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The effect of working capital management on profitability: A study on manufacturing companies in Bangladesh

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ABSTRACT

This research aims to analyze the impact of efficient working capital management on the profitability of the manufacturing firm in Bangladesh. Fifty-two manufacturing companies listed with Dhaka Stock Exchange (DSE) have been selected randomly from 2012 to 2017. Return on Assets (ROA) and Return on Equity (ROE) are used as indicators of profitability, while the inventory conversion period (ICP), the average collection period (ACP), the average payment period (APP), and the Cash Conversion Cycle (CCC) are used as the independent variables which are used as a measurement of working capital management of the firm. Ordinary Least Squares regression models and Pearson's Correlation are used to establish the relationship between working capital management and profitability. The results revealed a significant negative relation between ROA and CCC, ACP; a significant negative relationship exists between ROE and CCC, APP. Manufacturing companies can increase profitability by decreasing the cash conversion cycle, average payment period, and average collection period. It also revealed that ICP is also positively related to ROA and ROE. Therefore, this research concludes that efficiently and effectively managing working capital is very important for increasing manufacturing companies' profitability.

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Introduction

Working Capital Management (WCM) is the process of planning and controlling the level and mix of current assets and current liabilities. It also ensures a company has sufficient cash flow to meet its short-term debt obligations and operating expenses. It works to manage the relationship between a firm's short-term assets and the liability of a firm. Working capital management addresses companies' managing of their short-term capital, and the goal of the management of working capital is to promote satisfying liquidity, profitability and shareholders' value (Makori, & Jagongo 2013). Specifically, Working Capital Management requires financial managers to decide what quantities of cash, other liquid assets, accounts receivables, and inventories the firm will hold at any point in time. The duration of the Average Collection Period, Inventory Conversion Period, Average Payment Period, and Cash Conversion Cycle. The WCM practices a firm is significant because it determines the working capital level, which intends to influence performance (Taurigana and Afrifa 2013). Managing effective working capital is a superb way to sustain the company's operations and to improve earnings.

The investment in the current assets must be neither excessive nor inadequate. If the firm has excessive working capital, the firm needs to bear more capital and more time value of money. If the firm has not adequate working capital, the firm will not pay the current expenditures and short-term debt obligations. Both situations are very harmful to the firm to survive for a long period.

Working capital is the heart of manufacturing organizations in modern business. Proper management of working capital plays a vital role in the profitability and the success of the organizations. The main elements of working capital are the average collection period, inventory conversion period, average payment period, and cash conversion cycle. The average collection period indicates the from trade receivables, which helps the firm to re-invest available funds. The inventory conversion period suggests the conversion of inventory into cash. The average payment period indicates the payment for trade creditors. And finally, the cash conversion cycle

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shows the combination of cash collection and payment of the firm. All these elements individually and collectively affect the profitability of the company. Excessive working capital is the cause of the huge cost of capital. On the other hand, deficiency in working capital is the reason for the financial crisis.

In Bangladesh, the manufacturing sector plays a significant role in its economic growth and sustainable development. However, inadequate research work has been done on working capital management in manufacturing companies of Bangladesh. Therefore, the research will add value to the existing literature and help the manufacturing companies achieve better and sustainable profitability.

This study is an effort to reflect a clear idea about the impact of proper management of working capital on profitability.

Literature Review

Many researchers conducted various studies to determine the relationship between working capital management (WCM) and profitability. The results are quite mixed. Sin, Padachi (2006) studied in Mauritius on small firms and found a significant relationship between efficient working capital management and the firm's profitability. H. N. et al. (2017) found a positive relationship between the gross operating income and the accounts payables period. This extended account payment period creates short term financing for the firm. Singhania, et al. (2014) found that the performance of the firm is negatively related to the number of day's receivables and positively related to the number of day's payables. It indicates that the performance of the firm can be improved by minimizing the average collection cycle and maximizing the average payment cycle. Sharma and Kumar (2011) found that working capital management and profitability are positively correlated. However, the inventory of a number of days and numbers of day's accounts payable are negatively correlated with a firm's profitability, whereas the number of days accounts receivables and cash conversion period exhibit a positive relationship with corporate profitability. Akoto, et al. (2013) found a significant negative relationship between Profitability and Accounts Receivable Days and also found the firms' Cash Conversion Cycle, Current Asset Ratio, Size, and Current Asset Turnover significantly positively influence profitability.

Ashhari et al. (2009) studied 148 listed firms from 1996-2006 in Malaysia to find the relationship between working capital management and profitability. The study concluded a strong negative relationship between the cash conversion cycle and the firm's profitability, and the current ratio is positively related to profitability. Raheman and Nasr (2007) studied in Pakistan using data from 94 firms for 1999-2004 and found that the cash conversion cycle significantly negatively impacted the firm's profitability and found a significant negative relationship between the current ratio and firm's profitability.

Return on assets and return on equity are used to measure profitability, which indicates the efficiency and effectiveness of business operations. Mohamad and Saad (2010) studied in Malaysia using CCC and current ratio as the measures of working capital management and the returns on assets, returns on invested capital of firm and market value of firm are the measures of profitability. They found a significant negative relationship among CCC and all the profitability measures and a significant negative relationship among current ratio and returns on assets and return on invested capital.

Ramachandran and Janakiraman (2009) studied the paper industry in India for assessing the relationship between efficient working capital management and earnings before interest and tax. They claimed that the cash conversion cycle and inventory conversion period are negatively related to earnings before interest and tax, while the average payment period and average collection period are positively related to earnings before interest and tax.

Napompech (2012), in Thailand, found that there is a negative relationship between the operating profits and inventory conversion period and the accounts receivable collection period.

Gill, et al. (2010) found a statistically significant relationship between the cash conversion cycle and profitability. Raheman, et al. (2010) resulted in the cash conversion cycle, net trade cycle, and inventory turnover in days that significantly affect the firms' performance. Gakure, et al. (2012) found a strong negative relationship between the firm's performance and liquidity. Makori, & Jagongo (2013) that for overall manufacturing and construction sectors, Working Capital Management has a significant impact on the firms' profitability, and a longer Cash Conversion Cycle negatively impacts a firm's profitability.

In Bangladesh, the manufacturing sector plays a significant role in its economic growth and sustainable development. Several researchers researched to find the impact of working capital management on manufacturing firms. Khan, M. M. et al. (2020) researched Bangladesh and found that the cash conversion cycle, day's sales outstanding, and the inventory conversion period can increase firms' profit.

Huda, K. T. (2015) in Bangladesh Claimed that for any organization to maximize the shareholders' wealth and to become solvent, optimum working capital management is essential.

Amin & Islam (2014) studied the fuel and power companies listed on the Dhaka Stock Exchange from 2007 to 2011 using working capital management measured as time interest ratio, quick ratio, cash conversion cycle, accounts receivables collection period, accounts payable payment period, inventory processing period, cash to current liability, cash to sales ratios and net working capital, turnover, and debt to equity ratio and the profitability measured by return on assets and net profit margin. They argued that the net

profit margin and time interest ratio have a significant positive relation with ROA, while cash to current liability and accounts payables payment period have a significant positive influence on net profit margin.

To assess the effect of working capital management on profitability, Chowdhury, A. Y. et al. (2018), studied nine pharmaceutical companies listed with Dhaka Stock Exchange for the period from 2001 to 2015. They concluded that there is a significant positive relationship between average payment period and return on asset; and cash conversion cycle and return of equity, while there is a significant negative relationships between return on asset and average collection period, inventory conversion period, and cash conversion cycle; return of equity and average payment period; earning per share and average collection period and average payment period.

Through the review of relevant and contemporary literature, it can be understood that working capital management can be measured by inventory conversion period, average collection period, average payment period, and cash conversion cycle, and the profitability can be measured by return on assets (ROA), return on equity (ROE).

Research Hypotheses

- i. H₀₁: There is no significant relationship between the Average Collection Period (ACP) and Profitability.
- ii. H₀₂: There is no significant relationship between the Inventory Conversion Period (ICP) and Profitability.
- iii. H₀₃: There is no significant relationship between the Average Payment Period (APP) and Profitability.
- iv. H₀₄: There is no significant relationship between the Cash Conversion Cycle (CCC) and Profitability.

Research Methodology

Population, Sample, and data collection:

The Dhaka Stock Exchange (DSE) has 126 manufacturing companies; 52 manufacturing companies are randomly selected from different sectors. A total of 251 firm years are used as panel data for the required data analysis. All the numerical data of these selected firms are obtained from the companies' published annual report started from 2012 to 2017.

Model Specification

The firm's profitability (ROA and ROE) is modeled as a function of the four core working capital management measures like debt ratio, current ratio, sales growth, firm size, and firm characteristics. The following effects of working capital management on the firm's profitability are modeled using the following OLS regression equations to obtain the estimates:

$$ROA = f(CR, DR, ACP, ICP, APP, CCC, SG, SIZE)$$

$$ROE = f(CR, DR, ACP, ICP, APP, CCC, SG, SIZE)$$

$$\text{Model 1: } ROA_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 ACP_{it} + \varepsilon_{it}$$

$$\text{Model 2: } ROA_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 ICP_{it} + \varepsilon_{it}$$

$$\text{Model 3: } ROA_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 APP_{it} + \varepsilon_{it}$$

$$\text{Model 4: } ROA_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 CCC_{it} + \varepsilon_{it}$$

$$\text{Model 5: } ROA_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 ACP_{it} + \beta_6 ICP_{it} + \beta_7 APP_{it} + \beta_8 CCC_{it} + \varepsilon_{it}$$

$$\text{Model 6: } ROE_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 ACP_{it} + \varepsilon_{it}$$

$$\text{Model 7: } ROE_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 ICP_{it} + \varepsilon_{it}$$

$$\text{Model 8: } ROE_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 APP_{it} + \varepsilon_{it}$$

$$\text{Model 9: } ROE_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 CCC_{it} + \varepsilon_{it}$$

$$\text{Model 10: } ROE_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 DR_{it} + \beta_3 SG_{it} + \beta_4 FS_{it} + \beta_5 ACP_{it} + \beta_6 ICP_{it} + \beta_7 APP_{it} + \beta_8 CCC_{it} + \varepsilon_{it}$$

Where ROA denotes the return on assets, ROE is the return on equity, CR is the current ratio, DR is the debt ratio, SG is the sales growth, FS is the firm size as measured by the natural logarithm of total assets, ICP is the inventory conversion period, ACP denotes the average collection period, APP denotes the average payment period, and CCC is the cash conversion cycle, ε is the error term of the model and $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the Regression model coefficients. The subscript i indicate firms and t indicate years. In the first model, the ACP has been used against the ROA. In the second model, the ICP has also been used against the ROA. The third model involves a regression of the APP against the ROA. In the fourth model, the CCC is regressed against the ROA. In the fifth model, all four working capital measures (ACP, ICP, APP, and CCC) have been regressed together against the ROA. In the sixth model, the ACP has been used against the ROE. In the seventh model, the ICP has also been used against the ROE. The eighth model involves a regression of the APP against the ROA. In the ninth model, the CCC is regressed against the ROE. Finally, all the four working capital measures (ACP, ICP, APP, and CCC) have been regressed together against the ROE.

Data and Variables

For measuring the impacts of firm profitability, which are the ratio of earnings before interest and tax to total assets and total equity separately. Here ROA and ROE are used as dependent variables. ROA and ROE determine the management efficiency to use assets

and owner's equity for generating earnings. (Makori & Jagongo, 2013).ROA is a better measure since it relates to the company's profitability to the asset base (Padachi, 2006). The inventory conversion period (ICP), the average collection period (ACP), the average payment period (APP), and the Cash Conversion Cycle (CCC) are used as the independent variables which are used as a measurement of working capital management of the firm. These variables are selected because many researchers (Deloof, 2003; Garcia-Teruel& Martinez-Solano, 2007; Jose et al., 1996; Nazir&Afza,2009; Rahman& Nasr, 2007; Huang et al. (2009); and Shin & Soenen, 1998; Makori&Jagongo, 2013) have used these to calculate the relationship between WCM and profitability in various markets. The variables, abbreviations, and their measurements are as follows:

Table 1: List of Variables

Variable	Abbreviation	Measurement
Return on Assets	ROA	Earnings Before Tax And Interest/Total Assets
Return on Equity	ROE	Earnings Before Tax And Interest/Total Equity
Average Collection Period	ACP	Accounts Receivable/Net Sales*365
Inventory Conversion Period	ICP	Inventory/Cost of Sales*365
Average Payment Period	APP	Accounts Payable/Cost of Sales*365
Cash Convention Cycle	CCC	ACP + ICP – APP
Sales Growth	SG	(Salest – Salest-1)/Salest-1
Debt Ratio	DR	Total Liabilities/Total Assets
Current Ratio	CR	Current assets/Current Liabilities
Firm Size	SIZE	Ln(Total Assets)

Analysis:**Descriptive Statistics:**

Descriptive analysis shows the mean, median, standard deviation, minimum, and maximum.

Table 2: Descriptive Statistics of Variables

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
CR	242	.39	8.54	1.7386	1.21727
DR	250	.02	.91	.4350	.18827
ROA	251	-.0449	.4931	.091357	.0880163
ROE	232	-.1505	.5270	.142982	.1132340
ACP	247	6.00	275.00	82.9150	58.69347
ICP	248	2.00	296.00	125.5484	68.94084
APP	245	3.00	217.00	53.6776	51.78564
CCC	249	-82.00	562.00	153.4578	114.09980
SG	204	-.89	1.23	.1013	.28257
FS	252	14.93	25.55	21.4497	2.07858
Valid N (listwise)	171				

Source: 2011-2017 Survey Data, SPSS Output

Table 2 represents the summary statistics of the variables used in the present study for 251 firm years. The table shows the average ROA is 9.14%, with a standard deviation of 8.80%. The table also shows that the mean value of ROE is 14.30%, with a standard deviation of 11.32%. The average ACP is 82.92 days, with a standard deviation of 58.69 days. On average, firms take 125.55 days to convert their inventories into sales with a standard deviation of 68.94days. On average, the firms take 53.68days to pay their creditors with a standard deviation of 51.79 days.

The mean cash conversion cycle is 153.46 days, with a standard deviation of 114.10 days. The table also shows that an average firm has a size of 21.45, with a standard deviation of 2.08. The mean leverage ratio is 43.50%, with a standard deviation of 18.83%. The average current assets ratio is 1.74, with a standard deviation of 1.22. The typical firms have sales growth by almost 10.13% annually on average.

Correlations Analysis

Table 3: shows the correlation among different variables.

Table 3: Correlations Results:										
	ROA	ROE	CR	DR	ACP	ICP	APP	CCC	SG	FS
ROA	1									
Sig (2-Tailed)										
ROE	.614**	1								
Sig (2-Tailed)	.000									
CR	.181**	.082	1							
Sig (2-Tailed)	.005	.221								
DR	-.147*	.001	-.408**	1						
Sig (2-Tailed)	.020	.993	.000							
ACP	-.172**	-.174**	.192**	-.309**	1					
Sig (2-Tailed)	.007	.009	.003	.000						
ICP	-.167**	-.374**	.083	-.177**	.171**	1				
Sig (2-Tailed)	.009	.000	.199	.005	.008					
APP	.081	.046	-.195**	.036	-.135*	-.015	1			
Sig (2-Tailed)	.206	.490	.003	.580	.036	.815				
CCC	-.223**	-.328**	.179**	-.254**	.659**	.700**	-.516**	1		
Sig (2-Tailed)	.000	.000	.005	.000	.000	.000	.000			
SG	.184**	.131	.164*	-.038	-.049	-.068	-.102	-.021	1	
Sig (2-Tailed)	.009	.071	.022	.590	.485	.341	.152	.762		
FS	-.357**	-.231**	.099	-.073	.179**	.183**	-.264**	.321**	.137	1
Sig (2-Tailed)	.000	.000	.124	.249	.005	.004	.000	.000	.051	

** . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: 2011-2017 Survey Data, SPSS Output

From Table 3, it is found that the ROA is negatively related to DR, ACP, ICP, CCC and FS. The negative relation between ROA and ACP indicates that if the account receivable is paid quickly, the more cash is available to purchase inventory for sales, which increases profitability. The negative relationship between ROA and ICP indicates that less time in inventory conversion enhances assets' returns. The inverse relationship between ROA and CCC indicates that decreasing the time gap between payment for raw materials and collection from sales increases the profitability.

The negative relationship between ROA and FS indicates that the firm size is negatively related to profitability. From the Table it is also found that the ROA is positively related to CR, APP, and SG. The positive relationship between ROA and CR indicates more current assets like inventory enhance more return on assets.

The positive relation between ROA and APP indicates that more time to pay suppliers helps the firm hold some cash to purchase more inventories for sale, thus increasing its sales levels, increasing profitability. The correlation coefficients of CR, DR, ACP, ICP, CCC, SG, FS are significant, while the correlation coefficients of ICP is not significant.

This Table also shows that the ROE is negatively related to ACP, ICP, CCC and FS and positively related to CR, DR, APP, and SG. The correlation coefficients of ACP, ICP, CCC, SG, FS are significant while the correlation coefficients of CR, DR, and APP are not significant.

Regression analysis

For testing hypotheses, OLS regression analysis has been conducted to determine whether there is a significant relationship between working capital management and profitability. Table 4 provides results for the models tested by this study.

Table 4: Regression Result for Dependent Variable ROA

Dependent Variable: Return on Assets (ROA)					
Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.420(0.000)***	0.425(0.000)***	0.427(0.000)***	0.387(0.000)***	0.429(0.000)***
CR	0.198(0.006)***	0.167(0.016)**	0.162(0.025)**	0.189(0.007)***	0.174(0.015)**
DR	-0.159(0.026)**	-0.177(0.013)**	-0.134(0.059)*	-0.197(0.006)***	-0.224 (0.002)***
SG	0.182(0.007)***	0.177(0.008)***	0.194(0.004)***	0.176(0.008)***	0.168(0.012)**
FS	-0.377(0.000)***	-0.363(0.000)***	-0.408(0.000)***	-0.317(0.000)***	-0.341 (0.000)***
ACP	-0.132(0.060)*				0.040(0.677)
ICP		-0.186(0.007)***			
APP			0.038(0.585)		-0.092(0.277)
CCC				-0.245(0.001)***	-0.327(0.005)**
Adjusted R2	0.222	0.233	0.213	0.249	0.237
F-Value	11.888(0.000)***	12.580(0.000)***	11.057(0.000)***	13.640(0.000)***	9.314(0.000)***
D-W Statistic	0.712	0.744	0.711	0.731	0.737

*, **and ***Denotes significance level at 10%, 5% & 1% levels, respectively.

Source: 2011-2017 Survey Data, SPSS Output

Model 1, there is no significant relationship between the Average Collection Period and Return on Assets. The regression results indicate that ACP's coefficient is negative with -0.132, but it is not significantly different from zero (p-value =0.060). Thus, H_{01} hypothesis is accepted and is concluded that ACP is not statistically significant at 5% significance level ($p > 0.05$). The overall model is statistically significant, as the F-value of 11.888 ($p < 0.05$). The model's adjusted R2 0.222 implies that this model explains 22.2% of the variation in the profitability of the firms.

Model 2 tests the hypothesis that there is no significant relationship between Inventory Conversion Period and Return on Assets. From the regression results, it is found that the coefficient of ICP is negative with -0.186, and it is significantly different from zero (p-value =0.007). Thus, H_{02} hypothesis is rejected and is concluded that ICP is statistically significant at 5% significance level ($p < 0.05$), and there is a significant relationship between ICP and ROA. The overall model is statistically significant, as the F-value of 12.580 ($p < 0.05$). The model's adjusted R2 0.233 implies that this mode explains 23.3% of the ROA firms' variation.

Model 3 tests the hypothesis that there is no significant relationship Average Payment Period and Return on Assets. The regression results indicate that APP's coefficient is positive with 0.038, but it is not significantly different from zero (p-value =0.446). Thus, H_{03} hypothesis is accepted and is concluded that APP is not statistically significant at 5% significance level ($p > 0.05$). The overall model is statistically significant, as the F-value of 11.057 ($p < 0.05$). The model's adjusted R2 0.213 implies that 21.3% of the firms' firms' variation in the ROA are explained by this model.

Model 4 tests the hypothesis that there is no significant relationship between Cash Convention Cycle and Return on Assets. The regression results indicate that CCC's coefficient is negative with -0.245, and it is significantly different from zero (p-value =0.001). Thus, H_{04} hypothesis is rejected and is concluded that CCC is statistically significant at 5% significance level ($p < 0.05$), and there is a significant relationship between CCC and ROA.

The overall model is statistically significant, as the F-value of 13.640 ($p < 0.05$). The model's adjusted R2 0.249 implies that this model explains 24.9% of the firms' variation in the ROA. Model 5 is a model where all the variables are included for finding out the most significant variables affecting the ROA. The model shows that CR, DR, SG, FS, and CCC are highly significant and ACP and APP are not significant. In this model, the ICP is excluded from the model, CR and SG are positively related to the ROA, and DR, FS, ACP, APP, and CCC are negatively related to ROA. The model's adjusted R2 is 23.7%, with an F-value of 9.314, which is highly significant ($p < 0.01$).

Table 4: Regression Result for Dependent Variable ROE

Dependent Variable: Return on Equity (ROE)					
Parameter	Model 6	Model 7	Model 8	Model 9	Model 10
Constant	0.465(0.000)***	0.472(0.000)***	0.496(0.000)***	0.402(0.000)***	0.488(0.000)***
CR	0.108(0.171)	0.099(0.171)	0.071(0.376)	0.126(0.094)*	0.093(0.216)
DR	0.048(0.536)	-0.026(0.726)	0.058(0.448)	-0.025(0.738)	-0.065(0.386)
SG	0.175(0.020)**	0.127(0.067)*	0.173(0.020)**	0.139(0.052)*	0.129(0.069)*
FS	-0.314 (0.000)***	-0.247 (0.000)***	-0.347 (0.000)***	-0.209 (0.005)***	-0.243 (0.001)***
ACP	-0.069(0.367)				0.284(0.004)***
ICP		-0.373(0.000)***			
APP			-0.002(0.983)		-0.235 (0.007)***
CCC				-0.334 (0.000)***	-0.665 (0.000)***
Adjusted R2	0.111	0.229	0.112	0.190	0.251
F-Value	5.460(0.000)***	11.580(0.000)***	5.346(0.000)***	9.372(0.000)***	9.118(0.000)***
D-W Statistic	0.852	0.961	0.883	0.902	1.005

*, **and ***Denotes significance level at 10%, 5% & 1% levels, respectively.

Source: 2011-2017 Survey Data, SPSS Output

Model 6 tests the hypothesis that there is no significant relationship between the Average Collection Period and Return on Equity. The regression results indicate that ACP's coefficient is negative with -0.069, but it is not significantly different from zero (p-value =0.367). Thus, H₀₁ hypothesis is accepted and is concluded that ACP is not statistically significant at 5% significance level (p>0.05). The overall model is statistically significant, as the F-value of 5.460 (p<0.05). The model's adjusted R2 0.111 implies that this model explains 11.1% of the variation in the profitability of the firms.

Model 7 tests the hypothesis that there is no significant relationship between Inventory Conversion Period and Return on Equity. from the regression result, it is found that the coefficient of ICP is negative with -0.373, and it is significantly different from zero (p-value =0.000). Thus, H₀₂ hypothesis is rejected and is concluded that ICP is statistically significant at 5% significance level (p<0.05), and there is a significant relationship between ICP and ROE. The overall model is statistically significant, as the F-value of 11.580 (p<0.05). The model's adjusted R2 0.229 implies that 22.9% of the variation in the ROE of the firms is explained by this model.

Model 8 tests the hypothesis that there is no significant relationship Average Payment Period and Return on Equity. From the regression result, it is found that the coefficient of APP is negative with -0.002, and but it is not significantly different from zero (p-value =0.983). Thus, H₀₃ hypothesis is accepted and is concluded that APP is not statistically significant at 5% significance level (p>0.05). The overall model is statistically significant, as the F-value of 5.346 (p<0.05). The model's adjusted R2 0.112 implies that this model explains 11.2% of the variation in the ROE of the firms.

Model 9 tests the hypothesis that there is no significant relationship between Cash Convention Cycle and Return on Equity. From the regression results, it is found that the coefficient of CCC is negative with -0.334, and it is significantly different from zero (p-value =0.000). Thus, H₀₄ hypothesis is rejected and is concluded that CCC is statistically significant at 5% significance level (p<0.05), and there is a significant relationship between CCC and ROE. The overall model is statistically significant, as the F-value of 9.372 (p<0.05). The model's adjusted R2 0.190 implies that this model explains 19.0% of the variation in the ROE of the firms.

Model 10 is a model where all the variables are included for finding out the most significant variables affecting the ROE. The model shows that SG, FS, ACP, APP, and CCC are highly significant, and CR and DR are not significant. In this model, the ICP is excluded from the model, and CR and SG are positively related to the ROE, and DR, FS, ACP, APP, and CCC are negatively related to ROE. The model's adjusted R2 is 25.1%, with an F-value of 9.118, which is highly significant (p<0.01).

Implications

It is found that for manufacturing companies in Bangladesh, working capital management is very important and has a statistically significant role in the firm's profitability. For getting benefits manufacturing companies may follow the following suggestions:

- The negative relationship of the Average Collection Period with Return on Assets and Return on Equity indicates that the lower the collection time higher the profitability. Manufacturing companies can emphasis collection from tread receivables quickly, and this fund can be invested in further profit-generating activities.

- ii. The negative relationship of the Inventory Conversion Period with the profitability indicates that the inventory holding costs lessen the profitability of the firm. So manufacturing companies can minimize the inventory conversion cycle period as much as possible.
- iii. The positive relationship between Average Payment Period with profitability indicates that if the companies take the time to pay to their creditors, they can use this fund for other profit-generating activities.
- iv. The negative relationship of the Cash Conversion Cycle with the profitability indicates less CCC emphasis higher profitability. So manufacturing companies should convert inventory into cash quickly.

Conclusions

The proper management and utilization of working capital are very important for manufacturing companies in Bangladesh to ensure sufficient profit. If the firm has expansive working capital, then the firm needs to bear more cost of capital and more time value of money. If the firm has insufficient working capital, the firm will be unable to pay the current expenditures. It's considered as the lifeblood of the firm. Proper management of working capital may reduce the cost of capital and the risk of losing the firm's going concerned.

The study has investigated the relationship between working capital management and profitability of manufacturing companies in Bangladesh. The study is based on the 251 firm-year observations from 52 manufacturing firms listed on Dhaka Stock Exchange for the period of 2012-2017. This study used two dependent variables Return on Assets (ROA) and Return on Equity (ROE), separately. This study has found a significant negative relation of CCC, and ACP with ROA, and also a significant negative relationship of CCC, and APP with ROE. It also found that ICP is also positively related to ROA and ROE. This study would have a significant contribution that can be gained by manufacturing companies if they wish to manage their working capital.

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