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Sustainable Working Capital and Financial Performance in the Cement Industry of Pakistan: An OLS Approach*

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Abstract: This research aims to demonstrate for the first time how the Pakistani cement sector's financial health is impacted by sustainable working capital. The cement industry uses sustainable working capital techniques and practices for magnificent financial outcomes. Considering the importance of these profitable techniques, we practice these in cement firms with a sample size of 25 cement firms listed in the Pakistan stock market (PSX) from 1997-2022. The data were collected from annual reports available on the financial statements. The current ratio and quick ratio are measured for liquidity. Ordinary Least Square & correlation analysis indicates that the cash conversion cycle (β1= -0.564, p= 0.00), Current ratio (β2= -0.20, p= 0.040), Quick ratio (β3= -0.585, p= 0.000) and Inventory Turnover ratio (β4= -0.244, p= 0.004) have a negative effect on financial performance (Tobin's Q). This study helps policymakers that can handle liquidity-sustainable working capital for the cement industry.

Keywords: Inventory Management, Tobin's' Q, Current Ratio, Quick Ratio

1. Introduction

From the procurement of initial supplies to manufacturing and distribution, including waste management or recycling, an organization's supply chain can be affected by its working capital management (WCM), particularly accounts payable, accounts receivable, and inventories (Lefebvre, 2022). Sustainable short-term and long-term investment strategies consider factors related to the environment, society, and governance in addition to economic goals. Initially developed under the banner of socially responsible investing (SRI), this form of investment aimed to enforce punitive measures but has dramatically expanded its scope in recent decades (Tarkom, 2022). The value of investments focused on sustainability has now reached tens of billions of dollars and continues to rise (Ao et al., 2022). Given this rapid growth, it is crucial to understand how sustainable investment affects asset value and corporate behavior.

In Pakistan, cement industries have adopted a sustainable working capital strategy to maintain short-term investments. Since WCM directly affects a company's profitability, it is a crucial aspect of corporate finance (Adegbie & Akenronye, 2022). Effective control of sustainable working capital is essential for a company's success (Zheng et al., 2022).

Sustainable WCM involves managing diverse components of working capital to maintain appropriate levels of short-term investment for efficient corporate operations, thereby achieving the dual goals of profitability and sustainability (Chang et al., 2022). Companies must balance profitability and operational efficiency. Insufficient working capital reduces liquidity, while holding excessive working capital can negatively impact profitability by tying up funds (Setianto et al., 2022).

The complexity of managing sustainable WCM is heightened because it varies between organizations depending on factors such as the type of business, the scale of operations, the production cycle, credit policies, and the availability of materials (Nayal et al., 2022). Sustainable working capital consists of two key components: current assets and liabilities. Inadequate working capital could lead to a lack of raw materials and impair production, ultimately leading to revenue decline. Conversely, excess investment in financial resources leads to higher storage and processing costs, as well as lost potential profits (De Leijster et al., 2020).

A significant amount of money is required for long-term investments in current assets, particularly for maintaining sales levels while awaiting the conversion of sales into cash (Napier & Stadler, 2022). If a company can convert operating cash flow into profit within the same operational cycle, it can thrive. Otherwise, borrowing may be necessary to cover ongoing working

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capital needs (Xu et al., 2020). Coordinating profitability and liquidity is essential for financial performance (Kyere & Ausloos, 2021). Inefficient management of working capital can lead to supply chain disruptions, and while increased inventory might boost sales, it can also erode profits if the costs of maintaining working capital outweigh the benefits (Bhattacharya, 2023).

Empirical findings suggest that inefficient WCM is a significant contributor to industrial distress. Modern financial management seeks to reduce unnecessary asset investments while avoiding stock shortages (Woo et al., 2021). Effective WCM is a key indicator of corporate health, requiring minimized investment blockage to reduce funding costs. Given these considerations, this study examines WCM practices in Pakistan's cement industry. Alongside the steel and petrochemical sectors, the cement industry plays a crucial role in producing vital materials for factories and construction (Scope et al., 2020).

WCM involves two concepts: "gross working capital," referring to all of a company's current assets, and "net operational capital," the difference between current assets and liabilities. Effective WCM increases company value and growth potential (Jayathilaka, 2020). Profit, derived from the Latin word "prefects" meaning to advance, can be defined economically or in accounting terms, with this study focusing on the latter (Granof et al., 2021). Profits are the surplus after deducting all expenses related to bringing products to market (Haig, 2020).

Key indicators of sustainable WCM include the Cash Conversion Cycle (CCC), the current ratio, the quick ratio, and the inventory turnover ratio. The CCC is a vital measure of WCM success, representing the time it takes to convert investments in inventory and receivables back into cash (Dhole et al., 2019; Mazanec, 2022; Bhattacharya, 2023). The current ratio measures the relationship between current assets and liabilities, while the quick ratio measures a company’s ability to meet short-term obligations without selling inventory. The inventory turnover ratio reflects how many times inventory is sold and replaced over a given period. Tobin’s Q, which compares a company's market value to its net assets, is another widely used measure of financial performance (Ahmad et al., 2023; Azam, 2022; Cardao-Pito, 2022).

The specific objectives of this study are as follows:

- To assess the effectiveness of sustainable WCM practices in Pakistan's cement industry.
- To measure the progress of companies in raising the sustainability bar in WCM relative to industry benchmarks.

This study is motivated by the fact that the cement industry in Pakistan has thrived despite challenging global economic conditions. With 29 cement factories and a manufacturing capacity of 39 million tons, Pakistan meets domestic demand and exports surplus cement to Afghanistan, India, Africa, and the Middle East.

The remainder of this study is organized as follows: Section 2 reviews the literature and discusses our motivations in detail. Section 3 provides information on data, sampling, and variable measures. Section 4 presents the data analysis and empirical findings. Finally, Section 5 concludes the study and discusses managerial implications.

2. Literature Review

Many academics have investigated working capital from various perspectives and settings. Afeef (2011) studied 94 Pakistani companies listed on the Karachi Stock Exchange over six years (1999–2004) and found a significant inverse relationship between net operational efficiency and the typical collection duration, payout period, and CCC for a selection of Pakistani enterprises. These results suggest that executives may boost shareholder value by maintaining controlled inventory and receivables over time. The study also found that smaller companies tend to delay payments to suppliers, aligning with the inverse relationship between outstanding bills and financial performance.

Taheri et al. (2023) highlighted the importance of asset management, including the management of debtors and creditors, on Tobin's Q in the dairy industry. Effective management of working capital policies and their implementation is crucial for business success. Aytac et al. (2020) examined Turkish manufacturing companies (2003–2014) and identified the significance of working capital management practices, particularly regarding accounts receivable periods, inventory periods, and leverage. Their study also assessed the cash conversion cycle (CCC) and Tobin’s Q.

Dalci et al. (2019) argued that the size of an organization and CCC have minimal impact on profitability. Meanwhile, Prasad et al. (2019) evaluated working capital management in non-financial Indian firms listed on the Bombay Stock Exchange (2012–2017). Instead of traditional WCM ratios, they developed performance, utilization, and overall efficiency indices, which revealed poor performance among the companies studied during this period.

Peng & Zhou (2019) emphasized that profitability is a fundamental goal in working capital theory. They explored whether more recent working capital concepts correlate better with return on investment than traditional working capital ratios. Their results showed no significant differences across the years studied.

Panigrahi et al. (2022) demonstrated the critical role of effective WCM in enhancing shareholder

value for manufacturing companies in Oman. Through correlation and regression analysis, they revealed an inverse relationship between profitability and the length of the net trading cycle, with shorter trade cycles associated with higher risk-adjusted stock returns.

Louw et al. (2022) observed that most corporations invest significantly in working capital. Their research on Belgian enterprises found a weak correlation between the outstanding sales payment period and inventory days. Less profitable businesses tend to delay payments to suppliers, which negatively impacts profits. Mwenda & Pastory (2022) examined three commercial businesses listed on the Dar ES Salam Stock Exchange and found that profitability positively correlates with CCC, while liquidity negatively correlates with profitability.

Mahmood et al. (2022) found a negative correlation between CCC and return on assets. A longer CCC reduced returns, suggesting that companies could boost profits by reducing inventory conversion and collection periods. Kucera & Dvorakova (2023) studied pharmaceutical and biotechnology companies listed on the FTSE and found no effect of CCC on Tobin's Q. However, they observed that reducing the collection period increased shareholder value.

Mandipa & Sibindi (2022) demonstrated that CCC has an inverse relationship with Tobin's Q. Their research showed that businesses could increase profits by reducing collection periods and inventory turnover times. Demiraj et al. (2022) found that days' sales outstanding positively correlates with return on assets, while inventory turnover days are inversely related to financial viability.

Seth et al. (2021) contributed to the foundational theory of WCM, emphasizing the critical importance of managing cash flows, receivables, and payables. They argued that a money manager's primary responsibility is to provide capital when needed while investing any short-term surplus capital profitably, considering both safety and liquidity (Naz et al., 2022).

The company's profitability, as a factor influencing its going concern status, reflects the combined effects of debt, asset management, and liquidity (Rao et al., 2022). Profitability highlights the significance of balancing operational activities and financial gains. Excessive or insufficient inventory can affect profitability, as a higher inventory turnover improves cash flow and market value (Rasanjali et al., 2022).

Okunev (2022) argued that faster stock turnover boosts profitability, although slower turnover reduces profit margins. Achieving rapid inventory turnover requires businesses to consider various operational factors. Tobin's Q is widely used to measure a firm's profitability by comparing market value to net asset value (Cardao-Pito, 2022). The study's financial performance metric, Tobin's Q, serves as an indicator of efficient asset utilization.

Sustainable WCM determines the ideal levels of cash, inventory, and debtors, balancing short-term liabilities at the lowest cost to meet a company's ongoing needs (Agomour et al., 2022; Shingade et al., 2022; AYDOĞMUŞ et al., 2022). According to Kolling (2022), CCC management depends on the nature of the business and product. Shortening the CCC cycle increases profitability (Abolfathi et al., 2022).

Several studies have demonstrated a negative relationship between CCC and profitability (Soda et al., 2022; Harris & Hampton, 2022; Garg & Meentu, 2022). Richards & Laughlin (1980) first introduced the concept of CCC, which measures the time taken to convert cash outflows into cash inflows in business operations.

Chen et al. (2022) found no empirical link between CCC and financial performance, emphasizing that CCC is a product of inventory conversion, receivables collection, and payables deferral periods. Zimon et al. (2022) and Tiwari et al. (2023) highlighted that CCC analysis offers dynamic insights beyond static liquidity ratios, helping firms manage working capital effectively. Companies with shorter CCCs can make more sales with the same investment, demonstrating effective resource utilization (Doruk & Ergün, 2022).

In conclusion, studies show that a shorter CCC indicates fewer resources tied up in working capital, leading to stronger sales growth and profitability (Tarkom, 2022). However, Badakhshan & Ball (2022) cautioned that CCC should be kept as short as possible to maximize shareholder value.

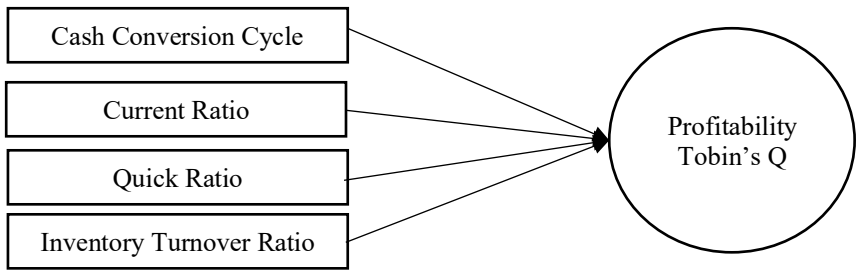

Figure 1: Conceptual Framework
Source: Author's Compilation.

2.1. Hypotheses of the study

H1= In Pakistan's cement business, the cash conversion cycle has a detrimental impact on Tobin's Q.

H2= In Pakistan's cement business, the current ratio has a detrimental impact on Tobin's Q

H3= In Pakistan's cement business, the quick ratio has a detrimental impact on Tobin's Q.

H4= In Pakistan's cement business, the inventory turnover ratio has a detrimental impact on Tobin's Q.

3. Research Method

With this strategy, a relationship between each factor is attempted. The deductive approach entails evaluating an assumption by laying out specific forecasts and gathering data to verify or refute deductions (Hall et al., 2022). This corresponds to the revisionist viewpoint within the conventional and conservative economics theory (Farrokhnia et al., 2022).

This study analyses the negative aspects of the financial performance of the cement industry. The sample period for this study is 25 years, from 1997 to 2022. This research is based on a quantitative approach. Secondary sources were used to gather the study's results in the form of financial statements of cement companies with annual reports of each cement company certified by the Pakistan Stock Exchange (PSX) every year. Furthermore, data were collected from published articles and research journals. The study covered a period of 25 years, from 1997 to 2022. The financial performance of the cement industry has been measured by profit-maximizing (Tobin's Q). Sustainable WCM is measured by the CCC, current ratio, quick ratio, and Inventory turnover ratio. Table 1 lists the values that are calculated for the parameters.

Table 1: Data Sources

Variable	Formula	Data Source
Tobin's Q	Market Value / Net Assets	PSX
Cash Conversion Cycle	Days Inventory Outstanding + Days Sales Outstanding – Days Payable Outstanding	PSX
Current Ratio	Current assets / Current liabilities	PSX
Quick Ratio	Existing assets – inventory / Current liabilities	PSX
Inventory Turnover Ratio	Cost of goods sold/ Average inventory	PSX

Source: Pakistan Stock Exchange

The Following (Ahmad et al., 2022; Sah et al., 2022; Tiwari et al., 2023) followed the OLS method adopted. These mathematical models were used in the research to illustrate the importance of distinctions between companies and the specific impacts of the parameters chosen inside the companies during the timeframe. The structure of the model is described as follows:

$$TQ = \propto_0 + \beta_1 CCC + \beta_2 CR + \beta_3 QR + \beta_4 IT + \mu$$

Where; TQ= Tobin's Q.

α = Intercept

β = Slope

CCC= Cash conversion cycle

CR= Current ratio

QR= Quick ratio

IT= Inventory Turnover.

4. Results And Discussion

The descriptive statistics in Table 3 provide detailed information about the study. It includes the minimum, maximum, mean, and standard deviations. Over 25 years, the average profitability was 5.59. The highest measured profitability was 17.0, while the lowest was 0.0550. The mean value of the cash conversion cycle (CCC) was 0.62, with a maximum value of 4.23, a minimum value of 2.22, and a standard deviation of 1.63. The average current ratio over the 25 years was 2.26, with a maximum of 4.75 and a minimum of 0.63. Similarly, the quick ratio averaged 1.77, with a maximum of 4.60 and a minimum of 0.18. The average inventory turnover was 2.99, with a maximum of 5.60 and a minimum of 0.65.

Karl Pearson's correlation coefficient was used in the study to determine the strength of the linear relationships between the variables. Pearson's correlation coefficient, denoted by "r", ranges between +1 and -1, where a value of 0 indicates no correlation. A value greater than 0 indicates a positive relationship, while a value less than 0 indicates a negative relationship. Pearson's correlation was applied to assess the linear relationship between dividend policy variables and financial profitability. Table 3 shows a correlation matrix representing the degree to which the variables are related. The

findings indicate a positive correlation between the cash conversion cycle and Tobin's Q (r=0.577) (Doruk & Ergün, 2022). A strong positive correlation exists between the current ratio and Tobin's Q (r=0.512) (Taheri et al., 2023; Arslan-Ayaydin et al., 2022). Tobin's Q also shows a moderate positive relationship with the quick ratio (r=0.347) and a weak negative association with the inventory turnover ratio (r=-0.01). Additionally, the cash conversion cycle has strong positive correlations with both the current ratio and the quick ratio (r=0.678, r=0.789), and a moderate positive correlation with the inventory turnover ratio (r=0.456) (Cardao-Pito, 2022). The current and quick ratios also exhibit a strong positive correlation (r=0.63), while the current ratio and inventory turnover ratio have a moderate negative correlation (r=-0.314). Furthermore, the quick ratio and inventory turnover ratio are moderately negatively correlated (r=-0.476).

Table 2: Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Tobin's Q	.0550	17.0000	4.499596	5.5914
Cash Conversion Cycle	0.62	4.23	2.22	1.63
Current Ratio	.63	4.75	2.2648	1.3628
Quick Ratio	.18	4.60	1.7689	1.2613
Inventory Turnover Ratio	.65	5.60	2.9933	.96453

Source: Author's Compilation

Table 3: Correlation Estimations

	Tobin's Q	Cash Conversion Cycle	Current Ratio	Quick Ratio	Inventory turnover
Tobin's Q	1	.577	.512	.347	-.010
Cash Conversion Cycle	.577	1	.678	.789	.456
Current Ratio	.512	.678	1	.635	-.314
Quick Ratio	.347	.789	.635	1	-.476
Inventory turnover	-.010	.456	-.314	-.476	1

Source: Author's Compilation

The study employed multiple regression analysis to assess the impact of several independent variables on the dependent variable, Tobin's Q, which measures financial profitability. The coefficient of determination (R-squared) indicates how well the independent variables—cash conversion cycle, current ratio, quick ratio, and inventory turnover ratio—explain the variation in Tobin's Q.

Table 4 presents the summary of the regression model. The correlation coefficient (R) value of 0.561 suggests a positive relationship between Tobin's Q, liquidity, solvency, and company size, consistent with prior research (Badakhshan & Ball, 2022; Harris & Hampton, 2022; Azam, 2022). The R-squared value of 0.314 indicates that changes in the cash conversion cycle, current ratio, quick ratio, and inventory turnover ratio account for 31.4% of the variation in Tobin's Q. The adjusted R-squared value of 0.561 shows that these factors explain 56.1% of the variation in Tobin's Q, supporting the findings of Kumpamool & Chancharat (2022).

Table 5 demonstrates the statistical significance of the regression model in predicting Tobin's Q (f=3.233, p=0.041). Since the p-value is less than 0.05, it suggests that the cash conversion cycle, current ratio, quick ratio, and inventory turnover ratio significantly predict financial profitability (Tobin's Q). The p-value of 0.041 indicates that the likelihood of the model making an incorrect prediction is low, confirming its statistical significance.

Table 6 shows the results of the Ordinary Least Squares (OLS) regression coefficients. The beta coefficients for the cash conversion cycle (COC), current ratio, quick ratio, inventory turnover ratio, and Tobin's Q are all positive, indicating a relationship between these variables and profitability (Chen et al., 2022; Tiwari et al., 2023; Doğan & Kevser, 2020). Specifically, the beta for the cash conversion cycle ($\beta1$=-0.564, p=0.00) suggests that a 1% increase in the cash conversion cycle decreases profitability by 56%. This result is consistent with other studies (Hussain et al., 2021; Tiwari et al., 2023; Doğan & Kevser, 2020). Similarly, the beta for the current ratio ($\beta2$=-0.20, p=0.040) indicates that a 1% increase in the current ratio reduces profitability by 20% (Suhendry et al., 2021; Mulyadi et al., 2020; Soesilo et al., 2020). The beta for the quick ratio ($\beta3$=-0.585, p=0.000) suggests that a 1% increase in the quick ratio reduces profitability by 58% (Ramadhanty & Sukmaningrum, 2020; Suhendry et al., 2021; Mulyadi et al., 2020). Lastly, the beta for inventory turnover ($\beta4$=-0.244, p=0.004) suggests that a 1% increase in inventory turnover reduces profitability by 20%. These findings are consistent with prior research (Boisjoly et al., 2020; Ahmad et al., 2023; Garg & Meentu, 2022).

Table 7 presents the results of hypothesis testing. The significance value (p-value) was used to determine whether the hypotheses were supported or not. OLS results suggest that the cash conversion cycle negatively affects Tobin's Q in the Pakistani cement industry (p=0.000), supporting H1. The

current ratio also negatively affects Tobin's Q (p=0.0040), supporting H2. The quick ratio negatively affects Tobin's Q (p=0.000), supporting H3. Lastly, the inventory turnover ratio negatively affects Tobin's Q (p=0.0040), supporting H4. Thus, all the hypotheses related to company size, liquidity, and solvency are supported based on the results shown in Table 7.

Table 4: R-Square Estimation

Model	R	R Square	Adjusted R Square	Std. Error
1	.545a	.297	.205	4.9857605

Source: Author's Compilation

Table 5: Regression Estimations

		Some of Squares	Df	Mean Square	F	Sig.
1	Regression	241.128	3	80.376	3.233	.041b
	Residual	571.730	23	24.858		
	Total	812.858	26			

Source: Author's Compilation

Table 6: Coefficient Estimations

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model	B	Std. Error	Beta		
(Constant)	-4.729	4.635	2.21	-1.020	0.318
Cash Conversion Cycle	0.564	4.556	2.24	1.46	0.000
Current Ratio	0.202	.929	.494	2.182	0.004
Quick Ratio	.0585	1.083	.132	.540	0.000
Inventory turnover	0.244	1.153	.208	1.045	0.004

Source: Author's Compilation

Table 7: Hypotheses Testing

S. No	Hypothesis	P=Value	Supported / Not Supported
H1	In Pakistan's cement business, the cash conversion cycle has a detrimental impact on Tobin's Q.	0.000	Supported
H2	In Pakistan's cement business, the current ratio has a detrimental impact on Tobin's Q.	0.004	Supported
H3	In Pakistan's cement business, the quick ratio has a detrimental impact on Tobin's Q.	0.000	Supported
H4	In Pakistan's cement business, the inventory turnover ratio has a detrimental impact on Tobin's Q.	0.004	Supported

Source: Author's Compilation

5. Conclusion

This study sought to investigate the connection between sustainable WCM and the financial success of cement industry businesses listed on the PSX. The data were collected from the financial statements of corporations listed on the PSX between 1997 and 2022. Statistical methods, including descriptive statistics, Pearson correlation coefficients, and multiple regression modeling (OLS), were used to analyze the data. The study's empirical findings demonstrated that sustainable WCM (including CCC, current ratio, quick ratio, and inventory turnover ratio) negatively and significantly impacts Tobin's Q scores of cement companies (Suhendry et al., 2021; Boisjoly et al., 2020; Soesilo et al., 2020). An increase in the cash conversion cycle improves financial performance because more orders are received from the market, allowing for more cash to be converted into producing those orders. Once the orders are sold, financial performance increases. A high current ratio indicates that the company has sufficient cash, and as the ratio increases, so does the company's ability to pay off its obligations. Conversely, if the current ratio is low, it indicates that the company may struggle to pay urgent debts, which can negatively impact financial performance.

The acid test ratio also has a significant effect on Tobin's Q of cement firms. A higher quick ratio indicates that a company can generate cash quickly in times of need (Kumpamool & Chancharat, 2022). Inventory turnover has a substantial adverse impact on Tobin's Q of cement firms, suggesting that increased inventory levels improve the financial performance of corporations (Ramadhanty & Sukmaningrum, 2020; Garg & Meentu, 2022).

The study has practical implications with important consequences for cement firms: (1) efficient management of inventory, creditors, debtors, and liquidity is critical for improving a company's

profitability; (2) policymakers can use these findings to establish guidelines or strategies to manage liquidity and sustainable working capital for cement companies; (3) cement industry executives can determine optimal levels of inventory and receivables, which would improve inventory control and receivables management. In light of these findings, the study suggests that sustainable WCM variables, including CCC, current ratio, quick ratio, and inventory turnover ratio, should be emphasized in the management strategies of cement companies as they are critical to the sustainability of the firm.

The study has certain limitations due to a lack of data availability; the researcher used a parametric frontier model for profit maximization. The study relied solely on secondary data obtained from the financial statements of cement companies, which may not always be reliable or free of errors. Additionally, the study focused on a small sample size of cement companies over 25 years, which may not provide a comprehensive analysis of the entire cement industry in Pakistan. A larger sample size from more companies could yield more accurate and reliable results. Furthermore, the study considered only four independent variables (CCC, current ratio, quick ratio, inventory turnover ratio) and one dependent variable (Tobin's Q). The researcher suggests including more independent variables in future studies, such as ROE, ROA, accounts receivable turnover, inventory turnover in days, net profit margin, and other debt management ratios. These variables would provide a more complete analysis of the efficiency of the cement industry in Pakistan.

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