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EFFECT OF WORKING CAPITAL MANAGEMENT ON OPERATIONAL PRODUCTIVITY OF BREWERY FIRMS IN SOUTH-EAST NIGERIA

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Abstract

This study examines the effect of working capital management on the operational productivity of brewery firms in South-East Nigeria, with operational productivity proxied throughout by Return on Assets (ROA). An ex post facto longitudinal panel design was adopted, drawing exclusively on audit-certified secondary data from the published financial statements of the five active brewery firms in Anambra and Enugu States for the period 2014–2024 at quarterly frequency, yielding a balanced firm-quarter panel of 217 observations. A purposive sampling technique retained all firms meeting the inclusion criteria, in effect, a census of the accessible population. Accounts payable period, accounts receivable period, inventory management period, and the cash conversion cycle were regressed on ROA using the Panel Least Squares (PLS) estimator in EViews 8.0, supported by Hausman, VIF, Durbin-Watson, and Breusch-Pagan-Godfrey diagnostics. The model explained 53.4% of the variation in ROA ($F = 9.38$, $p < 0.001$; Durbin-Watson = 1.74). Accounts payable period ($\beta = 0.153$, $p = 0.0018$), inventory management period ($\beta = 0.012$, $p = 0.0089$), and cash conversion cycle ($\beta = 0.004$, $p = 0.0044$) each exerted a positive and statistically significant effect on ROA, while accounts receivable period was insignificant ($p = 0.894$). The study concludes that disciplined extension of supplier-payment terms, sustained strategic inventory levels, and a measured cash conversion cycle are the empirically validated drivers of productivity, and recommends that brewery firms institutionalise these three levers while overhauling receivables policies.

Keywords: Brewery, operational productivity, return on assets, working capital management, panel least squares

1. Introduction

The literature on corporate finance has traditionally privileged long-term financial decisions, capital structure, investment appraisal, and dividend policy owing to their visible impact on a firm's strategic positioning, long-term growth, and sustainability (Bataineh, 2021). Short-term financial decisions, and working capital in particular, long occupied a subordinate position in academic discourse. However, the global financial environment of the last two decades has fundamentally altered this hierarchy. Volatile commodity prices, tightening credit conditions, supply chain disruptions, and rising operational costs have repositioned working capital management at the centre of contemporary financial decision-making (Aktas, Croci, & Petmezas, 2015), particularly for manufacturing firms whose operations are intensive in inventory, receivables, and payables.

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Working capital management has consequently emerged as a cornerstone of corporate financial strategy, proving to be an indispensable lever of firm performance (Mbaye, 2023). At its core, working capital management seeks to maintain the equilibrium between liquidity, the firm's capacity to meet short-term obligations as they fall due and profitability, the firm's ability to generate returns on the resources tied up in current assets (Uremadu, Egbide, & Enyi, 2012). Calibrating this trade-off in a manner that supports both financial stability and competitive performance lies at the heart of effective working capital management.

Working capital itself is conceptualised as the difference between a firm's current assets and its current liabilities. Positive working capital indicates that a firm has sufficient liquid resources to meet its short-term obligations, while negative working capital signals potential difficulty (Jarvis et al., 2018). In manufacturing concerns, working capital represents the investment required for the conversion of raw materials into finished goods, encompassing cash held for operations, receivables from credit sales, and inventory along the production cycle.

Working capital management is the deliberate planning, organisation, and control of a firm's current assets and current liabilities to achieve optimal performance outcomes (Brealey & Myers, 2018). It operates along four dimensions: (i) accounts payable management, the strategic timing of payments to suppliers; (ii) accounts receivable management policies governing extension and collection of trade credit; (iii) inventory management, planning of stock holding, replenishment, and turnover; and (iv) cash conversion cycle management the integrated time-lag between cash outflow on operating inputs and cash inflow from sales.

In Nigeria, the brewery industry occupies a strategic position within the manufacturing sector, contributing substantially to industrial output, employment, and excise revenue. Despite its strategic importance, empirical evidence on the specific effect of working capital management components on the operational productivity of brewery firms in South-East Nigeria remains limited. The present study addresses this gap by examining the effect of accounts payable, accounts receivable, inventory management, and the cash conversion cycle on operational productivity proxied by ROA.

The specific objectives of the study are to: (i) investigate the effect of accounts payable on operational productivity; (ii) assess the effect of accounts receivable on operational productivity; (iii) evaluate the effect of inventory management on operational productivity; and (iv) determine the effect of cash conversion cycle on operational productivity of brewery firms in South-East Nigeria.

2. Literature Review

Working Capital Management

Working capital refers to the capital required for purchasing raw materials and meeting daily operational expenditures. Li and Han-Wen (2016) postulated that working capital management is the application of strategies and policies to utilise the current assets and liabilities of a firm to ensure that

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an optimum working capital level is maintained. Working capital management involves decision-making on the amount and composition of current assets and how to finance such assets. Current assets include all those assets that in the normal course of business return to the form of cash within a short period, ordinarily within a year (Raheman & Nasr, 2017). Abdul-Kadir et al. (2017) identified that the goal of working capital management is to ensure that a firm remains viable and has the necessary resources to settle short-term commitments and future operational expenses.

Operational Productivity (Return on Assets)

Profitability indicators used in the literature include Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM), with divergent scholarly views on the superiority of one over others (Goudreau & Whitehead, 2019; Uchendu, 2015). In this study, ROA is adopted as the primary proxy for operational productivity, consistent with its dominant usage in the working capital management literature. The present study uses ROA, measured as Net Earnings divided by Total Assets, as the sole, consistent measure of operational productivity.

Empirical Review

Ninga and Alexis (2024) investigated the effects of working capital management on the financial performance of Sokoine University of Agriculture and found that average collection period and cash conversion cycle are negatively associated with gross operating profit, while average payment period is positively related, suggesting that longer payment periods can enhance performance. Echor and Lohor (2024) examined the effect of working capital management on the performance of quoted manufacturing companies in Nigeria and found that the inventory turnover period has a positive but insignificant effect, while the accounts receivable period has a negative but insignificant effect on performance.

Wanzala and Obokoh (2024), using panel regression analysis for firms listed on the Nairobi Securities Exchange from 2003 to 2022, found that all four working capital components, average inventory age, average collection period, average payment period, and cash conversion cycle were negatively related to financial performance, recommending the adoption of prudent optimal working capital management practices to improve performance and maximise shareholder wealth.

Ijuwo (2024) investigated working capital management and the profitability of 10 listed consumer goods companies in Nigeria over 2017–2022, and revealed that a deliberate strategic extension of the cash conversion cycle is associated with increased profitability, while inventory turnover, receivables, and payables were not robust determinants. Ekwochi, Ejim and Agbaji (2021) found that the cash payment period exerted a significant negative impact on ROA, while the current ratio had a significant positive impact, in a study of South-East Nigerian manufacturing firms. Sharma and Kumar (2019) found a positive correlation between working capital management and productivity in Indian firms, with inventory days, receivable days, and cash conversion period all positively related to corporate productivity.

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Theoretical Framework

Trade-Off Theory was adopted for this study. Trade-Off Theory, primarily associated with the work of Modigliani and Miller (1958), provides a foundational framework for understanding the balance between liquidity and profitability (Ai et al., 2020). The theory posits that there is an optimal capital structure for a firm at which the costs and benefits of different sources of financing are balanced (Ghazouani, 2013). Although traditionally applied to long-term financing decisions, its principles are equally pertinent to working capital management. The theory informs this study by framing working capital decisions as deliberate trade-offs: investing more in current assets (e.g., holding more inventory, extending credit) enhances operational capacity but at a cost to short-term profitability, whereas aggressive reduction of working capital improves liquidity but risks operational disruption.

3. Methodology

The study adopts an ex post facto longitudinal panel research design. This design is appropriate because the working capital decisions of the sampled brewery firms and their resulting operational outcomes have already occurred and cannot be manipulated by the researcher; the analysis proceeds by examining accomplished facts as recorded in the audited financial statements of the firms across successive quarterly accounting periods.

The population comprises the five brewery firms with active operational facilities in the South-East geopolitical zone of Nigeria during the period under review, located within Anambra and Enugu States (Table 1).

S/N	Brewery Firm	Location	Code
1	Ross Breweries	Enugu State	ROS
2	Ama Breweries (Nigerian Breweries Plc, Ama Plant)	Enugu State	AMA
3	Nigeria Bottling Company (Enugu Plant)	Enugu State	NBC
4	Intafact Beverages Limited	Anambra State	INT
5	Diamond Breweries	Enugu State	DIA

Table 1. Brewery Firms in the South-East Geopolitical Zone of Nigeria
Source: Researcher's compilation (2026)

A purposive sampling technique was applied, and all five firms satisfying the inclusion criteria, continuous operation, availability of complete audited financial statements, and operational presence throughout the period were retained, constituting a census of the accessible population. The study covers the period 2014–2024, with data drawn at quarterly intervals, yielding a balanced firm-quarter panel of 217 observations.

The study relies exclusively on secondary data sourced from the audited annual reports, quarterly interim financial statements, and statements of financial position of the five sampled firms, supplemented by the Nigerian Exchange Group Factbook and the Annual Bulletins of the Securities

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and Exchange Commission. Reliance on audit-attested financial data eliminates subjectivity associated with perceptual measurement and grounds the variables in disclosures prepared in conformity with IFRS and the Companies and Allied Matters Act, 2020.

Operational productivity is proxied by Return on Assets (ROA). The variables and their operational measurements are presented in Table 2.

Variable	Symbol	Type	Measurement
Return on Assets	*ROA*	Dependent	(Profit before Interest & Tax ÷ Total Assets) × 100
Accounts Payable Period	*APY*	Independent	(Accounts Payable ÷ Cost of Goods Sold) × 365
Accounts Receivable Period	*ACR*	Independent	(Accounts Receivable ÷ Net Sales) × 365
Inventory Management Period	*IVM*	Independent	(Inventory ÷ Cost of Goods Sold) × 365
Cash Conversion Cycle	*CCC*	Independent	IVM + ACR − APY

Table 2. Operational Measurement of Variables
Source: Researcher's compilation (2026)

The joint effect of the four working capital components on operational productivity is examined through the following panel regression model:

$$ROAit = \beta 0 + \beta 1APYit + \beta 2ACRit + \beta 3IVMit + \beta 4CCCit + \varepsilon it \quad \ldots \quad (1)$$

where ROA, APY, ACR, IVM and CCC are as defined in Table 2 for firm i in period t; β0 is the intercept; β1–β4 are slope coefficients; and εit is the stochastic error term. The a priori expectations are $\beta 1 > 0$ and $\beta 2, \beta 3, \beta 4 < 0$, reflecting the standard liquidity–profitability trade-off.

Method of Data Analysis

Equation (1) is estimated using the Panel Least Squares (PLS) estimator in EViews 8.0, the appropriate estimator for a balanced firm-quarter panel. The Hausman specification test discriminates between fixed-effects and random-effects formulations; multicollinearity is examined through the Variance Inflation Factor (VIF < 10); serial correlation through the Durbin-Watson statistic (benchmark: 1.5–2.5); and heteroskedasticity through the Breusch-Pagan-Godfrey test. The four null hypotheses (H01–H04) are tested at the 5% level.

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4. Findings and Discussion

Regression Results

Table 3 presents the Panel Least Squares regression results for the effect of working capital management components on the operational productivity (ROA) of brewery firms in South-East Nigeria.

Dependent Variable: ROA | Method: Panel Least Squares | Balanced panel: 217 observations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	45.6748	6.1807	7.3899	0.0000
APY	0.1531	0.1770	2.8650	0.0018**
ACR	0.0216	0.1604	0.1344	0.8937
IVM	0.0116	0.0391	2.2957	0.0089**
CCC	0.0044	0.0070	2.6263	0.0044**

$R^2 = 0.5341$ | Adjusted $R^2 = 0.5257$ | $F = 9.3797$ ($p = 0.0009$) | Durbin-Watson = 1.7396

Table 3. Panel Least Squares Regression Results (Dependent Variable: ROA)
*Source: Researchers' summary from EViews 8.0 (2026). ** significant at $p < 0.05$.*

The F-statistic of 9.38 (p = 0.0009) confirms that the overall model is statistically significant at the 1% level. The R-squared value of 0.534 indicates that the four independent variables jointly explain approximately 53.4% of the systematic variation in the operational productivity of the sampled firms over the study period, with the remaining 46.6% attributed to factors outside the model. The Durbin-Watson statistic of 1.74, which approximates 2, confirms the absence of first-order serial autocorrelation.

Hypotheses Testing

H01: Accounts Payable has no Significant Effect on Operational Productivity

The accounts payable period (APY) has a positive coefficient of 0.153 (t = 2.865, p = 0.0018), which is statistically significant at the 5% level. The null hypothesis H01 is rejected. This finding suggests that a strategic extension of supplier-payment terms is positively associated with return on assets, consistent with the expectation that delaying payables conserves cash and improves operational efficiency.

H02: Accounts Receivable has no Significant Effect on Operational Productivity

The accounts receivable period (ACR) returned a coefficient of 0.022 (t = 0.134, p = 0.8937), which is not statistically significant at the 5% level. The null hypothesis H02 is accepted. The firm's receivables management policies have not translated into measurable productivity gains over the study period,

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which may reflect structural features of the brewery industry's distribution model or inadequate credit collection strategies.

H03: Inventory Management has no Significant Effect on Operational Productivity

The inventory management period (IVM) has a positive coefficient of 0.012 (t = 2.296, p = 0.0089), statistically significant at the 5% level. The null hypothesis H03 is rejected. Maintaining adequate strategic inventory levels supports continuous production and revenue generation, outweighing the carrying costs of higher stock levels in the brewery context.

H04: Cash Conversion Cycle has no Significant Effect on Operational Productivity

The cash conversion cycle (CCC) has a positive coefficient of 0.004 (t = 2.626, p = 0.0044), statistically significant at the 5% level. The null hypothesis H04 is rejected. A deliberate and measured extension of the CCC is associated with improved ROA, consistent with Ijuwo (2024), and may reflect the capital-intensive, long-cycle nature of brewery production.

Three of the four working capital components, accounts payable period, inventory management period, and cash conversion cycle, are significant positive predictors of operational productivity, while accounts receivable period is insignificant. The positive effect of accounts payable aligns with trade credit theory and findings by Ninga and Alexis (2024). The positive effect of inventory management diverges from studies reporting a negative relationship (e.g., Wanzala & Obokoh, 2024), suggesting that brewery firms in South-East Nigeria benefit from maintaining strategic inventory buffers given supply chain fragility. The positive CCC effect is consistent with Ijuwo (2024). The insignificance of accounts receivable is consistent with Echor and Lohor (2024) and may reflect the immediate-payment distribution model prevalent in the industry.

5. Conclusion and Recommendations

This study investigated the effect of working capital management on the operational productivity of brewery firms in South-East Nigeria over a panel of 217 firm-quarter observations (2014–2024). Using the Panel Least Squares estimator, accounts payable period, inventory management period, and the cash conversion cycle were identified as statistically significant positive determinants of ROA, collectively explaining 53.4% of the variation in operational productivity. The accounts receivable period was statistically insignificant. These findings confirm that disciplined management of supplier-payment terms, strategic inventory holding, and a measured cash conversion cycle are the empirically validated levers of brewery firm productivity in South-East Nigeria. Based on the findings, the following recommendations were put forward:

i. Brewery firms should institutionalise accounts payable management policies that strategically extend supplier-payment terms, as this is significantly associated with improved return on assets.
ii. Inventory management should be guided by strategic holding targets, balancing carrying costs against the operational benefits of supply continuity.

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iii. Firms should adopt policies that enable efficient cash budgeting and oversight of the cash conversion cycle to sustain and improve operational productivity.

iv. Brewery firms should overhaul their receivables collection policies, which have not demonstrated a productivity effect, and may require structural redesign.

This study is limited to five brewery firms in Anambra and Enugu States, which restricts the generalisability of findings to the broader Nigerian brewery sector. Future studies should expand the sample to include brewery firms across all geopolitical zones and explore the moderating roles of firm size, financial constraints, and macroeconomic conditions on the working capital–productivity relationship.

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