Effect of Activity Based Costing on Financial Performance Sugar Companies in Kenya: The Moderating Role of Firm Size

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ABSTRACT

In recent competitive environment, activity-based costing in relation to profitability in manufacturing firms has proved it usefulness in the field of production particularly where management of cost is key. This study explored the effect of activity-based costing on financial performance of sugar companies in Kenya and determined the moderating effect of firm size on the relationship of activity-based costing and financial performance of sugar companies in Kenya. The study was anchored on theory of constraints and modern portfolio theory. Similarly, the research design applied on this study was longitudinal while census method was utilized in the study to incorporate all sugar companies in Kenya. Unit of analysis were 12 sugar companies in Kenya while unit of observation were the audited financial statements and annual reports of sugar firms during the period of 11years from 2014 to 2024. Secondary data were collected and analysed using random effect model and hierarchical regression model with help of STATA statistical software. Further, the results of the study was presented using central tendency and inferential statistics on tables and graphs The findings of the study revealed that activity base costing has a negative statistically significant effect on financial performance of sugar companies in Kenya (β = -0.0286, P= 0.002). Likewise, it was established that firm size has no statistically significant moderating effect on the relationship between activity-based costing and financial performance of sugar companies in Kenya (P= 0.806). This study concluded that activity-based costing reduces financial performance of sugar companies in Kenya while firm size to very small extent affect the relationship between activity-based costing and financial performance of sugar companies in Kenya. The study also recommended that Sugar firms should integrate activity-based costing technique with other cost management tools in order to improve financial performance. Additionally, the study also recommended that future studies should consider using other financial performance indicators to established why the study could yield the same results.

Key Words: Activity-based Costing, Financial Performance, Firm Size

INTRODUCTION

Background of the Study

Activity based costing is an important analysis of cost information for financial decision making. Thus, it connects costing to return on asset of a firm. Nevertheless, statistics show that manufacturing firms continue to face challenges. This issues have led to low profits and unprecedented overall slow growth in return on asset (Arithi, 2014).

Financial performance is an effective way that companies use to manage their assets during a period of time (Rudianto, 2013). According to Anabel and Hideyat, (2025), financial performance is an indicator used by companies to determine their amount of profit earned over certain period. According to Hashmi et al, (2020), larger firms have capacity to attract the trust of investors more than small firms. High trust from investors implies that they will invest more in the market which raises the market value, which translate to high profitability

LITERATURE REVIEW

Theory of constraints

This theory was initiated in 1980 by Dr. Eliyahu. M. Goldratt is a holder of Doctorate degree in physics and later embraced by other scientists. TOC is possibly most highly developed philosophy of operations management which exist. Its importance has been largely approved by many scholars. Comprehensiveness needed in organizations has made organizations which are smaller to be more successful when adopting theory of constraints compared to large organization. Theory of constraints supports activity-based costing by identifying the limitations affecting activities in production process.

Modern Portfolio Theory

MPT was proposed in 1952 by Harry Markowitz who is highly esteemed for his contribution in the area of financial economics and corporate finance theory. His original work formed the basis of what is currently famous as the modern portfolio theory. The background of this theory was eventually developed by Markowitz's fellow co-winner of the Nobel prize (Mangram, 2013). This theory uses mathematical methods to prove that investors are able to maximise their returns in the midst of particular level of risk by investment diversification (Mittal,2022).

Modern portfolio theory has remained as a back borne in accounting, finance and commerce field of recent (Financial Modelling Agency, 2006). This theory underpins financial performance because it provides a framework on how investors can use risks to deliver returns in an organization. Financial performance indicator in this study is return on asset hence this model stands to supply an organization with investment decision that minimises available resources in terms of asset in order to maximise returns.

Sakinah et al, (2025) conducted a study on the effect of activity-based costing on profitability and moderating variable management information quality. The study applied a systematic literature review approach to indexed articles by Scopus Q1 -Q4 for the year of study 2010 -2015. Secondary data was collected from 76 articles from different continents which included 28 articles from Europe, 21 articles from America, 24 articles from Asia and 3 articles from Africa.

This were the articles published during the years of study 2010 to 2015. The findings of the study revealed that 76 articles of literature review indicated that activity-based costing has a positive statistically significant effect on profitability of the company. The study concluded that the system of activity-based costing is capable of generating cost information which are acquired by use of real identification and consumption of resources. This is able to assist in operation efficiency improvement.

Statement of the Problem

Public owned sugar companies have continued to experience high level of indebtedness which has affected their financial performance. As a consequence, this has made it difficult for this firms to qualify for fresh funds from financial institutions. Additionally, severe cash flow problems have been experienced by sugar companies making it difficult for them to meet their day-to-day expenses and capital investment needs (Ministry of Agriculture, 2023).

In 2025, the government of Kenya finalized a lease agreements for 30 years for Sony sugar, Chemelil sugar, Nzoia sugar and Muhoroni sugar which are among the major public sugar companies owned by the government. This firms were leased to private operators of sugar firms in order to revive the sugar sector which has been struggling for long (Angela, 2026). Further, private sugar companies are struggling with high cost of production which have drastically affected their profitability level (Nekesa, et al, 2024) This study therefore sought to determine the effect of budgetary control on financial performance of sugar companies in Kenya. In response to the information above, this study sought to establish the effect of activity-based costing on financial performance of sugar companies in Kenya.

Objectives of the study

- To evaluate the effect of activity-based costing on financial performance of sugar companies in Kenya.
- To assess the moderating effect of firm size on the relationship between activity-based costing and financial performance of sugar companies in Kenya.

METHODOLOGY

Research Design

Current study utilized longitudinal research design which assisted in defining how data collection process was conducted (Ludlow et al, 2021).

Target Population

The unit of analysis for this study was all 12 sugar companies in Kenya comprising of 5 public owned firms and 7 private sugar companies. Similarly, the study collected secondary data from audited financial statements of the sampled sugar companies.

Sampling Technique and Sample Size

The study employed census method which incorporated all 12 sugar companies in Kenya. This implied that financial statements for secondary data were acquired from the records of all sugar firms.

Data Collection Instrument and procedure

The study collected secondary data using secondary data schedule which consisted of activity-based costing metrics (indirect cost and operational costs) and return on asset (indirect cost and total asset). This metrics were observed for a period of 11years (2014 to 2024) from financial statements of the 12 sampled sugar companies.

Data Analysis

Collected data was recorded on excel sheet and coded then transformed using inverse hyperbolic sine before importing it to STATA software. The next step was data cleaning which involved identifying missing value and repeated metrics. Additionally, cleaned data was subjected to diagnostic test the analysed using random effect estimator and hierarchical regression model.

Data Presentation

Central tendency was employed with tables to present the results of the study. The tables consisted of mean, standard deviation, minimum and maximum for descriptive statistics while coefficients, standard error and p-value presented the hypothesis results.

RESULTS

Descriptive Statistic for Activity Based Costing

Mean, Standard Deviation, Minimum and Maximum for Activity Based Costing Technique

Variable	Mean	Standard Error	Minimum	Maximum
Activity Based Costing	1.1126	1.7764	0.1734	18.7586

The findings of the study indicated that activity-based costing scored a mean of 1.1126 suggesting that activity-based costing average values were low. Similarly, standard deviation of 1.7764 indicated that variation of values in the data set is narrow. Further, minimum (0.1734) and maximum (18.7586) showed that activity-based costing reported both extreme low and high values in the data set.

Descriptive Statistic for Return on Asset

Mean, Standard Deviation, Minimum and Maximum for Return on Asset

Variable	Mean	Standard Deviation	Minimum	Maximum
Return on Asset	0.1397	0.5004	-1.7408	1.7810

The study results revealed that return on asset reported a mean of 0.1397 implying that on average the value of this variable were low in the data set. Likewise, standard deviation of 0.5004 means that the variability of the values in the data set is very narrow. The minimum (-1.708) and maximum (1.7810) showed that the values recorded in the data set were extremely low.

Descriptive Statistic for firm Size

Mean, Standard Deviation, Minimum and Maximum for Firm Size

Variable	Mean	Standard Deviation	Minimum	Maximum
Firm Size	15.3207	2.7681	9.0983	19.0834

According to the results of the study, firm size recorded a mean of 15.3207, suggesting that the values of firm size were extremely high in the data set. On the other hand, standard deviation of 2.7681showed that the variation of the values in the data set averagely narrow. Additionally, the minimum (9.0983) and maximum (19.0983) indicated that the values recorded ranged from high to extremely high.

Serial Correlation Test

Results for Wooldridge Test

Test	Value
F(1,11)	26.629
Pro >F	0.0003

H_0: No first order autocorrelation

H_1: First order autocorrelation exists

This study adopted Wooldridge test to determine whether there was any correlation on standard error. The results revealed that first order serial correlation was present (F (1,11) = 26.629, P = 0.0003) therefore the null hypothesis which postulates that there is no first order autocorrelation. was rejected. Consequently, this assumption was violated.

Prais-Winsten Regression, Correlated Panels Corrected Standard Errors (PCSEs) Results

Variable	**Coefficient**	**PCSE Standard Error**	**P -value**
Activity Based Costing	-0.0072	0.0158	0.648
Constant	-0.1192	0.2667	0.655
	Model Statistics		
Wald χ^2 (6)	16.71		
Prob > χ^2	0.0104		
R – squared (R^2)	0.2143		

In order to address the issue, panel- corrected standard error technique was utilised to acquire a robust standard error. Wald χ^2=16.71, P=0.0104 indicate that the model was statistically significant suggesting that activity based costing affect financial performance. On the other hand, R^2 = 0.2143 shows that 21.43% of return on asset is explained by cost management techniques. Under panel corrected standard error, activity-based costing scored a coefficient value of (β= -0.0072, P=0.648) which revealed that activity-based costing and return on asset had a negative and statistically insignificant relationship.

Heteroscedasticity Test

Results for Modified Wald Test for GroupWise heteroscedasticity

Statistical Test	**Value**
Chi-square -χ^2 (12)	16754.81
P – value	0.0000

This assumption was investigated using modified Wald test for GroupWise heteroscedasticity The results revealed that the test scored (χ^2 (12) = 16754.81, P= 0.0000) which is below 0.05 significance level and therefore null hypothesis was rejected. This suggests that heteroscedasticity is present across the sampled firms and that residual variances differ across the firms. on asset. On the other hand, activity-based costing scored a coefficient value of (β= -0.0072, P=0.648) which revealed that activity-based costing and return on asset had a negative and statistically insignificant relationship.

Model Summary for Panel-Corrected Standard Error

Variable	**Coefficient**	**PCSE Standard Error**	**P -value**
Activity Based Costing	-0.0072	0.0158	0.648
Firm Size	0.0187	0.1133	0.098

Constant	-0.1192	0.2667	0.655
	Model Statistics		
Wald χ^2 (6)	16.71		
Prob > χ^2	0.0104		

Heteroscedasticity assumption violation was addressed by utilizing Panel–Corrected Standard Error to adjust standard error in order to attain reliable inference.

Wald χ^2=16.71, P=0.0104 indicate that the model was statistically significant suggesting that activity based costing and firm size jointly affect financial performance. On the other hand, R^2 = 0.2143 shows that 21.43% of return on asset is explained by activity based costing.

Hausman Test

This test was done to determine which model between fixed effect and random effect estimators are acceptable for analysis.

Results for Fixed Effect versus Random Effect Model for Activity Based Costing Technique

Variable	**(b)**	**(B)**	**(b –B)**
	Fixed Effect	**Random Effect**	**Difference**
Activity Based Costing	-0.0276	0.0010	0.0030

H_0: Difference in coefficient is not systematic, χ^2 (1) = 0.13: Prob> χ^2 = 0.7175 Hausman test result observed that P=0.7175 is greater than significant level of 0.05 indicating that you fail to reject the null hypothesis which postulates that the difference in coefficient is not systematic. This study therefore preferred random effect estimator over fixed effect model in testing the effect of activity-based costing on return on asset.

Hypothesis Testing

The first objective was to evaluate the effect of activity-based costing on financial performance of sugar companies in Kenya. Random effect model was used to test the hypothesis one.

Regression Results for Activity Based Costing and Return on Asset

Variable	**Coefficient**	**Standard Error**	**P –value**
Activity Based Costing	-0.0286	0.0093	0.002
Constant	0.1716	0.1069	0.108
	Model Statistics		
Wald χ^2 (1)	9.57		

Prob > χ^2	0.0020	
R – squared (R^2)	0.0178	

Regression result exposed that activity-based costing has a negative relationship with return on asset (β = -0.0286). Similarly, the p-value of (P = 0.002) indicated that activity-based costing has a statistically significant effect on return on asset while (Wald χ^2 (1) = 9.57, P = 0.002) confirmed that the model was statistically significant. Additionally, (R^2 = 0.0178) implied that 1.78% of the variation in return on asset is accounted for by activity-based costing while the remaining 98.22% is accounted for by other factors outside the model.

The model was fitted as:

$Y_{it} = 0.1716 - 0.0286X_{it} + \varepsilon_{it}$

Hierarchical Regression Results

The second objective is to access the moderating effect of firm characteristics on the relationship between activity-based costing and financial performance.

Step 1: (M=0)

Variable	**Coefficient**	**Standard Error**	**t-statistic**	**p-value**
Activity Based Costing	-0.0376	0.0245	-1.54	0.127
Constant	0.1816	0.0512	3.55	0.001
Goodness of Fit		R^2 = 0.0718	Adjusted R^2= 0.0103	
		F = 2.36	Prob (F) = 0.1268	

Note: P<0.05 are the confidence level; Dependent Variable: ROA

The first step was conducted using regression analysis to examine the relationship between activity-based costing and return on asset in the absence of the moderator (firm size). The study results revealed activity-based costing scored a beta coefficient of -0.0376 suggesting that there is a negative relationship between activity-based costing and return on asset.

The p-value of 0.127 showed that there is no statistically significant effect of activity base costing on return on asset. The model obtained an R-squared of 0.0718 which implied that the model accounted for 7.18% of the variation in return on asset.

$Y_{it} = 0.1816 – 0.0376X_{it} + \varepsilon_{it}$

Step 2: = (+M)

Variable	**Coefficient**	**Standard Error**	**t-statistic**	**p-value**
Activity Based Costing	-0.3826	0.0245	-1.56	0.121
Firm size	0.0153	0.0157	0.98	0.331
Constant	-0.0527	0.2455	-0.21	0.830

Goodness of Fit		$R^2 = 0.0250$ F = 1.66	Adjusted R^2= 0.0099 Prob (F) = 0.1949	

Note: P<0.05 are the confidence level; Dependent Variable: ROA

The second step performed regression analysis with the presence of moderator (firm size). The result of the study showed that activity-based costing.

Step 2: = (+M)

Variable	**Coefficient**	**Standard Error**	**t-statistic**	**p-value**
Budgetary Control	0.0047812	0.0024978	1.91	0.059
Finlev	0.00969886	0.0125975	-0.77	0.444
Constant	0.109283	0.344358	3.17	0.002
Goodness of Fit		$R^2 = 0.0518$ F = 2.02	Adjusted R^2= 0.0262 Prob (F) = 0.1397	

Note: P<0.05 are the confidence level; Dependent Variable: ROA

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