
Effect of Credit Risk on Third-party Payment Processing among Retailers in Nairobi County, Kenya

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Abstract

This paper addresses the effect of credit risk on third-party payment processing among retailers in Nairobi County, Kenya. The study was guided by the positivism research philosophy and applied a descriptive cross-sectional research design targeting 226 retailers under the registered payment service providers regulated by the Central Bank of Kenya. The sample size of 144 heads of finance and compliance, and risk managers/heads of payments was drawn using stratified sampling technique. Primary data was collected through a self-administered questionnaire, which was designed based on the research objectives. Secondary data regarding firm size (total assets) was gathered from the financial statements. Both descriptive and inferential statistical methods were employed for analysis. The descriptive statistics revealed that default risk had the highest average of 3.90, followed by interest rate risk with an average of 3.64. Regression analysis results showed that credit risk positively and statistically influences third-party payment processing among retailers in Nairobi County, Kenya ($r^2 = .282$, $\beta = .312$, $t=6.838$, $p<.05$); hence, the null hypothesis was rejected. The study concludes that credit risk influences third-party processing among retailers in Nairobi County, Kenya. Consequently, the study recommends that managers of the retailers in Nairobi County should implement robust credit risk mitigation mechanisms. This may include implementing effective credit scoring models, establishing sound underwriting practices, including monitoring borrower creditworthiness regularly to minimize credit risks, diversifying exposure to credit risk, stress testing and maintaining adequate capitalization. This may significantly improve the third-party payment processing of the retailers.

Keywords: Credit risk, Third-party Payment Processing, Retailers in Nairobi County, Kenya

Introduction

Technology has been and keeps transforming societies through creation of new opportunities for different organizations as they serve their clients in the digital era. The dynamics in this space has brought about innovations that are embraced by the society (Saisimulinya & Khaoyamuyobo, 2022). Financial and technological firms are coming up with new digital ways of making payments. One of the developing areas is in the provision of payment services that endeavors to offer seamless experiences in the retail sector, convenience to clients and customers as well as

offering fast means of receiving cash by businesses (Munyao, 2020). These technological developments come with risks that need to be considered and managed to benefit both the payment service providers and the retailers. Some of the risks include charge backs, fraud, data breaches, unreliable infrastructure, breakdowns and unprecedented delays and lack of legal and institutional frameworks in governments on e-payments as well as integration issues (Saisimulinya & Khaoyamuyobo, 2022).

Risk refers to the probability of an adverse event occurring and is inherent in all types of businesses because of the high level of uncertainties in their internal and external environment (Tasmin & Muazu, 2019). According to BCBS (2000), credit risk is the possibility that a borrower in a bank or counterparty will fail to meet its duties in agreement with the terms in agreement. An increase in bank credit risk gradually leads to liquidity and solvency problems. Credit risk may increase if the bank lends to borrowers that it does not have adequate knowledge about (Gadzo et al., 2019). The issue of credit risk is of greater concern because of the higher levels of perceived risks resulting from some of the characteristics of clients and business conditions that financial institutions find themselves in (Ahmad & Ariff, 2020). According to Funso et al., (2021), among other risks faced by banks, credit risk plays an important role on banks' profitability since a large chunk of banks' revenue accrues from loans from which interest is derived. In the current study, credit risk was operationalized by default risk and interest rate risk.

Zhao and Sun (2022) posit that third-party online payment has become the new form of online payment. In its early development, online payment was more reflected in the involvement of the traders and the bank. Since the existence of banks to provide online payment services for individual with high cost, imperfect social credit system, distrust, high risk of direct payments, the interests of both parties could not be effectively guaranteed, which virtually limited the development of online payment (Li, 2020). In order to solve these problems of online payment, the third-party online payment form came forward. The third-party online payment platform plays the role as an intermediary to reduce the cost of banking services and eliminate the distrust of trading parties (Wang, 2019).

Third-party payment is widely used. However, due to the incomplete laws and policies of our country and the failure to establish a national credit system, the security of third-party payment cannot be well guaranteed and thus faces many challenges. There are still many deficiencies, mainly as follows: not suitable for buyer-to-buyer (B2B); buyers and sellers often appear in the transaction disputes, the financial departments may find it challenging to obtain evidence; payment platform is flawed, there will inevitably be man-made situations. Moreover, delayed settlements by Payment Service Providers (PSPs) causes cash flow challenges to merchants, and many times they pay more in transaction fees leading to increase in their expenses and at times suffer exchange losses (Ndwiga, 2021). In 2019, Safaricom was sued for the alleged breach of data privacy of an estimated 11.5 million subscribers; critics pointed to the absence of data protection laws in Kenya as an enabling factor of the scandal (Bandura & Ramanujam, 2021). In addition, there are some third-party payment platform security vulnerabilities that need to be improved. Therefore, this study focused on retailers to establish the effect of credit risks on third-party payment processing.

Problem Statement

According to Tahseen (2024), the crucial function that retailers play might be impacted by external and internal threats, including inept management, risks, economic issues and legal regulations. The

possibility of a business partner delaying or completely failing to fulfil their contractual agreement by the due date might seriously undermine the financial institution's ability to operate normally. However, the retailers and financial institutions with high risk also run a significant risk of bankruptcy, which also puts depositors at risk (Balungi, 2023). The majority of financial authorities and regulators are quite concerned about the different risks financial institutions face, and their effect on third-party payment processing (Aldayel, 2022).

The risks inherent in third-party payment processing cannot be overlooked, a report by the Central Bank of Kenya (CBK) indicates that banking and mobile money services risks is eroding customer confidence, though a disruptive innovation, it came with risks that raise consumer protection issues as well as financial stability risks thus increasing risk exposures (Daniel et al., 2022). The sector's financial sustainability and long-term viability are threatened by liquidity, credit risk, operational risk, interest rate, market risk, and exchange rate risks despite the development in the sector (Bank Supervision Annual Report, 2023). Numerous merchants using PSPs experience system failures forcing them to sort out client deposits manually, which consumes much time and ends up inconveniencing their clients. The PSPs do not settle the collected monies within the stipulated time and this leads to cash-flow issues in the merchant organizations (Kumari & Chattoraj, 2021). Rotich and Mungai (2022) revealed that the banking sector stability report of 2022 found that customers who have lost money through cybercrime accounted for 25.9 percent for mobile money users. Kenya Power ended prepaid token purchase from third-party vendors from September 1, 2022, citing cost cutting measures, since processing by third parties who earned commissions meant that the electricity tokens cost was higher, compared to direct processing through Kenya Power (Ambani, 2022).

Nasr and Farrag (2020) found that e-payments made it easier for people to survive and helped them save a lot of money and time while Atoyebi (2024) revealed that digital banking can lead to increased risks such as cybersecurity risks whereby digital hackers can compromise customers' personal information including account details, leading to identity theft and financial fraud. Kanyaru and Kyalo (2022) concluded that the challenges are related to the financial and operational risks that affect online merchants. From a managerial perspective, Daniel et al. (2022) concluded that several retailers have undergone managerial challenges such as poor management, funds embezzlement, lack of accountability, trust, ethics, lack of skilled labor and the role of CBK as a regulator. Even with the availability of resources, most of the retailers fail due to numerous risks resulting from lack of risk management techniques and proper managerial training and initiative.

From a policy perspective, the Central Bank has helped to regulate the PSPs in Kenya. However, majority of the PSPs have operated for a good number of years without regulation by the CBK, and some are still in operation without proper regulations, this caused and continues to cause anxiety to the merchants because in case of closure, the merchants do not have any fall back (Daniel et al., 2022). This lack of specific research on legal and regulatory constraints on third-party payment processing counteracts genuine efforts in designing programs to best facilitate their growth and risk management of the sector. Therefore, the researcher's aim in this study was to fill the gaps by establishing the effect of credit risk on third-party payment processing among retailers in Nairobi County.

Objectives of the Study

The main objective of the study was to determine the effect of credit risk on third-party payment processing among retailers in Nairobi County, Kenya

Theoretical Review

The study was guided by Enterprise Risk Management (ERM) Theory and Innovation Diffusion Theory.

Enterprise Risk Management (ERM) Theory

According to Nocco and Stulz (2022), Enterprise Risk Management (ERM) is a theory that advocates for the measurement and management of notable risk facing a given entity than the management of each risk independently. Its main aim is to combine the risk management silos in an organization into one holistic and comprehensive framework. The ERM theory helps to address and manage all types of risks, including financial and non-financial risks, facing an organization. This collective approach of combining and consolidating various types of risks minimizes the effects of individual risks compared to overall risks, which results in increased profitability and productivity through cost savings (Alviniussen & Jankensgard, 2019). Lai (2018) contend that a financial institution should determine and evaluate its risks in all its entire subsidiaries, branches, and entities in its area of jurisdiction. In line with the examination in progress, institutions within financial sector assess the interactions between financial risks alongside other risks that they are susceptible to as a result of their nature of operations. These risks span from operating, security and financial risks which include operational, interest rate, reputational, credit and legal risks as they influence the liquidity level of a financial institution. This theory therefore informs the independent variable (credit risk) and its influence on third-party payment processing for among retailers in Nairobi County. This means that the among retailers have to constantly evaluate and manage credit risks their businesses are exposed to so as to maintain a sound liquidity position that favours their third-party payment processing.

Innovation Diffusion Theory

Innovation diffusion theory was formulated by Rogers in 2003, he used the word technology to explain the spread and use of new technological ideas and practices in different settings (Rogers, 2003). The theory assumes that the target population is homogeneous and that the new technology, idea or product would be easily adopted by members of a given culture, it also assumes that internal factors such as cost, risks and perceived benefits are the only ones that influence adoption behavior (Deeley, 2019). Any piece of technology should be well thought through and the innovators must ensure that the right infrastructure is in place to ensure that such a risk is reduced, it can be a deal breaker (Valverde-Berrocoso et al., 2020). Not only does one need to ensure that they are on track in monitoring all other risks, there is need to ensure that once the product or idea has hit the market, there is proper infrastructure to support it. Risk and innovations go hand in hand, since every innovation faces risk throughout the process hence the need to ensure all risks are considered through the process of innovation (Kovacs et al., 2021). This study is considered an innovative technology that has diffused in the financial sector in different stages and keeps growing by the day. It therefore links the risks inherent in the relationship between third-party payment processors

and their merchants bringing out several considerations that technology disruptions present and that need to be considered as diffusion takes place, thus offering anchorage to the study.

Empirical Review

Wang (2019) noted that in the case of third-party payment, the buyer enters the funds into the account of the third-party payment platform for the purchase of goods. When the third-party payment platform receives the buyer's transaction information, it will send the funds to the seller, thus forming a complete transaction. However, in this process, there will be a phenomenon of capital retention, third-party payment platform precipitation of a large number of funds has credit and security risks (Hassan et al., 2019). According to Takang and Ntui (2023), if the third-party payment organization uses this part of the precipitated funds and the user can not withdraw the funds in time, or if the lack of perfect fund flow management system makes the third-party payment platform appear deposit absorption behavior, to a certain extent, the formation of operating capital risk. In addition, there is no supervision on whether the funds deposited in the third-party are used illegally and there is the behavior of the third-party paying the customer's money at will to gain profits which will also increase the credit risk (Khalid et al., 2021).

In China, Fengyun et al. (2022) found that third-party service providers and regulators influence the credit risk of cross-border e-commerce while Al-Mamoorey and Al-Rubaye (2020) observed a correlation between the use of electronic payment systems in banks and the reduction of credit risks. The findings corroborate a study by Sundus et al. (2020) and Bhattarai (2020) who discovered that there was a significant influence of credit risk on company performance. The results however disagree with research by Pondel (2022) which investigated factors affecting commercial banks performance in Nepal and revealed a significant inverse relationship between credit risk and banks performance. On the other hand, Al-Husainy and Jadah (2021) observed that credit risk has an adverse significant association with bank profitability in Iraq. Moreover, Kioko et al. (2019) found that multiple linear regressions exhibited an insignificant relationship between credit risk and financial performance of quoted commercial banks implying that credit risk has no impact on financial performance while Simamora and Oswari (2019) observed that there was no effect of credit risk on performance of financials.

From the foregoing, the study hypothesized that: *H₀₁: There is no significant relationship between credit risk and third-party payment processing among retailers in Nairobi County, Kenya.*

Methodology

The study was guided by the positivism research philosophy as it allowed objective observation of the social reality. Moreover, positivism allows for a casual explanation and predicts the relationship between variables using empirical methods. The study applied a descriptive cross-sectional research design as it reveals accurate information that allows inferences to be made through hypothesis testing. The study targeted 226 retailers under the registered payment service providers regulated by the Central Bank of Kenya. The sample size of 144 heads of finance and compliance and risk managers/heads of payments was drawn using stratified sampling technique. Primary data was collected through a self-administered questionnaire which was designed based on the research objectives. Secondary data regarding firm size (total assets) was gathered from the financial statements. The study employed descriptive statistics such as frequency distribution, percentages, mean and standard deviation to understand the data. Inferential statistics namely correlation analysis and regression analysis were used. A significance level of $p \leq .05$ was used by

the study to depict a significant association between the independent and dependent variables. Diagnostic tests were conducted for normality, linearity, multicollinearity and homoscedasticity. The data was presented in figures and tables as illustrated in the next section.

Results

Descriptive Analysis

Descriptive analysis performed and presented in the form of mean and standard deviation (SD) for the subconstructs of credit risk, that is default risk and interest rate risk.

Table 1: Descriptive Statistic for Default Risk

	N	Mean	SD
The company has a well outlined third-party payment processing plan to regulate, control and deal with delinquent cases in case of defaulted settlements	121	3.73	1.080
The company has an effective third-party payment collections plan that ensures funds are successfully recovered from third party payment processors after collection	121	4.03	.785
The firm has a clear and comprehensive set of onboarding third-party payment processors policies that guide such decisions to help curb default in settlements	121	3.88	1.069
The company has a quantitative support system for assessing third-party payment processing	121	4.01	.725
The company regularly updates the third-party payment processing default risk register and circulates to the management for decision making	121	3.76	1.103
The company encourages reporting of events in order to identify the third-party payment processing defaulters	121	4.07	1.119
The company may avoid the default risk if the risk margin is lower than the expected risk of taking the risk in third-party payment processing	121	3.74	.981
The management reviews default risks for inclusion in objective setting or strategic planning in third-party payment processing	121	3.96	1.028
Average		3.90	.986

On descriptive statistics for default risk, the mean values ranged between 3.76 and 4.07 revealing that majority of the respondents were in agreement with the default risk statements. Additionally, the overall mean was 3.90 with a standard deviation of .986.

Table 2: Descriptive Statistic for Interest Rate Risk

	N	Mean	SD
The company has formulated third-party payment processing strategies to help mitigate interest rate risk	121	3.73	.837
Interest rate risk leads to a decline in third-party payment processing profits due to unexpected fluctuations	121	4.06	.934

There is a formal third-party payment processing system of interest risk management in the organization	121	3.64	.930
The company regularly conducts third-party payment processing simulation analysis and measures interest rate risk sensitivity	121	3.16	1.080
Interest rate risks are considered in the company's third-party payment processing strategic framework	121	3.68	.829
Frequent meetings are held to assess the progress of implementing interest rate risk management techniques in third-party payment processing	121	3.54	1.148
Top management is always informed about the progress of implementing interest rate risk management techniques in third-party payment processing	121	3.74	.832
The company has a written policy to handle the third-party payment processing exposure if interest rate fluctuates	121	3.54	1.126
Average		3.64	.965

On descriptive statistics for interest rate risk, the mean values ranged between 3.16 and 4.06 revealing that majority of the respondents were in agreement with the interest rate risk statements. Additionally, the overall mean was 3.64 with a standard deviation of .965.

Correlation Analysis

Table 3: Correlation Analysis for Credit Risk on Third-Party Payment Processing

		Third-Party Payment Processing
Credit Risk	Pearson Correlation	.531**
	Sig. (2-tailed)	.000
	N	121

** . Correlation is significant at the 0.01 level (2-tailed).

The findings in Table 3, the relationship between the two was statistically significant; $r = (121) = .531$ $p = .000 < .01$. This positive coefficient suggests that when credit risk increases, third-party payment processing of retailers in Nairobi County, Kenya tends to increase, meaning that better management of credit risk is significantly associated with improved third-party payment processing, and effective credit risk controls contribute to more stable and efficient payment processing systems.

Regression Analysis

Regression analysis was utilized to determine the effect of credit risk on third-party processing among retailers in Nairobi County, Kenya. The hypothesis of this study was:

H0₁: There is no significant relationship between credit risk and third-party payment processing among retailers in Nairobi County, Kenya.

Table 4: Regression Model Summary for Credit Risk and Third-Party Payment Processing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.531 ^a	.282	.276	5.67506

a. Predictors: (Constant), Credit Risk

The findings in Table 4 indicate that there is a linear relationship between credit risk and third-party processing among retailers in Nairobi County, Kenya ($r=.531$). Additionally, the study findings indicate that the r-squared was .282 indicating that 28.2% of the changes in third-party processing among retailers in Nairobi County, Kenya was due to credit risk.

Table 5: ANOVA Results for Credit Risk and Third-Party Payment Processing

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1506.026	1	1506.026	46.762	.000 ^b
	Residual	3832.548	119	32.206		
	Total	5338.574	120			

a. Dependent Variable: Third-Party Payment Processing

b. Predictors: (Constant), Credit Risk

The study results in Table 5 reveal that the relationship between credit risk and third-party processing was significant, $F(1,119) = 46.762, p=.000 < .05$. Therefore, the overall model was found to be a good predictor in linking credit risk and third-party payment processing among retailers in Nairobi County, Kenya.

Table 6: Regression Coefficient Results for Credit Risk and Third-Party Payment Processing

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	85.267	2.796		30.492	.000
	Credit Risk	.312	.046	.531	6.838	.000

a. Dependent Variable: Third-Party Payment Processing

The results of the regression coefficients for credit risk presented in Table 6 found that credit risk positively and statistically influences third-party payment processing ($\beta = .312, t=6.838, p<.05$). Therefore, the study rejects the null hypothesis and concludes that there is a significant relationship between credit risk and third-party payment processing among retailers in Nairobi County, Kenya.

The findings of the study derive a linear regression model for between credit risk and third-party payment processing as follows:

$$y = \beta_0 + \beta_1 X_1 + \varepsilon$$

$$y = 85.267 + .312X_1$$

Where:

Y = Dependent variable (Third-party payment processing);

β_0 = Constant term;

β_1 = Beta coefficients;

X_1 = Credit risk;

ε = Error term

This model implies that a unit change in credit risk results in an increase in third-party payment processing by 31.2%.

Discussion of Results

The study sought to determine the effect of credit risk on third-party payment processing among retailers in Nairobi County, Kenya. In this study, the variable of credit risk was studied using the subconstructs of default risk and interest rate risk. The results of the regression analysis revealed that credit risk and third-party payment processing among retailers in Nairobi County, Kenya were positively and significantly correlated at $p < .05$. These results are in agreement with the findings presented by Karanja (2019) that the combined effect of credit risks positively influences the lending performance of banks. Similarly, Folajimi and Dare (2020) concluded that credit risk had a positive significant effect on financial performance of the DMBs while Boahene et al. (2022) observed that Ghanaian banks received a higher profitability even though the credit risk was high. Berrios (2023) pointed out a significant statistically and positive association between the credit risk and banks' profitability while Kargi (2021) exploring the association between profitability and credit risk in Nigerian banks, suggested significant positive relationship of advances and loans and non-performing loan with bank performance. These findings however inconsistent with the findings of a study by Sondakh et al. (2021) who indicated that partially credit risk had a significant negative effect on profitability. In congruence, Baruti (2023) observed that both Return of Assets (ROA) and Return On Investment (ROE) were inversely related to credit risk. Innocent et al. (2019) also agreed that credit risk had negative and statistically significant effect on the financial performance of the banks in Nigeria.

Conclusions

Following the study findings and discussion, this study concludes that credit risk has a positive and significant effect on third-party payment processing among retailers in Nairobi County, Kenya. This study concludes that improvement in credit risk would have beneficial effects on third-party payment processing among retailers in Nairobi County, Kenya. The study finds that addressing interest rate risks and default risks would ensure the long-term third-party payment processing of these firms and maintain stakeholder trust.

Recommendations and Areas for Further Research

The study finds the relationship between credit risk and third-party payment processing among retailers in Nairobi County, Kenya to be significant. Therefore, this study recommends the managers of the retailers in Nairobi County to implement robust credit risk mitigation mechanisms. This may include implementing effective credit scoring models, establishing sound underwriting practices, including monitoring borrower creditworthiness regularly to minimize credit risks, diversifying exposure to credit risk, stress testing and maintaining adequate capitalization. This may significantly improve the third-party payment processing of the retailers.

The study was limited in scope to retailers in different sectors. Consequently, the study recommends an extension of the study to specific retailers, such as financial services only, manufacturing sector or agricultural sector to better understand the effect of risks and enhance validity. Moreover, this study used a questionnaire survey and the only data gathering method. Future research should consider applying mixed methods research where a questionnaire is complemented by other qualitative data gathering methods such as key informant interviews and

focus group discussions. Such qualitative data gathering insights would provide more in-depth information and explanations regarding the effect of risks on third-party payment processing.

References

- Ahmad, N.H., & Ariff, M. (2020). Multi-country study of bank credit risk determinants. *International Journal of Banking and Finance*, 5(1), 135-152.
- Aldayel, M. (2022). Risk management and performance: a case study of credit risk management in commercial banks. *The Business and Management Review*, 10(1), 169-183.
- Al-Husainy, N.H., & Jadah, H.M. (2021). The effect of liquidity risk and credit risk on the bank performance: Empirical evidence from Iraq. *iRASD Journal of Economics*, 3(1), 3, 58–67.
- Al-Mamoorey, M., & Al-Rubaye, M. (2020). The role of electronic payment systems in Iraq in reducing banking risks: An empirical research on private banks. *Polish Journal of Management Studies*, 21(2), 49-59.
- Alviunessen, A. & Jankensgard, H. (2019). Enterprise risk budgeting: bringing risk management into the financial planning process. *Journal of Applied Finance*, 19 (1&2),178-190.
- Ambani, B. (2022, August 30). Kenya Power ends token purchase from third-party vendors. *Nation Media Group*.
- Atoyebi, O. (2023). Analyzing the impact of digital banking in Nigeria. *Social Science Electronic Publishing*, 23(22), 119-125.
- Balungi, D. (2023). *Credit Risk management and performance of financial institutions in Uganda: A Case Study of Housing Finance Bank, Kampala Branch*. (Master's thesis), Kampala University.
- Bandura, R., & Ramannujam, S. (2021). Developing inclusive digital payments. *In the Centre for Strategic and International Studies*.
- Bank Supervision Annual Report (2023). *Bank Supervision Annual Report, 2023*. Accessed 9th October, 2023 from [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.centralbank.go.ke/uploads/banking_sector_annual_reports/69043552_2023%20Annual%20Report.pdf](https://www.centralbank.go.ke/uploads/banking_sector_annual_reports/69043552_2023%20Annual%20Report.pdf)
- Baruti, B. H. (2023). The effect of credit risk on the financial performance of commercial banks in Balkan countries. *Corporate & Business Strategy Review*, 4(3), 18–25.
- Basel Committee on Banking Supervision (2000). *Principles for the Management of Credit Risk*. Accessed 11th July 2024 from <https://www.bis.org/publ/bcbs75.htm>
- Berrios, M. R. (2023). The relationship between bank credit risk and profitability and liquidity. *International Journal of Business and Finance Research*, 7(3), 105-118.
- Bhattarai, Y. R. (2020). Effect of credit risk on the performance of Nepalese commercial banks. *NRB Economic Review*, 28(1), 41-64.
- Boahene, H., Dasah, J., & Agyei, K. (2022). Credit risk and profitability of banks in Ghana. *Research Journal of Finance and Accounting*, 3(7), 31 – 40.
- Daniel, M., Shreyash, R., & Vasiliki, S. (2022). Managing financial crime risk in digital payments. *Journals of Computer in Education*, 2(1), 1-12.

- Deeley, S. J. (2019). Using technology to facilitate effective assessment for learning and feedback in higher education. *Assessment & Evaluation in Higher Education*, 43(3), 439-448.
- Fengyun, W., Mingxia, W., & Teo, B. (2022). Evolution of credit risk in cross-border e-commerce: based on the evolutionary game model between Third-party Service Providers and Regulators. *Journal of Positive School Psychology*, 6(9), 522-541.
- Folajimi, A., & Dare, O. (2020). Credit risk and financial performance. an empirical study of deposit money banks in Nigeria. *European Journal of Accounting, Auditing and Finance Research*, 8(2), 38-58.
- Funso, T., Kolade, R., & Ojo, M. (2021). Credit risk and commercial banks' performance in Nigeria: a Panel Model Approach. *Australian Journal of Business and Management Research*, 2(2), 31-38.
- Gadzo, S.G., Kportorgbi, H.K., & Gatsi, J.G. (2019). Credit risk and operational risk on financial performance of universal banks in Ghana: A partial least squared structural equation model (PLS SEM) approach. *Cogent Economics & Finance*, 7(1), 1-16.
- Hassan, M., Ashraf, K., & Paltinieri, A. (2019). Liquidity risk, credit risk and stability in Islamic and conventional banks. *Research in International Business and Finance*, 48(12), 17–31.
- Innocent, I. O., Ademola, O. G. & Teryima, T. S. (2019). Effect of capital adequacy, credit risk and operating efficiency on the performance of commercial banks in Nigeria. *Financial Markets, Institutions and Risks*, 3(1), 106-114.
- Kanyaru, P., & Kyalo, J. (2022). Factors affecting the online transactions in the developing countries: a case of e-commerce businesses in Nairobi County, Kenya. *Journal of Educational Policy and Entrepreneurial Research (JEPER)*, 2(3), 1-7.
- Karanja, D. (2019). *Effects of innovation strategies on performance of commercial banks in Kenya*. (Unpublished MBA Project), University of Nairobi.
- Kargi, H. (2021). *Credit risk and the performance of Nigerian banks*. (Master's thesis), Ahmadu Bello University, Zaria.
- Khalid, A., Wala, A., Neimat, A., Yousif, A., Ibrahim, E., & Adel, M. (2021). The impact of credit risk management on the financial performance of banking sector in Sudan. *Academy of Accounting and Financial Studies Journal*, 25(9), 1–11.
- Kioko, C. M., Olweny, T., & Ochieng, L. (2019). Effect of financial risk on the financial performance of commercial banks in Kenya listed on the Nairobi Stock Exchange. *The Strategic Journal of Business & Change Management*, 6 (2), 1936 –1952.
- Kovacs, H., Pulfrey, C., & Monnier, E. C. (2021). Surviving but not thriving: Comparing primary, vocational and higher education teachers' experiences during the COVID-19 lockdown. *Education and Information Technologies*, 26(6), 7543–7567.
- Kumari, C., & Chatteraj, N. (2021). Design of an Elementary Microstrip Power Splitter for Antenna Array. *2021 National Conference on Communications (NCC)*, Kanpur, India, 2021, 1-5, doi: 10.1109/NCC52529.2021.9530097.
- Nasr, M.M., & Farrag, M. (2020). E-payment systems risks, opportunities, and challenges for improved results in e-business. *International Journal of Intelligent Computing and Information Sciences* 20(1), 1-20. DOI:[10.21608/ijicis.2020.31514.1018](https://doi.org/10.21608/ijicis.2020.31514.1018)

- Nocco, B. W. & Stulz, R.M. (2022). Enterprise Risk Management: Theory and Practice. *Journal of Applied Corporate Finance, Morgan Stanley*, 34(1), 81-94, DOI: 10.1111/jacf.12490Pondel (2022)
- Rogers, E.M. (2003). *Diffusion of Innovations*. New York: Free Press.
- Rotich, A. C., & Mungai, J. N. (2022). Financing strategies and liquidity of supermarkets in Kiambu County, Kenya. *The Strategic Journal of Business & Change Management*, 9 (4), 1283 – 1298.
- Saisimulinya, J., & Khaoyamuyobo, D. (2022). Challenges facing digital payment system in Kenya. *Quest Journals Journal of Research in Business and Management Volume 10* (4), 01-08.
- Simamora, R. J., Oswari, T. (2019). The effects of credit risk, operational risk and liquidity risk on the financial performance of banks listed in Indonesian stock exchange. *International Journal of Economics, Commerce and Management*, 7(5), 182-193. <http://ijecm.co.uk/wp-content/uploads/2019/05/7510.pdf>
- Sondakh, J. J., Tulung, J. E., & Karamoy, H. (2021). *The effect of third-party funds, credit risk, market risk, and operational risk on profitability in banking for period 2014-2017*. <https://mpira.ub.uni-muenchen.de/112066/>
- Tahseen, M. S. (2024). Effects of risk management practices on banks' performance: An empirical study of the Jordanian banks. *Management Science Letters*, 10(2), 489- 496.
- Takang, F., & Ntui, C. (2023). *Bank performance and credit risk management*. (Masters' thesis), University of Skovde.
- Tasmin, R., & Muazu, M.H. (2019). Mediating effect of risk management function on determinants of enterprise risk management implementation in the Malaysian oil and gas sector; a conceptual framework. *J Technol Manag Bus* 4(2), 75–86.
- Valverde-Berrocoso, J., Garrido-Arroyo, M., Burgos-Videla, C., & Morales-Cevallos, M. B. (2020). Trends in educational research about e-learning: A systematic literature review (2009–2018). *Sustainability*, 12(5153), 1-23.