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Abstract

Purpose: Circular economy (CE) strategies are increasingly promoted as pathways to improved firm performance, yet evidence on their financial consequences in Kenyan manufacturing remains limited. This study examined the relationship between circular economy strategies (reusing materials, recycling practices and the use of sustainable materials) and the financial performance of East African Breweries Limited (EABL), Kenya.

Methodology: A correlational research design within a quantitative approach was adopted, and data were collected with a structured questionnaire at a single point in time. A sample of 316 respondents was drawn from a target population of 1,500 EABL employees in six departments (Sustainability, Resource Management, Finance, Operations, Marketing and Human Resources) using the Taro Yamane formula, and respondents were selected purposively. Financial performance was measured through employees' perceptions of the firm's net profit margin, return on assets and revenue growth rate rather than through audited financial statements, which report firm-wide figures that cannot be attributed to individual circular economy practices in a single-firm study; this reliance on perceptions is acknowledged as a limitation. Data were analysed in SPSS Version 27 using descriptive statistics, Pearson correlation, simple linear regression (one model for each specific objective) and multiple linear regression. Cronbach's alpha exceeded 0.79 for each construct.

Findings: In the simple linear regressions, each strategy had a positive and statistically significant relationship with financial performance: reusing materials ($r = 0.568$, $R^2 = 0.323$, $p < 0.001$), recycling practices ($r = 0.619$, $R^2 = 0.383$, $p < 0.001$) and sustainable materials ($r = 0.650$, $R^2 = 0.423$, $p < 0.001$). In the multiple regression model, the three strategies jointly explained 52.0% of the variance in financial performance ($R^2 = 0.520$, adjusted $R^2 = 0.516$; $F(3, 312) = 112.842$, $p < 0.001$). Sustainable materials had the largest standardised coefficient ($\beta = 0.389$, $p < 0.001$), followed by recycling practices ($\beta = 0.265$, $p < 0.001$) and reusing materials ($\beta = 0.182$, $p < 0.001$). Because the design is correlational and the data were collected at one point in time, the results show statistical relationships but not causation.

Unique Contribution to Theory, Practice and Policy: The study concludes that employees associate all three strategies with better financial performance at EABL, with sustainable materials showing the strongest relationship. It recommends that EABL measure the costs and returns of its circular economy practices in its management accounts, and that future studies use longitudinal designs and audited financial data.

Keywords: *Circular Economy, Financial Performance, Reusing Materials, Recycling Practices, Sustainable Materials*

JEL Codes: *L25, L66, M14, Q53, Q56, O55*

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INTRODUCTION

Businesses are embracing sustainability to remain competitive amid rising resource costs and tighter environmental regulation. The circular economy (CE), which keeps materials in productive use for as long as possible and treats waste as a resource, has become a prominent model for pursuing this goal (World Economic Forum, 2023).

In Kenya, East African Breweries Limited (EABL) is leading the way by incorporating circular principles such as water recovery systems, renewable energy and eco-friendly packaging (EABL, 2023). Most existing studies, however, focus on Europe and Asia, leaving limited evidence from Kenya (Kirchherr, 2022). This study examines how three such strategies relate to financial performance at EABL.

Statement of the Problem

Adoption of circular principles among major Kenyan manufacturers remains at an early stage, and evidence on its financial implications is limited (Aming'a et al., 2025). At EABL, virgin materials constitute approximately 70 per cent of total packaging usage (Cytonn Investments, 2023), yet the financial returns of specific circular practices remain empirically unverified.

Although EABL publishes audited accounts, these report firm-wide annual results that are not disaggregated by circular economy practice and offer no variation across respondents in a single-firm study. Financial performance was therefore measured through knowledgeable employees' perceptions of net profit margin, return on assets and revenue growth rate.

Objectives of the Study

The general objective was to establish the relationship between circular economy strategies and the financial performance of EABL, Kenya. The specific objectives were:

1. To assess the relationship between reusing materials and the financial performance of EABL, Kenya.
2. To determine the relationship between recycling practices and the financial performance of EABL, Kenya.
3. To analyse the relationship between the use of sustainable materials and the financial performance of EABL, Kenya.

Research Hypotheses

H_{01}: There is no statistically significant relationship between reusing materials and the financial performance of EABL, Kenya.

H_{02}: There is no statistically significant relationship between recycling practices and the financial performance of EABL, Kenya.

H_{03}: There is no statistically significant relationship between the use of sustainable materials and the financial performance of EABL, Kenya.

Significance and Scope of the Study

The findings show EABL's management which strategies employees most strongly associate with financial performance. The study covered EABL's manufacturing and packaging processes in Kenya only.

Limitations of the Study

The study focused on a single firm and relied on self-reported perceptions, which are open to common-method bias (Podsakoff et al., 2003). Data were collected at one point in time, so causal inference was not possible. Only three circular practices were examined, respondents were selected purposively, and the questionnaire was not subjected to factor analysis. In addition, the recycling items were worded in terms of each practice's contribution to financial performance, which may have strengthened the observed relationship.

LITERATURE REVIEW

Theoretical Review

The study draws on four theoretical perspectives, summarised in Table 2.1. Two are established theories, while the Circular Economy Principles and the Supply Chain Management (SCM) optimisation perspective are conceptual frameworks used to organise the expected relationships.

Table 1: Summary of Theoretical Perspectives

Perspective	Core argument and critique	Relevance to the study
Circular Economy Principles (Stahel, 2016)	Products and materials should stay in productive use through reuse, repair, remanufacturing and recycling. The concept has been criticised as vague (Korhonen et al., 2018).	Specifies the expected cost, asset and revenue pathways from each strategy to financial performance.
Theory of Planned Behaviour (Ajzen, 1991)	Behaviour stems from intentions shaped by attitude, subjective norms and perceived behavioural control. It explains only part of behaviour (Sniehotta et al., 2014).	Explains the behavioural conditions under which employees carry out circular practices; it does not predict financial outcomes.
SCM Optimisation Perspective (Christopher, 2000)	Coordinating flows of materials, information and resources creates value. SCM is a field of thought and not a single formal theory (Burgess et al., 2006).	Identifies the cost-efficiency pathway through procurement, packaging, warehousing and reverse logistics.
Resource-Based View (Barney, 1991)	Valuable, rare, inimitable and non-substitutable resources underpin superior performance. The view has been criticised as tautological (Priem and Butler, 2001).	Frames reuse, recycling and sustainable materials as firm-specific capabilities that could yield financial advantage.

Source: Author (2026)

Empirical Review

Reusing Materials and Financial Performance

Ghisellini (2022) showed that every ten per cent increase in component reuse in European breweries could reduce production costs by four per cent. Accenture (2021) linked reuse among Kenyan breweries to 15 to 20 per cent reductions in capital expenditure on packaging, while brewers with Material Circularity Index scores above 60 per cent achieved net profit margins that were 5 to 7 per cent higher (Circle Economy, 2022). Kenyan manufacturers diverting more

than 70 per cent of their waste reported average annual savings of USD 1.2 million (National Environment Management Authority [NEMA], 2022).

Recycling Practice and Financial Performance

The World Bank (2023) reported that breweries recycling 1,000 tonnes or more per year experienced a 3 per cent increase in net profit margin and an 18 per cent decrease in raw material prices. EABL (2022) disclosed a 1.5 per cent improvement in return on assets from its internal recycling scheme, and European breweries using recycled content for 30 per cent of their packaging saved USD 500,000 per year (EEA, 2022). Zhu and Sarkis (2004) also associated green supply chain practices, including investment recovery, with improved economic performance among Chinese manufacturers.

Sustainable Materials and Financial Performance

McKinsey (2023) reported that lightweight packaging reduced logistics costs by 20 per cent and raised net profit margin by a further 2.5 per cent, while DHL (2023) found that collapsible crates can reduce transportation costs by 15 per cent. In Kenya, environmentally friendly packaging contributed to a 7 per cent annual increase in revenue from locally sold products (NielsenIQ, 2023). Russo and Fouts (1997) found that stronger environmental performance was associated with higher return on assets, particularly in high-growth industries.

Critique and Research Gap

Most quantified gains in this literature come from industry, consultancy and regulator reports, many rest on pilot projects or consumer intentions, and few isolate one initiative from others. Perceptual measures have been shown to correlate with objective measures where objective data are unavailable or not comparable (Dess and Robinson, 1984; Venkatraman and Ramanujam, 1986). No reviewed study has tested the combined and relative contributions of reusing materials, recycling practices and sustainable materials to financial performance in the Kenyan alcohol beverage sector. This study addresses that gap using primary survey data from EABL.

Conceptual Framework

The independent variables are reusing materials, recycling practices and the use of sustainable materials, and the dependent variable is financial performance. Each variable is measured by six questionnaire items, two for each indicator shown in Figure 1.

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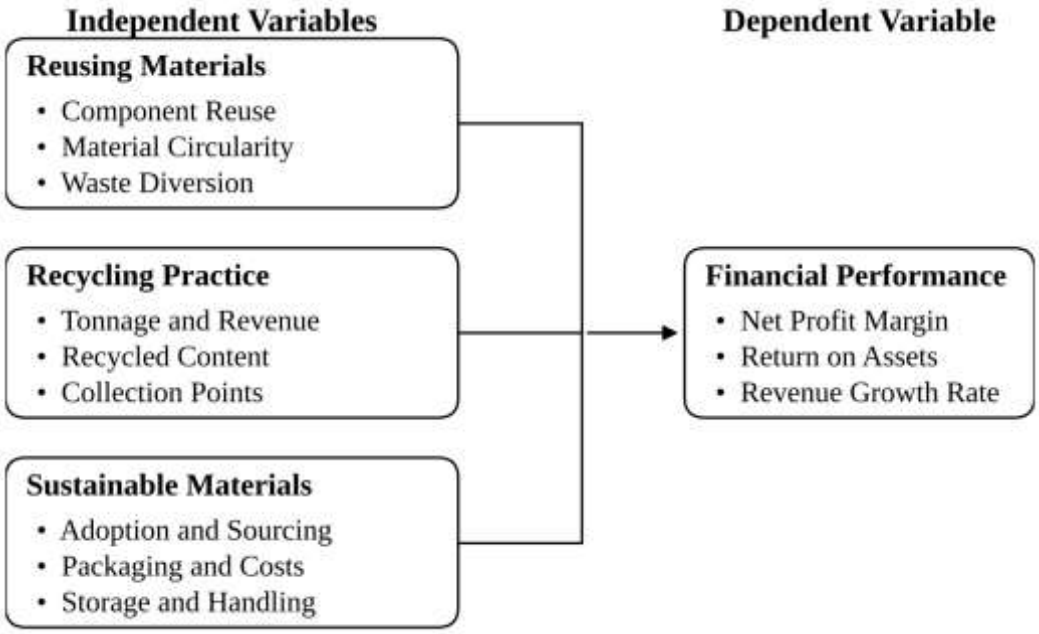


Figure 1: Conceptual Framework

Source: Author (2026)

METHODOLOGY

Research Design

The study adopted a correlational research design within a quantitative approach, because its purpose was to establish the direction and strength of relationships between the variables without manipulating them (Creswell and Plano Clark, 2023). Data were collected with a structured questionnaire at a single point in time.

Target Population, Sample Size and Sampling

The target population comprised approximately 1,500 EABL employees in the Sustainability, Resource Management, Finance, Operations, Marketing and Human Resources departments. The sample size was computed using the Yamane (1972) formula at a 0.05 margin of error:

$$n = N / (1 + N(e)^2) = 1,500 / (1 + 1,500(0.05)^2) = 1,500 / 4.75 = 316$$

The sample represents 21.1 per cent of the target population, above the 10 per cent threshold recommended by Kothari and Garg (2014). Purposive sampling was used to select employees with direct knowledge of circular practices and related financial matters. Because selection was non-random, the findings cannot be generalised statistically to the entire workforce.

Data Collection Instrument and Procedure

Sections B to E of the questionnaire each contained six items rated on a five-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree), as shown in Table 3.1. The questionnaire was administered electronically through official channels.

Table 2: Operationalisation and Measurement of Study Variables

Variable	Indicators	Section	Items
Reusing Materials (Independent)	Component reuse; material circularity; waste diversion	B	6
Recycling Practice (Independent)	Recycling tonnage and recovery revenue; recycled content and brand value; collection points and infrastructure	C	6
Sustainable Materials (Independent)	Adoption and responsible sourcing; sustainable packaging and cost–benefit evaluation; warehouse and storage handling	D	6
Financial Performance (Dependent)	Net profit margin; return on assets; revenue growth rate	E	6

Source: Author (2026), derived from the conceptual framework in Figure 2.1.

Pilot Test, Reliability and Validity

A pilot test was conducted among 32 EABL employees, about 10 per cent of the sample (Sekaran, 2015), and these participants were excluded from the main sample of 316. Reliability was assessed using Cronbach's alpha against the 0.70 threshold (Nunnally, 1978). Content validity was established through review by three experts and a Content Validity Index (Polit and Beck, 2006). Construct validity was examined through inter-item correlations; factor analysis was not conducted.

Data Analysis

Data were analysed in SPSS Version 27 using descriptive statistics, Pearson correlation, simple linear regression and multiple linear regression. One simple regression model ($Y = \alpha + \beta X + \varepsilon$) was fitted for each specific objective. The general objective was addressed through the model below, where Y = financial performance, X_1 = reusing materials, X_2 = recycling practice and X_3 = sustainable materials:

$$\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon}$$

Ethical Considerations

Authorisation was obtained from Zetech University (Ref. ZU/13/PGSTDLETTERS/16), the National Commission for Science, Technology and Innovation (Licence No. NACOSTI/P/25/4178603) and EABL management. Participation was voluntary, informed consent was documented, and responses were kept confidential.

FINDINGS AND DISCUSSION

Respondents' Profile

All 316 completed questionnaires were analysed. Table 1 shows that the largest groups of respondents held a bachelor's degree (47.5 per cent) and had worked at EABL for 5 to 10 years (42.1 per cent).

Table 3: Demographic Profile of Respondents (N = 316)

Characteristic	Category	Frequency	Per cent
Gender	Male	183	57.9
	Female	133	42.1
Education	College diploma	75	23.7
	Bachelor's degree	150	47.5
	Master's degree	91	28.8
Experience	Below 5 years	66	20.9
	5 to 10 years	133	42.1
	10 to 15 years	70	22.2
	Above 15 years	47	14.9

Source: Research Data, 2025

Reliability and Descriptive Statistics

Table 4: Reliability and Descriptive Statistics of Study Variables

Variable	Cronbach's Alpha	Mean	Std. Deviation	Range of item means
Reusing Materials	0.827	3.3987	0.83430	3.35 – 3.49
Recycling Practice	0.812	3.4225	0.85908	3.31 – 3.45
Sustainable Materials	0.799	3.3718	0.84761	3.34 – 3.41
Financial Performance	0.813	3.4383	0.85898	3.37 – 3.52

Source: Research Data, 2025; SPSS Output, 2026

All alpha values exceeded 0.70, and mean scores lay moderately above the neutral midpoint of 3.0. Respondents rated the frequent reuse of kegs and crates highest among the reuse items (M = 3.49) and collection points and recycling infrastructure highest among the recycling items (M = 3.45 each). The lowest-rated items were the sale or reprocessing of recovered materials (M = 3.31) and the adoption of sustainable packaging across a substantial share of products (M = 3.34).

Diagnostic Tests

Table 5 summarises the diagnostic tests. The Shapiro-Wilk results were significant, but W values close to 1, the Q-Q plots and the large sample indicate that normality was adequately met. Four unusual cases were retained because no data-entry errors were found.

Table 5: Summary of Diagnostic Test Results

Test	Criterion	Result	Decision
Normality	Q-Q points close to the diagonal; Shapiro-Wilk W close to 1	Points close to the diagonal; W = 0.965 to 0.975, p < 0.001	Adequately met
Autocorrelation	Durbin-Watson between 1.5 and 2.5	1.937	Met
Multicollinearity	VIF below 10; tolerance above 0.10; condition index below 30	VIF 1.699 to 2.040; tolerance 0.490 to 0.589; largest index 14.071	Met
Linearity	Residuals scattered around zero	No curved or systematic pattern	Met
Homoscedasticity	Even band of residuals	No funnel or fan shape	Met
Influential observations	Cook's distance below 1.0	Maximum = 0.194	Met
Outliers	Standardised residual within ±3; Mahalanobis below 16.27	Cases 16, 105, 276 and 277 beyond ±3; maximum Mahalanobis = 20.386	Retained

Source: SPSS Output, 2026

Correlation Analysis

Table 6: Pearson Correlation Matrix of the Study Variables

Variable	1	2	3	4
1. Reusing Materials	—			
2. Recycling Practice	0.648**	—		
3. Sustainable Materials	0.551**	0.607**	—	
4. Financial Performance	0.568**	0.619**	0.650**	—

N = 316. ** Correlation is significant at the 0.01 level (2-tailed). Source: SPSS Output, 2026

All three strategies were positively and significantly correlated with financial performance, with sustainable materials recording the highest coefficient (r = 0.650).

Simple Linear Regression Analysis

Each specific objective was tested through a separate simple regression model. Each R^2 in Table 7 exceeds the 0.26 benchmark for a large effect (Cohen, 1988).

Table 7: Simple Regression Model Summaries and ANOVA

Predictor	R	R^2	Adjusted R^2	Std. Error	F(1, 314)	Sig.
Reusing Materials	0.568	0.323	0.320	0.708	149.518	< 0.001
Recycling Practice	0.619	0.383	0.381	0.676	195.223	< 0.001
Sustainable Materials	0.650	0.423	0.421	0.654	229.998	< 0.001

Dependent Variable: Financial Performance. Source: SPSS Output, 2026

Table 8: Simple Regression Coefficients

Predictor	Constant	B	Std. Error	β	t	95% CI for B	Sig.
Reusing Materials	1.451	0.585	0.048	0.568	12.23	[0.491, 0.679]	< 0.001
Recycling Practice	1.319	0.619	0.044	0.619	13.97	[0.532, 0.706]	< 0.001
Sustainable Materials	1.216	0.659	0.043	0.650	15.17	[0.573, 0.744]	< 0.001

Dependent Variable: Financial Performance. Source: SPSS Output, 2026

Multiple Linear Regression Analysis

The three strategies jointly explained 52.0 per cent of the variance in financial performance ($R = 0.721$, $R^2 = 0.520$, adjusted $R^2 = 0.516$), and the model was statistically significant. The remaining 48.0 per cent is attributable to factors outside the model.

Table 9: ANOVA Results for Multiple Regression

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	120.950	3	40.317	112.842	< 0.001
Residual	111.472	312	0.357		
Total	**232.422**	**315**			

Dependent Variable: Financial Performance. Source: SPSS Output, 2026

Table 10: Multiple Regression Coefficients

Model	B	Std. Error	β	t	Sig.
(Constant)	0.566	0.161		3.504	< 0.001
Reusing Materials	0.187	0.055	0.182	3.404	< 0.001
Recycling Practice	0.265	0.056	0.265	4.738	< 0.001
Sustainable Materials	0.394	0.052	0.389	7.614	< 0.001

Dependent Variable: Financial Performance. Source: SPSS Output, 2026

The fitted equation is: Financial Performance = 0.566 + 0.187(Reusing Materials) + 0.265(Recycling Practice) + 0.394(Sustainable Materials).

Discussion

Reusing materials was positively related to financial performance ($R^2 = 0.323$), and the relationship remained significant after controlling for the other strategies ($\beta = 0.182$, $p < 0.001$). This is similar to Agyabeng-Mensah et al. (2020). Its smaller independent contribution reflects the overlap between reuse and recycling ($r = 0.648$).

Recycling practice also had a significant relationship with financial performance ($R^2 = 0.383$; $\beta = 0.265$, $p < 0.001$), which is consistent with Kipkorir and Chepkwony (2024) and De Giovanni and Vinzi (2022). Respondents rated collection points and infrastructure highest and the sale of recovered materials lowest, which suggests that the revenue-generating side of recycling is less visible at EABL.

Sustainable materials had the strongest relationship ($R^2 = 0.423$; $\beta = 0.389$, $p < 0.001$), in line with Flammer (2023), NielsenIQ (2023) and the SCM optimisation perspective (Heizer et al., 2020). This ranking does not show that sustainable materials yield the highest financial return, because the study did not measure the cost of adopting them.

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Hypothesis Testing

Table 11: Summary of Hypothesis Tests

Null	Predictor	B	t	F(1, 314)	R^2	β*	Decision
H_{01}	Reusing materials	0.585	12.23	149.52	0.323	0.182	Rejected
H_{02}	Recycling practices	0.619	13.97	195.22	0.383	0.265	Rejected
H_{03}	Sustainable materials	0.659	15.17	230.00	0.423	0.389	Rejected

All $p < 0.001$. * Standardised coefficient in the multiple regression model. Source: SPSS Output, 2026

All three null hypotheses were rejected at the 5 per cent level of significance. These results show statistically significant relationships and not causation.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

Reusing materials ($r = 0.568$; $R^2 = 0.323$; $\beta = 0.182$), recycling practices ($r = 0.619$; $R^2 = 0.383$; $\beta = 0.265$) and sustainable materials ($r = 0.650$; $R^2 = 0.423$; $\beta = 0.389$) each had a positive and statistically significant relationship with financial performance (all $p < 0.001$). Together, the strategies explained 52.0 per cent of the variance in financial performance.

Conclusion

The study concludes that employees at EABL associate higher implementation of reuse, recycling and sustainable materials with better financial performance. Sustainable materials showed the strongest relationship, recycling practices the second strongest and reusing materials the weakest independent relationship. Because the data are perceptions collected at a single point in time, these conclusions do not establish causation.

Recommendations

EABL should track the full cost of each reuse loop and report the net saving per returned unit in its management accounts. It should strengthen the commercial side of recycling by contracting buyers or reprocessors for recovered materials and reporting the resulting revenue separately. EABL should also extend sustainable packaging to a larger share of its product range and include supplier environmental credentials in purchasing decisions, after checking the related costs and revenue in its own records.

Policymakers should frame incentives under the Sustainable Waste Management Act, 2022 (Republic of Kenya, 2022) around measurable financial co-benefits as well as compliance.

Suggestions for Further Research

Future studies should test these relationships against audited financial statements over several years and use longitudinal designs to trace how they evolve. Comparative studies and a broader range of circular practices would further strengthen the evidence.

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