

Demand Forecasting Practices and Performance of Supermarkets in Nakuru City, Kenya

Chepkoech Beatrice¹, Dr. Pauline Keitany²

Jomo Kenyatta University of Agriculture and Technology P.O. Box Private Bag, JKUAT, 1063-20100, Kenya

ABSTRACT: Kenyan supermarkets have undergone significant changes over the past decade, with the rise and fall of several supermarket chains. Uchumi, Nakumatt, and Tuskys are among the largest supermarket chains that have experienced financial difficulties and closures in recent years. For example, in 2017, Tuskys Supermarket had to close several of its branches due to low stock levels, leading to a loss of revenue and a decline in customer confidence. Therefore, the study sought to assess the effect of demand forecasting practices on performance of supermarkets in Nakuru City, Kenya. The research was anchored on contingency theory. The study adopted descriptive research design. The target population was 17 procurement officers, 40 logistic officers and 56 stores managers in 10 supermarkets in Nakuru City. Since the study population is small census design was adopted. A pilot study was conducted in Naivas, Quickmart and Yako supermarkets within Eldoret town where 11 questionnaires were issued to procurement officers and logistic officer. Reliability of the instruments was determined using Cronbach Alpha. The study findings revealed that there is a strong, positive, and statistically significant relationship between demand forecasting practices and performance of supermarkets in Nakuru City, Kenya ($r=0.604$, $P=0.032$). From the findings the study recommended that supermarkets in Nakuru City, Kenya should utilize historical sales data, market trends, and customer behavior analysis to develop more accurate demand forecasts and embrace advanced analytical tools to identify patterns and trends.

KeyWords: Demand Forecasting Practices, Performance, Supermarkets

I. INTRODUCTION

Demand forecasting practices involve the systematic process of predicting future demand for goods or services based on historical data, market trends, economic indicators, and other relevant factors (Mungai, 2023). The aim is to anticipate consumer behavior accurately to optimize production, inventory management, resource allocation, and overall business planning. This ensures that products are available to meet customer demand without overstocking or understocking, which can tie up capital and lead to customer dissatisfaction. Demand forecasts assist distribution centers in planning their resource allocation more effectively. This includes allocating labor, storage space, and transportation resources based on anticipated demand patterns (Mentzer, Stank&Esper, 2018).

Supermarkets analyze historical sales data to identify patterns, trends, and seasonality in customer demand (Baitheimy, 2019). They use techniques such as time series analysis, moving averages, and exponential smoothing to forecast future sales accurately. Advanced inventory management systems integrate sales data, inventory levels, and supply chain information to generate real-time demand forecasts (Gatome-Munyua, 2022). These systems use algorithms to adjust stocking levels based on factors like sales velocity, lead times, and replenishment cycles. Supermarkets often run promotions and discounts to stimulate demand for certain products. Demand forecasting includes analyzing the impact of promotions on sales volume and adjusting forecasts accordingly. This involves tracking promotional effectiveness and considering factors like timing, duration, and pricing strategies (El-Katiri, 2019).

Kenyan supermarkets have undergone significant changes over the past decade, with the rise and fall of several supermarket chains. Uchumi, Nakumatt, and Tuskys are among the largest supermarket chains that have experienced financial difficulties and closures in recent years. For example, in 2017, Tuskys Supermarket had to close several of its branches due to low stock levels, leading to a loss of revenue and a decline in customer confidence. Kenyan Trade Associations, 2021). Just like in other parts of Kenya supermarkets in Nakuru also face performance issues. For the past five years a number of supermarkets have closed down while others have closed some of their branches. In 2021 Vision Mart supermarket closed down while in 2022 Stagematt Supermarket closed some of its branches within Nakuru City.

Therefore the study sought to assess the effects of demand forecasting practices on performance of supermarkets in Nakuru City, Kenya.

II. LITERATURE REVIEW

Contingency Theory

The contingency theory was developed by an Austrian psychologist known as Fred Edward Fiedler 1964. The Contingency theory states that in diverse situations, different solutions may prove effective (Barney, 2012), rather than propagating universally applicable organization management principles, the theory attempts to demonstrate that different situations necessitate different organization structures (Odhiambo, 2013). Organizations are affected by numerous contingencies including environment, size and technology. These contingencies are responsible for developing the specific structures and activities of an organization. When there is an incongruity between the contingent variables and the structure, the organization will achieve lower performance (Akintoye, McIntosh & Fitzgerald, 2010).

Kalakota and Robinson (2007) argued that in order to enhance supply chain performance for functional and innovative products, a corporation must change its organizational characteristics and organize its supply chain drivers such as management support and information sharing to create an efficient and responsive supply chain (Lee, 2001). Effective supply chain integration will likely be tied to a range of strategic, environmental, human and operations variable. For efficiency and effectiveness, a fit must exist between specific supply chain incorporation and strategic/environmental circumstances (Christopher, 2011). Thus, supply chain management relies on inventory management process.

The study benefited from the theory because of its focus on the connection between contingency theory and supply predicting lies in the fact that supply forecasting is one of the factors that managers need to consider when adapting their management style to fit the situation at hand. For example, if an organization is facing an unpredictable market, a manager using contingency theory might adopt a flexible management style that allows the organization to quickly adjust its supply in response to changes in demand. Alternatively, if an organization is facing a stable market with predictable demand, a manager might adopt a more rigid management style that focuses on long-term planning and maximizing efficiency. Therefore, the theory helped in explaining the effects of demand forecasting on performance of supermarkets chains in Nakuru City, Kenya.

Effect of Demand Forecasting Practices and Performance

Ghafour and Alianabi, (2022) focused on the role of forecasting in preventing supply chain disruptions during the COVID-19 pandemic: a distributor-retailer perspective. This study aimed to provide a practical solution to supply chain (SC) disruptions by estimating the best forecasting models for demand fluctuations in the context of food and beverages. The results demonstrate that distributors can reduce costs by dispensing with some retailers, particularly those who order low quantities and thus incur unjustified expenses. Furthermore, high accuracy is obtained, with minimal differences between the real data and the model's forecast.

Pamela and Matteo, (2018) did a study on the impact of demand forecasting on companies' performance: analysis in a multivariate setting. The paper aimed to investigate what relevant forecasting variables should be considered to improve companies' performance, and whether some forecasting variables can interact and influence performance with a synergistic effect. Analyses were conducted by means of data collected by the Global Manufacturing Research Group (GMRG). Data from a sample of 343 manufacturing companies in 6 different countries demonstrated that when companies intend to improve cost and delivery performances, they must devote their attention to all the different forecasting variables. In addition, the results found that the existence of positive interaction effects between the collection and use of information on the market and the other forecasting variables.

Mbugua and Kinyamu, (2017) focused on the strategic forecasting and manufacturing enterprises in Kenya's central region. In the study, all (110) questionnaires were administered to the sampled respondents with 82% response rate. The study showed that business trends greatly impact central Kenyan manufacturing firms. This was because items on business trend like management capacity to analyses trends, company reputation, sales trends and technological development trend had much relationship on firm performance. Seasonal trends affect firm performance.

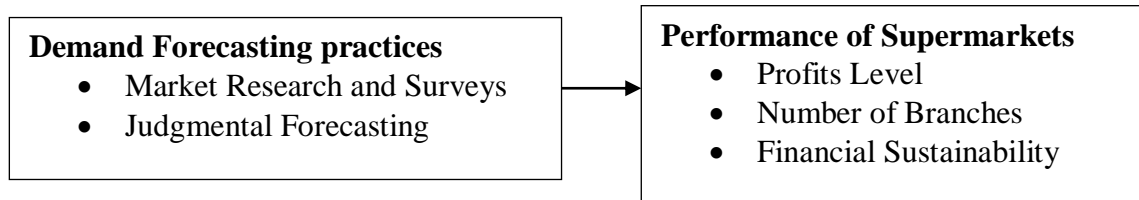
Seroney, Wanyoike and Langat, (2019) did a study on the influence of demand forecasting on supply chain performance of petroleum marketing companies in Nakuru City, Kenya. The study used a descriptive survey research design. 147 supply chain managers and the procurement officers working with the petroleum marketing companies in Nakuru City County, Kenya constituted the target population. The study used a structured questionnaire and the findings were

presented in tables. The results indicated that there was a positive correlation between demand forecasting and performance of supply chain.

Conceptual Framework

Independent Variables

Dependent Variable



III. METHODOLOGY

The study adopted descriptive research design. This method was considered appropriate because the researcher collect the data of the phenomenon under study in its natural environment and without any manipulation of the variables. The target population was 17 procurement officers, 40 logistic officers and 56 stores managers in 10 supermarkets in Nakuru City, Kenya. Since the study population is small, a census design was adopted. Primary data was sourced from the respondents through the use of closed-ended questionnaires. Questionnaires were preferred because they allow for standardized data collection, ensuring that all respondents answer the same set of questions.

Data collection process began by getting a formal letter from the university authorizing the field study. The letter together with the consent statement was then presented to the respective supermarkets as a means of seeking authority to assemble data from the institute. The researcher also sought for a permit from NACOSTI. Data was collected using drop and pick later method which was collected after two weeks. In this method, the consent statement was issued and then the questionnaire administered. The respondents were assured of their confidentiality of information to improve the response rate. A pilot study was conducted in Naivas, Quickmart and Yako supermarkets in Eldoret town where 11 questionnaires were issued to procurement officers and logistic officer. This represented 10% of the sample size (Kothari, 2012).

The instrument used ensured that the results obtained from the analysis of the data represented the phenomenon under study in terms of content, criteria and the characteristics. This was done by the experts in the University. Their comments were used to improve on the instruments. Reliability of the instruments was determined using Cronbach Alpha. Items with reliability coefficients of at least 0.70 were accepted as valid and reliable in this research. The collected data was quantitative in nature. Quantitative data was evaluated by use of SPSS 25 version. Descriptive and inferential statistics were employed in the study. Proportions, frequencies, mean, and standard deviation are descriptive statistics. Inferential statistics used correlation and multiple regression to determine the relationship between dependent and independent variables. The results were presented in form of tables. The study undertook preliminary diagnostic tests to ensure suitability of correlation and multiple linear regressions. The preliminary diagnostic tests include normality tests, multicollinearity test and Autocorrelation Test.

IV. RESULTS

Response Rate

The study administered 113 questionnaires for data collection. However, 98 questionnaires were properly filled and returned. This represented 87% overall successful response rates.

Demand Forecasting Practices on Performance of Supermarkets

The researcher sought to establish the influence of demand forecasting practices on performance of supermarkets in Nakuru City, Kenya. The findings were as indicated table 1

Table 1: Demand Forecasting Practices on Performance of Supermarkets

Demand Forecasting Practices	SA	A	N	D	SD	Mean	Std	Valid
Accurate forecasting can help Supermarkets chains to optimize their inventory levels, ensuring that they have the right products in the	58	24	8	4	6	4.177	0.912	98

right quantities at the right time								
Effective demand forecasting help the business to conduct accurate sales planning	40	48	4	8	0	3.984	1.032	98
Demand forecasting help Supermarkets chains to improve their supply chain management by predicting demand for products	50	34	8	4	4	4.145	0.921	98
Accurate demand forecasting help Supermarkets chains to optimize their operations which reduce the overall operation cost	54	36	2	5	3	4.563	0.608	98
Effective demand forecasting help the business to reduce risk and losses	48	44	0	5	3	4.307	0.738	98
Average						4.235	0.842	

Source: Research Data (2021)

From the findings 82% of the respondents agreed that accurate demand forecasting can help Supermarkets chains to optimize their inventory levels, ensuring that they have the right products in the right quantities at the right time (mean=4.177, SD=0.912). In addition 88% of the respondents agreed that effective demand forecasting help the business to conduct accurate sales planning (mean=3.984, SD=1.032). The study findings agrees with those of Zsidisin(2018) which revealed that effective demand forecasting plays a crucial role in helping businesses conduct accurate sales planning. Demand forecasting relies on historical sales data, market trends, and customer insights. By analyzing this data, businesses can make informed decisions about setting realistic sales targets and identifying growth opportunities. On the same note majority of respondents (mean=4.145, SD=0.921) agreed that demand forecasting help Supermarkets chains to improve their supply chain management by predicting demand for products. Furthermore, the 90% of respondents agreed that accurate demand forecasting help Supermarkets chains to optimize their operations which reduce the overall operation cost (mean=4.563, SD=0.608). Finally, 92% of the respondents agreed that the effective demand forecasting help the business to reduce risk and losses, (mean=4.307, SD= 0.738). The findings of the study concurs with those of Wagner and Bode (2017) which found that accurate demand forecasting helps businesses anticipate changes in demand and plan their supply chain operations accordingly. By aligning production and inventory levels with forecasted demand, they can avoid stock-outs or excess inventory, reducing the risk of supply chain disruptions and associated losses.

Performance of Supermarkets

The respondents were asked to indicate their level of agreement on the performance of supermarkets in Nakuru City, Kenya. The findings are presented in Table 2

Table 2: Performance of Supermarkets

Statement	S	A	U	D	SD	Mean	Std
	%	%	%	%	%		
The supermarket has been recording a gradual increase in profits	37	34	10	16	3	3.855	1.185
The supermarket has been opening new branches for the last five years	55	34	8	3	0	4.403	0.778
The supermarket has been consistently achieving a gradual increase in sales revenue over the past five year	44	46	7	3	0	4.307	0.738
The sales revenue of the supermarket reflects its ability to meet customer demand and expectations	55	33	7	5	0	4.387	0.869
The supermarket is able to meet credit obligations	37	44	16	3	0	4.145	0.807
Average						4.219	0.875

Source: Research Data (2024)

According to the findings majority of the respondents (71%) agreed that the supermarket has been recording a gradual increase in profits with a mean of 3.855 and a standard deviation of 1.185. Majority of the respondents (89%) also agreed that the supermarket has been opening new branches for the last five years with a mean of 4.403 and a standard deviation of 0.778. according to Barad and Salameh (2017) expanding by opening new branches is a common strategy for

supermarkets looking to grow their market presence and reach more customers. Opening new branches allows supermarkets to penetrate new markets and reach customers in different geographic locations. This helps increase brand awareness and market share. New branches provide convenience to customers by bringing the supermarket closer to their homes or workplaces. This can attract new customers and encourage repeat business.

The respondents further agreed (90%) that the supermarket has been consistently achieving a gradual increase in sales revenue over the past five year with a mean of 4.307 and a standard deviation of 0.738. Majority of the respondents (88%) also agreed that the sales revenue of the supermarket reflects its ability to meet customer demand and expectations with a mean 4.387 and a standard deviation of 0.869. In addition, majority of the respondents (81%) agreed that the supermarket is able to meet credit obligations with a mean of 4.145 and a standard deviation of 0.807. Verma, and Pullman, (2016) noted that market share growth is a positive indicator of the success and competitiveness of a particular supermarket chain. When a supermarket's market share increases, it means that it has captured a larger portion of the market compared to its competitors. This growth can be attributed to various factors and strategies that have contributed to its success.

Correlation Analysis

The researcher undertook correlation analysis to establish the nature and strength of the relationships between the demand forecasting practices and the performance of Supermarkets in Nakuru City, Kenya.

Table 3: Correlation between Demand Forecasting Practices on Performance of Supermarkets

		Performance of Supermarkets	
Demand Practices	Forecasting	Pearson Correlation	.604*
		Sig. (2-tailed)	.032
		N	98

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Research Data (2024)

The correlation analysis results shown in Table 4.18 indicates that there exist a strong, positive and significant relationship ($r=0.604, P=0.032$) between demand forecasting practices on performance of supermarkets in Nakuru City, Kenya. This implies that demand forecasting practices enhances performance of supermarkets in Nakuru City, Kenya. The study findings are in line with those of Adegbesan and Olatunji (2019) which examined how vendor performance evaluation affects Sub-Saharan African supermarkets. It examines vendor parameters including delivery, product quality, and contractual compliance. The results showed that thorough vendor performance evaluation improves regional supermarkets operational efficiency and profitability. The study findings are in line with those of Pamela and Matteo, (2018) who found that the existence of positive interaction effects between the collection and use of information on the market and the other forecasting variables.

Multiple Regression Coefficients

Table 4. 1: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.038	.145		.260	.796
Demand Forecasting Practices	.432	.106	.382	4.076	.000

Dependent Variable: Performance of Supermarkets in Nakuru City, Kenya.

Source: Research Data (2024)

The study also conducted a regression analysis to establish the regression coefficients connecting the independent and dependent variables as illustrated by the equation illustrated below:

$$Y = \beta_0 + \beta_1 X_1$$

Whereby Y represents performance of supermarkets in Nakuru City, Kenya, X_1 represents demand forecasting practices, β_0 represents constant which defines the value of performance of supermarkets in Nakuru City, Kenya without the inclusion of predictor variables.

$$Y = 0.038 + 0.432X_1$$

The value of performance of supermarkets in Nakuru City, Kenya without the influence of the predictor variables is 0.038. This explains that, at any given time performance of supermarkets in Nakuru City, Kenya will be 0.038 holding other factors constant at 0. The results also illustrate that a unit increase in demand forecasting practices would result to 0.432 times increase in performance of supermarkets in Nakuru City, Kenya, as given by the coefficients in the model.

V. DISCUSSION

In summary, the study findings revealed that accurate demand forecasting can help Supermarkets chains to optimize their inventory levels, ensuring that they have the right products in the right quantities at the right time. The study further revealed that effective demand forecasting helps the business to conduct accurate sales planning. Moreover, the study findings also revealed that demand forecasting help Supermarkets chains to improve their supply chain management by predicting demand for products. Finally the findings revealed that there is a strong, positive, and statistically significant relationship between demand forecasting practices and performance of supermarkets in Nakuru City, Kenya ($r=0.604$, $P=0.032$). Verma, and Pullman, (2016) noted that market share growth is a positive indicator of the success and competitiveness of a particular supermarket chain. When a supermarket's market share increases, it means that it has captured a larger portion of the market compared to its competitors. This growth is attributed to various factors and strategies that have contributed to its success.

VI. CONCLUSIONS AND RECOMMENDATIONS

The study concluded that there exist a strong positive and significant relationship ($r=0.604$, $P=0.032$) between demand forecasting practices on performance of supermarkets in Nakuru City, Kenya. This implies that demand forecasting practices enhances performance of supermarkets in Nakuru City, Kenya. The study findings are in line with those of Adegbesan and Olatunji (2019) which examined how vendor performance evaluation affects Sub-Saharan African supermarkets. It examines vendor parameters including delivery, product quality, and contractual compliance. The results showed that thorough vendor performance evaluation improves regional supermarkets operational efficiency and profitability. The study findings are in line with those of Pamela and Matteo, (2018) who found that the existence of positive interaction effects between the collection and use of information on the market and the other demand forecasting variables. In regards to the findings, the study recommended that supermarkets in Nakuru City should embrace data-driven demand forecasting practices. Supermarkets should carefully consider the impact of seasonal fluctuations and promotional activities when forecasting. Adequate preparation for peak periods, including holiday seasons and special promotions, is necessary to prevent stock-outs and optimize inventory levels.

The study recommended that Supermarkets in Nakuru City should embrace data-driven demand forecasting practices. This involves utilizing historical sales data, market trends, and customer behavior analysis to develop more accurate demand forecasts. Advanced analytical tools can help identify patterns and trends, enhancing the precision of demand forecasts. Engaging various stakeholders, including suppliers, distributors, and store managers, in the demand forecasting process is crucial. This multi-perspective approach ensures that demand forecasts are comprehensive and reflect a range of valuable insights. Collaboration among these parties contributes to increased demand forecast accuracy. Supermarkets should carefully consider the impact of seasonal fluctuations and promotional activities when forecasting. Adequate preparation for peak periods, including holiday seasons and special promotions, is necessary to prevent stock-outs and optimize inventory levels. A proactive approach to demand forecasting ensures that customer demand is met efficiently.

REFERENCES

- [1] Ailawadi, K. L., &Harlam, B. A. (2017). The consequences of poor demand forecasting in supermarket chains: A conceptual framework. *Journal of Retailing*, 93(3), 456-472.
- [2] Akintoye, A., McIntosh, G., & Fitzgerald, E. (2010). A contingency theory approach to sustainable performance of construction-related organizations. *International Journal of Project Management*, 28(2), 185-198.
- [3] Baitheimy, A. (2019). Analyzing historical sales data for demand forecasting in supermarkets. *Journal of Retail Analytics*, 6(1), 78-92.
- [4] Barney, J. B. (2012). Contingency theory: Understanding the relationship between organizations and their environments. *Journal of Management*, 38(4), 935-955.
- [5] César, J. M., & Trounce, B. (2018). Demand forecasting and its impact on budgeting and planning in supermarkets. *Journal of Business Forecasting Methods & Systems*, 37(2), 56-68.
- [6] Christopher, M. (2011). *Logistics & supply chain management*. Pearson UK.

- [7] Duus, J. (2018). Demand forecasting practices and their impact on supermarket chain performance. *International Journal of Retail & Distribution Management*, 46(3), 225-239.
- [8] El-Katiri, F. (2019). Impact of global market dynamics on demand forecasting in Egyptian supermarkets. *International Journal of Retail Management*, 35(4), 432-445.
- [9] El-Katiri, F. (2019). Impact of promotions on demand forecasting in supermarkets: A case study. *Marketing Science Quarterly*, 28(3), 320-335.
- [10] Fiedler, F. E. (1964). A Contingency Theory of Leadership Effectiveness. *Advances in Experimental Social Psychology*, 1, 149-190.
- [11] Gatome-Munyua, P. (2022). Advanced inventory management systems for real-time demand forecasting in supermarkets. *Supply Chain Management Review*, 18(4), 56-68.
- [12] Greenley, G. (2019). The benefits of demand forecasting practices in supermarket chains. *Journal of Retailing and Consumer Services*, 48, 112-125.
- [13] Igbinedion, O. (2018). Incorporating climate factors into demand forecasting practices for fresh produce in Egyptian supermarkets. *Journal of Supply Chain Management*, 25(2), 210-225.
- [14] Jabu, L. (2018). Continuous improvement in demand forecasting practices: Insights from South African supermarkets. *Operations Management Research*, 11(4), 112-126.
- [15] Kalakota, R., & Robinson, M. (2007). *E-business 2.0: Roadmap for success*. Pearson Education.
- [16] Kohli, A. (2018). Strategic sourcing and demand forecasting integration in Kenyan supermarkets. *African Journal of Business Management*, 12(3), 112-125.
- [17] Lee, H. L. (2001). Creating value through supply chain integration. *Supply Chain Management Review*, 5(2), 30-36.
- [18] Leonidou, C. (2019). Supplier performance monitoring and its impact on demand forecasting accuracy in Kenyan supermarkets. *Journal of Operations Management*, 28(1), 78-92.
- [19] Masindet, M. (2019). The impact of demand forecasting on supermarket chain performance: A case study of Nakuru City, Kenya. *International Journal of Retailing Management*, 34(5), 101-115.
- [20] Mayounga, R. (2021). Category management strategies based on demand forecasting in supermarkets. *Journal of Retailing*, 48(2), 201-215.
- [21] Mentzer, J. T., Stank, T. P., & Esper, T. L. (2018). Resource allocation in distribution centers: A demand forecasting perspective. *International Journal of Logistics Management*, 29(2), 403-421.
- [22] Mungai, S. (2023). Demand forecasting practices: A systematic approach. *Journal of Business Forecasting*, 42(3), 112-125.
- [23] Mwamburi, S. (2019). Continuous monitoring of supplier performance metrics in Kenyan supermarkets: A case study analysis. *International Journal of Logistics and Supply Chain Management*, 15(3), 320-335.
- [24] Odhiambo, N. M. (2013). Contingency theory and organizational structure in Kenya: An empirical study. *International Journal of Business and Management*, 8(14), 101-115.
- [25] Tumuhanye, A., & Ntayi, J. (2019). Seasonal adjustments in demand forecasting for supermarkets: A case study approach. *International Journal of Production Economics*, 17(7), 230-245.
- [26] Zulu, K. (2020). Collaborative planning practices in South African supermarkets: An analysis. *Supply Chain Forum: An International Journal*, 21(3), 112-128.