Impact of Working Capital Management on Profitability of Listed Manufacturing Companies in India

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ABSTRACT

This empirical study investigates the effect of Working Capital Management (WCM) on the profitability of 120 manufacturing firms in India during FY2018-19 to FY2022-23, resulting in 720 observations collected from the Prowess IQ (CMIE) database and BSE annual reports.

Four WCM variables — CCC, ICP, RCP, and APP — were used as independent variables, while ROA, ROE, and GOP served as dependent variables. Both Fixed Effects (FE) and Random Effects (RE) panel regression models were employed, with the Hausman specification test validating FE as the appropriate estimator across all three models.

Key findings show a significant negative relationship between CCC and ROA ($\beta = -0.127$, $p < 0.01$), ICP and ROA ($\beta = -0.098$, $p < 0.01$), and RCP and ROA ($\beta = -0.084$, $p < 0.05$), while APP is positively related to profitability ($\beta = +0.073$, $p < 0.05$). All four research hypotheses are supported.

Sector-wise analysis indicates that the textile and pharmaceutical sectors carry the highest CCC values, and therefore hold the greatest potential for profitability improvement through WCM optimization. The findings carry significant implications for financial management, policy, and future research in India.

Keywords

Working Capital Management, Cash Conversion Cycle, Profitability, BSE India, Panel Data, Fixed Effects Model, Manufacturing Sector

1. INTRODUCTION

Working capital management (WCM) forms the very basis of short-term financial planning and is an essential element in determining the operational efficiency and profitability of a business. Working capital management is defined as the management of current assets (inventory, accounts receivable, and cash) and current liabilities (accounts payable and shortterm debt) in order to ensure that the company meets its short-term obligations while also making productive use of its funds.

Indian manufacturing is very vital in the economy of the country by contributing about 17%-18% of GDP and employing more than 57 million people. “Make in India” initiative from the government of India, together with the PLI scheme, worth more than $26 billion, has played a great role in enhancing investments in the Indian manufacturing industries. In this regard, effective working capital management has been identified as one of the strategies used by Indian manufacturing firms that are traded on the stock market in an increasingly globalized world..

Relationship between WCM and profitability has been studied comprehensively around the world ever since the pioneering work of Deloof (2003), which revealed the existence of a negative and significant relationship between CCC and profitability of firms operating in Belgium. With regard to India, the empirical literature on the subject matter is scarce and contradictory. This is mainly due to dissimilarities among various studies in terms of sample criterion, time span, sector coverage, and methodology. In addition, all the previous studies in India have been conducted prior to the emergence of the COVID-19 outbreak.

The present study seeks to overcome these limitations by: (a) building a balanced panel dataset of 120 manufacturing companies listed in BSE over six fiscal years (FY2019-FY2023); (b) accounting for the period of disruption caused by COVID19; (c) conducting Fixed Effects panel regression analysis using Hausman test validation; (d) examining four hypotheses based on different measures of profitability; and (e) performing sector-wise sub-group analysis for nine manufacturing sub-sectors.

1.1 Objectives of the Study

The specific objectives of this research include:

- To determine the effect of Cash Conversion Cycle (CCC) on the profitability of Indian manufacturing firms listed on stock exchanges.
- To evaluate the effect of Inventory Conversion Period (ICP) on the profitability of firms.
- To determine the effect of Receivables Collection Period (RCP) on the profitability of sample firms..
- To evaluate the influence of Accounts Payable Period (APP) on firm profitability.
- To compare WCM efficiency and its profitability impact across manufacturing sub-sectors.

2. REVIEW OF LITERATURE

2.1 Theoretical Foundations

The theoretical underpinning of WCM research is anchored in three main theories, namely; (i) the Liquidity-Profitability Trade-off Theory, (ii) the Operating Cycle Theory, and (iii) the Resource Based View (RBV) theory of the firm. According to the Liquidity-Profitability Trade-off theory, firms that allocate more resources to current assets sacrifice profitability due to the cost of idle resources while at the same time reducing financial risk. On the other hand, firms that adopt aggressive WCM strategies – involving low levels of current assets and high levels of current liabilities – enhance their profitability but expose themselves to liquidity risks (Bhattacharya, 1988). The Operating Cycle Theory is centered around the amount of time that a business takes to convert its raw materials investments into cash inflows, measured using CCC..

2.2 International Empirical Evidence

According to Deloof (2003), who investigated 1,009 Belgian non-financial firms, accounts receivable days, inventory days, and accounts payable days were significantly negatively correlated with gross operating profit, thus confirming the CCC as the key WCM ratio. García-Teruel and Martínez-Solano (2007) used 8,872 SMEs in Spain and proved that lowering the CCC positively impacts profitability, and inventory management becomes the most important factor here. Gill et al. (2010) used data from 88 US manufacturing firms and revealed that the correlation between CCC and gross profit was positive among large companies, implying that market power could be used to provide customers with credit.

2.3 Indian Empirical Evidence

According to Sharma & Kumar (2011), the link between WCM and profitability is positive using the OLS regression technique among the Indian firms listed on the Bombay Stock Exchange (2000-2008). This is quite interesting considering the contrasting findings in international studies. The CCC among Indian firms was the highest among India, China, and Singapore according to Singhania et al., (2014). Boruah (2023) discovered a non-linear, inverted-U-shaped relationship between working capital investment and profitability. Garg and Singh (2024), in the most comprehensive recent study using 20-year data from 419 BSE-listed firms, confirmed that CCC has a negative and significant impact on profitability, while sales growth is a significant moderator.

3. RESEARCH METHODOLOGY

3.1 Sample and Data

The sample population consists of all the manufacturing sector firms listed on the Bombay Stock Exchange (BSE) up to April 2018. From the BSE 500 list, there are 187 manufacturing firms. Out of these 187 firms, after excluding those that have incomplete data, non-manufacturing conglomerates that have more than 50% non-manufacturing sales, and firms that had been involved in any merger or delisting activities during the study period, the remaining 120 firms were selected, giving a total of 720 firm-year observations (balanced panel: 120 firms × 6 years.

Table 2: Sample Distribution by Manufacturing Sub-Sector

Manufacturing Sub-Sector	No. of Companies	% of Sample
Automobiles and Auto Components	18	15.0%
Manufacturing Sub-Sector	**No. of Companies**	**% of Sample**
Pharmaceuticals and Healthcare	16	13.3%
Chemicals and Petrochemicals	15	12.5%
Steel and Metals	14	11.7%
Textiles and Apparel	12	10.0%
Consumer Goods / FMCG	13	10.8%
Electrical and Electronics	10	8.3%
Cement and Construction Materials	8	6.7%
Others (Paper, Plastics, Packaging)	14	11.7%
Total	**120**	**100.0%**

3.2 Variables and Econometric Model

Three profitability ratios are used as dependent variables, namely Return on Assets (ROA), Return on Equity (ROE), and Gross Operating Profit (GOP). Four proxies for WCM include the Cash Conversion Cycle (CCC = ICP + RCP − APP) in days, Inventory Conversion Period (ICP) in days, Receivables Collection Period (RCP) in days, and Accounts Payable Period (APP) in days. The control variables are firm size (SIZE = ln of total assets), financial leverage (LEV = total debt/total assets), and sales growth (SG).

The general Fixed Effects panel model is:

$$Profitability^{I}_{t} = \alpha + \beta_1 CCC^{I}_{t} + \beta_2 ICP^{I}_{t} + \beta_3 RCP^{I}_{t} + \beta_4 APP^{I}_{t} + \beta_5 SIZE^{I}_{t} + \beta_6 LEV^{I}_{t} + \beta_7 SG^{I}_{t} + \mu^{I} + \lambda_{t} + \varepsilon^{I}_{t}$$

For each model, the Hausman (1978) test specification is used to choose between the two methods: Fixed Effect or Random Effect. Heteroskedasticity is controlled by the use of firm-specific clusters in the standard error and the presence of

Multicollinearity in analyzed data is measured by calculating Variance Inflation Factors (VIF). **Table 1: Research Hypotheses**

Hypothesis	Null (H_0)	Alternate (H_1)	Expected β
H1	CCC has no significant impact on ROA	CCC has a significant negative impact on ROA	$\beta_1 < 0$
H2	ICP has no significant impact on ROA	ICP has a significant negative impact on ROA	$\beta_2 < 0$
H3	RCP has no significant impact on ROA	RCP has a significant negative impact on ROA	$\beta_3 < 0$
H4	APP has no significant impact on ROA	APP has a significant positive impact on ROA	$\beta_4 > 0$

[1]. EMPIRICAL RESULTS

operations with significant variations across companies (-6.43% to 31.82%). The high Sales Growth standard deviation (14.27%) reflects significant revenue disruption caused by COVID-19 in FY2020–21.

Table 3: Descriptive Statistics (N = 720 firm-year observations, FY2019–FY2023)

Variable	Mean	Median	Std. Dev.	Min	Max	Skewness
ROA (%)	9.24	8.71	5.87	−6.43	31.82	0.847
ROE (%)	14.38	12.96	9.14	−18.21	58.76	1.124
GOP (%)	23.47	21.83	10.62	3.12	61.44	0.934
CCC (days)	67.43	62.18	38.74	−21.34	198.65	1.327
ICP (days)	48.92	45.31	27.16	8.24	142.73	1.218
RCP (days)	42.17	38.56	24.83	4.12	138.92	1.456
APP (days)	31.84	28.47	17.63	6.21	98.34	1.073
SIZE (ln ₹ Cr.)	10.43	10.28	1.74	7.82	14.67	0.123
LEV (ratio)	0.342	0.318	0.187	0.024	0.814	0.567
Sales Growth (%)	11.73	9.82	14.27	−32.18	87.43	1.762

Note: *ROA = Return on Assets; ROE = Return on Equity; GOP = Gross Operating Profit; CCC = Cash Conversion Cycle; ICP = Inventory Conversion Period; RCP = Receivables Collection Period; APP = Accounts Payable Period; SIZE =*

[1].1 Descriptive Statistics

Table 3 shows the descriptive statistics of all the variables. The mean CCC of 67.43 days is comparable to other studies conducted on Indian manufacturing companies listed in BSE. Indian manufacturing companies need 48.92 days to sell their inventories and 42.17 days to collect their receivables, but they pay off their debts in just 31.84 days, thus generating a positively structured CCC, which leads to a net working capital financing gap. The mean ROA of 9.24% indicates moderately profitable

Natural log of Total Assets; LEV = Leverage Ratio; SG = Sales Growth. FY2020–21 data reflects significant disruptions due to the COVID-19 pandemic.

4.2 Hausman Test and Panel Regression Results

The Hausman specification test firmly rejects the null hypothesis at the 1% significance level in all three cases (ROA: $\chi^2 = 38.47$, p = 0.000; ROE: $\chi^2 = 31.82$, p = 0.000; GOP: $\chi^2 = 29.64$, p = 0.001), indicating that Fixed Effects is the preferred and consistent estimator. The VIFs in all three cases are less than the cutoff point of 5, confirming the absence of multicollinearity. Table 4 provides the results of Fixed Effects regression of all three profit model regressions, with the inclusion of year fixed effects to control for common shocks such as the coronavirus pandemic during FY2020-21.

Table 4: Fixed Effects Panel Regression Results — Impact of WCM on Profitability

Variable	Model 1: ROA		Model 2: ROE		Model 3: GOP	
	β	t-stat	β	t-stat	β	t-stat
CCC (days)	−0.127***	(−5.82)	−0.183***	(−6.14)	−0.094***	(−4.37)
ICP (days)	−0.098***	(−4.24)	−0.134***	(−4.68)	−0.076**	(−3.21)
RCP (days)	−0.084**	(−3.67)	−0.117***	(−4.12)	−0.063**	(−2.87)
APP (days)	+0.073**	(+3.14)	+0.098**	(+3.42)	+0.058**	(+2.74)
SIZE — ln(Assets)	+0.312***	(+6.87)	+0.427***	(+7.43)	+0.214***	(+5.62)
LEV — Debt/Assets	−0.218***	(−5.43)	−0.312***	(−5.87)	−0.163***	(−4.18)
SG — Sales Growth	+0.124***	(+4.32)	+0.167***	(+4.87)	+0.143***	(+5.14)
Constant	4.312***	(+8.47)	6.187***	(+9.12)	11.243***	(+10.34)
Observations	720		720		720	
Variable	Model 1:	ROA	Model 2:	ROE	Model 3: GOP	
R^2 (within)	0.4312		0.4187		0.3964	
F-statistic	47.32***		43.18***		38.76***	
Year Fixed Effects	Yes		Yes		Yes	
Firm Fixed Effects	Yes		Yes		Yes	

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. *Robust standard errors clustered at the firm level (t-statistics in parentheses). Dependent variables: ROA = Return on Assets (%); ROE = Return on Equity (%); GOP = Gross Operating Profit (%). All WCM variables measured in days. Year dummy coefficients suppressed for brevity.*

4.3 Hypothesis Testing Results

All four hypotheses are supported across all three profitability measures. The R^2 within-estimator values of 43.1% for ROA, 41.9% for ROE, and 39.6% for GOP indicate satisfactory model fit. Table 5 summarises the hypothesis testing outcomes. **Table 5: Summary of Hypothesis Testing Results**

Hyp.	Variable	Expected Sign	β (ROA)	t-stat	p-value	Decision
H1	CCC	Negative (−)	−0.127	−5.82	0.000	**SUPPORTED** ✓
H2	ICP	Negative (−)	−0.098	−4.24	0.000	**SUPPORTED** ✓
H3	RCP	Negative (−)	−0.084	−3.67	0.002	**SUPPORTED** ✓
H4	APP	Positive (+)	+0.073	+3.14	0.003	**SUPPORTED** ✓

5. DISCUSSION OF FINDINGS

5.1 CCC and Profitability

Nonetheless, the most important relationship out of all of these is that between CCC and profit margin ($\beta = -0.127$ for ROA; $p < 0.01$). This shows that a one day decrease in CCC causes a corresponding increase in ROA by 0.127 percentage point. If one considers a firm with average SIZE value of INR 1,200 crore, a one day decrease in CCC will result in an additional INR 1.52 crore in annual profits on a daily basis. In cases where the firms have higher CCC values compared to the median CCC value of 62 days (firms dealing in textile and pharmaceutical business, for example), a radical reduction in their CCC can result in annual profits worth tens of crore rupees.

5.2 Inventory, Receivables, and Payables

A very strong inverse correlation of ICP and ROA ($\beta = -0.098$, $p < 0.01$) underlines the need to manage inventory as the most controlable component in WCM framework. The mean level of ICP is estimated to be at 48.92 days, which exceeds the global standard for such firms of 30-35 days and proves that there is something fundamentally wrong with the management of inventory due to a fragmented structure of the supply chain and inadequate forecast and logistics. The application of factoring, invoice discounting, and the newly introduced governmental program called TReDS can help in solving the problem with converting working capital into cash. In addition, the positive correlation between APP and profitibility ($\beta = +0.073$, $p < 0.05$) reflects the trade credit theory where a free short term borrowing can be made by delaying payment terms for suppliers.

5.3 COVID-19 Impact

The mean CCC increased by about 8 days between FY2018-19 and FY2020-21 (from 64.38 to 72.47 days), mainly due to the increase in ICP (from 46.72 to 53.68 days). This happened due to disruption in the supply chain causing delays in inventory conversion. The ROA decreased by 278 basis points, from 10.12% to 7.34%. The year fixed effect in the regression model captures the common shock, and the within-firm WCM-profits association holds good even after accounting for the shock.

5.4 Sector Heterogeneity

Table 6: Sector-wise CCC Impact on ROA (Sub-group Fixed Effects Regression)

Sub-Sector	n	Mean CCC (days)	Mean ROA (%)	Coeff. CCC→ROA	Significance
Textiles and Apparel	12	94.72	7.13	−0.187	***
Pharmaceuticals and Healthcare	16	82.47	12.84	−0.167	***
Automobiles & Auto Components	18	71.34	8.93	−0.143	***
Electrical and Electronics	10	68.34	9.47	−0.124	***
Chemicals and Petrochemicals	15	63.21	10.12	−0.112	***
Others (Paper, Plastics, Pkg.)	14	66.83	8.64	−0.118	**
Cement and Construction Mat.	8	51.67	9.81	−0.091	**
Steel and Metals	14	58.43	8.27	−0.098	**
Consumer Goods / FMCG	13	42.18	11.73	−0.082	**

Note: *** $p < 0.01$; ** $p < 0.05$. *Sectors ranked by mean CCC (descending). All CCC coefficients are negative and statistically significant, confirming robustness of H1 across sectors.*

The sector-wise analysis highlights significant heterogeneity. The Textiles industry (mean CCC = 94.72 days) and the Pharmaceuticals industry (CCC = 82.47 days) have the highest CCCs because of their lengthy production cycles, compulsory testing, and delayed receipts because of exports. This suggests that the Textile and Pharmaceutical industries have the highest CCC coefficients, meaning they have the most to gain from WCM. The Consumer Goods/FMCG sector demonstrates the most efficient WCM (mean CCC = 42.18 days), benefiting from high inventory turnover, modern distribution networks, and strong retailer credit management.

6. CONCLUSION AND IMPLICATIONS

This research presents empirical validation of the effect of Working Capital Management on profitability of 120 Indian manufacturing companies listed on stock exchanges during FY2019-FY2023 through fixed effects panel regression analysis of a balanced panel data set comprising 720 observations. All four hypotheses have been validated, namely CCC ($\beta = -0.127$, $p < 0.01$), ICP ($\beta = -0.098$, $p < 0.01$), RCP ($\beta = -0.084$, $p < 0.05$) are negatively correlated with profitability whereas APP ($\beta = +0.073$, $p < 0.05$) is positively correlated. Results are consistent across all three proxies of profitability as well as the COVID-19 disruption period. The sectors with the highest CCC values and maximum scope for profitability enhancement include textiles and pharmaceuticals.

Managerial Implications

- Inventory: Adopt demand-based inventory management strategies, ERP-based forecasting and vendor-managed inventory (VMI) systems to lower ICP towards international best practices of 30-35 days.
- Receivables: Utilize the benefits of TReDS platform, factoring and dynamic discounting programs to speed up collections without harming client relationships.
- Payables: Extend payment terms with suppliers within reasonable limits through supply chain finance platforms.

- Sector-specific: Textiles firms must focus on lean manufacturing practices; pharmaceutical firms must work with regulators to improve batch clearance timelines.

Policy Implications

- Expanding TReDS platform adoption beyond large enterprises to MSME suppliers could unlock significant receivablestrapped working capital across the manufacturing value chain.
- Logistics infrastructure investments under Gati Shakti should be calibrated to reduce port dwell times and rail turnaround cycles, directly impacting ICP for export-oriented manufacturers.
- Targeted supply chain finance schemes under PLI programmes — particularly for the textile and pharmaceutical sectors — could yield outsized profitability benefits given high CCC levels.

Limitations and Future Research

This study is limited to BSE 500-listed companies; unlisted and MSME manufacturers are not covered. The study does not model the potentially non-linear WCM–profitability relationship. Future research should extend the panel to NSE-listed and MSME firms, investigate non-linear specifications, examine digitisation (e-invoicing, TReDS, ERP adoption) as a moderator, and use two-step system GMM to more rigorously address endogeneity.

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