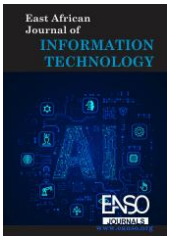

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Original Article

Business Process Innovation and Demand Forecasting Performance of Oil Marketing Companies in Kenya

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Business process innovation, Resource replenishment, Process alignment, Task coordination, Demand forecasting performance.

ABSTRACT

The oil industry has a significant impact on a country's economic growth, contributing about 4.8% of Kenya's GDP through oil imports. Business process innovation enables organisations to adopt new or improved methods that enhance efficiency and productivity by leveraging new technologies. However, the performance of these firms, measured by metrics such as profitability and market share, is often hindered by their inability to align operational processes with market realities. This study focused on the influence of business process innovation on demand forecasting performance among oil marketing companies in Kenya. The study applied systems theory, using resource replenishment, process alignment, and task coordination as indicators for measuring business process innovation. Out of a population of 143 registered oil marketing companies, 81 firms were purposively selected as the study sample. Primary data were collected through open-ended questionnaires, with 51 responses successfully returned and deemed usable for analysis, reflecting a response rate of 71.83%. Secondary data was obtained from reports published by ERPA on demand forecasting performance, and moving averages were used to analyse the data. The multiple regression analysis revealed that business process innovation accounted for a 40.8% change in demand forecasting performance. The correlation analysis confirmed a strong and positive relationship between business process innovation and demand forecasting performance (r=.639, p=.000). Consequently, the study indicates that business process innovation has a statistically significant relationship with demand forecasting performance (p=.000). Therefore, it recommends that companies regularly review and improve their core operations, focusing on reducing bottlenecks and accelerating data flow.

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INTRODUCTION

A business process encompasses all interconnected activities or decisions that add value to the end customer, enhancing efficiency, consistency, and quality while also lowering costs and risks (Dumas et al., 2018). These processes exist at every level of an organisation and may be visible to customers or hidden. Process innovation involves combining facilities, skills, and technologies to produce, deliver, or support a product or service. Business processes can be categorised as either management, operational or supporting processes (Differential, 2020).

Process innovation capability (PIC) refers to a firm's ability to acquire, assimilate, and transform technical resources, procedures, and knowledge for innovation (Frishammar et al., 2012). Organisations require dynamic capabilities in sensing, seizing, and transforming to continually renew resources, assets, and core capabilities, enabling them to innovate and respond effectively to market changes (Teece, 202). Process innovation may involve modifications to manufacturing equipment and technology, enhancements to tools, techniques, and software used throughout the supply chain and delivery systems, sales and warehousing methods, and accounting and customer service practices (Differential, 2020). Business process innovation strategies can be either incremental or radical, with supply chain processes specifically targeted to support innovation through gradual changes or full revisions to improve performance. BPI enhances value creation, strengthens buyer-supplier relationships, and accelerates the shift from traditional supply chains (Fornasiero et al., 2021; Schniederjans, 2018).

Global Perspective

In Indonesia, digital transformation efforts in the oil marketing sector have incorporated technologies like ERP systems, IoT, and blockchain to improve supply chain flexibility and customer engagement among leading oil marketing firms (Putra & Mahendrawathi, 2024). European companies have explored Business Process Innovation (BPI) through ambidextrous BPM combined with digital innovations, which has increased process change rates and enhanced customer-centric designs, thereby supporting greater effectiveness, strategic alignment, and agility, and enabling sustainable process improvements (Ahmad & Van Looy, 2020). Business process innovation merges business process management and digital innovation. In Norway, high-tech hospitals promote a balancing process design approach amid ongoing digital changes, using tools such as process mining and lightweight apps (Mendling et al., 2020).

Africa Perspective

Nkomo & Marnewick (2021) outlined a business process re-engineering (BPR) framework for financial institutions in South Africa that improves project success rates by integrating project management phases, strengthening change management, and defining roles for process analysis and enterprise architects. However, these financial institutions have faced challenges such as resistance to change, a lack of strategy linkage, and poor communication, which require factors such as stakeholder engagement and top-down

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initiation. Similarly, Ekweli (2020) mentions that the Nigerian banking sector's adoption of process innovation has led to improved detection and decision-making agility.

Kenya Perspective

In Kenya, commercial banks and other organisations use process automation to streamline routine tasks such as customer onboarding and loan processing. This reduces human error and boosts operational efficiency. Such innovations often incorporate new technologies and equipment, enabling firms to deliver better products at lower cost and maintain their competitiveness (Amiru & Mwanzia, 2025). Government centres have also successfully used these strategies to automate activities such as data entry and customer onboarding, thereby reducing human errors and operational costs. This comprehensive workflow overhaul aims to replace slow, bureaucratic systems with fast, transparent, and tech-driven processes aligned with Kenya's development goals (Otwoma et al., 2021). The success of this strategy is measured by the deployment of new software and hardware, the adoption of improved production techniques, and cost reductions. Process innovation helps organisations reduce customer and supplier complaints, enhance service delivery, and support growth. Nonetheless, many Kenyan companies still rely on basic strategies such as cost leadership or differentiation, which may be less effective in complex, unpredictable business environments (Kihiko et al., 2024).

Demand Forecasting

Demand forecasting is a core concept that enables informed procurement, production planning, stock management, and distribution. Inaccurate forecasting severely hinders a firm's capacity to plan and allocate resources effectively and respond to customer demands (Mutua & Odari, 2025). It also helps organisations reduce stock-holding costs, prevent waste, and ensure products are available in the right quantity and quality when needed (Seroney et al., 2023). In this turbulent environment, for oil and gas firms to remain viable and competitive, they need to be efficient, which is achieved through innovation by exploring new strategies that enable them to produce more at a lower cost (Oliveira et al., 2024). Accurate forecasting enables firms to make informed decisions regarding procurement, production planning, and resource distribution. Reducing stock-holding costs, minimising operational expenditures, and ensuring products are supplied at the correct timing and quantity ensure that demand forecasting directly contributes to achieving operational efficiency and competitive advantage (Seroney et al., 2023). Furthermore, the positive influence of high-quality forecasting is statistically confirmed to enhance overall supply chain performance in demanding sectors, facilitating proactive planning rather than reactive management (Mutua & Odari, 2025).

Forecasting methods broadly fall into qualitative approaches, used especially when historical data are unavailable, such as new product launches or unprecedented market conditions, and quantitative approaches, which rely on historical numerical data and assume that past patterns partly continue into the future (Hyndman & Athanasopoulos, 2018). Quantitative methods include time series models such as ARIMA and exponential smoothing, as well as machine learning techniques, including artificial neural networks and support vector machines, which have proven effective for capturing both linear and nonlinear features of demand data (Zougagh et al., 2020). Hybrid models that combine traditional time series techniques with machine learning have been developed to improve forecast accuracy, especially in complex and volatile environments (Zougagh et al., 2020). In supply chain management, accurate demand prediction directly impacts inventory costs, service levels, and overall supply chain efficiency. This requires adapting various forecasting methods to market characteristics, demand volatility, and data availability. Furthermore, integrating sustainability and resilience considerations into supplier and demand management enhances robustness against disruptions, a growing concern

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highlighted during events such as the COVID-19 pandemic (Sonar et al., 2022).

Oil Industry Perspective

From the oil and petroleum industry perspective, firms should practice innovation efficiency to remain sustainable during global shifts, such as the energy transition (Oliveira et al., 2024). However, traditional forecasting methodologies, which predominantly rely on historical sales patterns, are fundamentally challenged by the dynamic nature of modern markets and thus often fail to capture complex, real-world drivers of demand (Yadav, 2025). Consequently, the strategic adoption of advanced information systems has become critical for oil marketing firms seeking enhanced performance (Kiprop et al., 2025). This strategic imperative pushes organisations toward implementing more robust, data-centric prediction tools.

Statement of the Problem

Accurate demand forecasting for petroleum products such as AGO, PMS, and LPG is essential, as it underpins effective supply chain management and inventory control. This directly impacts operational efficiency, cost savings, and the ability to ensure consistent market supply (Seroney et al., 2023; Aldahmani et al., 2024). Although the importance of strategic forecasting is recognised, with recommendations to adopt advanced models to predict inflation and consumer demand, implementing and integrating these models into core business processes remains challenging. Regulatory measures, such as fuel price controls, exacerbate this issue by causing losses for oil marketing firms and supply shortages due to low-price caps (Kikanga et al., 2024). As a result, the performance metrics of these companies, such as profitability and market share, are often undermined because they cannot align their operations with market realities. The link between business process innovation (BPI) and demand forecasting performance is underdeveloped, limiting Kenyan oil marketing firms' ability to sustain competitive advantage (Majimbo, 2020). While research shows demand forecasting positively influences firm performance (Kikanga et al., 2024), how BPI elements, such as resource replenishment, process alignment, and task coordination, moderate or improve this relationship remains largely unexplored in Kenya (Kiprop et al., 2025). This disconnect between BPI and forecasting accuracy, coupled with industry performance challenges, represents a critical issue that warrants investigation to develop practical strategies to enhance demand forecasting outcomes among Kenyan oil marketing companies.

Research Objective

To establish the influence of business process innovation on demand forecasting performance in oil marketing companies in Kenya

Research Hypothesis

> **H_{01}** Business process innovation does not have a statistically significant influence on demand forecasting performance in oil marketing companies in Kenya

LITERATURE REVIEW

The study is grounded in systems theory, also known as social systems theory, introduced by Bertalanffy (1968). This theory concentrates on understanding complex processes and their interactions. It highlights the significance of open systems, as organisations, whether biological or social, require environmental interactions to supply inputs essential for their production and sustainability. Such openness enables systems to be more adaptable, promoting better outcomes through the synergies created by their interaction and collaboration.

Systems theory, as a supply chain framework, explains how different organisations' supply chains operate. The theory discusses the relationship between the components of the supply chain system to better understand the value it provides. It simplifies complex structures and identifies organisational stakeholders (Lavassani & Movahedi, 2010). Applying systems theory to supply chains requires a comprehensive review of its properties and their connection to supply chain

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practices. These properties include; holism, which considers the supply chain as a system of interdependent elements such as suppliers, customers, and logistics; complexity and uncertainty, which organisations must manage to make their supply chains agile and resilient enough to adapt to demand changes, disruptions, and price fluctuations; and integration and collaboration, where organisations work closely with supply chain partners to coordinate the flow of information and feedback (Helou & Cady, 2006).

Systems theory is highly effective for business process innovation because it views organisations as interconnected systems composed of multiple related parts. It highlights the importance of considering both internal and external factors that impact business processes. The theory encourages organisations to be agile and responsive to external influences, such as customer demands, technological progress, and competitive pressures. By adopting this theory, business process innovation becomes not only about improving internal operations but also about aligning with the wider ecosystem in which the organisation functions. This alignment helps companies stay competitive and adaptable, fostering resilient, future-oriented innovation.

Empirical Review

Hahn (2020) examined Industry 4.0 from an innovative supply chain perspective, categorising business processes into three groups: orchestrate, operate, and support. These categories cover supply chain infrastructure, human resources, procurement, contracts, and risk management. The research was based on empirical and descriptive analysis, including data collection and evaluation. Findings indicated that companies' business processes primarily focused on value creation and transportation, often neglecting warehousing and inventory management. An increased adoption of predictive analytics and real-time response strategies was observed. The study concluded that these processes enhanced scalability and flexibility. However, the lack of detailed information on how variables were measured limits the assessment of their validity and reliability. Clarifying the definitions and methods used to measure these variables would strengthen the study's rigour and reproducibility.

Wang, Li, Lu, and Cheng (2022) studied business innovation enabled by artificial intelligence and blockchain technology, proposing improvements to business practices and a secure way for clients to interact. The study collected empirical data from a few respondents from different business sectors. The study showed that business innovation with artificial intelligence and blockchain technology (BI-AIBT) improved the demand forecasting performance ratio by 97.1%, customer behaviour analysis by 96.3%, Business development by 98.9%, product quality by 98.3%, and customer satisfaction by 97.2%. The study's findings are based on data collected from a few respondents across different business sectors, which may limit the generalizability of the results to other industries or regions. Including a more diverse sample of businesses and conducting a broader analysis of the impact of BI-AIBT across various contexts would enhance the study's external validity.

Paunović et al. (2023) conducted a study on process innovation in family firms in Serbia to examine their innovation performance and the relationship between BPI and customer satisfaction. They surveyed 207 newly established companies and used descriptive statistics, t-tests, ANOVA, and correlation analysis to identify and demonstrate relationships. The study found that family firms incorporated various innovations in production and distribution areas and that there was a positive link between BPI and customer satisfaction and retention. However, it did not specify which innovations were introduced and focused solely on customer satisfaction within family-owned companies. While the research objectives are clear, expanding the scope to include the significance of process innovation in family firms and their unique challenges would be beneficial. Additionally, restricting the sample to newly-established companies may limit the applicability of the findings to more experienced

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family firms. The study focuses solely on family-owned companies in Serbia, which may limit the generalizability of its findings to other industries or regions. Including a more diverse sample and examining cultural and contextual factors could improve the study's external validity.

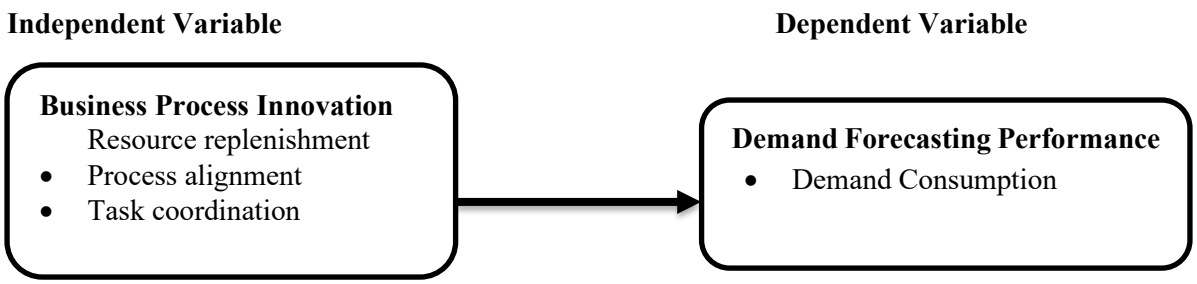
Jerab (2024) undertook a comprehensive analysis of the impact of coordination on organisational performance, examining how internal and external coordination affected organisational outcomes. The research analysed how coordination influences performance by identifying its key components, examining its mechanisms, and exploring the factors that lead to success. The study uses a mixed-methods approach that combines a desk review with empirical analysis from surveys, interviews, and case studies. The findings showed that effective coordination had a positive impact on performance on efficiency (15%), effectiveness (20%), quality (25%), innovation (30%), and adaptability (40%). However, the paper also notes that challenges like "silo mentality, information asymmetry, and conflicting goals" can hinder these efforts. The study concludes that coordination is a critical driver of organisational performance, and by addressing its inherent challenges and adopting best practices, organisations can significantly improve their competitiveness and success.

Mahmoud and Jallad (2025) investigated the optimisation of internal material handling processes by integrating Lean principles with digital decision-support technologies. The study's primary objectives were to analyse how material flow in internal logistics could be improved and to determine how Power BI could enhance human and truck resource planning in response to changes in production volume and tact time. The study employed a single-case study methodology at Volvo Construction Equipment, utilising a mixed-methods approach that combined qualitative data from observations and interviews with quantitative analysis of operational data. The findings demonstrate that material flow was significantly improved by implementing lean concepts such as Milk-run logistics, Kanban systems, and Heijunka scheduling, while Power BI proved a powerful tool for enabling dynamic, real-time adjustments to resource planning through scenario simulation and visual analysis. The study concluded that the strategic integration of Lean methodologies with digital technologies like Power BI is crucial for creating an internal logistics system that is not only efficient but also robust and adaptable to the dynamic demands of modern manufacturing.

Conceptual Framework

The model will showcase an independent variable (business process innovation components) and the dependent variable (demand forecasting performance).

Figure 2: Conceptual Framework



METHODOLOGY

The study adopted a mixed-methods research design to examine the relationship between the independent and dependent variables, combining quantitative and qualitative data collection and analysis (Tegan, 2025). It focused on the 143

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registered oil marketing companies managed by the Energy and Petroleum Regulatory Authority in Kenya. The study employed purposive sampling, selecting 81 oil marketing companies that consistently provided and submitted demand consumption data to EPRA from 2021 to 2024. This approach helped eliminate missing data, enhance data integrity, and identify companies that remained competitive in the market. The study targeted supply chain officers and managers from these oil marketing companies and used purposive sampling to specifically focus on companies with demand consumption data supplied by EPRA during 2021-2024. Data collection involved open-ended questionnaires with a four-point Likert scale to measure BPI indicators, along with secondary data from EPRA reports and databases for demand forecasting performance, providing quantitative data. The quantitative data were analysed using descriptive statistics, including percentages, means, and standard deviations. Qualitative data were analysed through thematic analysis, with related themes grouped, reviewed, and explained based on the collected information.

Multiple regression was used to show the relationship between the supply chain innovation agility components and demand forecasting performance by the model:

$Dfp = \beta o + \beta_1 BPi + e$

Where, Dfp = Demand forecasting performance

βo =constant

$\beta_1 BPi$ = Business Process Innovation

e= Error term

The secondary data collected was from the Energy and Petroleum Regulatory Authority (EPRA) energy database. To enhance accuracy, the study applied a moving average technique to determine the mean demand across the reporting periods, thereby establishing a single point of analysis for trend evaluation.

The researcher obtained a research permit from the National Commission for Science, Technology and Innovation (NACOSTI) and the Murang'a University of Technology Board of Postgraduate Studies to carry out the research. The researcher also informed the respondents of the research's purpose and assured them of the confidentiality and anonymity of the data collected using the collection tool to ensure their privacy. The researcher also contacted EPRA to obtain access to demand data for the companies from 2021 to 2024, to ensure the data's authenticity for analysis.

FINDINGS

Descriptive Analysis

The respondents were required to indicate to what degree the specific business process been innovated to ascertain flexibility in their supply chains. The responses were categorised into the following scale: Low (0-24%)-L, Partial (25-49%)-P, Moderate (50-74%)-M, High (75-100%)-H. A percentage mean (PM) was used to accurately indicate the degree of innovation adoption.

Table 1: Descriptive Analysis for Business Process Innovation

Statement	L	P	M	H	PM	SD
Inventory levels adjust in response to changes in the market	2 3.9%	16 31.4%	21 41.2%	12 23.5%	**71%**	**.834**
Departments adjust to align with changing operational priorities	2 3.9%	13 25.5%	20 39.2%	16 31.4%	**74.5%**	**.860**
Cross-functional teams coordinate dynamically to respond to emerging changes	1 2.0%	12 23.5%	29 56.9%	9 17.6%	**72.5%**	**.700**
Operational tasks (e.g. order processing, delivery scheduling) are digitised	3 5.9%	16 31.4%	21 41.2%	11 21.6%	**69.5%**	**.856**
Automated systems detect and correct process deviations to reduce delays	0 0.0%	15 29.4%	22 43.1%	14 27.5%	**74.5%**	**.761**

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Statement	L	P	M	H	PM	SD
Alignment between customer orders and warehouse dispatches is automated	2 3.9%	10 19.6%	24 47.1%	15 29.4%	**75.5%**	**.812**
Our company monitors supplier risk in real time to ensure timely replenishment	2 3.9%	13 25.5%	19 37.3%	17 33.3%	**75%**	**.872**
Digital oversight exists in managing supplier compliance	6 11.8%	17 33.3%	16 31.4%	12 23.5%	**66.8%**	**.973**

Table 1 shows that the degree of adoption of business process innovations is relatively moderate, with most of the agile functionalities falling within the moderate range of 50-75%. The highest adoption is the automation of the alignment between customer orders and warehouse dispatches (M=3.02, PM=75.5%, SD=8.12). The lowest is the digital oversight used for managing supplier compliance (M=2.67, PM=66.8%, SD=9.73). Departments adjust to align with changing operational priorities, and automated systems detect and correct process deviations to reduce delays. Real-time monitoring of supplier risk to ensure timely replenishment also shows a relatively higher level of adoption of agility (M=2.98, PM=74.5%, SD=.860; M=2.98, PM=74.5%, SD=.761; M=3, PM=75%, SD=.872). Operational tasks such as order processing and delivery scheduling digitisation are also adopted at a moderate level (M=2.78, PM=69.5%, SD=.856). Most companies' BPI ratings range from low to moderate.

Demand Forecasting Performance

The graph in Figure 2 shows a clear change in forecasting accuracy and market behaviour between the first and second halves of the period. In 2021 and 2022, the oil marketing companies tended to over-forecast. Predicted demand exceeded actual results, especially in 2022, with a gap of over 600,000 units. This suggests that the initial projections might have been overly optimistic or failed to account for external market slowdowns. Such differences can lead to high inventory costs and possible overinvestment in production capacity, underscoring the need for more cautious estimation models during those periods. On the other hand, the trend reversed in 2023 and 2024, moving toward under-forecasting. In these years, actual demand was about 316,000 and 445,000 units higher than predictions. While surpassing sales goals is usually a good thing, ongoing under-forecasting can lead to problems like stockouts, high shipping costs, and strained relationships with suppliers. The shift from a surplus to a deficit figures points to a volatile market where the current forecasting approach may not be keeping pace with the real recovery or growth in consumption

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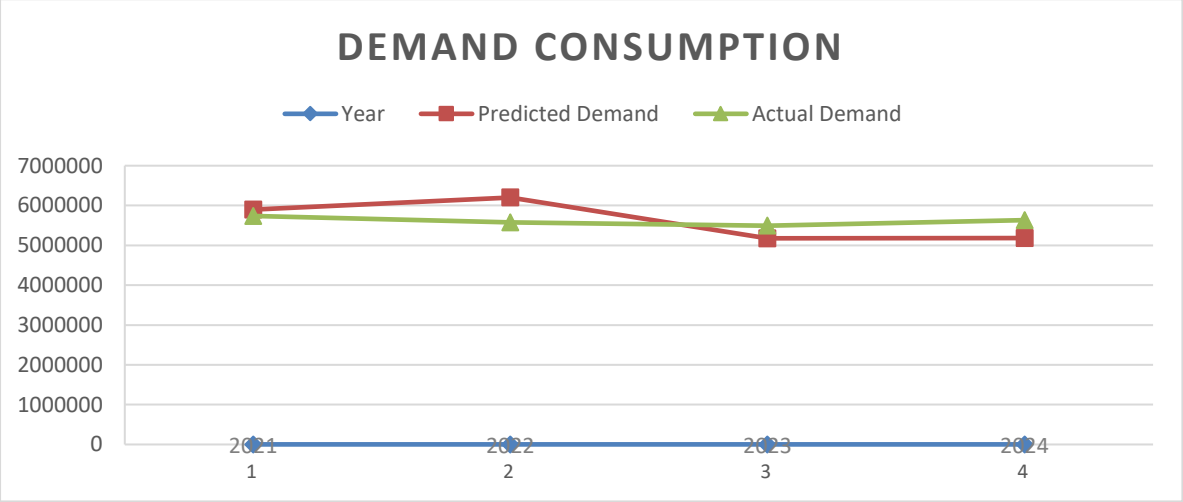
Figure 2: Trend of Oil Demand Performance



Qualitative Analysis

The study asked the respondents to mention some of the strategies that their respective companies have been able to adopt to improve their process automation and to identify the challenges that the companies have experienced during the automation of such processes.

The study was able to identify several recurring strategies that have been adopted by these companies. The first was staff workshops and trainings, employees were trained in order to help the company adjust appropriately in an industry riddled by an influx of technologies such as artificial intelligence and machine learning for decision-making. Improved employee skills increased rat e of management and implementation of process innovations and automations. Al Rob, Nor and Salleh (2024) also confirmed that staff training is important as it increases the employees to have a willingness to adopt the new tools and technologies and affirms their perceptions on the importance of adopting the new process, which effectively improved the employees quality and efficiency of work

The respondents also mentioned Enterprise Resource Planning (ERP) upgrades, which were done to increase compatibility and integration with other new processes/innovations to ensure that oil marketing companies are able to adequately and quickly adjust to the changes in the industry's workflow processes. Nzama (2021) affirms that ERP upgrades ensure that institutional systems are up to date with current technology, eliminating the need to acquire costly projects for future use. However, these upgrades involve reengineering of business processes, which require certain factors, such as top management commitment and employee training, for them to be effectively implemented.

However, the lack of full realisation of these innovations was attributed to challenges that deterred them from fully automating their business processes. The high cost of incorporation and investment in automation tools and systems was identified as a major challenge for companies. This led a significant number of oil marketing companies to lack the capacity or adequate resources to immediately acquire contemporary infrastructure. This can be attributed to the company's age and size, which play a significant role in budgetary allocations and overall cost management. Markwide Research Report (2024) noted that high initial investment is a prominent challenge for oil marketing companies in the Middle East and African countries, especially for medium- and small-scale companies, where full system integration is required.

Resistance to change among the employees was also identified as a challenge whose probable cause was a skills gap or fear of redundancy. This was reinforced by Kipkorir et al. (2023), whose findings also showed that full adoption of

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business process reengineering was not possible due to employees' resistance to change.

Correlation Analysis

The study wanted to investigate whether there exists a significant relationship between business process innovation (BPI) and demand forecasting performance (DFP). Table 2 shows a positive, moderate correlation between business process innovation and demand forecasting performance. BPI had a moderate positive correlation with DFP ($r = 0.623$, $p < .000$). This suggests that organisations that have adopted business process innovations are able to enhance cross-functional coordination among departments and increase flexibility and responsiveness during shocks or disruptions.

Table 2: Correlation Analysis

		Demand Forecasting Performance	Business Process Innovation
Demand Forecasting Performance	Pearson Correlation	1	.639**
	Sig. (2-tailed)		.000
	N	51	51
Business Process Innovation	Pearson Correlation	.639**	1
	Sig. (2-tailed)	.000	
	N	51	51
**. Correlation is significant at the 0.01 level (2-tailed).			

Regression Analysis

The study employed a simple regression analysis to examine the impact of business process innovation on the demand forecasting performance of oil marketing companies in Kenya. A regression equation model was used to demonstrate the direct relationship between the variables. From Table 3, there was a moderate correlation between business process innovation (BPI) (.639). The R2 value was .408, indicating that only 40.8% of BPI can explain the variation in demand forecasting performance among oil marketing companies in Kenya.

Table 3: Model Summary for Business Process Innovation and Demand Forecasting Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.639[a]	.408	.396	.44680
a. Predictors: (Constant), Business Process Innovation				

The analysis of variance (ANOVA) in Table 4 from the regression shows that the p-value is less than 0.05 ($F=33.744$, $P=.000$). This indicates that business process innovation has a statistically significant influence on the demand forecasting performance of oil marketing companies in Kenya, thereby rejecting the null hypothesis. Wang et al. (2022) confirmed that combining business innovation with artificial intelligence improved demand forecasting performance.

Table 4: ANOVA for Business Process Innovation and Demand Forecasting Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.736	1	6.736	33.744	.000[b]
	Residual	9.782	49	.200		
	Total	16.518	50			
a. Dependent Variable: Demand forecasting performance						
b. Predictors: (Constant), Business Process Innovation						

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Table 5 shows that, when business process innovation is held constant, demand forecasting performance improves, with a coefficient of 1.931. However, the coefficient for business process innovation was positive and significant (B=.783, P=.000). This implies that for each unit increase in business process innovation, there is a positive increase in the rate and accuracy of demand forecasting performance among oil marketing companies in Kenya. This was confirmed by Liu and Chen (2024), who noted that business process management had a positive, direct, and statistically significant effect on corporate performance. Paunovic et al. (2023) also confirmed a positive correlation; however, they were unable to determine whether the relationship between business process innovation and customer satisfaction was statistically significant in family-owned businesses in Serbia.

The regression model of the study was: *Dfp= 1.931 + .783BPi+ e*

Table 5: Coefficients for Business Process Innovation and Demand Forecasting Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.931	.369		5.240	.000
	BPI	.783	.135	.639	5.809	.000
a. Dependent Variable: Demand forecasting performance						

Hypothesis Test

Table 5 showed that BPI had a statistically significant effect with a p<.05 (p=.000). This implies that the significance was low enough to reject the null hypothesis; therefore, the study concluded that BPI had a statistically significant influence on demand forecasting performance. This is confirmed by Abdelaziz et al. (2023), who found that process innovation had a positive moderate relationship with turbulent technology. This supports the idea that BPI plays a significant role in influencing demand forecasting performance.

DISCUSSIONS

The positive impact of supply chain automation, especially in downstream processes like order-to-dispatch linkages, scores 75.5%. This aligns with Govindan et al. (2022), who connect such automation to improved order accuracy, shorter cycle times, and process stability through SCOR® metrics and neural network predictions of performance gains. Departments' adaptability and problem-solving skills, at 74.5%, further support this view. Rasool et al. (2021) highlight how AI and IoT-driven flexibility matches the findings on internal resilience during disruptions. However, significant contradictions appear: real-time supplier risk monitoring is at 75.0%, while coordination gaps are at 72.5%. Hofmann and Osterwalder (2022) note the strengths in detection but point out delays in execution for upstream metrics. Lower inventory scores at 71.0% and digitisation scores at 69.5% generally align with calls for broader adoption to address manual bottlenecks. Ambulkar et al. (2019) reinforce this harmony, showing that automation KPIs predict overall improvements without conflicting with ongoing gaps, such as supplier compliance, which scores 66.8%. The high variability here indicates a shared need for consistent oversight.

The inferential results reveal a robust link between business process innovation (BPI) and demand forecasting performance (DFP) among Kenyan oil marketing companies, with a moderate positive correlation ($r = 0.623$, $p < .001$) and significant regression coefficient ($B = 0.783$, $p < .001$), explaining 40.8% of variance ($R^2 = 0.408$) as confirmed by ANOVA ($F = 33.744$, $p < .001$). This implies that streamlining processes—such as adopting ERP systems or workflow automation—directly enhances predictive accuracy in volatile petroleum markets, where efficient operations mitigate supply disruptions and align with dynamic capabilities theory from your literature framework. These results extend those of Liu and

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Chen (2024), who demonstrated BPI's positive impact on environmental performance through IT integration, suggesting that similar mechanisms could boost forecasting agility in Kenya's oil sector by optimising data flows and resource allocation. While Paunovic et al. (2023) found a positive but non-significant link between BPI and customer satisfaction in Serbian family firms, the study's findings highlight the contextual relevance for emerging markets; however, the adjusted R^2 indicates that other factors, such as technological innovation or firm size, warrant further blocks in hierarchical models.

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

The study aimed to examine how business process innovation affects demand forecasting performance in oil marketing companies in Kenya. The findings showed a moderate ability to align operational priorities (74. 5%), coordinate cross- functional teams to respond to emerging changes (72. 5%), monitor real- time supplier risks (75. 0%), adjust inventory based on market response (71. 0%), digitise operational tasks (69. 5%), ensure digital supplier compliance (66. 8%), and automate customer orders and warehouse dispatches to enable a smoother flow of information, which is vital for accurate forecasting. Challenges such as high implementation costs and resistance to change also significantly affected the effectiveness and precision of their demand forecasting. Nonetheless, the observed benefits, such as improved forecasting accuracy, indicate these investments offer considerable returns. The results demonstrated a positive and significant relationship ($r = 0.623$, $p < .001$; $B = 0.783$, $p < .001$) between business process innovation (BPI) and demand forecasting performance. This significance suggests that business process innovation, as an integrated system, substantially impacts demand forecasting, implying that forecasting accuracy relies on how well internal processes are synchronised. This aligns with systems theory, which posits that strong resource subsystems provide the necessary inputs for accurate predictions. While process alignment and task coordination did not show a significant effect on demand forecasting performance, systems theory cautions that poorly aligned processes can weaken information flow between departments, potentially reducing forecasting quality indirectly. Overall, these findings highlight that demand forecasting performance depends on how effectively different organisational sub-systems, such as resource management, process structures, and team coordination, interact, reaffirming systems theory's core principle that the overall system's performance depends on the quality of interactions among its parts.

Conclusion

The findings show that firms have made significant progress in adopting business process innovation through increased digitisation, automation, and systems integration across key operational functions. The high levels of positive responses across most indicators suggest that organisations are increasingly utilising digital technologies to enhance process flexibility, improve coordination between departments, and strengthen real-time responsiveness to market and operational changes. The widespread automation of core activities such as inventory adjustments, order processing, warehouse dispatch, and deviation detection reflects a strategic shift towards data-driven and technology-enabled operations aimed at improving efficiency, reducing delays, and increasing service reliability. Moreover, the integration of digital systems in monitoring supplier risks highlights a growing recognition of the importance of end-to-end supply chain visibility in ensuring supply continuity. However, despite these advancements, the relatively lower adoption levels observed in digital oversight of supplier compliance indicate that some critical governance and control mechanisms have not yet fully developed. This suggests that while firms are progressing towards more integrated and intelligent operational systems, there remains a need to further strengthen compliance monitoring frameworks to

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fully realise the benefits of comprehensive process digitalisation and to better manage operational and supply chain risks.

Recommendations

Policy Recommendation

Policymakers should develop targeted policy incentives, such as tax reliefs, innovation grants, or subsidised digital infrastructure, to support oil marketing companies in adopting business-process innovation technologies, as public policy support would directly improve sector-wide forecasting accuracy and supply stability.

Management Recommendations

Top management should support ERP upgrades and reengineering initiatives, recognising business process innovation as a strategic capability rather than merely an IT project. The study results indicate that training and workshops were the most common successful strategies, while resistance to change and skills gaps were significant barriers. Therefore, oil marketing companies should establish ongoing staff training programmes, enhance digital skills, and implement structured change management strategies.

Firms should prioritise ERP modernisation and full system integration to facilitate real-time data sharing across procurement, inventory, and sales functions. They should also invest in advanced digital supplier compliance and risk monitoring platforms, and regulators should set minimum digital compliance standards.

Recommendations for Further Study

Future research should adopt a longitudinal approach to track the maturation of BPI and its long-term impact on forecasting. Research should be expanded to include external variables, such as macroeconomic factors and price-capping mechanisms, that influence artificial demand spikes, which BPI models may currently struggle to predict. Additionally, a comparative study of the gap between highly automated downstream operations and inconsistent upstream oversight could be conducted, as this limits overall systemic efficiency. Research should also examine how regional market volatility affects the accuracy of domestic demand forecasting in Kenya.

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