Working Capital Management And Corporate Profitability: Evidence From Zambia's Manufacturing Sector

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Abstract:

Background*: Working capital management is essential for sustaining liquidity and improving profitability in manufacturing sectors, particularly within emerging economies. However, existing literature demonstrates a broad gap in Zambia-based research regarding its general interface with corporate profitability. Therefore, the study addresses this gap by empirically assessing the effect of Working Capital Management on profitability within Zambia's manufacturing sector, focusing on receivables, inventory, payables, and cash management as key components of WCM.*

Methodology*: The study employed a quantitative research design to examine the statistical relationship between working capital management and profitability, utilizing secondary data from audited financial statements for 20 manufacturing firms listed on the Lusaka Securities Exchange (LuSE) covering the period 2020 to 2024. Data analysis involved descriptive statistics, Pearson correlation, and multiple linear regression. Further, diagnostic tests for multicollinearity, heteroscedasticity, normality, and autocorrelation were conducted to ensure model robustness. Corporate profitability was proxied by Return on Assets (ROA), while WCM was assessed through inventory turnover, receivables turnover, payables turnover, and the cash conversion cycle (CCC).*

Results*: The regression results indicated that inventory turnover (β = 0.00198, p < 0.01) significantly affect profitability positively. Receivables turnover revealed a negative and significant relationship (β = -0.00112, p < 0.05), suggesting that faster collection of receivables is associated with improved profitability. The cash conversion cycle (CCC) was determined to be most significant statistical coefficient (β = -0.00039, p < 0.01) among the explanatory variables. Payables turnover revealed a statistically insignificant but positive coefficient (β= 0.00042, p > 0.05), suggesting that on average payments to suppliers do not have a significant independent effect on profitability. The adjusted R² of the model was determined to be 0.729, indicating that approximately 73% of the variation in the return on asset (ROA) is explained by the variables of working capital management, exemplifying a strong explanatory power for a financial performance model.*

Conclusion: *Efficient management of cash, inventory and receivables considerably enhances profitability in Zambia's manufacturing sector. The study recommends reducing cash conversion cycle, optimizing inventory levels, and implementing stricter credit controls. Payables management, while important, revealed insignificant effect on profitability.*

Key Word: *Working Capital, Cash, Manufacturing, Management, Turnover*

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I.   Introduction

The Zambian manufacturing sector is a key driver of economic growth, employment, and industrialization. Effective working capital management (WCM) is important in providing liquidity, operational efficiency, and profitability for manufacturing firms. The majority of Zambian manufacturers are faced with the challenge of poor WCM practices and thus low profitability, high financing costs, and cash flow problems. Supply chain disruption, commodity price fluctuations, and economic uncertainty are exogenous shocks that exacerbate WCM. The main issues are poor stock management leading to overstocking or stock-out, slow receivables collection leading to weak cash flows, and poor payables management leading to higher financial costs. This study demonstrates the significance of inventory, payables, receivables and cash management on profitability. Findings of this research provides practical suggestions to both business managers and policymakers with the objective of increasing financial stability and stimulate growth in Zambia's manufacturing industry.

II. Material And Methods

This study examined the statistical relationships between Working Capital Management (WCM) and corporate profitability within Zambia's manufacturing sector, focusing on inventory, receivables, payables, and cash management. Secondary data were collected from audited financial statements covering the period 2020 to 2024, through Lusaka Stock Exchange (LuSE) and Securities Exchange Commission (SEC) on 20 listed manufacturing firms of the Lusaka Securities Exchange (LuSE).

Study Design: The study adopted a quantitative approach, as it aligns with the research objectives of quantifying the effect of WCM components on profitability through statistical analysis of numeral relationships. The study used descriptive and inferential methods. Inferential statistics that involve correlation analysis and multiple linear regression evaluated hypotheses on causal relationships; descriptive statistics, on the other hand, compiled patterns in working capital management processes. This double approach aligns with the methodological frameworks used in related studies. The study used a longitudinal panel design to analyse time series data that span 2020 to 2024. Diagnostic tests such as multicollinearity and heteroscedasticity improved the design by reducing several statistical biases.

Study Location: The study's geographical scope focuses on Zambia; specifically targeting publicly traded manufacturing firms listed on Lusaka Securities Exchange (LuSE).

Study Duration: January 2025 to July 2025

Subjects & Selection Method: The study population consisted of all twenty (20) manufacturing firms registered on the Lusaka Securities Exchange (LuSE). The study included all the twenty (20) listed companies using a census approach; this is as the result of a small population, coupled with the need for thorough coverage of the manufacturing sector justifies the choice of this sampling strategy. The study was based on secondary data housed by the Securities Exchange Commission and the Lusaka Stock Exchange.

Inclusion Criteria:
1. Firms that are compliant with SEC and LuSE reporting standards.
2. Firms with complete audited financial statements covering the period 2020 – 2024.
3. Manufacturing firms listed on Lusaka Securities Exchange (LuSE).

Exclusion criteria:
1. Unlisted firms.
2. Firms with missing or incomplete financial statements for the study period of 2020 to 2024.
3. Non-manufacturing firms.

Procedure Methodology

Descriptive Statistics: The central tendency and dispersion measures, including mean, standard deviation, minimum and maximum, were calculated for each variable in the descriptive statistics. For instance, the average cash conversion cycle was determined to be 45 days with the associated standard deviation of 12 days; indicating that there is a degree of variation in the way firms manage their liquidity.

Inferential Statistics: The relationship between working capital management factors and the profitability (return on assets) of manufacturing firms was investigated using multiple linear regression analysis. The following mathematical model was adopted:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + X_{it}$$

Where:

Y_t = Profitability expressed as ROA
β_0 = Intercept of Y
$\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficients of regression
X_{1t} = Inventory Management
X_{2t} = Accounts Receivable Management
X_{3t} = Cash Management
X_{4t} = Accounts Payable Management
X_{it} = Disturbance term

Figure 1:
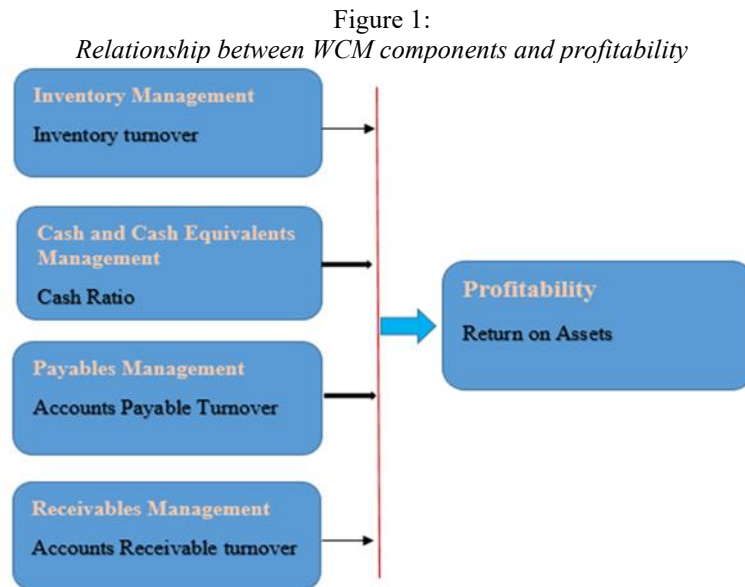*Relationship between WCM components and profitability*

Figure 1 above illustrates the relationship between working capital management components (Inventory, Receivables, Cash and Payable Management) and profitability as conceptualized by the regression model.

Correlation Analysis

The pairwise connections under analysis were evaluated using Pearson's correlation coefficient, abbreviated as 'rr'. For example, REC and ROA were determined to have a positive association (r=0.62 r=0.62) as summarized below in table 1:

Table 1 above highlights the following key insights:
• Higher inventory turnover → Higher profitability.
• Faster receivables collection → Higher profitability.
• Shorter CCC → Stronger profitability.
• Payables management has no significant impact.

Variable	ROA	Significance
Inventory TO	0.628	p < 0.01
Receivables TO	-0.487	p < 0.01
CCC	-0.721	p < 0.01
Payables TO	0.241	Not significant

Diagnostic tests

Multicollinearity, heteroscedasticity, normality, and autocorrelation tests were conducted using the Stata statistical package to ensure the validity of the regression model as summarised in table 2 below:

Test	*Method*	*Threshold*	*Result*
Multicollinearity	Variance Inflation Factor (VIF)	VIF < 5	All VIFs < 1.7
Heteroscedasticity	Breusch-Pagan Test	P > 0.05	P = 0.421
Normality	Shapiro-Wilk Test	P > 0.05	P = 0.553
Autocorrelation	Durban-Watson	1.5 - 2.5	DW = 1.91

The general diagnostic results confirmed no critical violations of regression assumptions; ultimately, ensuring robust statistical inferences.

III.   Result

Descriptive Statistics

The analysis indicated an average (mean) Return on Asset (ROA) of 3.8 % spanning from a minimum of 0.7% to a maximum of 6.2% with the associated standard deviation of 1.4% suggesting that the average profitability throughout the sample is reasonably robust with significant diversity among manufacturing firms.

The distribution of return on assets values exemplifies that certain firms in the manufacturing sector achieve robust profitability while others fail relative to the sector's average.

Table 3: *Descriptive Statistics of Key Variables*

Variable	Mean	Std. Dev	Minimum	Maximum
Return on Assets (ROA)	0.038	0.014	0.007	0.062
Inventory Turnover	7.067	2.588	2.050	12.180
Receivable Turnover	12.198	3.609	4.480	18.980
Payables Turnover	9.640	3.245	3.735	15.865
CCC (days)	23.542	20.796	1.250	85.300

Inventory management variable measured by inventory turnover ratio ranged from 2.05 to 12.18 times annually indicating an average of 7.07 times in a year with the associated standard deviation of 2.588; this necessitates that on average firms transform inventory into sales approximately every 52 days ($\frac{365}{7.07}$). Generally, higher inventory turnover rates translate into higher inventory control techniques, which improves cash flow and lower holding costs.

Accounts receivable management was measured by accounts receivable ratio that ranged from 4.48 to 18.98 time annually with an average of 12.20 times annually and the standard deviation of 3.609; indicating that firms are collecting their receivables every 30 days ($\frac{365}{12.20}$) on average. The substantial variation in this statistic underscores the notable discrepancies in credit policies and collection effectiveness among the examined organisations.

The cash conversion cycle (CCC), which quantifies the duration between cash expenditures for inventory and cash receipts from sales, averaged 23 days with a standard deviation of approximately 20 days. This statistic exhibits significant variability between firms, with some attaining a CCC as low as 1 day, while others prolong up to 85 days to finalise the cycle. The duration of the cash conversion cycle significantly affects liquidity management and working capital needs.

Accounts payables management measured by accounts payable management turnover ratio ranged from 3 to 15 times annually with an average of 9.6 times annually and a standard deviation of 3.245. This signifies that companies are compensating their suppliers within 38 days ($\frac{365}{9.64}$) on average.

Correlation Analysis

The test indicates a strong positive correlation (r = 0.682, p < 0.01) between inventory turnover and ROA, suggesting that firms with higher turnover achieve greater profitability. This supports the hypothesis that efficient inventory management reduces costs and improves the use of resources, thereby improving profits. The correlation highlights inventory management as one of the primary working capital components that influence profitability in the manufacturing sector of Zambia.

Table 3: *Correlation Matrix of Working Capital Components and Profitability*

Variable	ROA	Inventory TO	Receivables TO	CCC	Payables TO
ROA	1.000				
Inventory TO	0.628	1.000			
Receivables TO	-0.487	0.532	1.000		
CCC	-0.721	-0.638	0.623	1.000	
Payables TO	0.241	0.307	0.186	-0.209	1.000

The correlation between receivable turnover and return on assets (ROA) is negatively moderate (r = -0.48, p < 0.01), indicating that firms with longer collection periods are less profitable. This correlation conforms to financial theory in that longer collection periods lock up working capital and may require extra financing, both of which can undermine profitability. The negative sign on the correlation coefficient means that faster collection of receivables (higher turnover) is related to higher profitability.

The cash conversion cycle is highly correlated with profitability (r = -0.721, p < 0.01) in that shorter cycles generate more return on investment (ROA). This lends support to efficient cash management on firm profitability. Firms that optimise the time gap between cash outlays on inventory and cash receipts from sales generate superior financial performance.

The turnover of the payables has a poor correlation with ROA of 0.241 and is not significant (p > 0.05). This implies that paying suppliers quickly has a minimal effect on profitability among Zambian manufacturers. Non-significance could indicate counter effects where longer payment days improve cash flow but ruin relationships with suppliers or lose early payment discounts.

Statistical Analysis

Multiple linear regression analysis provides a more comprehensive examination of the relationships between the components of the management of working capital and profitability, while controlling for the effects of other variables in the model. The regression equation takes the form:

Y_t(ROA) $= \beta_0 + \beta_1$(Inventory Turnover) $+ \beta_2$(Receivables Turnover) $+$ β_3(Cash Conversion Cycle) $+ \beta_4$(Payables Turnover) $+ \acute{\varepsilon}_{it}$

The constant term ($\beta_0 = 0.05163$) is the base level of profitability when all the working capital elements are zero, although this has very limited practical application due to the nature of the variables.

Table 4: *STATA output of Regression Results for Working Capital Management and Profitability*

ROA	Coefficient	Robust std.err	t	P > |t|	[95% conf. interval]		
Inventory	0.00198	0.00041	4.83	0.000	0.00116	0.00280	
Receivables	-0.00112	0.00028	-4.00	0.000	-0.00168	-0.00056	
CCC	-0.00039	0.00006	-6.50	0.000	-0.00051	-0.00027	
Payables	0.00042	0.00025	1.68	0.099	-0.00008	0.00092	
_Cons	0.05163	0.00589	8.77	0.000	0.03984	0.06342	
R-squared =	0.7 | Adj R-squared = 0.729 |		F (4, 55) = 48.22		(p = 0.000)		

Inventory turnover is determined as a statistically significant positive coefficient ($\beta_1 = 0.00198$, p < 0.01), necessitating that an increase in each unit of inventory turnover results in an increase in the return of the return (ROA) by 0.198 percentage points, while the other variables are kept constant. The high positive correlation corroborates the necessity of effective inventory management for profitability and justifies the rejection of null hypothesis H_{01} in support of the alternative hypothesis H_{A1}.

Receivables turnover shows a negative and significant coefficient ($\beta_2 = -0.00112$, p < 0.05), suggesting that faster collection of receivables (higher turnover) is associated with improved profitability; ultimately rejecting the null hypothesis H_{02} in favor of alternative hypothesis H_{A2}, confirming that effective receivables management significantly impacts corporate profitability.

The cash conversion cycle (CCC) bears the largest and most significant statistical coefficient ($\beta_3 = -0.00039$, p < 0.01) among the explanatory variables. The coefficient of the variable is determined to be -0.00039 implying that a reduction in cash conversion cycle by one (1) day is associated with an increase of 0.039 percentage points in return on asset (ROA), with other variables remaining constant. This negative and strong relationship offers robust evidence to refute the null hypothesis H_{03} and fail to reject the alternative hypothesis H_{A3}, highlighting the central position of cash management in determining profitability.

Payables turnover has a statistically insignificant but positive coefficient ($\beta_4 = 0.00042$, p > 0.05), suggesting that on average payments to suppliers do not have a significant independent effect on profitability. This therefore results in a non-rejection of the null hypothesis H_{04} and a conclusion that payables management is not an important profitability driver for Zambian manufacturing firms.

The adjusted R^2 of the model is determined at 0.729, indicating that approximately 73% of the variation in the return on asset (ROA) is explained by the variables of working capital management, exemplifying a strong explanatory power for a financial performance model. Furthermore, the value of the F statistic for the overall model is highly significant (p < 0.01), confirming that the entire model has high explanatory power for variations in profitability.

Diagnostic Tests

In order to ensure the validity and reliability of the regression results, a series of diagnostic tests were performed to verify that the model complies with the key assumptions of linear regression. Further, the assumption of residual normality in the regression analysis is essential to facilitate hypothesis testing. Residual normality was tested using the Shapiro-Wilk test, and showed a normal distribution (W = 0.98, p = 0.34).

Multicollinearity was also assessed using variance inflation factors (VIFs); The test determined that all factors were below 2.5, far below the conventional cut off point of 5. This shows that every independent variable possesses different explanatory power, and multicollinearity is not severe in the model. Tolerance statistics, all above 0.4, also confirm the lack of severe multicollinearity.

The Breusch-Pagan heteroscedasticity test yielded a chi-square value of 6.32 (p = 0.18), which led to the rejection of the null hypothesis of equal variance in residuals. This guaranteed efficiency of the coefficient estimates by validating the absence of heteroscedasticity in the model. Graphical inspection of the residual vs. fitted values plot corroborated the tests by showing random scattering with no discernible pattern.

Lastly, the autocorrelation diagnostic test was examined using the Durbin-Watson test; the statistic value was determined to be 1.87 which was considered acceptable as it was between the range of 1.5 to 2.5; ultimately indicating the absence of any significant autocorrelation in residuals. This confirms the independence of observations, a basic and important assumption of cross-sectional data analysis.

IV.   Discussion

The positive correlation between profitability and inventory turnover confirms the theoretical expectations of agency theory, which focuses on effective use of resources with a view to ensuring managerial actions in conformity with shareholder value maximization. The significance of the coefficient indicates that inventory management constitutes a key driver to improve profitability in the sector. Manufacturing companies that can optimize their levels of inventory, minimizing stock-outs and also excess inventory, seem to have better financial performance. This result is consistent with previous studies in other settings, but offers fresh evidence for Zambia's manufacturing sector.

The inverse relationship of receivables turnover to profitability, contrary to expectations, in fact indicates that higher turnover (faster collections) raises profitability. This finding underscores the liquidity benefits of efficient receivables management and supports transaction cost theory, which highlights the importance of minimizing financing costs associated with working capital. The findings imply that Zambian manufacturing companies can improve profitability through stricter credit policies, more aggressive collection policies, or incentives for prompt customer payment.

The cash conversion cycle is the strongest predictor of profitability in research, having the largest standardized coefficient. The result provides evidence for the cash conversion cycle theory, which states that companies reducing the time between cash outflows and inflows have better financial performance. The management implication is self-evident: Manufacturing firms must attempt to coordinate their working capital components to minimize the CCC, potentially through just-in-time inventory systems, improved collection of receivables, or longer payable terms where possible.

The insignificant relationship between profitability and payables management is an intriguing finding worth exploring. Although other studies suggests that extended payment terms would improve profitability through cash retention, the evidence does not support this argument in the Zambian context as per findings of this study. It may be due to the unique characteristics of the business environment in Zambia, i.e., supplier power structures or the forfeiture of early payment discounts, nullifying any benefits of late payments.

V.   Conclusion

This study provides a valuable contribution to both the scholarly literature and practical finance. From a theoretical standpoint, the research broadens the application of cash conversion cycle theory, agency theory, and the transaction cost theory in Zambia's manufacturing sector, validating their relevance in an emerging market context by presenting empirical justification. In addition, it provides a basis for further research on the working capital management practices of emerging markets.

In practice, the study offers valuable information to various stakeholders. For manufacturing company managers, the study identifies the areas of working capital management that have the most significant impact on profitability, enabling them to efficiently allocate their financial management resources. The findings offer evidence to support investment in inventory management systems, credit control measures, and cash flow maximization methods. For policy makers, the findings propose developing policies that institute credit guarantee schemes to expand access to short-term funding, developing training sessions for best-practice working capital management, and establishing forums to facilitate knowledge transfers between industry partners; this involves reviewing regulatory frameworks in a way that provides scope for improving working capital management rather than restricting it.

The study presents various conclusions on working capital management and its impacts on company profitability in the manufacturing sector in Zambia. The findings reaffirms that efficient inventory management has a significant influence on profitability through the reduction of holding costs, in addition to the enhancement of operational efficiency. The study support the importance of receivables management for healthy cash flows and profitability. The negative correlation between receivable turnover and profitability actually indicates that timely collection of accounts receivables contributes to improved financial performance. Further, the study establishes that cash management, as reflected in the cash conversion cycle, is the most critical determinant of profitability among the working capital components in question. The high negative relationship between CCC and ROA reaffirms the central importance of liquidity management in the manufacturing sector. While payables management is indeed another important component of working capital management, it is deduced from this study that it does not have a direct impact on profitability as much as other components within the manufacturing sector of Zambia.

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