An Empirical Investigation of Cash Conversion Cycle of Manufacturing Firms and its Association with Firm Size and Profitability

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ABSTRACT

The purpose of this empirical study is to investigate Cash Conversion Cycle of thirty manufacturing firms listed in Dhaka Stock Exchanges under six different categories, which are, Food and allied, Pharmaceuticals and chemical, Cement, Textile, Engineering and Miscellaneous. This paper sets industry average Cash Conversion Cycle for these six industries and examines the relationship of Cash Conversion Cycle with firm size and profitability. This study did not find statistically significant differences among the Cash Conversion Cycle of varying manufacturing industries. The result of this study indicates a statistically significant negative relationship between the Cash Conversion Cycle and profitability, especially in terms of Return on Equity. The result also shows that the Cash Conversion Cycle of manufacturing firm also has significant negative relationship with firm size, when measured in terms of net sales.

Keywords: Cash Conversion Cycle, Size, Profitability, Manufacturing Industry, ROE, ROA

INTRODUCTION

Working capital management refers to the management of current assets and current liabilities of a firm in order to achieve a balance between profitability and risk that contributes positively to the value of a firm (Gitman, 2000). One of the popular and powerful measures of working capital management is Cash Conversion Cycle. Firm's typically follow a cycle, in which they purchase inventory, sell goods on credit and then collect accounts receivables. This cycle is referred to as Cash Conversion Cycle. Therefore, the Cash Conversion Cycle can be defined as the length of time between the firm's actual cash expenditures to pay for raw materials and its own cash receipts from the sale of finished goods. Thus the Cash Conversion Cycle equals the average length of time a dollar is tied

up in current assets (Ehrhardt & Brigham, 2003). Therefore, it is evident that Cash Conversion Cycle focuses only on the time period for which cash flow is engaged in the cycle and does not consider the amount of fund committed to a product as it moves through the Cash Conversion Cycle (Nobanee, 2009).

The Cash Conversion Cycle is a more powerful measure of working capital management and firm's liquidity, compared to the static traditional measures which are found to be inadequate and misleading in the evaluation of firm's liquidity. According to Moss Stine (1993), a useful way of assessing the liquidity of a firm is through Cash Conversion Cycle. The traditional measures of liquidity such as the current ratio and quick ratio are useful liquidity indicators but they focus on static balance sheet values (2009). On the contrary, Jose et al. (1996) advocate Cash Conversion Cycle as a dynamic measure of ongoing liquidity management, since it combines both balance sheet and income statement data to create a measure associated with time dimension (2009).

The length of Cash Conversion Cycle is expected to vary across industries because there is likely to be an industry affect on individual firms' Cash Conversion Cycle. Therefore, determination of industry average is significant since it allows the individual firm's within an industry to evaluate its own performance relative to the industry and prevents itself from probable liquidity crisis. The primary focus of this empirical study is investigating the differences in Cash Conversion Cycle of six different manufacturing industries of Bangladesh.

Small firm may not have much investment in fixed assets. But it generally has higher level of investment in current assets since these firms faces severe problem in collecting their debtors, especially in Bangladesh. Besides, the role of current liabilities in financing current assets is far more significant in case of small firms. Because as unlike large firms, small firms faces difficulty in raising long-term finances (Pandey, 2005). Thus, Cash Conversion Cycle is likely to have a negative relationship with firm size. Earlier studies also have proved that size of firm is one of the variables that affect Cash Conversion Cycle. Therefore, this study aims to establish association between Cash Conversion Cycle and firm size in the context of manufacturing sector of Bangladesh.

A long Cash Conversion Cycle might increase profitability because it leads to higher sales, greater investment in inventories and trade credit granted by the firm. On the contrary, shorter Cash Conversion Cycle harms firms' profitability. However, corporate profitability might decrease with the Cash Conversion Cycle, if the cost of investment in working capital rises faster than the benefits of holding more inventories and granting more trade credit to customers (Gill, Bigger, & Mathur, 2010). Therefore, Cash Conversion Cycle may have both positive and negative impact on the firm's profitability. Earlier studies have also established both positive and negative relationship between Cash Conversion Cycle and

profitability. Thus, the present study also attempts to determine the association between Cash Conversion Cycle and profitability of manufacturing firms of Bangladesh.

LITERATURE REVIEW

The corporate finance literature written in the context of Bangladesh has traditionally focused on capital structure, investments, dividends and firm's valuations. The study of working capital management in the context of Bangladesh is very little explored by the researchers. Therefore, considering this research gap, the present empirical study seeks to shed light onto this area by evaluating one of the powerful measures of working capital management, which is Cash Conversion Cycle.

Working capital management is concerned with the management of current assets and current liabilities and the interrelationship between them. Its operational goal is to manage the current assets and current liabilities in such as way that a satisfactory level of working capital is maintained (Khan & Jain, 2007). One of the powerful measures of working capital management is Cash Conversion Cycle. Schilling (1996) and Gallinger (1997) advocates Cash Conversion Cycle as a powerful working capital evaluation technique. The advantage of this technique is that it can be used to evaluate changes in circulating capital and thereby facilitate the monitoring and controlling of its components (Lyroudi & Lazaridis, 2000). According to Richards and Laughlin (1980) Cash Conversion Cycle provides dynamic insights compared to traditional static liquidity ratios. They suggested a positive relationship between the current and quick ratio and the Cash Conversion Cycle (Lyroudi & Lazaridis, 2000). Mos and Stine (1993) and Jose et al. (1996) suggest that traditional static measures focus on single point in time whereas Cash Conversion Cycle being a dynamic measure of time takes a firm to go from cash outflow to cash inflow (2009).

Cash Conversion Cycle is the length of time that elapses from when the firm pays for the material it uses in its production cycle until it receives cash from the sales of its products. The Cash Conversion Cycle components are inventory conversion period, receivables collection period and payable deferral period. The inventory conversion period is the number of days it takes to convert raw materials into finished goods and sell those goods to the firm's customers. The receivables collection period is the time taken to collect receivables from the customers. The payable deferral period refers to the time taken by the firm to pay its own obligations. Cash Conversion Cycle reports the result in length of time, which is important because the amount of capital needed to finance the company is related to the speed with which 'input' is converted into 'output' and payment

is received for the sales of this 'output'. The following formula is used to calculate the Cash Conversion Cycle of a firm (Kaen, 1995):

Cash Conversion Cycle = (Inventory conversion Period + Receivables collection period – Payable deferral period)

$$\text{Where, i) Inventory Conversion Period} = \frac{\text{Inventory}}{\text{Cost of Goods Sold} / 365}$$

$$\text{ii) Receivables Collection Period} = \frac{\text{Account Receivables}}{\text{Credit Sales} / 365}$$

$$\text{iii) Payable Deferral Period} = \frac{\text{Accounts Payable}}{\text{Cost of Goods Sold} / 365}$$

Cash Conversion Cycle can be positive as well as negative. A positive result indicates the number of days a company must borrow or tie up capital while awaiting payment from a customer. According to Hutchison et al. (2007) a negative Cash Conversion Cycle indicates the number of days a company has received cash from sales before it must pay its suppliers (2009). The main goal of any firm would be to shorten its Cash Conversion Cycle. However, the changes in the length of the Cash Conversion Cycle are likely to have costs as well as benefits for the firm.

Level of working capital and Cash Conversion Cycle of a firm is affected by a variety of factors and one of the important factors is nature of the business. According to Belt (1985) retailing and wholesaling firms both have Cash Conversion Cycle shorter than those of manufacturing firms (Lyroudi & Lazaridis, 2000). Studies by Hawawini et al. (1986), Weinraub and Visscler (1998), Wu (2001) and Filbeck (2005) have showed an industry affect on firm's working capital policies which was explained by differences in trade credit and investment in inventories across industries (Pedro et al. 2009). Besides Smith (1987) and Ng et al. (1999) suggested a wide variation in credit terms across industries but little variation within industries Nisaken and Nisaken (2006) also found differences in levels of accounts receivables and accounts payables between industries (Pedro et al. 2009). Furthermore, Hutchison et al. (2007) advocate that analysis of an individual firm's Cash Conversion Cycle is helpful while industry benchmarks are crucial for a company to evaluate its Cash Conversion Cycle's performance and assess opportunities for improvement (2009).

Empirical evidences suggests that size is another variable that affects working capital management, hence the Cash Conversion Cycle of a firm. Moss and Stine (1993) examined the relationship between the Cash Conversion Cycle and the size of US retail firms and found that larger firms have shorter Cash Conversion Cycle, which implies smaller companies should try to better manage their Cash Conversion Cycle (Lyroudi & Lazaridis, 2000). Kieschnick et al. (2006) and Chiou et al. (2006) demonstrated a positive relationship between size and Cash Conversion Cycle (Pedro et al. 2009). It is expected in the present study, as in previous studies by Moss and Stine (1993), size will also negatively influence the Cash Conversion Cycle of manufacturing firms of Bangladesh.

Level of profit of a firm is also affected by its Cash Conversion Cycle. Sanger (2001) advocates that working capital though represents a safety cushion for providers of short-term funds of the company, however, from operating point of view, excessive level of working capital is looked at as a restraint on financial performance, since these assets do not contribute to return on equity (Eljelly, 2004). Deloof (2003) found a significant negative correlation between gross operating income and the number of days in account receivables, inventories and accounts payables of Belgian firms. Raheman and Nasr (2007) established a strong negative relationship between variables of working capital management and profitability of the firm (Gill et al., 2010). The present study also aims at investigating the relationship between Cash Conversion Cycle and profitability of manufacturing firms of Bangladesh.

RESEARCH OBJECTIVES

The objectives of this study are stated below:
1) Determination and examination of difference in Cash Conversion Cycle of six manufacturing industries, which are categorized as Food and allied, Pharmaceutical and Chemical, Textile, Cement, Engineering and miscellaneous.
2) Determining firm size in each industry and examining its association with Cash Conversion Cycle.
3) Determining profitability of firm in each industry and examining its association with Cash Conversion Cycle.

To fulfill the aforesaid objectives the following null hypotheses are formulated:
1) There are no significant differences among the Cash Conversion Cycle of all six manufacturing industries.
2) There is no significant linear relationship between Cash Conversion Cycle and firm size.

3) There is no significant linear relationship between Cash Conversion Cycle and firm's profitability.

RESEARCH METHODOLOGY

This empirical research primarily focuses on secondary data, which were obtained from the annual reports of the corporations listed on the Dhaka Stock Exchange. The sample consists of thirty manufacturing companies from six different manufacturing industries, which are categorized in the Dhaka Stock Exchange as Engineering, Textile, Food and Allied, Pharmaceuticals and Chemical, Cement and Miscellaneous. For selection of sample, stratified random sampling method is used and 5 sample companies are selected under each type of industry. Service rendering corporations were not included since they do not fit with the scope of the study. The data are obtained for the year 2008 and includes yearly sales, cost of goods sold, receivables, payables, inventory, total asset, total equity and net profit of thirty sample companies. These data were used to calculate the Cash Conversion Cycle, average firm size and average profitability of firms' in each of the six different industries.

When the means of more than two groups are to be compared, one-way ANOVA is the appropriate statistical tool (Zikmund, 2000). Therefore, in order to determine, whether statistically significant differences exist among the Cash Conversion Cycle of six manufacturing industries, one-way ANOVA analysis was conducted. Here, the independent variable is industry which has six different levels. The dependent variable is Cash Conversion Cycle. Since there are six groups or levels, a t-test cannot be used for the testing of statistical significance.

In this study, the firm size is measured by total assets and net sales and profitability is measured by ROA and ROE. The most popular technique that indicates the relationship of one variable to another is simple correlation analysis (Zikmund, 2000). Therefore, to determine the linear relationship among variables, which are Cash Conversion Cycle, total assets, net sales, ROA and ROE, Pearson Correlation analysis is applied. Furthermore, to determine the significance of a correlation coefficient, a t-test is performed, which hypothesizes that linear relationship between two variables is zero. The result of correlation and t-test is reported through a correlation matrix table with a footnote indicating each statistically significant coefficient. Data are summarized by Microsoft Excel and different tests were conducted by Minitab Statistical Package.

RESEARCH FINDINGS

Descriptive Statistics

Table I (Appendix) reports the descriptive statistics of the main variables used in this study. This table shows the yearly average values of inventory, accounts payables, accounts receivables, total assets, net sales, ROA, ROE and Cash Conversion Cycle of six different manufacturing industries. The reported differences in Cash Conversion Cycle of industries support the argument that there is an industry affect on the firms' Cash Conversion Cycle. Among all six industries, Engineering has the longest Cash Conversion Cycle, followed by Textile and Cement industry.

The reason behind these industries to have longer Cash Conversion Cycle is that these enterprises makes fairly large amount of investment in inventories and receivables, to support their production, purchase and sales activity. Besides, these sectors tend to store inventory for longer period of time and production process also lengthen days in inventory. Furthermore, they also take most time to collect payment from its customers. Hence, these industries faces more need to finance their working capital requirement. The lowest average Cash Conversion Cycle is found in the Food and Allied industry, because this sector stores inventory for the shortest period of time.

A formal test known as, one-way ANOVA is introduced to compare the average Cash Conversion Cycle of six different manufacturing industries. This test allows to determine whether the differences in Cash Conversion Cycle are statistically significant or not. The test result shown in Table II (Appendix) reports that the critical value of F at the 0.05 level of significance for five and twenty four degrees of freedom is 2.62. The table II (Appendix) indicates that the calculated value of F is 1.348 which is below the critical value 2.62. Therefore, the null hypotheses have been accepted. The test suggests that all the six different industries have approximately the same average Cash Conversion Cycle and there are no statistically significant differences among them. Therefore, the differences that exist among Cash Conversion Cycle of manufacturing industries of Bangladesh are not statistically significant.

Cash Conversion Cycle and Firm Size

Second objective of this study is to investigate the relationship between Cash Conversion Cycle and firm size, for which two measures are used, which are net sales and total assets. Pearson Correlation analysis and t-test was performed to determine statistically significant relationship. Result of correlation analysis in

Table III (Appendix) indicates that the linear relationship of Cash Conversion Cycle with total asset and net sales is negative. The correlation matrix shown in table III (Appendix) also points out that the negative correlation between Cash Conversion Cycle and net sales is statistically significant. The critical value of t-test at 0.05 level of significance (two-tailed) is 2.048 and the calculated value of 't' for correlation of Cash Conversion Cycle with total assets and net sales are -1.42 and -3.49 respectively. Since the value of 't' for correlation between net sales and Cash Conversion Cycle, exceeds the critical value, the null hypothesis is rejected. Therefore, it can be concluded that there exists significant negative linear relationship between Cash Conversion Cycle and firm size, in the context of manufacturing firms of Bangladesh. This means, larger firms in Bangladesh have shorter Cash Conversion Cycle and smaller firms have longer Cash Conversion Cycle. The probable reason could be that, in Bangladesh smaller firms have less bargaining power, grants more trade credit to generate sales. Henceforth makes higher investment in inventories and also faces severe problem in collecting their debtors. Therefore, the ratio of investment made by smaller firms in current assets is high compared to fixed assets and thus resulting in longer Cash Conversion Cycle. On the contrary, larger firms having more bargaining power tend to have less investment in current assets compared to smaller firms, thus resulting in shorter Cash Conversion Cycle. Therefore, small-scale firms should focus on shortening their Cash Conversion Cycle by reducing their inventory conversion period, receivables collection period and by increasing accounts payable period.

Cash Conversion Cycle and Profitability of the Firm

To determine the relationship of Cash Conversion Cycle with profitability two criteria has been used, which are Return on Equity (ROE) and Return on Assets (ROA). The correlation matrix Table III (Appendix) shows that the linear relationship of Cash Conversion Cycle with ROA and ROE is negative indicating longer Cash Conversion Cycle reduces profitability of the firm and vice-versa. Results of correlation analysis in Table III (Appendix) also indicate that the linear relationship of Cash Conversion Cycle with ROE is statistically significant. The critical value of t-test at 0.05 level of significance (two-tailed) is 2.048 and the calculated value of 't' for correlation of Cash Conversion Cycle with ROE and ROA are -2.07 and – 1.63 respectively. Since the value of 't' for correlation between ROE and Cash Conversion Cycle, exceeds the critical value, the null hypothesis is rejected. Therefore, the result suggests, there exist significant negative linear relationship between Cash Conversion Cycle and profitability of manufacturing firms of Bangladesh. Longer Cash Conversion Cycle indicates

higher investment in inventories and debtors which in turn increases carrying cost and reduces profitability of the firm. Hence, firms having longer Cash Conversion Cycle should focus on shortening it by holding fewer days of production needs in raw material inventory, speeding up the production process, holding fewer goods in finished goods inventory, reducing the credit term offered to customers and taking longer time to pay trade creditors. However, the length of the Cash Conversion Cycle should be maintained at such a level, so that it does not lead to increase in shortage cost, which can also hampers firm's profitability.

CONCLUSION

This study presents the comparative average values of Cash Conversion Cycle for the six different manufacturing industries as listed in Dhaka Stock Exchange. Descriptive statistics reports that Cash Conversion Cycle varies from industry to industry. But the variation is not large enough to establish statistically significant differences among Cash Conversion Cycle of six manufacturing industries. However, several earlier studies have investigated the differences in working capital management across industries and also reported industry effect on firm's working capital policies.

Former studies of same kind showed that, firm size significantly affects cash conversion cycle. Jose et al. (1996) found that larger firms tend to be more profitable and tend to have shorter Cash Conversion Cycle (Pedro et al., 2009). The findings of the present study also indicate that there exists a significant negative linear relationship between the Cash Conversion Cycle and the firm size, especially in terms of net sales. Therefore, small-scale manufacturing firms have longer Cash Conversion Cycle and vice versa. The finding of the present study is also in line with the findings of Moss and Stine (1993). According to them, since longer Cash Conversion Cycles are associated with smaller firms, this offers a strong incentive for these firms to better manage their Cash Conversion Cycle (2009).

The tradition link between Cash Conversion Cycle and firm's profitability is that shorter Cash Conversion Cycle reduces the time period for which cash is tied up in working capital, thus improves profitability. A longer Cash Conversion Cycle indicates high level of investment in working capital resulting in higher carrying costs for the firm which hampers profitability. Former studies by Wu (2001) and Chiou et al. (2006) showed that the working capital requirement and the performance of the firm have effects on each other. In addition, they have found that Return on Assets has a negative relationship with measures of working capital management (Pedro et al., 2009). The present study also shows significant

negative linear relationship of Cash Conversion Cycle with Return on Equity. High opportunity cost or shortage cost is associated with shorter Cash Conversion Cycle whereas high carrying cost is associated with longer Cash Conversion Cycle. Therefore, the length of Cash Conversion Cycle can create both cost and benefits for the firm. Hence, understanding and weighting of these costs and benefits and efficient management of Cash Conversion Cycle is crucial for enhancing profitability of a firm.

LIMITATIONS AND SCOPE FOR FUTURE RESEARCH

This study comprises only thirty manufacturing firms from six different manufacturing industries of Bangladesh. Since the sample size is small, this study could not establish the existence of significant differences in Cash Conversion Cycle among varying industries, which has been found in parallel studies. Furthermore, being a study on a limited-scale, significant correlation between Cash Conversion Cycle and total assets and Cash Conversion Cycle and ROA, also could not be established. Therefore, future researches should include all the listed corporations under all categories of manufacturing industries. Besides the data obtained from the sample were only for the year 2008, which is one of the drawbacks of this study. However, future researches should include a large sample and cover a longer time period to investigate the differences in Cash Conversion Cycle among various manufacturing industries and also to determine its association with firm size and profitability.

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APPENDIX

Table I. Results of Descriptive Statistics

Industry	Inventory Yearly Average Taka	Receivables Yearly Average Taka	Payables Yearly Average Taka	CCC Yearly Average Days	Total Assets Yearly Average Taka	Net Sales Yearly Average Taka	ROA Yearly Average	ROE Yearly Average
Engineering	296958687	296384226	63374288.8	316.84	1269076636	812443043.4	0.0037	(0.00106)
Textile	528611683	465890743	499359336.2	150.07	2183356231	1358315306	0.02345	0.04803
Pharmaceutical & Chemical	890655492	176938412	67296669.8	139.55	6159757151	3304305714	0.08588	0.18467
Cement	267411400	240915372	209935314.2	149.66	4548627904	2298462381	(0.04091)	(0.05567)
Food & Allied	53747687	46768527	123328069	74.13	2080697617	2858563395	0.01201	0.06152
Miscellaneous	125069011	22478128.2	2643588	141.89	679457272	496384916.6	0.044289	0.093012

Table II. Results of One-way ANOVA Analysis

	Sum of Squares	Degree of Freedom	Mean Square	F (Calculated)	Level of Significance	Critical value of F
Between Groups	164,499.63	5	32,899.926	1.348	0.05	2.62
Within Groups	585,791.034	24	24,407.96			
Total	750,290.663	29				

Table III. Correlation Matrix

CCC		Net Sales	Total Assets	ROA	ROE
CCC	1	(0.551)*	(0.259)	(0.295)	(0.364)*
Sig. (two-tailed)		(0.349)	(1.42)	(1.63)	(2.07)
N	30	30	30	30	30
Net Sales	(0.551)*	1	0.811 *	0.177	0.333**
Sig. (two-tailed)	(0.349)		7.34	0.95	1.87
N	30	30	30	30	30
Total Assets	(0.259)	0.811 *	1	0.206	0.286
Sig. (two-tailed)	(1.42)	7.34		1.11	1.58
N	30	30	30	30	30
ROA	(0.295)	0.177	0.206	1	0.980*
Sig. (two-tailed)	(1.63)	0.95	1.11		26.06
N	30	30	30	30	30
ROE	(0.364)*	0.333**	0.286	0.980*	1
Sig. (two-tailed)	(2.07)	1.87	1.58	26.06	
N	30	30	30	30	30

* Correlation is significant at the 0.05 level of significance (two-tailed) and 28 degree of freedom.
** Correlation is significant at the 0.10 level of significance (two-tailed) and 28 degrees of freedom.