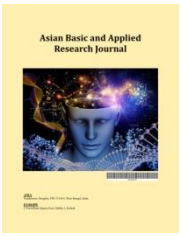

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Risk Mitigation Strategies and Supply Chain Performance of Petroleum Marketing Firms in Kisumu County, Kenya

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Supply chain performance is important for petroleum marketing firms (PMFs) since it can strongly impact the profitability and customer satisfaction. However, Kisumu County imports 100% of its crude oil, making it vulnerable to supply chain disruptions caused by increasing complexities in the global supply markets. The investigation assessed the influence of risk mitigation strategies (demand, operational, supply and financial risk mitigation strategies) on Kisumu County petroleum marketing firms' supply chain performance, Kenya. This investigation was based on the Resource-Based View, Agency, and Supply Chain Risk Management Theory. The target population consisted of the 47 registered PMFs that have a presence in Kisumu County, according to the Ministry of Trade, Kisumu County. A census of all the 47 registered PMFs in Kisumu County was done. Questionnaires were utilised to obtain primary data and contained both structured and unstructured

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questions, the target respondents being 99 senior managers from 47 registered PMFs. Descriptive analysis, correlation analysis and Multiple Regression Analysis (MRA) were used to analyse data collected. Findings revealed that operational risk mitigation strategies positively (β = 0.377) and significantly (ρ = 0.000) affect the firm's supply chain performance. Financial risk mitigation strategies negatively (β = -0.189) and significantly (ρ = 0.018) affect the supply chain performance of petroleum marketing firms in Kisumu County, Kenya. The results suggest that firms that successfully address supply risks—like fuel availability disruptions, procurement delays, or variations in supplier reliability—tend to enjoy greater stability and performance in their supply chains. The study recommends that these firms shift their focus toward enhancing other aspects of supply chain management that have a more pronounced impact. In particular, building stronger relationships with suppliers and customers should be a top priority to boost operational efficiency and cut costs. This can be done through strategic collaboration, like joint planning, open communication, and shared risk management practices.

Keywords: Kisumu county; petroleum marketing firms; risk mitigation strategies; resource-based view; supply chain performance.

1. INTRODUCTION

Supply chain includes all businesses and departments directly or indirectly involved in meeting the needs of customers. The supply chain is not only about the manufacturers and suppliers, but also the transportation company, warehouse, retailer and its customers. Management of the supply chain requires coordination between partners in a comprehensive supply chain to bring satisfaction to customers (Ngoc et al., 2022). However, global supply chains have become increasingly complex and linked in recent decades, making them more vulnerable to disruptions (Lambaino *et al.* 2018). The resiliency of supply chains has been the focus during the COVID-19 pandemic and the war in Ukraine, and countries around the world are taking steps to reduce risks and enhance supply chains' functionality (Supply Chain Management Review, 2023).

One notable example is the Russian invasion of Ukraine in 2022 that caused significant disruptions to global oil markets. Among the top oil-producing nations in the world is Russia. However, the war and subsequent sanctions on Russia have led to a reduction in Russian oil exports. This has led to higher oil prices and supply shortages in some parts of the world. The war in Ukraine and the COVID-19 pandemic are a reminder of the importance of risk in supply chain management (SCRM) in the oil marketing business (Ivanov, 2021). By diversifying their suppliers and developing contingency plans, petroleum marketing firms (PMFs) can lessen their exposure to supply chain risks and protect their businesses and customers.

Unlike other commodities, oil is influenced by many factors, including production policies set by the Organisation of Petroleum Exporting Countries (OPEC), shifts in global demand due to economic activities, and speculations in futures markets (Ikevuje et al., 2024). The global supply chain of petroleum marketing firms is currently facing a complex situation with variations depending on the specific region. In 2023, disruptions due to refinery shutdowns and rising gasoline demand created supply chain challenges in the United States (Conglin & Laura, 2023). Refinery closures tightened supply, and a surge in demand as pandemic restrictions ease is leading to price hikes and potential shortages (Nkrumah et al., 2020). This volatility can make it difficult for PMFs to plan and budget effectively (Nooraie & Parast, 2015). Geopolitical tensions are pushing China to increase reliance on domestic crude oil production to bolster supply chain security. This shift could impact global crude oil flows and potentially affect prices for other countries. Such disruptions can lead to shortages of crude oil and refined products, which can have a significant impact on PMFs and their customers (PricewaterhouseCoopers, 2019). Focus on expanding refining capacity is a key trend for petroleum marketing firms in India, as the country aims to meet the demands of its growing fuel consumption. This expansion could see India playing a larger role in the global refined product market in the coming years.

In Africa, pipeline vandalism and fuel shortages have severely disrupted the supply chain in Nigeria. In 2023, S&P Global Platts reported that the Nigerian oil sector struggles with pipeline disruptions and fuel shortages, curbing production and exports. These disruptions are

often caused by militant groups that siphon fuel from pipelines for illegal sale, leading to shortages and price hikes for consumers. South Africa's fuel retail market is experiencing moderate stability with occasional disruptions. Frost and Sullivan (2022) stated that the "South African Fuel Retail Market, Outlook 2023" report highlights that while the South African market is generally stable, factors like global oil price fluctuations and local supply constraints are causing temporary supply chain disruptions.

In another case, Angola's petroleum marketing firms are facing severe challenges due to foreign exchange shortages and infrastructure deficiencies. Africa Energy Outlook Report (2023) states that Angola's oil and gas sector is severely impacted by foreign exchange shortages, making it difficult for companies to import essential equipment and services. Additionally, ageing infrastructure and limited storage capacity further complicate the supply chain. Conversely, Egypt's petroleum marketing firms are grappling with rising fuel prices and limited storage capacity. The Arab Organisation of the Petroleum Exporting Countries' (2022) report mentions that Egypt's domestic fuel market faces challenges due to rising global oil prices, straining government subsidies and impacting consumer affordability. Furthermore, limited storage capacity is leading to logistical bottlenecks and price volatility in the Egyptian oil market.

Despite these challenges, there are also positive developments in the petroleum marketing sector across Africa. Several countries are investing in upgrading their storage facilities, pipelines, and transportation networks (Kiptum et al., 2024). Nigeria is rehabilitating its existing pipelines and building new ones to improve its oil supply chain (World Bank, 2023). Petroleum marketing firms are increasingly adopting digital technologies like automation, information analytics, and blockchain to improve competence and clarity in their supply chains. Egypt is piloting blockchain technology to track fuel shipments and combat fuel adulteration. African countries are also collaborating on initiatives to improve regional infrastructure and harmonise regulations, which could benefit the petroleum marketing sector. The East African Crude Oil Pipeline project, once completed, would transport Ugandan crude oil to the Tanzanian coast, improving petroleum supply chain efficiency for both countries.

Kenya’s supply chain success of PMFs presents a mixed picture, characterised by both progress and ongoing challenges impacting efficiency, reliability, and ultimately, customer satisfaction. The Kenyan market boasts several major players like TotalEnergies, Vivo Energy, Gulf Energy, Hass Petroleum, OiLibya (OLA), Rubis Energy and National Oil (Kimani *et al.* 2017), leading to intense competition and pressure on profit margins, which can sometimes incentivise cost-cutting measures that compromise supply chain efficiency. Additionally, Kenya lacks domestic crude oil production, making PMFs entirely reliant on imports, exposing them to price fluctuations and potential supply disruptions (Livoh, 2011). Slow clearance procedures at ports and complex licensing processes often lead to delays and inefficiencies (Shivo, 2016). Inadequate storage capacity in upcountry regions still creates product shortages, particularly during peak demand periods.

To mitigate the challenges, PMFs like Total Energies Kenya and Vivo Energy have invested in storage facilities and pipelines, improving oil product availability and reducing reliance on road transport, which faces congestion and delays. Total Energies and Vivo Energy are embracing digital solutions like real-time inventory tracking and route optimisation, leading to faster deliveries and reduced operational costs (Nnadili, 2016). Collaboration with third-party logistics providers is enabling some PMFs to streamline operations and leverage expertise in specific areas (Barua, 2012). Given the high risk level involved in the petroleum industry, it is important for PMFs in Kenya should implement strong risk-reduction plans in order to lessen the effect of hazards on the efficiency of their supply chain.

Effective supply chain management leads to competitive advantage as well as overall performance for firms (Chege et al., 2016). Supply Chain Operations Reference (SCOR) Model defines 5 core processes (plan, source, make, deliver, return) and performance attributes for each in measuring supply chain performance (Mentzer et al., 2001). Within each process, metrics like perfect order fulfilment, inventory turnover, production cycle time, and delivery cycle time are tracked to assess the supply chain's effectiveness and efficiency. Social metrics track labour practices, community engagement, and product safety. Büyüköz and Göçer (2018) employ Data Envelopment Analysis (DEA), a non-parametric technique, to compare SCP across different companies without predefined weights for metrics. They consider cost metrics like total supply chain

cost and inventory holding cost, efficiency metrics like inventory turnover and delivery lead time, and responsiveness metrics like on-time delivery rate and order fulfilment cycle time.

1.1 Statement of the Problem

Petroleum is one of the leading contributors to Kenya's contemporary economic expansion via its generation of revenue to the economy. Within the oil sector, the supply chain network consists of pipelines that may cross several counties (Kisumu County), oil tankers, and vessel transport. The number of oil marketing companies in Kisumu County has kept rising, which has increased competition among the many companies in the oil marketing industry. The success of the oil marketing companies has been steadily declining due to the high operational costs brought on by the fierce competition among the corporations. The market share of the PMFs best illustrates the performance deterioration. PMFs' total market share was 62. 97% in 2021; however, in just two years, that percentage had sharply decreased to 53. 9% by 2023. Planning and control systems for the supply chain, as well as production systems, need increased flexibility and dependability due to the environmental uncertainties in PMFs. By putting risk management strategies into practice, these risks were reduced. Therefore, this investigation evaluates how risk management strategies affect Kisumu County's supply chain performance of PMFs in Kenya.

Kisumu County imports 100% of its crude oil, making it vulnerable to fluctuations in international oil prices and supply disruptions. In 2023, the price of crude oil has surged, leading to the highest fuel prices ever experienced in Kisumu County. The price volatility has made it difficult for petroleum marketing firms to plan and budget for their supply chains. According to the World Bank, the global price of crude oil is expected to average $95 per barrel in 2023, up from $71 per barrel in 2022, posing a challenge for petroleum marketing firms in Kisumu County.

In 2022, the county experienced a fuel shortage that lasted for several weeks due to a combination of factors, including the war in Ukraine (KIPPRA, 2022). The county does not have strategic reserves of petroleum products, which makes it difficult to cope with supply disruptions or unexpected spikes in demand. Road transport accounts for over 70% of fuel distribution costs, with fuel taxes further adding to the burden (Shivo, 2016). A 2013 report by the Energy Regulatory Commission estimated that transportation costs account for up to 30% of the final retail price of fuel in Kisumu County (ERC, 2013). Maintaining optimal inventory levels across numerous depots and retail outlets remains a challenge. Inadequate forecasting and demand planning have consistently led to stockouts or unnecessary overstocking, impacting both customer satisfaction and profitability.

The success of petroleum marketing firms in Kisumu County heavily relies on robust supply chains that can withstand disruptions. Effective risk mitigation strategies play a crucial role in achieving this resilience and enhancing overall supply chain success. Lambaino *et al.* (2018) investigated the influence of risk transfer strategies, such as insurance and partnerships, on supply chain robustness in the petroleum sector of Kenya. Their findings suggest a positive correlation, indicating that transferring risks strengthens a firm's ability to bounce back from disruptions. Mburu *et al.* (2014), focusing on a broader context of manufacturing companies in Kenya, demonstrated a similar connection. Their research showed that a well-defined risk identification and management strategy can contribute to cost reduction and improved profitability within the supply chain.

Studies by Kamakia (2013) and Barua (2012) point to some progress in the petroleum sector. Adoption of digital solutions like real-time tracking and route optimisation, that has been embraced by some PMFs, has enhanced transportation efficiency. Chen *et al*. (2013) uncovered that supply chain operational risk management affects performance of a firm positively. The risk factors related to transport influenced the supply chain performance positively, whereas those related to distribution influenced it negatively (Cheng, 2018). The other study conducted by Kiore (2018), on the contrary, revealed that risk management strategies influenced the financial effectiveness of listed oil marketing firms in Kisumu County, Kenya, significantly. These studies point towards a cause-and-effect relationship. By proactively identifying and mitigating potential risks, petroleum marketing firms in Kisumu County can achieve reduced disruptions caused by unforeseen events, leading to smoother operations and timely product delivery.

The above studies on supply chain performance used different methodologies, targeted different populations, or employed different metrics to assess supply chain mitigation strategies and supply chain success, making it challenging to draw relevant conclusions applicable to the PMFs in Kisumu County. This investigation addressed this gap by adopting cost, efficiency, quality, and financial - to measure supply chain performance of PMFs in Kisumu County. Furthermore, it investigated the effectiveness of financial risk and operational risk mitigation strategies in enhancing Kisumu County's supply chain performance of PMFs.

1.2 Research Objectives

1.2.1 General objective

The investigation evaluated the effect of risk mitigation strategies on supply chain performance of a petroleum marketing firm in Kisumu County, Kenya.

1.2.2 Specific objectives

i) To assess the effect of financial risk mitigation strategies on supply chain performance of petroleum marketing firms in Kisumu County, Kenya.
ii) To examine the effect of operational risk mitigation strategies on supply chain performance of petroleum marketing firms in Kisumu County, Kenya.

2. LITERATURE REVIEW

2.1 Theoretical Review

Resource-based View (RBV) Theory posits that businesses can get a competitive edge by utilising their special assets and skills (Wernerfelt, 1984). It is based on the following three main principles: Companies can obtain a competitive advantage by optimising their unique resources and competencies. Resources and capabilities are costly, unusual, imperfectible, and non-substitutionary (VRIN). Firms should develop and maintain core competencies that are essential to their competitive advantage. The RBV has been criticised for its overemphasis on internal resources and overlooking the prominence of external relationships and the dynamic nature of competitive landscapes. Critics argue that focusing solely on resources might neglect the social and environmental dimensions of performance (Wieland & Wallenburg, 2012). But the theory still remains relevant to the investigation at hand. It underlines emphasising on the importance of valuable resources, which enable a firm to come up with products or services that are more highly valued by their customers than those of their competitors (Barney, 1991).

The Agency Theory is a theoretical structure for comprehending the link between principals and agents, where the principal is the party that delegates power to the agent to take action on their behalf. It was proposed by Jensen and Meckling (1976). The theory avers that issues pertaining to agencies occur when the principal and agent have diverse interests or goals and that these problems can be mitigated through mechanisms such as contracts, monitoring, and bonding. The Agency theory has been criticised for its focus on self-interest and its neglect of cooperative behaviour. The theory has also been criticised for its difficulty in operationalising and measuring (Chopra &Meindl, 2019). But the premise is applicable to the recent inquiry, as it aids in the understanding of how the relationship between PMFs and their suppliers can impact supply chain risk and performance. Traditional fixed-price contracts may incentivise suppliers to prioritise short-term cost reductions over long-term quality and sustainability.

The Supply Chain Risk Management (SCRM) Theory was first proposed by Christopher and Peck (1995). A supply chain's risks are identified, evaluated, and mitigated using the SCRM process. It pertains to implementing and developing strategies to lessen the possibility and effect of disruptions, and to guarantee the continuity of supply chain operations (Chopra & Meindl, 2019). The theory is a holistic approach to managing risks in the chain of supply, from raw material acquisition to finished product delivery. It is a proactive approach to risk control, focusing on preventing disruptions from occurring in the first place. SCRM also involves alliance with all supply chain stakeholders to identify, assess, and mitigate risks (Christopher & Peck, 2004). Effective SCRM practices can lead to lower operational costs by minimising disruptions, preventing stockouts, and optimising inventory levels. In the 2011 Thailand floods, Honda's effective SCRM practices, including supplier diversification and flexible production scheduling, helped them minimise disruptions and resume production quickly after the floods, outperforming competitors.

2.2 Empirical Review

2.2.1 Operational risk mitigation strategies and supply chain performance

Mwangi (2019) assessed how operational risk mitigation strategies affect Kenya's supply chain tenacity in the oil and gas business. The inquiry used a quantitative method. The target audience of the investigation was all 87 oil and gas businesses operating in Kenya. The investigation revealed that operational risk mitigation strategies have a notable, favourable influence on supply chain resilience.

However, the inquiry has the following geographic, conceptual and contextual gaps, respectively, which the current study intends to fill. It focuses on the oil and gas industry in Kenya but lacks specificity regarding the geographic areas within Kenya. It discusses operational risk mitigation strategies, but does not categorise and explore various operational risk mitigation strategies explicitly. The study recommends implementing operational risk mitigation strategies, but does not explore their specific impact on SCP.

Ombati (2019) studied how supply chain risk factors affect success in Kenya's petroleum industry using a case study of KPC Limited. The target audience was employees and stakeholders of KPC. Operational risk was conceptualised as risk assessment and risk modelling. The findings identified key operational risks (e.g., theft, accidents, price fluctuations) and their impact on performance.

The study has the following geographic, conceptual, and contextual gaps, respectively, which the current study intends to fill. It focuses on a case study of the Kenya Pipeline Company, limiting the generalizability to other petroleum marketing firms in Kenya. It discusses operational risk but lacks a comprehensive examination of operational risk mitigation strategies. The study recommends technology upgrade and diversification, but doesn't explore their effectiveness in the broader context of petroleum marketing firms.

Okemwa and Njihia (2021) explored how supply chain risk factors affect effectiveness in the Kenyan petroleum industry. The methodology used was a mixed method with interviews and questionnaires. The study targeted managers and supply chain professionals in 85 petroleum companies in Kenya. Operational risk factors were considered into internal (such as forecasting errors, human error) and external (such as price fluctuations, political instability) risks. The study found that both internal operational factors and external risk factors impacted supply chain performance. Effective collaboration, information sharing, and risk diversification strategies were recommended to mitigate these risks, which PMFs in Kenya should focus on collaborative relationships, improved information visibility, and diversifying their supply chains to enhance resilience and performance.

The study has the following geographic, conceptual, and contextual gaps, respectively, which the current study intends to fill. It focuses on the petroleum industry in Kenya without specific attention to geographic variations. While it identifies internal and external operational risk factors, it doesn't explicitly categorise and explore operational risk mitigation strategies. The study recommends collaboration and information sharing, but does not investigate their impact on SCP.

2.2.2 Financial risk mitigation strategies and supply chain performance

Kiore (2018) did an assessment of risk management on the supply chain effectiveness of 85 listed Kenyan oil marketing firms. The investigation used a descriptive research design using a questionnaire survey, and financial risk mitigation was operationalised as diversification, hedging, insurance cover, internal controls and contingency planning. It found that financial risk management strategies, such as changes in oil prices, fluctuations in exchange rates, and credit risks, had a noteworthy effect on the SCP of the listed Kenyan oil marketing firms.

That said, the study has the following geographic, conceptual, and contextual gaps, respectively, which the current study intends to fill. It assesses risk management on listed oil marketing firms in Kenya without specific attention to regional variations. It discusses financial risk management strategies but doesn't explicitly categorise and explore various financial risk mitigation strategies.

Daferighe and Edet (2019) assessed the determinants of SCP of the listed Nigerian oil and gas companies. A panel data analysis of 10 listed Nigerian oil and gas companies for 10

years was used. The findings were that financial risk management strategies like risk avoidance had a noteworthy and favourable effect on the SCP of listed Nigerian oil and gas companies. It is suggested that companies should implement effective financial risk management strategies in order to improve their SCP. However, the study has the following geographic, conceptual, and contextual gaps, respectively, which the current study intends to fill. It focuses on the listed Nigeria oil and gas companies, limiting its applicability to other countries or industries. It discusses financial risk management strategies, but does not categorise and explore various financial risk mitigation strategies explicitly.

In Lagos State, Nigeria, a study on the moderating role of firms' size was carried out by Asikhia *et al*. (2023) on SCRM and SCP of selected oil and gas marketing companies. The investigation used a survey research design whereby 362 workers from five businesses that were chosen to market oil and gas in Nigeria's downstream petroleum industry were surveyed. The investigation discovered that the supply chain success of oil and gas marketing enterprises in Lagos, Nigeria, was highly impacted by the financial risk management strategy, and that the link between supply chain risk management strategy and supply chain success was greatly mitigated by company size.

However, the study has the following geographic, conceptual, and contextual gaps, respectively, which the current study intends to fill. The investigation focuses on Nigeria’s oil and gas marketing businesses, limiting its generalizability to other countries. It discusses financial risk management strategy, but does not categorise and explore various financial risk mitigation strategies explicitly. The study recommends strategic agility measures but doesn't explore their specific impact on SCP.

2.2.3 Supply chain performance

Otieno (2013) carried out an inquiry on the factors determining the success of supply chain systems in petroleum firms in Nairobi. A mixed-methods design, combining a quantitative survey with qualitative interviews, was used. Data was collected from supply chain managers of 15 Nairobi marketing firms. Supply chain performance was measured through a composite index of cost efficiency, delivery reliability, and customer satisfaction. The study found that crude oil price fluctuations, inadequate infrastructure, and inefficient logistics processes negatively impacted supply chain performance and that collaboration within the supply chain and effective risk management strategies were crucial for mitigating these challenges.

The study has the following geographic, conceptual, and contextual gaps, respectively, which the inquiry filled. The inquiry focuses on petroleum firms in Nairobi, lacking generalizability to the broader Kenyan context or other regions. While it explores factors affecting supply chain performance, it doesn't explicitly categorise and explore risk mitigation strategies. The study recommends investment in infrastructure and risk management practices, but does not investigate their impact on SCP.

A study on the supply chain performance and inventory management of PMFS in Nairobi was conducted by Kamakia (2015). The investigation utilised a descriptive survey approach whereby questionnaires were utilised to gather data from 66 petroleum companies in Nairobi. Supply chain performance was operationalised by measuring inventory turnover ratio, inventory holding cost, and customer satisfaction. The outcome unveiled that inventory management techniques had a favourable and noteworthy effect on supply chain effectiveness. The inquiry has the following geographic, conceptual, and contextual gaps respectively which the inquiry covered. The inquiry focuses on petroleum marketing firms in Nairobi, limiting its generalizability to other regions in Kenya. While it explores inventory management techniques, it doesn't explicitly categorise and explore various supply risk mitigation strategies.

Wagner and Bode (2019) conducted an empirical analysis of supply chain success across multiple risk aspects. The methodology used was quantitative analysis of secondary data from multiple firms. The target population were 52 large firms across various industries in South Africa, 31 of which were petroleum companies. Supply chain performance was operationalised as cost efficiency, inventory levels, and delivery reliability. The investigation established that diverse supply chain risk types (e.g., demand, supply, supplier) impact performance differently and that effective risk management strategies tailored to specific risks are essential for mitigating negative effects.

However, the study has the following geographic, conceptual, and contextual gaps respectively

which the study covered. The investigation focused on large firms in South Africa, with only a subset being petroleum companies, limiting its applicability to the Kenyan context. It explores the impact of diverse types of supply chain risks but lacks an explicit examination of risk mitigation strategies. It also recommends comprehensive risk management plans, but does not investigate their specific impact on SCP in the petroleum sector.

3. RESEARCH METHODOLOGY

This investigation utilised a correlational survey research approach, a type of non-experimental research approach that investigates the link between two or more variables, none of which the researcher is in control of or has manipulated. The correlational design was quantitative, such that numerical scores or ratings were used to measure variables (Creswell, 2014).

According to the Energy Regulatory Authority (EPRA), one hundred and six (106) petroleum marketing firms operate in Kenya as of 31st March 2023. Out of these, forty-seven (47) petroleum marketing firms have a branch in Kisumu County. The target population comprised 99 senior managers who were randomly selected from the 47 petroleum marketing firms in Kisumu County.

The data which was gathered was analysed by descriptive, correlation(relational), and inferential (Multiple Regression) Analysis, a method of statistical analysis used to calculate correlations between variables. The linkage between the independent variables and the dependent variable was observed through the use of a multivariate regression model, as shown below;

$$SCP= \beta_0 + \beta_1 FRM+\beta_2 ORM+\varepsilon_i \ldots\ldots \quad (3.1)$$

Where; SCP= Supply chain performance
FRM = Financial risk mitigation
SRM= Supply risk mitigation
β_0= Constant Term
β_1-β_4= Beta Coefficients
ε **=** Error term
i = subscript for Petroleum Marketing Firms

4. RESULT AND DISCUSSION

4.1 Response Rate

Response rate is important when it comes to making sure research is reliable and valid. When the response rate is high, it shows that respondents are engaged, which helps in getting more accurate perspectives into how risk mitigation strategies affect on supply chain performance of petroleum marketing firms. The detailed breakdown of the response rate is in Table 1.

Table 1. Response rate

Response	Frequency	Percent
Response	99	100
Unresponded	0	0
Total	99	100

Source: Field Survey (2025)

Table 1 indicates that all 99 surveys were completed and returned, providing a 100% response rate without any missing surveys. That is an ideal response rate, far above the normal for surveys that usually run from 50% (good) up to 100% (perfect) (Denscombe, 2017). Achieving such a high response rate indicates that the manner in which the survey was constructed, disseminated, and in which the individuals were invited to participate was highly effective in eliciting complete cooperation from the target audience. Complete response rates ensure that the results are reliable and accurate by eliminating any bias from non-respondents.

4.2 Regression Analysis

Regression analysis is all about examining how various risk mitigation strategies affect the supply chain performance of petroleum marketing firms. Detailed in Table 2 is the result of this analysis model summary.

Table 2 uncovered an R-value of 0.656, which indicates the correlation coefficient, which shows both the strength and direction of the linear relationship between the independent variables (risk mitigation strategies) and the dependent variable (supply chain performance). An R-value of 0.656 points to a moderately strong positive relationship that suggests that as risk mitigation strategies improve, supply chain performance tends to get better as well. The R-square value of 0.430, also known as the coefficient of determination, demonstrates that 43% of the variation in supply chain performance among petroleum marketing firms in Kisumu County is attributed to the combined effects of financial and operational risk mitigation strategies. This indicates that while these factors are important in influencing supply chain performance, there is still 57% of the variation that remains unexplained, hinting at other significant factors that are not included in the model.

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.656[a]	.430	.406	.25763

Source: Field Survey (2025)

Table 3 demonstrated that all the explanatory factors have a jointly significant effect on the supply chain performance of the petroleum firms in Kenya. This outcome emphasises the significant mitigation risk strategies that play in the supply chain performance of petroleum firms in Kenya.

Table 4 revealed that the constant has a positive and significant coefficient of 2.369. This means that without considering demand, supply, financial, and operational risk mitigation strategies, the supply chain performance of the firms would still be positive.

Table 4 also showed that the demand risk mitigation strategy had a positive effect (B = 0.058) on supply chain performance in Kisumu's petroleum firms, but this effect was statistically insignificant (p = 0.304). This means that a one-unit increase in the demand risk mitigation strategy results in a 0.058-unit increase in supply chain performance. However, since this effect is not statistically significant, it suggests that changes in demand risk management efforts do not have a direct impact on supply chain performance. The outcome could be attributed to the fact that, regarding the petroleum sector, demand risks like changing fuel prices or unpredictable consumer behaviour might not be the biggest players impacting supply chain performance. Companies often have flexible pricing and inventory strategies in place that can lessen the need for formal demand risk mitigation strategies. The finding aligns with Mutimbia (2017), who found that demand risk mitigation insignificantly correlates with supply chain risk management of oil marketing enterprises.

However, regarding the effect of operational risk mitigation strategies, the findings noted a negative effect on supply chain performance. It showed a significant negative effect, with a coefficient of -0.189 and a p-value of 0.018. This suggests that increasing operational risk mitigation efforts by one unit could actually lead to a 0.189 unit decrease in supply chain performance. The outcome noted that too much focus on mitigating operational risks might create inefficiencies or constraints that ultimately hinder overall supply chain performance. This suggests that firms that put too much emphasis on operational risk controls may face inefficiencies or constraints that negatively affect overall performance. The findings could be linked to overly strict operational risk controls, such as excessive compliance requirements, rigid quality controls, or inefficient bureaucratic processes, which slow down decision- making, increase costs, or reduce flexibility in responding to market changes. Additionally, excessive focus on mitigating operational risks might divert resources from other critical areas such as financial and supply chain risk management, leading to unintended negative consequences. The findings agree with Mwangi (2019), Ombati (2019), and Okemwa and Njihia (2021), who all disclosed that operational risk mitigation significantly affects performance.

Table 3. Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.709	4	1.177	17.737	.000[b]
	Residual	6.239	94	.066		
	Total	10.948	98			

Source: Field Survey (2025)

Table 4. Coefficients results

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	2.369	.334		7.093	.000
Financial Risk Mitigation Strategy	.377	.052	.579	7.286	.000
Operational Risk Mitigation Strategy	-.189	.078	-.268	-2.418	.018

Source: Field Survey (2025)

The results showed that the strategy for mitigating supply risks had a positive effect on performance in Kisumu's petroleum firms, with a coefficient of 0.118 and a statistically significant p-value of 0.024. This means that for every one-unit increase in the supply risk mitigation strategy, there is a corresponding 0.118-unit increase in supply chain performance. Essentially, better management of supply risks leads to improved performance in petroleum marketing firms. This highlights that having reliable suppliers, effectively managing procurement risks, and guaranteeing a steady fuel supply all play a crucial role in boosting operational efficiency. This may be due to the fact that the petroleum industry is particularly dependent on a constant flow from refineries and imports. Any hiccup in the supply chain, whether due to geopolitical tensions or refinery closures, can seriously affect business performance, which is why companies that take proactive steps to manage supply risks are in a stronger position to maintain smooth operations. The outcomes are consistent with Njenga (2019), Olagunju and Olorundare (2022), and Mousavi Davoudi *et al*. (2020) indicated that supply risk mitigation strategies have a significant impact on the effectiveness of petroleum marketing firms.

On the other hand, financial risk mitigation strategies had a positive impact, with a coefficient of 0.377 and a significant beta of 0.000. This indicates that a one-unit increase in financial risk mitigation strategy results in a 0.377 unit boost in supply chain performance, highlighting that financial risk management plays a crucial role in enhancing supply chain effectiveness. This suggests that companies that have solid financial risk management strategies, like hedging against price swings, ensuring they have enough liquidity, and handling currency risks, tend to do much better in their supply chains. This can be attributed to the petroleum industry being highly capital-intensive, facing challenges like price fluctuations, exchange rate risks, and credit limitations. By effectively managing financial risks, companies can keep their operations running smoothly during tough economic times, invest in necessary infrastructure, and make the most of their working capital. The outcomes agree with Kiore (2018); Daferighe and Edet (2019); and Asikhia *et al*. (2023), who discovered that financial risk mitigation strategies possessed a significant effect on supply chain performance.

5. CONCLUSION

The study looked into how risk mitigation strategies affect the supply chain performance of petroleum marketing firms in Kisumu County, Kenya, and the conclusions were drawn based on specific outcomes. Regarding the effect of demand risk mitigation strategies on these firms' supply chains, the results showed that these strategies have an insignificant effect on supply chain performance. Conclusively, demand risk mitigation strategies do not significantly influence the supply chain performance of petroleum marketing firms in Kisumu County, Kenya. This suggests that simply managing changes in consumer demand does not greatly enhance overall supply chain efficiency. Therefore, while demand risk management is still an important part of maintaining supply chain stability, companies should consider focusing on more effective risk mitigation strategies, like financial and supply risk management, to boost their operational resilience and efficiency.

The investigation aimed to uncover how supply risk mitigation strategies affect the performance of petroleum marketing firms' supply chains. The findings revealed that these strategies significantly influence the supply chain performance of these companies. The study concluded that effective supply risk mitigation strategies play a crucial role in enhancing the supply chain performance of petroleum marketing firms in Kisumu County, Kenya. This highlights the importance of managing uncertainties related to supply in order to boost operational efficiency. The results suggest that firms that successfully address supply risks—like fuel availability disruptions, procurement delays, or variations in supplier reliability—tend to enjoy greater stability and performance in their supply chains. Given the petroleum sector's reliance on a consistent and reliable supply of products, fostering strong supplier relationships, diversifying sourcing options, and implementing solid contingency plans can help minimise risks and build resilience. Therefore, it is essential for firms to prioritise supply risk mitigation strategies as a fundamental part of their supply chain management approach to ensure smooth operations, lessen vulnerabilities, and maintain a competitive edge in the ever-evolving petroleum industry.

The study considered how financial risk mitigation strategies affect the performance of supply chains in petroleum marketing firms. The

findings clearly showed that these strategies play a vital role in enhancing supply chain performance. The investigation concludes by emphasising that financial risk mitigation is crucial for the supply chain success of petroleum marketing firms in Kisumu County, Kenya. It highlights how important financial stability is for smooth operations. Given that the petroleum industry requires a lot of capital, effective financial risk management—like hedging against price swings, securing credit access, and optimising cash flow—helps firms weather market fluctuations and keep their supply chains running efficiently. This connection indicates that companies with strong financial planning and risk management are in a better position to handle economic uncertainties, minimise cost fluctuations, and ensure consistent fuel distribution. Consequently, making financial risk mitigation a priority is key to boosting resilience, enhancing operational efficiency, and maintaining long-term supply chain performance in the petroleum marketing industry.

The study looked into how operational risk mitigation strategies affect the performance of petroleum marketing firms' supply chains. The findings revealed that these strategies significantly affect how well these firms operate. In fact, the research concludes that overly strict operational controls can negatively impact supply chain performance in petroleum marketing firms located in Kisumu County, Kenya. This suggests that while it is crucial to manage risks—like equipment failures, regulatory issues, and logistical hiccups—being too rigid can actually create inefficiencies, drive up costs, and slow down decision-making. Therefore, some firms might be focusing too much on avoiding risks, which could come at the cost of their ability to be flexible and responsive to market changes. To navigate this, petroleum marketing firms should aim for a balanced approach to managing operational risks, ensuring that their strategies boost efficiency instead of creating unnecessary bureaucratic hurdles that could hinder overall supply chain performance.

6. RECOMMENDATIONS

The petroleum marketing firms should build stronger relationships with suppliers and customers should be a top priority to boost operational efficiency and cut costs. This can be done through strategic collaboration, like joint planning, open communication, and shared risk management practices. By nurturing these partnerships throughout the supply chain, firms can better align their operations with what stakeholders need, which can help indirectly address demand risks while also improving overall supply chain performance.

The management of these firms should put in place an effective supplier risk management strategy that involves frequent supplier reliability and capacity assessments, supplier diversification via multi-sourcing and near-sourcing, implementation of superior supply chain mapping technologies and stress testing to ensure minimal disruption and improve the overall functioning of the supply chain.

These firms should implement a robust cash flow management system. This should include establishing emergency funds to cushion against financial shocks, maintaining low accounts receivable to ensure liquidity, and creating a comprehensive cash forecasting strategy that accounts for market volatility and operational needs.

The petroleum marketing firms should improve the implementation of a lean and balanced operational risk management strategy by utilising predictive maintenance with the help of IoT and AI, streamlining internal processes, prioritising key risk indicators and including regular checks and feedback variables to achieve greater agility, reduced downtimes and align mitigation strategies with overall business goals.

7. SUGGESTION FOR FURTHER STUDIES

Having examined the effect of risk mitigation strategies on the supply chain performance of petroleum marketing firms in Kisumu County, Kenya, researchers should investigate the underlying reasons why demand risk mitigation strategies have an insignificant effect on supply chain performance, using qualitative interviews to drill out management perspectives. Other studies could be investigated across different regions or industries to determine whether these results are unique to petroleum marketing firms in Kisumu County. Other studies should integrate advanced modelling techniques, such as stochastic or simulation-based approaches, could help quantify the relationship between various risk

mitigation strategies and supply chain performance. Other aspects of risk mitigation strategies could be included in other studies to determine their effect on the supply chain to improve the R-square.

CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Asikhia, O. U., Makinde, G. O., Akinlabi, H. B., &Olawore, O. P. (2023). Supply chain risk management and business performance of selected oil and gas marketing companies in Lagos State, Nigeria: Moderating role of firms' size. *Journal of Procurement & Supply Chain Management, 21(1), 1-11.*

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17(1), 99-120.*

Barua, D. (2012). Challenges facing supply chain management in the oil marketing companies in Kenya. *University of Nairobi Digital Repository.*

Büyüköz, Z., &Göçer, F. (2018). Performance evaluation of Turkish automotive supply chains using data envelopment analysis. *International Journal of Production Economics, 200, 87-95.*

Chege, P. W, Ngugi, P. K., Ngugi, J. K & Kirui, C. C (2016). Supplier Relationship Management Practices and the Performance of the Large Manufacturing Firms in Kenya.

Chen, I. J., Sohal, A. S., & Prajogo, D. (2013). Supply chain operational risk management and performance: Empirical evidence from the petroleum industry. International *Journal of Production Economics, 145(2), 717-729.*

Cheng'e, Z. (2018). Supply chain risk factors and performance in petroleum industry in Kenya. *University of Nairobi Digital Repository.*

Chopra, S., & Meindl, P. (2019). *Supply chain management: Strategy, planning, and operation (6th ed.)*. Pearson Education.

Christopher, M., & Peck, H. (2004). Building the resilient supply chain. *International Journal of Logistics Management, 15(2), 1-14.*

Conglin, X. & Laura, B. (2023). Oil market to tighten in 2023. Retrieved 4th October, 2024 from https://www.ogj.com/general-interest/economics-markets/article/14288169/oil-market-to-tighten-in-2023

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed method approaches (4th ed.)*. Sage.

Daferighe, E. E., &Edet, J. P. (2019). Empirical investigation of determinants of financial performance of listed oil and gas companies in Nigeria. *East African Scholars Journal of Economics, Business and Management.*

Energy Regulatory Commission (ERC) (2013). *Fuel price determination in Kenya: A review of the current methodology.* June, 2013.

Ikevuje, A. H., Kwakye, J. M., Ekechukwu, D. E., Ogundipe, O. B., & Esiri, A. E. (2024). Negative crude oil prices: Supply chain disruptions and strategic lessons. *Open Access Research Journal of Multidisciplinary Studies*, *8*(01), 085-093.

Ivanov, D. (2021). Supply chain viability and the COVID-19 pandemic: a conceptual and formal generalisation of four major adaptation strategies. *International Journal of Production Research*, *59*(12), 3535-3552.

Jensen, M. C., &Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3(4), 305-360.*

Kamakia, C. W. (2013). Inventory management and supply chain performance of petroleum marketing firms in Nairobi. *University of Nairobi Digital Repository*.

Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2022). *The petroleum industry in Kenya: Challenges and opportunities.* Nairobi, Kenya.

Kimani, C., NdoloMuthini, J. N., Namusonge, G., & Shale, N. (2017). Supply chain management challenges in Kenya petroleum industry: Case of National Oil Corporation of Kenya. *International Journal of Management and Applied Sciences, 3(1), 1-10.*

Kiore, B. (2018). An assessment of risk management on financial performance of listed oil marketing firms in Kenya. *United States International University Africa Digital Repository.*

Kiptum, C. K., Bouraima, M. B., Ibrahim, B., Oloketuyi, E. A., Makinde, O. O., & Qiu, Y. (2024). Implementation of effective supply chain management practice in the national oil corporation in developing country: an integrated BWM-AROMAN approach. *Decision making advances*, *2*(1), 199-212.

Lambaino, D.K., Guyo, E.C., Odhiambo, O.D., & Getuno, F.C. (2018). Supply Chain Risk Management and Supply Chain Resilience in the Kenyan Petroleum Industry". *International Journal of Management and Applied Sciences, 3(1), 1-10.*

Livoh, A. O. (2011). Downstream supply chain performance measurement by the oil marketing companies in Kenya. *Unpublished Master's thesis, University of Nairobi.*

Mburu BK, Kung'u JB, Muriuki JN (2014). Effects of Climate Variability and Change on Household Food Sufficiency among Small-Scale Farmers of Yatta District, Kenya. J. Environ. 03(02): 19-27

Mentzer, J. D., Dewitt, W., Larsen, K., Sapp, T., & Song, M. (2001). *Supply chain management: Improving competitiveness through effective integration*. Sage Publications.

Mutimbia, J.M. (2017). Effect of Supply Chain Risk Management on Operational Performance of Oil Marketing Companies in Kenya. *Unpublished Master's thesis, University of Nairobi.*

Mwangi J. K. (2019) Influence of Risk Mitigation Strategies on Supply Chain Resilience in the Oil and Gas Industry in Kenya. *Unpublished master's thesis, University of Nairobi.*

Ngoc, N. M., Viet, D. T., Tien, N. H., Hiep, P. M., Anh, N. T., Anh, L. D. H., & Dung, V. T. P. (2022). Russia-Ukraine war and risks to global supply chains. *International Journal of Mechanical Engineering*, *7*(6), 633-640.

Njenga, B.K. (2019). Supply Chain Risk Factors and Performance in Petroleum Industry in Kenya. *Unpublished master's thesis, University of Nairobi.*

Nkrumah, S.K., Apam, J., & Boadu, P. (2020). Enhancing operational performance through supply chain management practices: Evidence from firms in the petroleum downstream. *Journal of Economics, Management and Trade, 26*(3), 34–46.

Nnadili, F. (2016). Supply chain risk factors and performance in petroleum industry in Kenya. *University of Nairobi Digital Repository*.

Nooraie, N., &Parast, M. M. (2015). A multi-objective approach to supply chain risk management: Integrating visibility with supply and demand risk. *International Journal of Production Economics, 141(1), 1-12.*

Okemwa, G. N., &Njihia, J. M. (2021). Supply Chain Risk Factors and Performance in Petroleum Industry in Kenya. *University of Nairobi Digital Repository.*

Olagunju, B. O., & Olorundare, A. (2022). Supply chain risk management and business performance of selected oil and gas marketing companies in Lagos State, Nigeria: Moderating role of firms' size. *Journal of Procurement and Supply, 12(1), 1174- 1189*.

Ombati, C. O. (2019). Supply Chain Risk Factors and Performance in Petroleum Industry in Kenya. *University of Nairobi Digital Repository*.

Otieno O. J. (2013). Factors Affecting Performance of Supply Chain Systems in the Petroleum Industries in Nairobi. *Unpublished Master's thesis, University of Nairobi*.

PricewaterhouseCoopers (PwC). (2019). *Oil and gas trends 2019: A midstream perspective*. London, UK: PwC.

Mousavi Davoudi, S. M., Abdul Rasid, S. Z., Iranmanesh, M., & Najmi, A. (2020). Benchmarking the relationship between supply chain risk mitigation strategies and supply chain performance. *International Journal of Economics and Finance, 10*(8), 146–155.

Shivo, B. (2016). Downstream supply chain performance measurement by the oil marketing companies in Kenya. University of Nairobi. *Unpublished Master's thesis, University of Nairobi.*

Supply Chain Management Review (2023). *Top 10 Supply Chain Risk Mitigation Strategies for 2023*.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5(2), 171-180*.

Wieland, A., & Wallenburg, M. (2012). *Essentials of supply chain risk management*. Springer.

World Bank (2023). *Commodity Markets Outlook. July, 2023*.

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