks. It overlooked the mediating effect of operational efficiency in the relationship between aspects of risk management, particularly liquidity risk management and financial management.

Arand and Wardani (2024) explored on the effect of operational efficiency on the financial performance of Islamic banks listed on the Indonesia Stock Exchange for the period 2019-2023. The research sample consisted of three Islamic banks. Operational efficiency was measured by the Data Envelopment Analysis (DEA) using multiple linear regression. The findings showed that operational efficiency has no significant effect on financial performance of Islamic banks. The previous study measured operational efficiency by DEA which supports long-term operational strategy while the current study measured operational efficiency by Cost-Income-Ratio which will focus on short-term financial monitoring.

Although Hasmiana & Pintor (2022) investigated the effect of financial risk, capital structure and banking liquidity on profitability with operational efficiency as an intervening variable in

Indonesian state-owned and private commercial banks, their findings indicated that while financial risk, capital structure and liquidity had significant direct effects on profitability and the combined influence of financial risk, capital structure and liquidity on profitability through operational efficiency was not statistically significant. Similarly, Santosa and Lestari (2026) examined whether capital adequacy, liquidity, credit risk and financial performance of regional development banks in Indonesia. Using Sobel test, Santosa and Lestari (2026) found that operational efficiency did not mediate the relationship between liquidity risk management and financial performance although, it significantly mediated the relationship credit risk and financial performance of regional development banks in Indonesia. However, these studies were conducted in different geographical and institutional contexts, creating a contextual gap since their findings may not be directly applicable to commercial banks in Kenya. To address this gap, the current study examined the relationship between liquidity risk management and financial performance of commercial banks in Kenya and the mediating effects of operational efficiency.

Applying theoretical lens, liquidity risk management and operational efficiency tend to influence performance. The Resource-Based View provides a theoretical basis for examining this relationship by emphasizing the importance of valuable organizational resources and capabilities in creating and maintaining competitive advantages (Barney, 1991). From this perspective, the ability of commercial banks to efficiently manage financial resources, including liquid assets, may constitute an organizational capability that contributes to improved performance. The Shiftability Theory also provides a basis for understanding how banks can maintain liquidity by holding assets that can be readily converted into cash when required (Moulton, 1918). Previous studies have examined direct relationship between liquidity risk management and financial performance of commercial banks other studies have investigated operational efficiency as an explanatory factor for financial performance. Consequently, there remains a need to examine whether operational efficiency transmits the effect of liquidity risk management to financial performance. Addressing this gap, the current study investigated the mediating effect of operational efficiency on the relationship between liquidity risk management and financial performance of commercial banks in Kenya.

1.2. Objective of the Study

To examine the mediating effects of operational efficiency on the relationship between liquidity risk management and financial performance of commercial banks in Kenya.

1.3. Hypothesis of the Study

H₀: The mediating effect of operational efficiency on the relationship between liquidity risk management and financial performance of commercial banks in Kenya is not statistically significant.

2. METHODOLOGY

Positivism research philosophy was adopted in the study. The study population comprised of 38 commercial banks in Kenya for the period between 2020 and 2024. The final sample comprised of 32 commercial banks after screening for missing observations and outliers. Secondary panel data was obtained from published audited financial statements. Data was cleaned and coded in Microsoft Excel then exported to STATA version 19 for analysis and the results were presented using tables and graphs. Data was analyzed using descriptive statistics and random panel regression techniques. Liquidity risk management (LRM) was operationalized using liquidity risk management index which was constructed from the metrics of cash flow forecasting, contingency planning and liquidity buffer metrics. Cash flow forecasting was measured using cash to deposit ratio, contingency planning was measured using loan to deposit ratio while liquidity buffer was measured using cash holding ratio. Principal Component Analysis (PCA) was performed to construct the index. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were conducted to determine whether the data were suitable for Principal Component Analysis (PCA). Operational efficiency (OE) was measured using Cost-to-Income Ratio while financial performance was measured using Return on Assets. The mediating effect of operational efficiency was tested using the bootstrapping approach. To achieve this, the four paths mediation procedure proposed by Hayes (2013) was adopted.

3. RESULTS

A response rate of 84.2% was obtained. Descriptive statistics were used to summarize liquidity risk management, operational efficiency and financial performance features into mean, standard deviation, skewness and kurtosis. The findings of descriptive statistics are presented in Table 1.

Table 1: Descriptive Statistics

Variables	N	Mean	Min	Max	SD	Skewness	Kurtosis
FP	32	0.0232	0.0100	0.0388	0.0063	0.2493	2.5985
LRM	32	0.3365	0.0000	1.0000	0.1995	0.8366	3.2520
OE	32	0.6914	0.2368	2.3433	0.3250	1.8472	8.4901

The results presented in Table 1 show that financial performance had an aggregate (*Mean* = 0.0232, *SD* = 0.0063) reflecting a positive return from the assets employed. This indicated the asset base contributed to the generation of net earnings during the study period. The minimum and maximum for financial performance were 0.0100 and 0.0388 respectively. The standard deviation of 0.0063 indicates limited variation in financial performance among banks, implying that most commercial banks recorded financial performance values close to the industry average. The skewness of 0.2493 indicates that financial performance was slightly positively skewed with the observations generally distributed close to the mean indicating limited departure from a normal distribution. The kurtosis of 2.5985 indicates that the distribution of financial performance was relatively flatter than a normal distribution, with fewer extreme observations.

Table 1 shows that liquidity risk management had an aggregate (*Mean* = 0.3365, *SD* = 0.1995) indicating that commercial banks maintained a moderate level of liquidity risk management dimensions during the study period. Liquidity risk management had a minimum and maximum of 0.0000 and 1.0000 respectively. The standard deviation was 0.1995 reflected a relatively low level of dispersion implying that liquidity risk management did not vary substantially across the banks, indicating consistency within the industry. The skewness of 0.8366 indicates that the distribution of liquidity risk management was positively skewed, implying that a few banks exhibited relatively higher liquidity risk management scores than majority of banks.

The kurtosis was 3.2520 hence slightly leptokurtic since it was slightly above 3. This indicated a higher concentration of observations around the mean.

The results presented in Table 1 highlight that operational efficiency had an aggregate ($Mean = 0.6914, SD = 0.3250$). This implies that, on average, commercial banks incurred 0.6914 units of operating costs for every unit of operating income generated during the study period suggesting that commercial banks devoted a substantial share of their operating income to operating expenses, reflecting the level of operational efficiency during the study period. The minimum and maximum for operational efficiency were 0.2368 and 2.3433 respectively. The standard deviation of 0.3250 indicates moderate variability in operational efficiency across banks. The skewness of 1.8472 implies that the distribution of operational efficiency was positively skewed, implying that a few banks recorded high operational efficiency ratios relative to majority of banks. The kurtosis of 8.4901 is highly leptokurtic, indicating a pronounced peak and heavy tails. This suggests the presence of extreme observations in operational efficiency.

3.1 Correlation Analysis

Pearson product moment correlation coefficient was used in the correlational analysis of liquidity risk management, operational efficiency and financial performance and the findings are shown in Table 2.

Table 2: Pairwise Correlation Matrix

Variables	(1)	(2)	(3)
(1) Financial Performance	1.000		
(2) LRM	0.3301*** (0.000)	1.000	
(3) Operational Efficiency	0.0810 (0.3087)	0.0193 (0.8085)	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The correlation results presented in Table 2 show a weak, positive and significant correlation between liquidity risk management and financial performance ($r = 0.3301, p = < 0.05$). The results imply that an improvement in liquidity risk management corresponded to an improvement

in financial performance, reflecting a direct relationship between the variables, however, the magnitude of the relationship was weak. The correlation results ($r = 0.0810, p = 0.3087 > 0.05$) indicate a very weak, positive and non-significant correlation between operational efficiency and financial performance. The results imply that an improvement in operational efficiency leads to an improvement in financial performance, indicating a direct relationship between the variables. Additionally, the correlation coefficient between operational efficiency and liquidity risk management ($r = 0.0193, p = 0.8085 > 0.05$) displayed a very weak, positive and not significant relationship between the variables. The results imply that an increase/improvement in operational efficiency is linked to an improvement in liquidity risk management.

3.2. Hypothesis Testing

The study investigated the mediating effect of operational efficiency (OE) measured by Cost-to-Income Ratio (CIR) on the relationship between liquidity risk management (LRM) measured by liquidity risk management index (LRMI) and financial performance (FP) measured by Return on Assets (ROA) of commercial banks in Kenya. To achieve this, the four paths mediation procedure proposed by Hayes (2013) was adopted. The following models were used to guide the analysis.

$$Y_{it} = \beta_0 + \beta_1 LRM_{it} + \varepsilon_{it} \dots\dots\dots 1$$

$$OE_{it} = \beta_0 + \beta_1 LRM_{it} + \varepsilon_{it} \dots\dots\dots 2$$

$$Y_{it} = \beta_0 + \beta_1 LRM_{it} + \beta_2 OE_{it} + \varepsilon_{it} \dots\dots\dots 3$$

$$IE = a \times b \dots\dots\dots 4$$

In First path, the total effect (path c) of liquidity risk management on financial performance was estimated as specified in model 1. In the second path, the effect of liquidity risk management on operational efficiency (path a) was estimated as presented in model 2. In the third path, financial performance was regressed on both liquidity risk management and operational efficiency to estimate the effect of operational efficiency on financial performance (path b) and the direct effect of liquidity risk management on financial performance after controlling for the mediator (path c') as expressed in model 3. Finally, the indirect effect was computed as the product of paths a and b ($a \times b$) as shown in equation 4.

3.2.1 Mediation Path a

In the second path, liquidity risk management was regressed on the operational efficiency. Prior to regression analysis, the study conducted diagnostic tests namely linearity, homoscedasticity,

autocorrelation, normality, stationarity and Hausman test for specification stationarity before regression analysis. Firstly, to establish whether there is linear relation between the variables, the study used scatter plots to examine the linear relationship between liquidity risk management and operational efficiency. The findings are presented in figure 1.

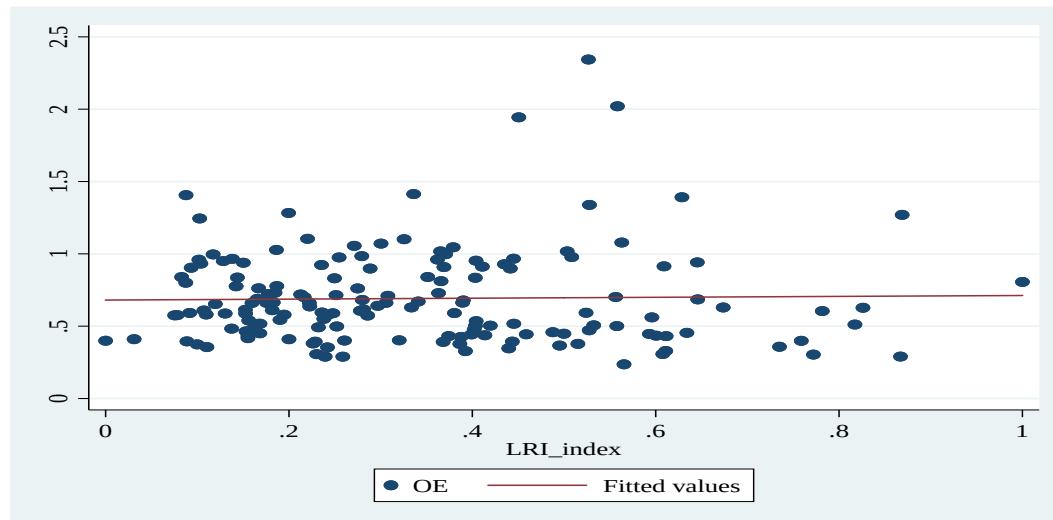


Figure 1: Scatter Plots for Liquidity Risk Management and Operational Efficiency

As illustrated in Figure 1, when operational efficiency is plotted against liquidity risk management, the data points exhibit a scatter around the line of best fit suggesting the presence of linearity.

Secondly, the test for heteroscedasticity was conducted using Breusch–Pagan/Cook-Weisberg test. The null hypothesis states that the variance of the regression error terms is constant across all observations therefore, homoscedasticity exists while the alternative hypothesis states that the variance of the regression error terms is not constant across all observations; therefore, heteroscedasticity exists. A p-value greater than 0.05 indicates homoscedasticity, whereas a p-value of 0.05 or less indicates heteroscedasticity. The findings are presented in Table 3.

Table 3: Heteroscedasticity Test Results

Breusch–Pagan/Cook-Weisberg for heteroscedasticity	
Ho: Constant variance	
Variables: fitted values of OE	
chi2(1)	= 15.49
Prob > chi2	= 0.0001

The results presented in Table 3 show ($\chi^2 = 15.49, p = 0.0001 < 0.05$) indicating a p-value less than the 5% significance level. This implies that the null hypothesis of constant error variance is rejected for the model. This indicates that heteroscedasticity is present, revealing that the error variances are not constant across observations. Consequently, the robust standard errors estimation technique was employed to correct for heteroscedasticity.

Thirdly, autocorrelation was tested using Wooldridge Test to determine whether first-order serial correlation existed in the panel data. The decision criterion was based on the p-value, where a p-value greater than 0.05 indicated the absence of first-order autocorrelation, while a p-value of 0.05 or less indicated the presence of first-order autocorrelation. The findings are presented in Table 4.

Table 4: Autocorrelation Test

Wooldridge test for autocorrelation in panel data	
H0: no first order autocorrelation	
F(1, 31) =	60.957
Prob > F =	0.0000

The results presented in Table 4 indicate presence of first order autocorrelation between liquidity risk management and operational efficiency since the model yielded ($F - test = 60.957, p < 0.05$). To address serial correlation, robust standard Errors was employed to remedy the violation. Fourthly, normality test was conducted using Jarque-Bera (JB) test. The null hypothesis of Jarque-Bera test is that the residuals are normally distributed (Huseynli,2022). If p-value is greater than 0.05, the null hypothesis is not rejected while if the p-value is less than 0.05 the null hypothesis is rejected. The results are presented in Table 5.

Table 5: Normality Test

Jarque-Bera Normality Test:	Chi(2)	P-value
Jarque-Bera test for Ho: normality:	1073	9.e-234

The results presented in Table 24 reveal ($\chi^2 = 1073, p < 0.05$) indicating that the regression residuals were not normally distributed, hence the null hypothesis of normality was rejected. Non-normality will be mitigated by estimating the model using robust standard error.

Fifthly, the study applied the Im-Pesaran-Shin (IPS) and fishers to test for stationarity. The null hypothesis states that the panel contains a unit root (non-stationary) while the alternative hypothesis states that the panel is stationary. A p-value of 0.05 or less led to the rejection of the null hypothesis of a unit root, indicating that the variable was stationary. Conversely, a p-value greater than 0.05 indicated that the variable contained a unit root and was therefore non-stationary. The findings are presented in Table 6.

Table 6: Stationarity Test

Method	IPS		Fisher's	
Statistic	t	t-critical (5%)	Inverse Chi-square	p-value
OE	-3.3846	-1.950	389.8562	0.000
LRM	-1.5728	-1.950	119.5973	0.000

The results presented in Table 6 indicate that the Im–Pesaran–Shin (IPS) and Fisher-type panel unit root tests yielded p-values less than 0.05. Accordingly, the null hypothesis of a unit root was rejected, indicating that the panel data were stationary and suitable for subsequent panel regression analysis.

Lastly, Hausman test for specification was conducted to choose between the Fixed effects model and random effects model. A p-value greater than 0.05 indicated that the Random Effects model was appropriate, while a p-value of 0.05 or less indicated that the Fixed Effects model was preferred. The results of the test are shown in Table 7.

Table 7: Hausman Test for Specification

Model	Statistics	Coefficient
$OE_{it} = \beta_0 + \beta_1 LRM_{it} + \varepsilon_{it}$	Chi-Square test value	0.18
	P-value	0.6715

The Hausman test for specification yielded ($\chi^2 = 0.18, p = 0.6715 > 0.05$)) hence the null hypothesis was not rejected. This indicates that there is no statistically significant difference between the fixed effects and random effects estimators. Consequently, the study adopted the

random effects model for estimating the panel regression because it is more efficient and appropriate for the data.

Following the diagnostic tests and Hausman specification test, the random effects generalized least squares (GLS) regression model with robust standard errors clustered at firm level was computed. The results are presented in Table 8.

Table 8: Random Effects Model Results

Random-effects GLS regression			Number of observations = 160			
Group Variable: firmid			Number of Groups = 32			
R-sq: Within = 0.0048			Obs per group:			
Between = 0.0000			Min = 5			
Overall = 0.0004			avg = 5.0			
			Max = 5			
			Wald chi2(1) = 0.31			
Corr(u_i, X) = 0 (assumed)			prob> chi2 = 0.5774			
			(Std. Err. adjusted for 32 clustered in firmid)			
OE	Coef.	Panel- Std. Err	corrected z	p> z	95% Conf.	Interval
LRM	0.0958	0.1719	0.56	0.577	-0.2412	0.4327
Constant	0.6591	0.0605	10.90	0.000	0.5406	0.7777

The results presented in Table 8 indicate that liquidity risk management exerted a positive but statistically insignificant effect on operational efficiency ($\beta = 0.0958$, $z = 0.56$, $p = 0.577$). The corresponding 95% bootstrap confidence interval (-0.2412, 0.4327) contained zero, confirming the absence of a statistically significant relationship. These findings suggest that changes in liquidity risk management did not significantly explain variations in operational efficiency of commercial banks. Therefore, the first condition necessary for mediation was not satisfied.

3.2.2 Mediation Path b and c'

In the third path, liquidity risk management and operational efficiency were simultaneously included in the regression model. This enabled estimation of the effect of operational efficiency on financial performance (path b) while controlling for liquidity risk management, as well as the direct effect of liquidity risk management on financial performance after accounting for the mediator (path c'). Prior to regression analysis, the study conducted diagnostic tests namely

multicollinearity, homoscedasticity, autocorrelation, normality, stationarity and Hausman test for specification stationarity before regression analysis.

Firstly, multicollinearity test was conducted to determine whether liquidity risk management (LRM) and operational efficiency (OE) in a regression model are correlated with each other. Variance inflation factor (VIF) was used to determine the degree of multicollinearity in linear regression models. If VIF is equal to 1, then variables are not correlated, if VIF is between 1 and 5, then the variables are moderately correlated and if VIF is greater than 5, then the variables are highly correlated (Shrestha, 2020). When VIF is higher than 10, there is significant multicollinearity that needs to be corrected (Shrestha, 2020). The results are presented in Table 9.

Table 9: Multicollinearity test

Variable	VIF	1/VIF
LRM	1.00	0.999627
OE	1.00	0.999627
Mean	1.00	

The results presented in Table 9 show that liquidity risk management and operational efficiency recorded a VIF of 1.00 with a VIF mean of 1.00 indicating that the variables are not correlated.

Secondly, Breusch–Pagan/Cook-Weisberg test was conducted to test for heteroscedasticity. The null hypothesis of the Breusch–Pagan/Cook-Weisberg test for heteroscedasticity states that the variance of the error terms is constant across all observations, implying that the regression model does not suffer from heteroscedasticity(homoscedasticity) while the alternative hypothesis states that the variance of the residuals is not constant, implying that the regression model does suffer heteroscedasticity (Bobbit, 2020). The null hypothesis of homoscedasticity is not rejected when the p-value exceeded 0.05, indicating constant error variance. The results of the Breusch–Pagan/Cook-Weisberg heteroscedasticity tests are presented in Table 10.

Table 10: Heteroscedasticity Test Results

Breusch–Pagan/Cook-Weisberg for heteroscedasticity	
Ho: Constant variance	
Variables: fitted values of FP	
chi2(1)	= 2.32

Prob > chi2 = 0.1278

The results presented in Table 10 show ($\chi^2 = 2.32, p = 0.1278 < 0.05$) indicate presence of heteroscedasticity. Consequently, the study applied robust standard errors method to remedy the violation.

Thirdly, autocorrelation was tested using Wooldridge Test for autocorrelation in panel data. If p-value is greater than 0.05, fail to reject the null hypothesis indicating that there is no evidence of first-order autocorrelation in the panel data, whereas a p-value less than or equal to 0.05 led to the rejection of the null hypothesis, suggesting the presence of first-order autocorrelation. The findings are presented in Table 11.

Table 11: Autocorrelation Test

Wooldridge test for autocorrelation in panel data	
H0: no first order autocorrelation	
F(1, 31) =	0.000
Prob > F =	0.9917

The results presented in Table 11 show that the null hypothesis was not rejected ($F - test = 0.000, p = 0.9917 > 0.05$) suggesting that the model did not exhibit statistically significant first-order autocorrelation.

Fourthly, normality test was conducted using Jarque-Bera (JB) test. The null hypothesis of Jarque-Bera test is that the residuals are normally distributed (Huseynli,2022). If p-value is greater than 0.05, the null hypothesis is not rejected while if the p-value is less than 0.05 the null hypothesis is rejected. The findings are presented in table 12.

Table 12: Normality Test

Jarque-Bera normality test:	Chi(2)	P-value
Jarque-Bera test for Ho: normality:	0.97	0. 6157

The results presented in Table 12 reveal ($\chi^2 = 0.97, p = 0.6157 > 0.05$) indicating that the regression residuals were normally distributed, hence the null hypothesis of normality was not rejected.

Fifthly, stationarity test was conducted to determine whether the panel data variables exhibited constant statistical properties over time. In this study, the Im-Pesaran - Shin (IPS) test and the Fisher-type unit root test were applied. The findings are presented in Table 13.

Table 13: Stationarity Tests

Method	IPS		Fisher's	
Statistic	t	t-critical (5%)	Inverse Chi-square	p-value
FP	-1.6977	-1.950	170.005	0.000
LRM	-1.5728	-1.950	119.5973	0.000
OE	-3.3846	-1.950	389.8562	0.000

The results presented in Table 13 shows ($p < 0.05$) hence rejecting the null hypothesis of the unit root, indicating all panels are stationary.

Finally, Hausman test for specifications was used to choose between the Fixed effects model and random effects model. The results of the Hausman test are shown on table 14.

Table 14: Hausman Test for Specification

Model	Statistics	Coefficient
$Y_{it} = \beta_0 + \beta_1 LRM_{it} + \beta_2 OE_{it} + \varepsilon_{it}$	Chi-Square test value	0.37
	P-value	0.8329

The results presented in Table 14 show ($\chi^2 = 0.37, p = 0.8329 > 0.05$) hence the null hypothesis was not rejected. This indicates that there is no statistically significant difference between the fixed effects and random effects estimators. Consequently, the study adopted the random effects model for estimating the panel regression because it is more efficient and appropriate for the data.

Following the diagnostic tests and Hausman specification test, the random effects generalized least squares (GLS) regression model with robust standard errors clustered at firm level was computed. The results are presented in Table 15.

Table 15: Random Effects Model Results

Random-effects GLS regression			Number of observations = 160			
Group Variable: firmid			Number of Groups = 32			
R-sq: Within = 0.1174			Obs per group:			
Between = 0.1132			Min = 5			
Overall = 0.1133			avg =5.0			
			Max = 5			
			Wald chi2(1) =20.35			
Corr (u_i, X) = 0 (assumed)			prob> chi2 = 0.000			
(Std. Err. adjusted for 32 clustered in firmid)						
Panel-corrected						
FP	Coef.	Std. Err	z	p> z	95% Conf.	Interval
LRM	0.0112	0.0027	4.16	0.000	0.0059	0.0164
OE	0.0023	0.0015	1.52	0.129	-0.0001	0.0053
Constant	0.0178	0.0016	11.43	0.000	0.0148	0.0209

The results presented in Table 15 revealed that operational efficiency had a positive and not significant effect on financial performance ($\beta = 0.0023$, $z = 1.52$, $p = 0.129 > 0.005$). Additionally, the 95% bootstrap confidence interval (0.0001, 0.0053) included zero, confirming that operational efficiency did not exert a statistically significant effect on financial performance. This indicates that an increase in operational efficiency is associated with an increase in financial performance of commercial banks. On the other hand, the direct effect of liquidity risk management on financial performance remained positive and statistically significant after controlling operational efficiency ($\beta = 0.0112$, $z = 4.16$, $p < 0.05$). Additionally, the 95% bootstrap confidence interval (0.0059, 0.0164) excluding zero, confirming that liquidity risk management exerted a statistically significant direct effect on financial performance after accounting for operational efficiency. The regression model for path b and c'

$$Y = 0.0178 + 0.0112LRM \dots \dots \dots 5$$

Where;

Y = The dependent variable (Financial Performance)

LRM = Liquidity risk management

0.0178 = y-intercept (Constant). Estimate of the expected value of financial performance when liquidity risk management is zero.

0.0112 = An estimate of the expected increase in financial performance in response to a unit increase in liquidity risk management after controlling operational efficiency.

3.3 Mediation Path a×b

The final step estimated the indirect effect of liquidity risk management on financial performance through operational efficiency. To check the robustness of the mediation results, bootstrapping was conducted. The indirect effect was calculated as the product of paths a and b and its significance was evaluated using bootstrap confidence intervals. To obtain the indirect effect, bootstrap resampling with 2000 replications was subsequently performed. The findings are presented in Table 16.

Table 16: Bootstrap Mediation Analysis

Path	Coef.	Bootstrap Std. Err	Bias	95% Conf.	Interval
c: LRM → <i>FP</i> (total effect)	0.0114	0.0030	0.000	0.0054	0.0170
a: LRM → OE	0.0958	0.1765	0.0122	-0.2320	0.4609
b: OE → <i>FP</i> (controlling for LRM)	0.0023	0.0018	-0.0002	-0.0018	0.0052
c' (direct effect)	0.0112	0.0029	0.000	0.0054	0.0167
ab (indirect effect)	0.0002	0.0005	0.000	-0.0005	0.0019

The results presented in Table 16 reveal the bootstrap analysis which produced an indirect effect coefficient of 0.002 with a bootstrap standard error of 0.0050. The 95% bootstrap confidence interval ranged from -0.0005 to 0.0019, which included zero indicating that the indirect effect was statistically insignificant. Therefore, the indirect effect of liquidity risk management on financial performance through operational efficiency was not statistically significant. The null hypothesis that the mediating effect of operational efficiency on the relationship between liquidity risk

management and financial performance of commercial banks in Kenya was supported therefore the hypothesis was not rejected.

4. DISCUSSION

The findings of this hypothesis demonstrate that there is no mediating effect of operational efficiency on the relationship between liquidity risk management and financial performance of commercial banks in Kenya. The mediation analysis revealed that the indirect effect of liquidity risk management through operational efficiency was not statistically significant. This implies that the relationship between liquidity risk management and financial performance is not transmitted through changes in operational efficiency. Instead, liquidity risk management and operational efficiency appear to affect financial performance independently. Ozili (2023) highlighted that liquidity risk management and operational efficiency are distinct drivers of bank performance. Similarly, BCBS (2023) emphasizes that effective liquidity risk management and sound operation management are separate pillars of prudent bank management, each requiring dedicated governance and control.

According to Resource-Based View theory, internal organizational resources such as operational efficiency create superior performance only when they are valuable, rare, inimitable and non-substitutable. The absence of mediation suggests that within the Kenyan banking sector during 2020-2024 improvements in liquidity risk management did not systematically translate into efficiency gains that subsequently enhanced profitability. Several explanations are plausible. First, the Cost-to-Income Ratio was used as a proxy for operational efficiency. It emphasizes cost control but may not fully capture process or technological efficiencies linked to liquidity management systems (Kausar et al., 2025). Second, regulatory pressure may have rendered liquidity practices predominantly compliance-driven rather than efficiency-enhancing (BCBS, 2023). The result challenges the assumption of a straightforward capability-based transmission pathway and suggests that any performance effects of liquidity risk management in Kenyan banks may operate through alternative channels, such as reduced funding costs, enhanced depositor confidence, or regulatory capital relief, rather than through operational efficiency (Aldasoro et al., 2026; Haq et

al., 2025; Kinini et al., 2023).). Future research could usefully examine these alternative mediators. In the same way, liquidity preference theory posits that institutions maintain liquidity to satisfy precautionary, transactional and speculative motives. The decision to maintain liquid assets is primarily driven by the need to meet future financial obligations and preserve liquidity, rather than by the pursuit of operational efficiency, which did not significantly mediate the relationship between liquidity management and financial performance. Shiftability theory emphasizes that banks should maintain liquid assets that can easily be converted into cash to meet unexpected liquidity needs without incurring substantial losses. The theory primarily emphasizes the maintenance and strategic management of liquid assets as a means of safeguarding financial stability, rather than positioning operational efficiency as the principal mechanism through which liquidity is managed.

Several supporting studies conducted in different contexts provide insights that can corroborate the potential findings of the current study. Santosa and Lestari (2026) examined whether capital adequacy, liquidity, credit risk and financial performance of regional development banks in Indonesia. Using Sobel test, Santosa and Lestari (2026) found that operational efficiency did not mediate the relationship between liquidity risk management and financial performance although, it significantly mediated the relationship credit risk and financial performance of regional development banks in Indonesia. Hasmiana and Pintor (2022) demonstrated that liquidity had significant direct effects on profitability of Indonesian state-owned and private commercial banks but liquidity on profitability through operational efficiency was not statistically significant. Conversely, Damanik, (2025) and Ratemo and Ndebe (2021) concluded that operational efficiency significantly mediated the relationship between liquidity risk and financial performance.

REFERENCES

- Aldasoro, I., Doerr, S., & Zhou, H. (2026). *Liquidity regulation and bank funding costs*. BIS Working Papers No. 1352.
- Amira, E. A., Alala, B. O., & Musiega, M. (2023). Influence of liquidity risk management on financial performance of commercial banks in Kenya. *African Journal of Empirical Research*, 4(2), 7–13.

- Aranda, E., & Wardani, L. (2024). The Effect of Operational Efficiency on the Financial Performance of Islamic Banks Listed on the Indonesia Stock Exchange for the 2019-2023 Period: Data Envelopment Analysis (DEA) Approach. *Journal of Economics*, 7(12).
- Barney, J. B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17: 99–120.
- Basel Committee on Banking Supervision (BCBS) (2023). Report on the 2023 banking turmoil. Available at: www.bis.org/bcbs/publ/d555.htm
- Beck, T., Döttling, R., Lambert, T., & Van Dijk, M. (2023). Liquidity creation, investment, and growth. *Journal of Economic Growth*, 28(2), 297-336.
- Bobbit, Z. (2020). How to Calculate a Pooled Standard Deviation (With Example)'. *Statology*. Retrieved May, 30, 2024.
- Central Bank of Kenya. (2024). *Bank supervision annual report 2024*.
- Cook, B. (2025). *Understanding the basics of liquidity management*. Tipalti. <https://tipalti.com>
- Damanik, J. H. (2025). The influence of credit risk level, liquidity risk on profitability with operational efficiency level as an intervening variable (Case study on conventional commercial banks KBMI 3 and KBMI 4 listed on the IDX in 2021–2024). *Formosa Journal of Multidisciplinary Research*, 4(4), 1893–1912.
- Eltweri, A., Sawan, N., Al-Hajaya, K., & Badri, Z. (2024). The Influence of Liquidity Risk on Financial Performance: A Study of the UK's Largest Commercial Banks. *Journal of Risk and Financial Management*, 17(12), 580.
- Haq, M., Srivastava, N., & Wang, Z. (2025). Bank capital and liquidity risk: Influence of crisis and regulatory intervention. *Review of Quantitative Finance and Accounting*.
- Hasmiana, M., & Pintor, S. (2022). The effect of financial risk, capital structure, banking liquidity on profitability: Operational efficiency as intervening variables in Perserobank and private commercial banks. *ratio*, 5(1).
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- Huseynli, N. (2022). Econometric analysis of the relationship between tourism revenues, inflation and economic growth: The case of Morocco and South Africa. *African Journal of Hospitality, Tourism and Leisure*, 11(1), 135-146.

- Ibebi, C., & Ule, P. (2024). Managing the Resource Curse for A Conflict Free Niger Delta Region: Lessons and Prospects. *International Journal*, 1(1), 174-185.
- Jatmiko, B. (2025). Operational Efficiency and Risk Management: Implications for the Financial Performance of the Jakarta Regional Development Bank. *Neo Journal of economy and social humanities*, 4(1), 74-85.
- Kausar, A., Lim, J. H., & Park, Y. I. (2025). Data Analytics and Operational Efficiency. *Accounting Horizons*, 1-19.
- Kinini, D. M., Ocharo, K. N., & Kariuki, P. W. (2023). Capital adequacy, competition and liquidity creation of banks; evidence from Kenya. *African Journal of Economic and Management Studies*, 15(3), 440–457.
- Kuziev, A.S. (2026). The role of commercial banks in economic development. *Oriental Renaissance: Innovative, Educational, Natural and Social Sciences*, 6(4), 737-741.
- Marimira, N., & Gumel, B. I. (2025). The Effect of Liquidity Risk on Operational Efficiency: A Study of Some Micro-financial Institutions within Sub-Saharan Region. *Asian Journal of Economics, Business and Accounting*, 25(4), 558-576.
- Matunda, R. M., Miroga, J., & Otinga, H. N. (2024). Liquidity management and financial performance of commercial banks in Kenya. *Strategic Journal of Business & Change Management*, 11(4).
- Moulton, H. G. (1918). Commercial Banking and Capital Formation. *The Journal of Political Economy*. 26(7). 32-38.
- Nyagah, D., Kithinji, M., & Mutegi, D. (2024). Effect of liquidity risk on financial performance of commercial banks in Kenya. *The Strategic Journal of Business & Change Management*, 11 (3), 400 – 414. <http://dx.doi.org/10.61426/sjbcm.v11i3.3035>
- Ozili, P. K. (2023). Economic research in banking: A survey. In *Digital Transformation, Strategic Resilience, Cyber Security and Risk Management* (pp. 217–226). Emerald Publishing.
- Ratemo, S. K., & Ndede, F. W. S. (2021). Liquidity risk and financial performance of commercial banks in Kenya. *Journal of Finance and Accounting*, 5(1), 113–128.
- Santosa, J., & Lestari, W. (2026). Determinants of regional development bank performance with operational efficiency as an intervening variable. *Journal of Management: Small and Medium Enterprises (SMEs)*, 19(1), 205–219.

- Shisia, A., Kerosi, E., & Onsiro, M. R. (2025) Liquidity Risk, Bank Size and Financial Performance of Commercial Banks: Evidence from Kenya.
- Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics and Statistics*, 8(2), 39-42.
- Triki, M. & Bouaziz, F. (2020). The relationship between liquidity risk and bank performance: Evidence from emerging markets. *Borsa Istanbul Review*, 20(4),376-383.
- World Bank. (2023). *Global Economic Prospects*.
<https://www.worldbank.org/en/publication/global-economic-prospects>
- Yahaya, A., Mahat, F., & Yahya, M. H. (2021). Effect of Liquidity and Credit Risk on Banking Performance: Evidence from Sub Saharan Africa. *Journal of Economic Cooperation & Development*, 42(2).