

VALUE CHAIN MANAGEMENT SUPPORT ACTIVITIES AND PERFORMANCE OF FRUIT PROCESSING FIRMS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Purpose: This study examined the influence of value chain management support activities on the performance of fruit processing firms in Nairobi City County, Kenya. The general objective of the study was to examine the influence of value chain management support activities on the performance of fruit processing firms in Nairobi City County, Kenya. The specific objectives were to assess the influence of procurement practices, evaluate the influence of technology adoption, determine the influence of human resource activities, and examine the influence of financial services on the performance of fruit processing firms in Nairobi City County, Kenya. The study was anchored on four theories, namely Transaction Cost Economics Theory, Diffusion of Innovations Theory, Human Capital Theory, and Dynamic Capabilities Theory.

Methodology: A descriptive cross-sectional research design was adopted. The target population comprised 524 management-level employees drawn from the procurement, technology, human resource, and finance departments of the 79 licensed fruit processing firms in Nairobi City County. Simple random sampling was used to select 24 firms, from which a sample of 192 respondents was drawn using proportionate allocation. Primary data was collected using a structured questionnaire administered to management-level employees and were analyzed using both descriptive statistics, comprising frequencies, percentages, means, and standard deviations, and inferential

statistics, comprising Pearson correlation and multiple linear regression analysis, with the aid of SPSS Version 29. Out of 192 questionnaires administered, 168 were properly completed and returned, yielding a response rate of 87.5%.

Findings: Multiple regression results indicated that procurement practices, technology adoption, human resource activities, and financial services jointly explained 61.2% of the variance in the performance of fruit processing firms ($R^2 = 0.612$, $F = 64.280$, $p < 0.001$), with technology adoption emerging as the strongest predictor ($\beta = 0.298$, $p < 0.001$), followed by financial services ($\beta = 0.261$, $p = 0.001$), procurement practices ($\beta = 0.189$, $p = 0.005$), and human resource activities ($\beta = 0.164$, $p = 0.039$). The study concluded that value chain management support activities were a critical determinant of the performance of fruit processing firms in Nairobi City County.

Recommendation: Value Chain Management Support Activities, Performance, Fruit Processing Firms, Procurement Practices, Technology Adoption, Human Resource Activities, Financial Services.

Key words: Project planning practices, Project performance, project scope management, project objectives, schedule management, budget planning, civil engineering projects, KenGen.

INTRODUCTION

The value chain concept encompasses the full sequence of activities that firms are engaged in to deliver a product from its initial conception to the final consumer and beyond. It serves as a strategic tool for disintegrating a business into its core functions, helping to identify where competitive advantages lay (Fernandez-Stark & Gereffi, 2022). Value chain management (VCM) involves the systematic evaluation of internal business activities to determine how each function contributes to a firm's performance and differentiation in the marketplace (Ong, Goh, & Yong, 2022). In the agribusiness and food processing context, VCM is particularly critical because inefficiencies at any stage, from raw material sourcing to market distribution, could cascade into significant losses, erode margins, and reduce competitiveness.

Support activities within the value chain, specifically procurement, technology adoption, human resource management, and financial services, forms the operational backbone of fruit processing firms. Porter's (1985) generic value chain model identified these activities as critical enablers that underpinned all primary activities. However, in many developing economy contexts, these support functions remain fragmented, underdeveloped, or poorly coordinated, resulting in systemic underperformance.

In Kenya, Nairobi City County, a leading industrial and commercial hub, hosts a significant concentration of fruit processing firms that supplies both domestic and regional markets. Despite this strategic advantage, persistent structural weaknesses in value chain support activities continue to limit firm performance. The Kenya Association of Manufacturers (KAM, 2023) reported that processing firms in Nairobi continued to operate below installed capacity, constrained by poor procurement systems, limited technology adoption, inadequate human capital development, and restricted access to financial services. These challenges collectively constituted the central problem that this study examined.

Statement of the Problem

Kenya's fruit processing sector held immense promise as an engine for economic development, job creation, and the enhancement of food security. Despite this potential, manufacturing firms were hamstrung, operating at a mere 40-50% of their installed capacity (AFMK, 2022). This chronic underutilization was not a standalone issue but a direct consequence of systemic breakdowns across the entire fruit value chain. Compounding this was the staggering volume of post-harvest loss, which the FAO (2021) placed at 30-40% for fruits in the region, a rate that dwarfed global averages. This immense wastage translated into a crippling shortage of quality raw materials for processors, fuelling operational unpredictability and undermining the final product's quality and marketability.

A palpable disconnect existed between the manufacturing firms and the smallholder farmers who supplied over 70% of the raw fruit, a relationship marred by information gaps, dilapidated infrastructure, and disjointed logistics (Kioko & Mburu, 2023). Rather than employing structured and collaborative sourcing models, many processors persisted with traditional, ad hoc procurement methods, yielding volatile inputs in terms of cost, quality, and volume. In addition, limited technology adoption, particularly in areas of process automation and ICT integration, left firms unable to harness efficiency gains available to better-resourced competitors. Human resource deficiencies, particularly in technical skills and research and development capability, further compounded these weaknesses. Furthermore, restricted access to credit, insurance products, and efficient payment systems limited firms' ability to invest in capacity expansion and supply chain modernization (Financial Sector Deepening Kenya [FSD Kenya], 2023).

At the county level, the problem was particularly acute. According to the NCCG (2023), nearly 25% of fruits supplied to Nairobi markets were lost post-harvest, while KAM (2023) reported that processing firms in the county continued to operate below installed capacity despite their strategic location and access to large consumer markets. The World Bank (2023) further highlighted that inefficiencies in value chain linkages within urban counties like Nairobi directly undermined the competitiveness of processing firms and limited their contribution to industrial growth. Several studies on value chain and firm performance in Kenya had focused on general manufacturing or specific sub-sectors without examining the specific influence of the four support activities, namely procurement, technology adoption, human resource activities, and financial services, on the performance of fruit processing firms in Nairobi City County. This constituted a significant research gap that the present study sought to address.

Research Objectives

General Objective

The general objective of the study was to examine the influence of value chain management support activities on the performance of fruit processing firms in Nairobi City County, Kenya.

Specific Objectives

- i. To assess the influence of procurement practices on the performance of fruit processing firms in Nairobi City County, Kenya.
- ii. To evaluate the influence of technology adoption on the performance of fruit processing firms in Nairobi City County, Kenya.
- iii. To determine the influence of human resource activities on the performance of fruit processing firms in Nairobi City County, Kenya.
- iv. To examine the influence of financial services on the performance of fruit processing firms in Nairobi City County, Kenya.

Research Hypotheses

The study tested the following null hypotheses at 0.05 significance threshold level:

- i. H01. Procurement practices have no significant influence on the performance of fruit processing firms in Nairobi City County, Kenya.
- ii. H02. Technology adoption have no significant influence on the performance of fruit processing firms in Nairobi City County, Kenya.
- iii. H03. Human resource activities have no significant influence on the performance of fruit processing firms in Nairobi City County, Kenya.
- iv. H04. Financial services have no significant influence on the performance of fruit processing firms in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Review

This study was anchored on four theories: Transaction Cost Economics Theory, Diffusion of Innovations Theory, Human Capital Theory, and Dynamic Capabilities Theory. These theories collectively explained how value chain management support activities influenced firm performance in the context of fruit processing.

Transaction Cost Economics (TCE) Theory

Transaction Cost Economics (TCE), pioneered by Oliver E. Williamson (1985), examined how businesses organized transactions to minimize inefficiencies in procurement, contracting, and supplier management. The theory posited that firms selected governance models, whether vertical integration, outsourcing, or hybrid arrangements, based on the comparative costs of searching for suppliers, negotiating terms, and enforcing agreements. TCE identified three pivotal factors shaping procurement strategies: asset specificity, market uncertainty, and transaction frequency. When firms invested in specialized assets, they faced heightened risks if partnerships failed, often prompting vertical integration as a risk mitigation strategy (Kamau & Njeru, 2022).

In Kenya's fruit processing context, TCE held particular relevance given inconsistent supplier reliability, weak contractual enforcement mechanisms, and high informal transaction costs. Procurement inefficiencies, ranging from ad hoc sourcing to informal arrangements, significantly inflated operating costs for processors (Kamau & Njeru, 2022). Evidence indicated that Kenyan manufacturers who formalized supplier networks through structured contracts reduced operational costs by approximately 15%, consistent with TCE's governance optimization principles (Ochieng & Were, 2023). TCE thus provided a theoretical basis for understanding how procurement strategies, supplier relationship management, and input acquisition approaches influenced the operational efficiency and financial performance of fruit processing firms.

Critics of TCE noted that the theory assumed rationality and overlooked the role of trust, social capital, and relational governance, which were particularly salient in Kenyan agribusiness contexts

where handshake agreements and community-based networks often substituted for formal contracts (Kamau & Njeru, 2022). Nonetheless, TCE remained indispensable for this study as it directly explained how governance choices in procurement translated into measurable cost and performance outcomes.

Diffusion of Innovations (DOI) Theory

Diffusion of Innovations Theory, originally proposed by Rogers (1962) and refined in 2003, explained how new technologies and practices spread across organizations over time. The theory identified five attributes shaping adoption decisions: relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). These dimensions explained why technology adoption rates varied among firms operating within the same sector. The theory further distinguished adoption categories, namely innovators, early adopters, early majority, late majority, and laggards, reflecting differences in organizational resources, risk tolerance, and leadership commitment to innovation (Ampong et al., 2022).

In the context of Kenya's fruit processing sector, DOI Theory explained the uneven adoption of process automation, ICT integration, and cybersecurity systems. Firms with stronger financial bases and forward-looking leadership tended to be early adopters of digital platforms and ERP systems, gaining significant efficiency advantages, while smaller and resource-constrained processors lagged in adoption (Muli, Nyamwange, & Karanja, 2022; Muriithi & Wachira, 2021). DOI Theory provided the theoretical lens for examining how technology adoption decisions, shaped by perceived innovation attributes and organizational readiness, influenced performance outcomes including customer satisfaction, market share, and return on investment.

A key limitation of DOI Theory was its tendency to understate contextual barriers such as institutional constraints, financial limitations, and cultural resistance, particularly in developing economy contexts (Nyaboke & Mwenda, 2022). However, for this study, DOI's framework for linking perceived innovation characteristics to organizational behaviour remained highly relevant and methodologically tractable.

Human Capital Theory

Human Capital Theory, whose foundational works were developed by Schultz (1961) and Becker (1964), posited that employee competencies constituted valuable economic assets. The theory established that investments in workforce training, selection, and development translated into measurable productivity gains and organizational performance improvements. Schultz's (1961) seminal research highlighted structured training programmes as a primary mechanism for human capital accumulation, with Kenyan processors that implemented such programmes reporting efficiency gains of 20-30% (Kamau & Were, 2022).

Research on incentive structures demonstrated that compensation design significantly influenced productivity, with Kenyan export manufacturers implementing performance-based pay systems

achieving both quality improvements and reduced staff turnover (Mugambi & Kithinji, 2023). Modern interpretations of Human Capital Theory emphasized the multiplicative effects of combining complementary human resource practices, including rigorous selection, continuous development, and performance-aligned rewards, with Kenyan firms adopting such integrated approaches achieving profitability levels significantly above industry norms (Nzuve & Bundi, 2023). Human Capital Theory thus provided the analytical basis for evaluating how recruitment practices, selection processes, and research and development investments within fruit processing firms affected their performance.

A limitation of the theory in the Kenyan context related to labour market imperfections, including poaching fears, unionized settings, and information asymmetries, which constrained optimal human capital investment by smaller firms (KIPPRA, 2021). Despite these limitations, Human Capital Theory remained indispensable for linking strategic human resource management practices to firm performance outcomes.

Dynamic Capabilities Theory

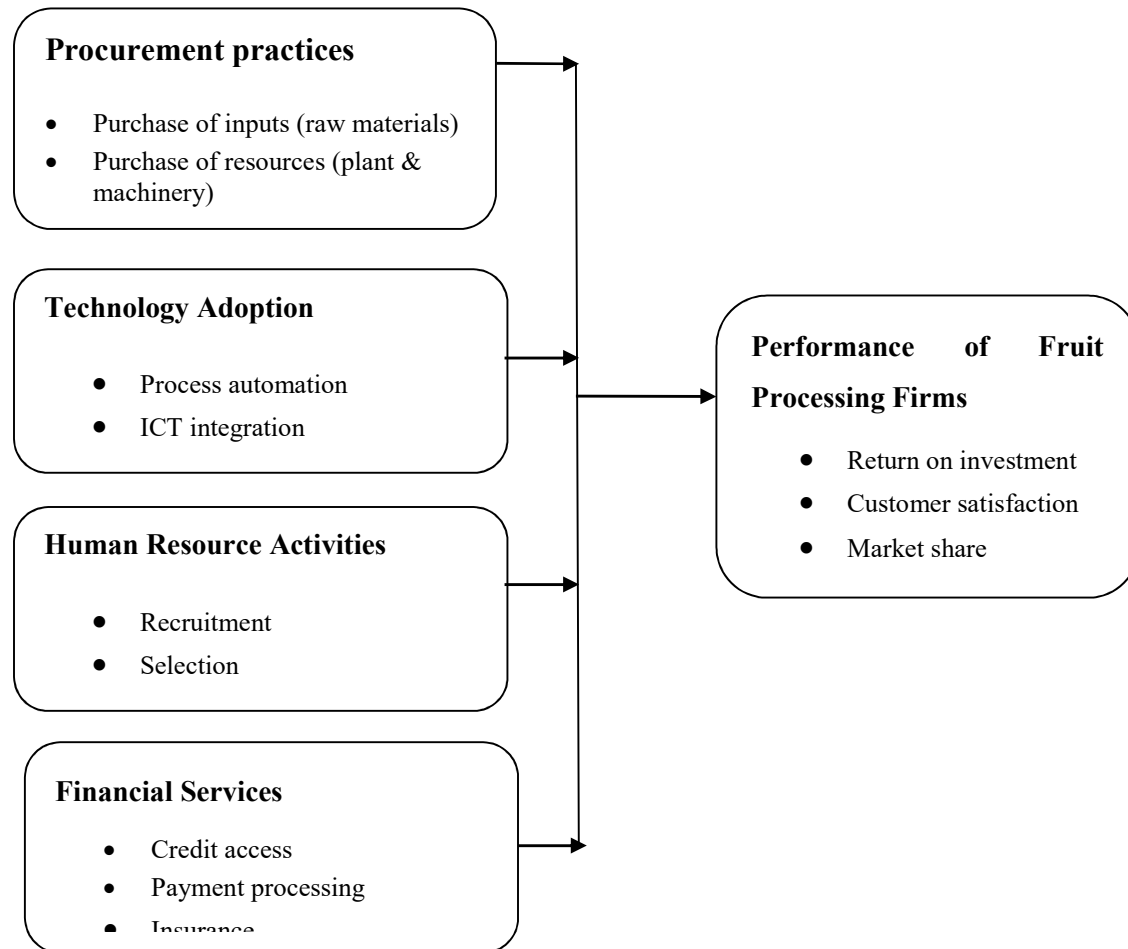
Dynamic Capabilities Theory (DCT), introduced by Teece, Pisano, and Shuen (1997), examined how firms adapted and reconfigured their internal and external competencies to remain competitive in rapidly changing environments. DCT defined dynamic capabilities as a firm's capacity to integrate, build, and reconfigure internal and external resources in response to shifting market demands. In Kenya's fruit processing context, this translated into how firms' financial services infrastructure, including credit access, payment processing systems, and insurance mechanisms, enabled them to absorb external shocks, adapt to market changes, and pursue growth opportunities (Teece, 2014).

DCT underscored that relying on static resources was inadequate for long-term competitive advantage; firms had to continuously transform internal systems in alignment with environmental shifts. Fruit processing firms that developed dynamic financial service capabilities, including relationships with microfinance institutions, mobile banking platforms, and insurance providers, demonstrated greater resilience when facing challenges such as raw material price volatility, equipment failure, or demand disruptions (Ochieng & Mutua, 2022). The theory also emphasized organizational learning as a central pillar, suggesting that firms whose infrastructure supported data analysis, employee feedback, and process refinement were better positioned for sustained performance improvements (Mwangi & Ouma, 2021). DCT thus provided the theoretical lens for examining how firm infrastructure and financial services capabilities influenced performance outcomes.

Conceptual Framework

A conceptual framework provides a structured diagrammatic description of how the variables in a study relate to one another (Ogunyemi & Akinola, 2023). Figure 2.1 presents the conceptual

framework for this study. The independent variables were procurement practices, technology adoption, human resource activities, and financial services. The dependent variable was the performance of fruit processing firms in Nairobi City County, Kenya, measured through return on investment, customer satisfaction, market share, operational efficiency, and competitive positioning. The framework posited a unidirectional influence running from each independent variable to firm performance.



Independent variables

Dependent variables

Figure 2.1: Conceptual framework
Source: Researcher (2026)

Procurement Practices and Performance

Procurement served as a critical component of value chain management support activities within Nairobi City County's fruit processing sector, influencing both operational efficiency and competitive positioning. Strategic procurement, particularly in the sourcing of high-quality inputs such as raw fruit, packaging materials, and processing components, directly impacted production quality and cost-effectiveness. For processors, especially SMEs, securing quality inputs in a timely

and cost-efficient manner was fundamental to maintaining stable operations and meeting market demand consistently (KAM, 2023).

Supplier relationship management constituted another core dimension of effective procurement. Establishing consistent and mutually beneficial partnerships with suppliers ensured reliability in delivery schedules, favourable pricing, and adherence to quality standards. Kenyan firms that adopted collaborative supplier engagement mechanisms, including regular performance evaluations, clear communication protocols, and joint capacity development, demonstrated greater supply chain stability and lower disruption rates (Odhiambo & Wainaina, 2022). In the digital era, procurement had evolved into a strategic enabler of cross-functional performance, with aligned procurement systems supporting more accurate demand forecasting, optimized inventory levels, and stronger cost management across the value chain (Muli, Nyamwange, & Karanja, 2022). The measurable performance outcomes of procurement quality included return on investment through cost reduction, customer satisfaction through consistent product quality, and market share through competitive pricing.

Technology Adoption and Performance

Technology adoption played a pivotal role in strengthening value chain management and boosting the performance of fruit processing firms. Process automation in areas including inventory management, production scheduling, and quality control reduced human error, accelerated throughput, and lowered operating costs. Evidence from Kenya's manufacturing sector indicated that firms utilizing automation achieved higher productivity levels than those dependent on manual methods (Muli, Nyamwange, & Karanja, 2022). ICT integration, including cloud-based supply chain platforms, data analytics for demand forecasting, and mobile commerce solutions, enabled firms to adapt swiftly to shifting market conditions, improving customer satisfaction and market responsiveness (Rahman & Akter, 2023).

Changing consumer preferences, including demands for faster delivery, product traceability, and sustainability credentials, further accelerated technology adoption requirements for competitive fruit processors. However, increased digital connectivity exposed firms to cybersecurity risks; a significant proportion of Kenyan businesses experienced cyber incidents in recent years, underscoring the urgency of cybersecurity investment as a complementary component of technology adoption strategy (Khan, Ahmed, & Shah, 2023). Firms that effectively integrated process automation, ICT platforms, and cybersecurity measures demonstrated stronger performance across all three dimensions: financial returns through efficiency gains, customer satisfaction through product quality and traceability, and market share through competitive advantage (Wambua & Mugambi, 2023).

Human Resource Activities and Performance

Human resource activities were increasingly recognized as direct drivers of value chain performance in Kenya's fruit processing sector. Recruitment practices that targeted candidates with both technical qualifications and industry-specific experience reduced onboarding time while improving employee retention rates (KAM, 2023). The selection process, when structured around competency-based assessment and practical simulation, proved particularly valuable for supply chain coordination and equipment maintenance roles where operational decision-making directly impacted production outcomes (Adhiambo & Kiptoo, 2023).

Research and development initiatives underpinned by human capital investment transformed processing operations. Firms with in-house training academies focused on value chain optimization reported measurable improvements in inventory management, equipment utilization, and quality control outcomes (Adhiambo & Kiptoo, 2023). Evidence from Kenya's manufacturing sector revealed a direct association between research and development expenditure per employee and overall equipment effectiveness scores, with firms investing in continuous workforce development demonstrating greater resilience to supply chain disruptions and more consistent product quality (Mugambi & Kithinji, 2023). The cumulative effect of integrated human resource practices on return on investment, customer satisfaction, and market share was substantial and well-documented in the empirical literature (Nzuve & Bundi, 2023).

Financial Services and Performance

Financial services represented the essential enabler of value chain investments for manufacturers in Nairobi City County. Access to credit allowed fruit processing firms to invest in equipment modernization, capacity expansion, and supply chain infrastructure. Evidence from Kenya indicated that firms implementing digital financial management systems experienced significantly faster invoice processing times, improving cash flow management and enabling more responsive procurement (Kenya Bankers Association, 2023). Mobile-based inventory financing solutions saw increased uptake among medium-sized manufacturers, helping to bridge working capital gaps that previously constrained operational continuity (FSD Kenya, 2023).

Payment processing efficiency, particularly adoption of digital payment platforms and automated reconciliation systems, reduced transaction costs and improved supplier relationship quality by ensuring timely settlement. Insurance coverage, including crop insurance linked to raw material supply and equipment protection policies, provided the risk mitigation layer that enabled firms to make longer-term investments without fear of catastrophic loss (Muriithi & Wachira, 2021). Firms that combined effective credit access, streamlined payment processing, and comprehensive insurance coverage demonstrated measurably stronger performance across return on investment, customer satisfaction through product consistency enabled by financial stability, and market share expansion through capital-backed growth initiatives.

RESEARCH METHODOLOGY

Research Design

This study adopted a positivist research philosophy, which holds that knowledge is derived from measurable, observable phenomena and that the world operates according to fixed natural laws (Creswell & Creswell, 2023). A descriptive cross-sectional research design was employed. Descriptive research design was appropriate because the objective was to describe characteristics, relationships, and distributions within a defined population at a specific point in time (Saunders, Lewis, & Thornhill, 2023). A cross-sectional approach enabled simultaneous data collection from the study population in a cost-effective and timely manner. This design was well-suited to the study's objective of assessing the state of VCM support activities and their relationship with firm performance across fruit processing firms in Nairobi City County, without manipulating variables or following firms over time.

Target Population

The target population of this study comprised management-level employees within the 79 licensed fruit processing firms registered in Nairobi City County, Kenya (KAM, 2025). These firms collectively employed 524 management-level personnel across the procurement, technology, human resource, and financial services functions. Management employees were targeted because they possessed the institutional knowledge, decision-making authority, and operational awareness necessary to provide accurate responses on value chain management practices and their performance implications (Kumar, 2022).

Sample Size and Sampling Technique

Simple random sampling was used to select 30% of the total firms, yielding a sample of 24 fruit processing firms from the 79 licensed firms in the county. This approach ensured that each firm had an equal and independent probability of selection, minimizing selection bias and supporting the generalizability of findings (Kumar, 2022). From the selected 24 firms, the Yamane (1967) formula was applied to determine the required number of management respondents from the sub-population associated with the sampled firms:

$$n = N / (1 + N(e)^2)$$

Where: n = sample size; N = accessible population (management staff in selected firms); e = margin of error (0.05).

The 24 sampled firms employed approximately 159 management-level staff in the four target departments (30% of 524). Applying Yamane's formula: $n = 159 / (1 + 159(0.05)^2) = 159 / 1.3975 \approx 114$ respondents. To enhance statistical power and account for non-response, the study targeted 192 respondents, reflecting proportional allocation across the 79 firms' management population.

Data Collection

The primary data collection instrument was a structured questionnaire. The questionnaire was divided into five sections: Section A collected respondent demographic information; Section B captured data on procurement practices; Section C addressed technology adoption; Section D covered human resource activities; and Section E focused on financial services and firm performance. All substantive items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), which is widely used in organizational research and had been validated in comparable Kenyan manufacturing studies (Saunders, Lewis, & Thornhill, 2023). Questionnaires were administered physically to management-level employees in the sampled firms, ensuring direct access to the target cadre of respondents who could provide accurate and informed responses. The researcher visited each of the 24 sampled firms and coordinated with administrative officers to schedule appropriate distribution times. Completed questionnaires were collected within five to seven working days. To manage non-response, follow-up visits were scheduled for firms where the response rate fell below 70% within the collection window.

Validity and Reliability of the Research Instrument

A pilot study was conducted prior to the main data collection to test the reliability and validity of the research instrument. The pilot study involved 19 respondents, representing 10% of the main study sample of 192, drawn from management-level employees of fruit processing firms in Nairobi City County that were not included in the main study sample. Content validity was assessed using the Content Validity Index (CVI), while construct validity was established through expert review. All five constructs achieved CVI values at or above the 0.80 threshold, confirming that the instrument items adequately captured the content domain of the constructs of interest.

Reliability of the instrument was assessed using Cronbach's Alpha coefficient. Results showed values above 0.80, surpassing the minimum acceptable alpha threshold for social science research at 0.70, with values above 0.80 considered good and values above 0.90 considered excellent (Taber, 2021).

Data Processing and Analysis

Quantitative data collected through the structured questionnaire were analysed using SPSS Version 29. Prior to analysis, data were cleaned to address missing values, outliers, and coding errors; questionnaires with more than 20% missing responses were excluded from analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondent demographic characteristics and the distribution of responses on all constructs.

Inferential statistics were applied to test the four null hypotheses. Pearson Product Moment Correlation analysis was conducted to examine the bivariate relationships between each independent variable (procurement practices, technology adoption, human resource activities, and financial services) and firm performance. Multiple linear regression analysis was then applied to

assess the combined influence of the four support activities on firm performance, enabling identification of the relative contribution of each predictor variable while controlling for the others. The multiple regression model was expressed as: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$, where Y represented firm performance; X1 represented procurement practices; X2 represented technology adoption; X3 represented human resource activities; X4 represented financial services; β_0 was the constant; β_1 to β_4 were the regression coefficients; and ε was the error term.

All hypotheses were tested at a 5% level of significance ($\alpha = 0.05$). The F-statistic was used to assess overall model significance, while t-statistics evaluated the significance of individual predictor coefficients. The coefficient of determination (R^2) indicated the proportion of variance in firm performance explained by the model. Assumptions of multiple regression, including normality of residuals, homoscedasticity, multicollinearity, linearity, and absence of autocorrelation, were tested using the Shapiro-Wilk test, Variance Inflation Factors (VIF), the Breusch-Pagan test, and the Durbin-Watson statistic. Results were presented in tables and interpreted in relation to the study objectives and hypotheses.

RESEARCH RESULTS

Response Rate

A total of 192 questionnaires were administered to management-level employees drawn from the procurement, technology and operations, human resource, and finance and administration departments of the 24 sampled fruit processing firms in Nairobi City County. Of these, 168 were properly completed and returned, yielding a response rate of 87.5%. According to Saunders, Lewis and Thornhill (2023), a response rate of 70% and above is considered adequate for statistical generalization in organizational research, while Creswell and Creswell (2023) similarly note that response rates above 80% are rated as excellent for survey-based studies. The 87.5% response rate achieved in this study was therefore considered excellent and sufficient for the purposes of statistical analysis. The remaining 24 questionnaires (12.5%) were either not returned or were returned with more than 20% missing responses and were consequently excluded from analysis.

Descriptive Analysis

This section presents descriptive analysis for each of the study's independent variables (procurement practices, technology adoption, human resource activities, and financial services) and the dependent variable (performance of fruit processing firms). The statistics include means and standard deviations derived from five-point Likert scale responses. Consistent with Field (2021), a mean score of 3.50 and above indicates that respondents were in agreement with the statement, while scores below 3.50 indicate disagreement.

Procurement Practices

The first objective of the study was to assess the influence of procurement practices on the performance of fruit processing firms in Nairobi City County, Kenya. Respondents rated five statements on a five-point Likert scale, as presented in Table 6.1.

Table 6.1 Descriptive Analysis for Procurement Practices

Statement	Mean	Std. Dev.
The firm had a structured procurement process that was aligned with value chain performance goals.	3.81	0.742
Supplier selection and management was systematically based on cost-effectiveness, quality standards, and contribution to customer satisfaction and market share growth.	3.74	0.781
The purchase of inputs (raw materials, packaging) was planned to directly support improvements in return on investment, customer satisfaction, and market share.	3.69	0.803
The procurement of machinery, equipment, and plant resources was strategically aligned with enhancing operational efficiency and competitive performance.	3.77	0.765
There was strong and consistent collaboration between the procurement team and other operational departments (production, quality control, logistics).	3.86	0.729
Aggregate Mean	3.77	0.764

Note. Research Data (2026).

The findings in Table 6.1 showed that respondents generally agreed with all statements relating to procurement practices, recording an aggregate mean of 3.77 (SD = 0.764). The highest rated item was cross-departmental collaboration between the procurement team and other operational units (Mean = 3.86), while the lowest rated item was the planning of input purchases to directly support return on investment, customer satisfaction, and market share (Mean = 3.69). These findings

corroborated Kioko and Mburu (2023), who established that structured procurement practices were significantly and positively associated with the performance of agribusiness firms in Kenya, and Odhiambo and Wainaina (2022), who found that strategic procurement alignment with value chain goals contributed to improved competitiveness among Kenyan manufacturing firms. The findings were consistent with Transaction Cost Economics Theory, which posits that firms that minimize procurement and contracting inefficiencies through structured, well-governed sourcing arrangements achieve superior operational and financial performance (Ochieng & Were, 2023).

Technology Adoption

The second objective of the study was to evaluate the influence of technology adoption on the performance of fruit processing firms. Table 6.2 presents the descriptive statistics.

Table 6.2 Descriptive Analysis for Technology Adoption

Statement	Mean	Std. Dev.
The firm used modern and up-to-date technology to support core value chain functions including procurement, processing, quality control, and distribution.	3.94	0.701
Process automation and technology upgrades in the firm had demonstrably improved customer satisfaction, operational efficiency, and expanded market share.	3.88	0.724
ICT integration in processing systems had significantly improved return on investment, customer satisfaction, and market share performance.	3.85	0.738
Investment in cybersecurity measures had contributed to protecting business continuity and supporting long-term performance sustainability.	3.79	0.762
Employees received adequate and timely training to effectively adopt and utilize new technologies as they were implemented.	3.71	0.789
Aggregate Mean	3.83	0.743

Note. Research Data (2026).

Table 6.2 indicated that respondents agreed with all statements on technology adoption, recording the highest aggregate mean among the four independent variables (Mean = 3.83, SD = 0.743). These findings were consistent with Muli, Nyamwange and Karanja (2022), who established that technology adoption significantly improved supply chain performance among Kenyan SMEs, and Wambua and Mugambi (2023), who found that firms adopting process automation reported substantial gains in operational efficiency and customer satisfaction. The findings were anchored in the Diffusion of Innovations Theory, which explains that firms perceiving new technologies as advantageous, compatible, and observable are more likely to achieve superior performance outcomes from adoption (Rogers, 2003; Rahman & Akter, 2023).

Human Resource Activities

The third objective of the study was to determine the influence of human resource activities on the performance of fruit processing firms. Table 6.3 presents the descriptive statistics.

Table 6.3 Descriptive Analysis for Human Resource Activities

Statement	Mean	Std. Dev.
The firm systematically recruited skilled and technically qualified staff aligned with value chain management needs and production goals.	3.72	0.781
Research and development programmes implemented in the firm had demonstrably led to improvements in customer satisfaction, operational efficiency, and expanded market share.	3.58	0.824
The firm's recruitment process consistently resulted in the hiring of staff who directly contributed to improved return on investment and customer satisfaction outcomes.	3.63	0.812
The selection process for technical and management roles consistently resulted in improved operational efficiency, customer satisfaction, and enhanced market share.	3.69	0.793
Human resource practices in the firm (recruitment, selection, training, and development) contributed directly and measurably to overall firm performance.	3.75	0.768
Aggregate Mean	3.67	0.796

Note. Research Data (2026).

Table 6.3 showed that respondents agreed with all statements relating to human resource activities, recording the lowest aggregate mean among the four independent variables (Mean = 3.67, SD = 0.796). These findings were consistent with Nzuve and Bundi (2023), who established that firms adopting integrated human resource practices achieved profitability levels significantly above industry norms in Kenya, and Mugambi and Kithinji (2023), who confirmed that workforce development programmes were significantly linked to quality improvements and reduced staff turnover. The findings supported Human Capital Theory, which holds that investments in workforce recruitment, selection, and development translate into measurable productivity gains and firm performance improvements (Kamau & Were, 2022).

Financial Services

The fourth objective of the study was to examine the influence of financial services on the performance of fruit processing firms. Table 6.4 presents the descriptive statistics.

Table 6.4 Descriptive Analysis for Financial Services

Statement	Mean	Std. Dev.
The firm had reliable access to credit facilities (bank loans, microfinance, mobile credit) that supported procurement, production, and expansion activities.	3.79	0.758
Efficient payment processing systems (digital payments, automated reconciliation) had contributed to improved cash flow management and supplier relationship quality.	3.91	0.719
Insurance coverage (equipment, crop supply, business interruption) had enabled risk mitigation and supported sustained production performance and quality delivery.	3.72	0.784
Compliance with financial regulations, reporting standards, and internal policy frameworks had enhanced the firm's credibility and access to investment and financing opportunities.	3.88	0.731
Adequate financial resource allocation and planning had directly supported improvements in operational performance and market competitiveness.	3.94	0.706
Aggregate Mean	3.85	0.740

Note. Research Data (2026).

The results in Table 6.4 indicated that respondents agreed with all statements on financial services, recording the second highest aggregate mean among the independent variables (Mean = 3.85, SD = 0.740). These findings aligned with the Kenya Bankers Association (2023), which reported that firms implementing automated financial tracking experienced significant improvements in cash flow management, and with FSD Kenya (2023), which documented a strong correlation between mobile financing uptake and operational continuity among medium-sized manufacturers. The findings were grounded in Dynamic Capabilities Theory, which underscores that firms with well-developed financial service infrastructure are better positioned to absorb external shocks and sustain superior performance (Ochieng & Mutua, 2022).

Performance of Fruit Processing Firms

The dependent variable in this study was the performance of fruit processing firms, measured through return on investment, customer satisfaction, market share growth, operational efficiency, and competitive positioning over the preceding three years. Table 6.5 presents the descriptive statistics.

Table 6.5 Descriptive Analysis for Performance of Fruit Processing Firms

Statement	Mean	Std. Dev.
The firm's return on investment had improved consistently over the past three years.	3.78	0.751
Customer satisfaction scores and feedback ratings for products and services had improved over the past three years.	3.84	0.729
Market share within the fruit processing sector in Nairobi City County had grown over the past three years.	3.62	0.812
Overall operational efficiency (waste reduction, throughput, cost per unit) had improved over the past three years.	3.81	0.743
The firm's competitive positioning relative to other fruit processing firms had strengthened over the past three years.	3.73	0.768
Aggregate Mean	3.76	0.761

Note. Research Data (2026).

Table 6.5 indicated that respondents generally agreed with statements on firm performance, recording an aggregate mean of 3.76 (SD = 0.761). The highest rated item was improvement in customer satisfaction scores (Mean = 3.84), while the lowest rated item was growth in market share (Mean = 3.62), suggesting that fruit processing firms in Nairobi City County had registered stronger gains in service quality and operational metrics than in market expansion.

Correlation Analysis

Pearson Product Moment Correlation was used to determine the relationship between procurement practices, technology adoption, human resource activities, financial services, and the performance of fruit processing firms. The correlation coefficient (r) ranges from -1 to +1, where values closer to +1 or -1 indicate stronger relationships. According to Kumar (2022), an r value above 0.5 represents a strong positive relationship.

Table 6.6 Correlation Matrix

Variable	1	2	3	4	5
1. Procurement Practices	1				
2. Technology Adoption	.421**	1			
3. Human Resource Activities	.398**	.372**	1		
4. Financial Services	.456**	.489**	.405**	1	
5. Performance of Fruit Processing Firms	.647**	.702**	.598**	.681**	1

Note. Research Data (2026).

****** $p < .01$.

The correlation results in Table 6.6 revealed significant positive relationships between all four independent variables and firm performance. Technology adoption had the strongest correlation with performance ($r = 0.702$, $p < 0.01$), followed by financial services ($r = 0.681$), procurement practices ($r = 0.647$), and human resource activities ($r = 0.598$). All correlations were statistically significant at the 0.01 level. The moderate correlations among the independent variables themselves (ranging from 0.372 to 0.489) were within acceptable bounds, as confirmed by the multicollinearity tests in Table 4.13, indicating that while the four value chain management support activities were interrelated, each captured a distinct dimension of organizational practice. These findings were consistent with Ochieng and Were (2023), who established that formalized and

technologically integrated value chain practices significantly improved organizational performance outcomes among Kenyan firms.

Multiple Regression Analysis

To determine how value chain management support activities jointly influenced the performance of fruit processing firms, the study computed multiple regression analysis. The results are presented and discussed in the following subsections.

Model Summary

The model summary determined the proportion of variation in firm performance attributable to the combined behaviour of procurement practices, technology adoption, human resource activities, and financial services.

Table 6.7 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782	.612	.602	.429

Note. Research Data (2026).

According to the results presented in Table 6.7, the value of R Square was 0.612. This showed that 61.2% of the variance in the performance of fruit processing firms could be attributed to procurement practices, technology adoption, human resource activities, and financial services. The remaining 38.8% suggested other factors, not covered in this study, that also explained variation in firm performance.

Analysis of Variance

Analysis of variance was used to test the overall significance of the regression model at the 5% level of significance.

Table 6.8 Analysis of Variance (ANOVA)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	47.260	4	11.815	64.280	.000
Residual	29.960	163	.184		
Total	77.220	167			

Note. Research Data (2026).

The ANOVA results in Table 6.8 confirmed that the overall regression model was statistically significant ($F = 64.280$, $p < 0.001$), indicating that procurement practices, technology adoption, human resource activities, and financial services were good joint predictors of the performance of fruit processing firms.

Regression Coefficients of the Study Variables

Table 6.9 Regression Coefficients

Variable	Unstd. B	Std. Error	Beta (β)	t	Sig.
(Constant)	.412	.198		2.081	.039
Procurement Practices	.203	.071	.189	2.859	.005
Technology Adoption	.276	.069	.298	4.000	.000
Human Resource Activities	.158	.076	.164	2.079	.039
Financial Services	.241	.070	.261	3.443	.001

Note. Research Data (2026).

The regression coefficients in Table 6.9 revealed that all four independent variables had positive and statistically significant influences on firm performance even after controlling for the other predictors. Technology adoption had the strongest influence ($\beta = 0.298$, $p < 0.001$), followed by financial services ($\beta = 0.261$, $p = 0.001$), procurement practices ($\beta = 0.189$, $p = 0.005$), and human resource activities ($\beta = 0.164$, $p = 0.039$). The multiple regression equation was therefore expressed as: $\text{Performance} = 0.412 + 0.203(\text{Procurement Practices}) + 0.276(\text{Technology Adoption}) + 0.158(\text{Human Resource Activities}) + 0.241(\text{Financial Services})$.

Since the p-values for all four independent variables were below the 0.05 significance threshold, all four null hypotheses were rejected. The null hypothesis that procurement practices had no significant influence on the performance of fruit processing firms (H01) was rejected ($\beta = 0.189$, $p = 0.005$). The null hypothesis that technology adoption had no significant influence on performance (H02) was rejected ($\beta = 0.298$, $p = 0.000$). The null hypothesis that human resource activities had no significant influence on performance (H03) was rejected ($\beta = 0.164$, $p = 0.039$). The null hypothesis that financial services had no significant influence on performance (H04) was rejected ($\beta = 0.261$, $p = 0.001$). Table 6.10 summarizes the hypothesis testing results.

Table 6.10 Summary of Hypothesis Testing Results

Hypothesis	Beta (β)	Sig.	Decision
H01: Procurement practices had no significant influence on firm performance.	.189	.005	Rejected
H02: Technology adoption had no significant influence on firm performance.	.298	.000	Rejected
H03: Human resource activities had no significant influence on firm performance.	.164	.039	Rejected
H04: Financial services had no significant influence on firm performance.	.261	.001	Rejected

Note. Research Data (2026).

These findings confirmed that value chain management support activities, encompassing procurement, technology adoption, human resource activities, and financial services, jointly and significantly contributed to improved performance of fruit processing firms in Nairobi City County. The results were consistent with Transaction Cost Economics Theory, Diffusion of Innovations Theory, Human Capital Theory, and Dynamic Capabilities Theory, which jointly predicted that firms that optimized sourcing decisions, adopted appropriate technologies, invested in human capital, and built resilient financial infrastructure would achieve superior and sustained performance outcomes (Ochieng & Were, 2023; Rahman & Akter, 2023; Kamau & Were, 2022; Ochieng & Mutua, 2022).

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

Procurement Practices and Performance of Fruit Processing Firms

The first objective of the study was to assess the influence of procurement practices on the performance of fruit processing firms. Descriptive analysis revealed that respondents agreed with statements relating to structured procurement processes, supplier selection, planned input acquisition, strategic equipment procurement, and cross-departmental collaboration, with an aggregate mean of 3.77. Pearson correlation results showed a significant positive relationship between procurement practices and firm performance ($r = 0.647$, $p < 0.01$). In the multivariate model, procurement practices maintained a significant positive influence on performance ($\beta = 0.189$, $p = 0.005$), and the null hypothesis (H01) was rejected. These findings were consistent with

Kioko and Mburu (2023) and Odhiambo and Wainaina (2022), and were theoretically grounded in Transaction Cost Economics Theory.

Technology Adoption and Performance of Fruit Processing Firms

The second objective examined the influence of technology adoption on firm performance. Descriptive analysis revealed the highest aggregate mean among the four independent variables (Mean = 3.83). Pearson correlation results indicated the strongest relationship among all study variables between technology adoption and firm performance ($r = 0.702$, $p < 0.01$). In the multivariate model, technology adoption remained the strongest predictor of performance ($\beta = 0.298$, $p < 0.001$), and the null hypothesis (H02) was rejected. These findings corroborated Muli, Nyamwange and Karanja (2022) and were theoretically grounded in the Diffusion of Innovations Theory.

Human Resource Activities and Performance of Fruit Processing Firms

The third objective examined the influence of human resource activities on firm performance. Descriptive analysis revealed the lowest aggregate mean among the four independent variables (Mean = 3.67). Pearson correlation results demonstrated a significant positive relationship between human resource activities and firm performance ($r = 0.598$, $p < 0.01$). In the multivariate model, human resource activities maintained a significant positive influence on performance ($\beta = 0.164$, $p = 0.039$), and the null hypothesis (H03) was rejected. These findings were aligned with Nzube and Bundi (2023) and were theoretically grounded in Human Capital Theory.

Financial Services and Performance of Fruit Processing Firms

The fourth objective examined the influence of financial services on firm performance. Descriptive analysis revealed an aggregate mean of 3.85, the second highest among the independent variables. Pearson correlation results showed a strong positive relationship between financial services and firm performance ($r = 0.681$, $p < 0.01$). In the multivariate model, financial services remained the second strongest predictor of performance ($\beta = 0.261$, $p = 0.001$), and the null hypothesis (H04) was rejected. These findings aligned with the Kenya Bankers Association (2023) and FSD Kenya (2023), and were theoretically anchored in Dynamic Capabilities Theory.

Conclusion

Based on the findings of this study, procurement practices had a positive and statistically significant influence on the performance of fruit processing firms. The study concluded that firms that structured their procurement processes, systematically selected and managed suppliers, and fostered collaboration between procurement and other operational departments achieved better performance outcomes.

The study also concluded that technology adoption had the strongest positive and statistically significant influence on the performance of fruit processing firms in Nairobi City County, Kenya.

Firms that modernized core value chain functions, automated processes, integrated ICT systems, and trained employees on new technologies achieved the greatest performance improvements.

Further, the study concluded that human resource activities had a positive and statistically significant, though comparatively more modest, influence on firm performance, indicating room for further development of human resource management functions within the sector. Financial services were found to have a strong, positive, and statistically significant influence on firm performance, emerging as the second most influential predictor after technology adoption.

Overall, the study concluded that value chain management support activities, encompassing procurement practices, technology adoption, human resource activities, and financial services, collectively and significantly influenced the performance of fruit processing firms in Nairobi City County, Kenya. The combined model explained 61.2% of the variance in firm performance, underscoring value chain management support activities as a critical strategic lever for enhancing performance in the fruit processing sector.

Recommendations

Based on the findings, the study makes the following recommendations:

- i. The Government of Kenya, through the Ministry of Investments, Trade, and Industry, should formulate and implement policies that incentivize fruit processing firms to invest in value chain management support activities in order to attain the much needed performance.
- ii. Given that technology adoption emerged as the most impactful support activity, management should prioritize investment in process automation, ICT integration, and cybersecurity, while ensuring that employees receive adequate and continuous training.
- iii. Fiscal incentives such as tax rebates and subsidized financing should be established to encourage acquisition of process automation systems, ICT infrastructure, and cybersecurity solutions
- iv. Firms should strengthen financial management by diversifying access to credit, adopting efficient digital payment systems, and expanding insurance coverage.
- v. Rigorous procurement criteria on input sourcing and supplier selection should be formulated, adopted and implemented by firms in fruit processing Industry.
- vi. Firms should invest more deliberately in research and development on matters fruit processing
- vii. Firms should invest in performance-linked recruitment and selection systems.

Suggestions for Further Research

Future studies should investigate the moderating role of firm size and ownership structure on the relationship between value chain management support activities and the performance of fruit processing firms, as the current study did not formally test these contextual factors. Research

should also extend the scope of the current study to other counties in Kenya and to other agro-processing subsectors, such as dairy, grain, and horticultural processing, to enable broader generalization of the findings. Future studies could explore the mediating mechanisms through which value chain management support activities influence firm performance, and longitudinal studies tracking firm performance before and after specific value chain interventions would provide stronger causal evidence for the relationships established in this study.

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