AN ANALYSIS OF WORKING CAPITAL MANAGEMENT EFFICIENCY IN TELECOMMUNICATION EQUIPMENT INDUSTRY

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Abstract

This study analyses the working capital management efficiency of firms from telecommunication equipment industry. The relationship between working capital management efficiency and profitability is examined using correlation and regression analyses. ANOVA analysis is done to study the impact of working capital management on profitability. Using a sample of 443 annual financial statements of 349 telecommunication equipment companies covering the period 2001-2007, this study found evidence that even though "days working capital" is negatively related to the profitability, it is not significantly impacting the profitability of firms in telecommunication equipment industry

1 Introduction

Working capital management (WCM) is the management of short-term financing requirements of a firm. This includes maintaining optimum balance of working capital components – receivables, inventory and payables – and using the cash efficiently for day-to-day operations. Optimization of working capital balance means minimizing the working capital requirements and realizing maximum possible revenues. Efficient WCM increases firms' free cash flow, which in turn increases the firms' growth opportunities and return to shareholders. Even though firms traditionally are focused on long term capital budgeting and capital structure, the recent trend is that many companies across different industries focus on WCM efficiency.

There is much evidence in the financial literature that present the importance of WCM. Results of empirical analysis show that there is statistical evidence for a strong relationship between the firm's profitability and its WCM efficiency [7]. However the study undertaken based on the data from CFO magazine on the rakings of firms on WCM efficiency reveals that the measures of WCM efficiency vary across different industries [5]. The study also gives significant evidence that issues of WCM are different for different industries and firms from different industry sectors adopt different approaches to working capital management. Firms follow an appropriate working capital management approach that is favorable to their industry. Firms in an industry that has less competition would focus on minimizing the receivable to increase the cash flow. For firms in industry where there are large numbers of suppliers of materials, the focus would be on maximizing the payable.

The Telecommunication industry is characterized by high intensive working capital requirements and high competition because of rapid technology changes, which make the WCM crucial to bring attractive earnings to shareholders. The study undertaken based on the data from CFO magazine on the rakings of firms on WCM efficiency gives statistical evidence that telecommunication industry showed

a wide variation in the WCM efficiency [6] and there is consistency in the approach of the working capital management within any given industry over a period of time. The subject of this analysis is about this variation in WCM measures and how a WCM component impacts WCM efficiency in the telecommunication industry. The analysis is done to get insight into how efficiently WCM is managed in telecommunication industry and to find the approach the telecommunication firms more inclined to in improving WCM efficiency.

2 Working Capital Management Concepts

The working capital meets the short-term financial requirements of a business enterprise. It is the investment required for running day-to-day business. It is the result of the time lag between the expenditure for the purchase of raw materials and the collection for the sales of finished products. The components of working capital are inventories, accounts to be paid to suppliers, and payments to be received from customers after sales. Financing is needed for receivables and inventories net of payables. The proportions of these components in the working capital change from time to time during the trade cycle. The working capital requirements decide the liquidity and profitability of a firm and hence affect the financing and investing decisions. Lesser requirement of working capital leads to less need for financing and less cost of capital and hence availability of more cash for shareholders. However the lesser working capital may lead to lost sales and thus may affect the profitability.

The management of working capital by managing the proportions of the WCM components is important to the financial health of businesses from all industries. To reduce accounts receivable, a firm may have strict collections policies and limited sales credits to its customers. This would increase cash inflow. However the strict collection policies and lesser sales credits would lead to lost sales thus reducing the profits. Maximizing account payables by having longer credits from the suppliers also has the chance of getting poor quality materials from supplier that would ultimately affect the profitability. Minimizing inventory may lead to lost sales by stock-outs. The working capital management should aim at having balanced, optimal proportions of the WCM components to achieve maximum profit and cash flow.

3 Measures of Working Capital Management Efficiency

The form and amount of working capital components vary over the operating cycle. It would be hard to get the amounts of the components used in operations for an operating cycle. Hence the working capital management efficiency is measured in terms of the "days of working capital" (DWC). DWC value is based on the dollar amount in each of equally weighted receivable, inventory and payable accounts. The DWC represents the time period between purchases of materials on account from suppliers until the sale of finished product to the customer, the collection of the receivables, and payment receipts. Thus it reflects the company's ability to finance its core operations with vendor credit.

The firm's profitability is measured using the operating income plus depreciation related to total assets (IA). This measure is indicator of the raw earning power of the firm's assets. Another profitability measure used for this analysis is the operating income plus depreciation related to the sales (IS). This indicates the profit margin on sales. To measure the liquidity of the firm the cash conversion efficiency (CCE) and current ratio (CR) are used. The CCE is the cash flow generated from operating activities related to the sales. The formulae for calculating these values are given in the following Table 1.

Working Capital Management Component Definitions	
Component	**Equation**
Days Sales Outstanding (DSO)	Receivables/(Sales/365)
Days Inventory Outstanding (DIO)	Inventories/(Sales/365)
Days Payable Outstanding (DPO)	Payables/(Sales/365)
Days Working Capital (DWC)	DSO + DIO - DPO
Current Ratio (CR)	Current Assets/Current Liabilities
Cash Conversion Efficiency (CCE)	(Cash flow from operations)/Sales
Income to Total Assets (IA)	(Operating Income + Depreciation)/Total Assets
Income to Sales (IS)	(Operating Income + Depreciation)/Sales

Table 1. Working Capital Management components definitions

4 Research Methodologies

The objectives of this research are:

1. Discover the relationship between the WCM efficiency and firm's profitability and liquidity to find if there is evidence of WCM in telecommunication equipment industry.
2. Discover the WCM component that relates to the performance of the WCM in the telecommunication equipment industry.

For these objectives, we formulate the following hypotheses and will attempt to find statistical evidences to support the hypotheses.

Hypothesis H1:
The DWC is negatively related to the company's profitability – higher DWC, lower the profitability and vice versa.

Hypothesis H2:
The DWC is negatively related to the cash conversion efficiency – higher the DWC, lower the cash conversion efficiency.

Hypothesis H3:
Firms in telecommunication industry manage all three components – DSO, DIO and DPO – equally for working capital management.

Hypothesis H4:
    DWC less than 59 days affect the profitability significantly.

Deriving statistical evidences to test hypotheses H1 and H2 is done to conform to the previous study of relationship between the WCM efficiency and profitability [7]. Correlation analysis among DWC, DSO, DIO, DPO, CCE, IA, IS and CR are done to get the statistical evidence in terms of Pearson correlation coefficients.

Statistical evidences are derived to find the approaches of WCM that telecommunication firms use to increase profitability and liquidity. Classical Analysis of Variance – ANOVA-F test is done for the hypotheses H3 and H4.

To do the analysis, a sample of 349 publicly listed communication equipment companies in USA are chosen randomly. The data for the measures of WCM, profitability and liquidity, are collected from the annual financial statements of these samples firms over the 2001-2007 periods. The publicly available financial information is collected from the Securities and Exchange Commission (http://www.sec.gov). The communication equipment companies are identified based on SEC's following Standard Industry Classification (SIC) codes:

1. Computer communication equipment (3576)
2. Radio &TV Broadcasting and communication equipment (3663)
3. Communication equipment (3669)
4. Telephone and Telegraph apparatus (3661)
5. Telegraph and other messages communication (4822)
6. Radio Telephone communication (4812)
7. Telephone communication (4813).

The research started with 640 publicly listed companies that fall under the above groups. Firms that do only communication services businesses were removed from the list and arriving at 349 companies. The starting sample of 973 financial statements of 349 companies for a period covering 2001-2007, is reduced to sample size of 443 entries of data after removing the outliers.

5 Research Findings

5.1 Descriptive Statistics

Initially the DWC values are calculated for all the 973 entries and a histogram is plotted to check the normality and outliers were removed using the inter-quartile range. The following figure (see Fig. 1) depicts the distribution of DWC that shows a normal distribution.
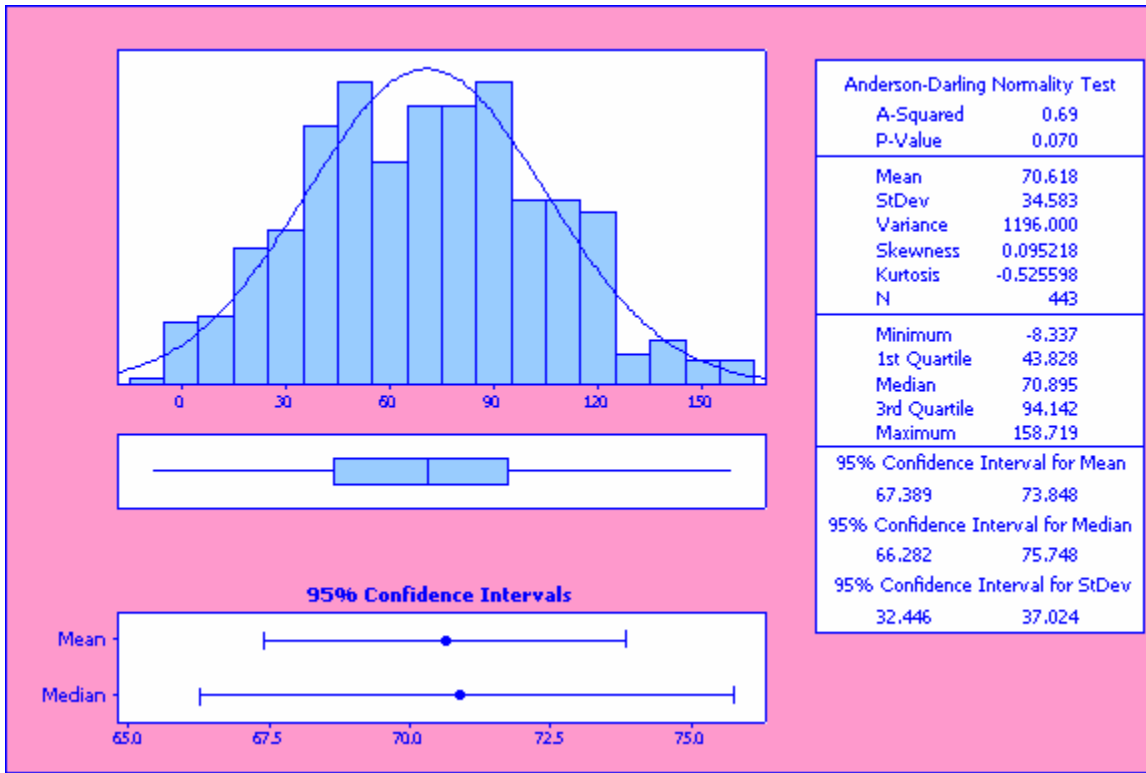
Figure 1. Distribution of DWC

The Table 2 represents the descriptive statistics for the components of working capital management efficiency for the sample firms. The variables are as follows. **DSO** is the days of sales of outstanding, **DIO** is the inventories turn over per year in terms of days of inventory outstanding, **DPO** is the Days of payable outstanding, **DWC** is the days of working capital, **CCE** is the cash conversion efficiency, **IA** is the Income to Total Assets ratio, **IS** is the Income to Sales ratio, and **CR** is the current ratio.

	DSO	DIO	DPO	DWC	CCE	IA	IS	CR
Mean	57.26	40.16	26.80	70.62	0.06	0.04	0.05	3.10
Median	56.90	38.58	25.40	70.90	0.07	0.05	0.06	2.74
SD	18.88	25.12	11.66	34.58	0.12	0.11	0.14	1.64
CI (95.0%)	1.76	2.35	1.09	3.23	0.01	0.01	0.01	0.15

Table 2. Descriptive Statistics

The higher standard deviation of 34.58 days for DWC indicates a wide variation in DWC among the equipment firms in communication industry. This DWC median of 70.90 days indicates that the firms in communication industry have higher days of working capital when compared to the DWC

median 59 of the communication equipment companies surveyed for WCM [6]. It is also observed that other components of working capital – DSO, DIO and DPO – have very large standard deviation that indicate a wide variation in managing these components by firms in communication industry. However the DSO median 56.90 days and DPO median 25.40 respectively, are near to the medians of DSO and DPO (57 and 25 respectively) of communication companies surveyed for WCM [6]. Large difference in DIO median 38.58 from the DIO median 27 of companies surveyed for WCM indicates that the firms in the sample have not managed inventory well and this is the contributor for the increased median of the DWC.

5.2 Correlation Analysis

The descriptive statistics show the working capital measures and its variations among the firms in sample industry. The correlation analysis is done to analyze the association between the working capital management efficiency and profitability and liquidity. To examine the relationship among these variables, Pearson correlation coefficients are calculated. The Table 3 shows the correlation matrix with Pearson correlation coefficients. The P-values are listed in the parenthesis.

	DSO	DIO	DPO	DWC	CCE	IA	IS
DIO	0.218 (0.0)						
DPO	0.102 (0.032)	0.153 (0.001)					
DWC	0.67 (0.0)	0.794 (0.0)	-0.17 (0.0)				
CCE	-0.167 (0.0)	-0.325 (0.0)	-0.324 (0.0)	-0.218 (0.0)			
IA	0.027 (0.564)	-0.187 (0.0)	-0.279 (0.0)	-0.027 (0.573)	0.625 (0.0)		
IS	-0.007 (0.883)	-0.287 (0.0)	-0.316 (0.0)	-0.106 (0.026)	0.719 (0.0)	0.885 (0.0)	
CR	0.013 (0.786)	0.132 (0.006)	-0.238 (0.0)	0.183 (0.0)	0.066 (0.167)	0.008 (0.874)	-0.046 (0.33)

Table 3. Pearson correlation matrixes

Since efficient working capital management is expected to improve a company's profitability and liquidity [7], DWC should be negatively correlated to IA, IS and CCE. The correlation coefficients from Table 3 indicate that there is statistical evidence that the profitability and liquidity are negatively related to the working capital efficiency. However for IA, even though DWC is negatively correlated, the statistical evidence is not significant. This means that IA is not significantly correlated to the DWC. One possible reason for this is that the total asset includes the fixed asset, which is huge for

telecommunication equipment industry when compared to other industries. This heavy fixed asset requirement cancels out the effect of working capital management efficiency on income related to total assets. It is also found that the correlation between DSO and IA and the correlation between DSO and IS are not significant while DIO and DPO are significantly negatively correlated to IA and IS. This indicates that there is evidence that managing DSO does not have much impact on return on assets and profit margin because of heavy fixed assets, which is major contributor to the total assets.

5.3 Regression Analysis

Simple linear regression analysis was done for CCE, IA and IS with DWC, DSO, DIO and DPO to investigate further, the association between the working capital measures and the profitability and liquidity measures. The profitability and liquidity measures are the dependent variables and working capital management measures are the independent variables. The following table gives the results of the regression analysis that shows the slope and the corresponding P-values in parenthesis.

	DSO	DIO	DPO	DWC
CCE	-0.0011 (0.0004)	-0.0016 (0.0000)	-0.0034 (0.0000)	-0.0008 (0.0000)
IA	0.0002 (0.5638)	-0.0008 (0.0001)	-0.0027 (0.0000)	-0.0001 (0.5727)
IS	-0.0001 (0.8830)	-0.0016 (0.0000)	-0.0039 (0.0000)	-0.0004 (0.0262)

Table 4. Regression of WCM measures with profitability and liquidity measures

The regression analysis results indicate that there is evidence that the liquidity and profitability measures are negatively associated with DWC. However, even though the profitability measure IA is negatively associated with the DWC, the association is not significant. This means that there is no significant predictability of IA using DWC. The results also indicate that there is evidence that the profitability measure - profit margin (IS) is negatively related to the DWC, DSO, DIO and DPO. However the association of DSO with IS and IA is not significant enough to predict IS or IA using DSO. This means that effect of managing DSO is not significant enough to impact the profitability measures. This result is consistent with the correlation analysis.

The reason for this could be proportions of account receivables reduced by WCM management activities are much less when compared to the total assets and the sales made. Hence, there is evidence that in telecommunication industry, either account receivables management is poor or the fixed asset is disproportionately large when compared to the current assets.

5.4 Analysis of Variance (ANOVA)

Single factor Analysis of variance is done on the three components of working capital management – DSO, DIO and DPO to find if the means of the working capital management components are significantly different. The following table gives the results of the ANOVA analysis.

Source of Variation	SS	df	MS	F	P-value	F critical
Between Groups	206558.7	2	103279.37	275.80	0.00	3.00
Within Groups	496552.2	1326	374.47			
Total	703110.9	1328				

Table 5. Results of ANOVA for DSO, DIO and DPO

The results of this analysis indicate that there is significant evidence that means of the working capital management components widely vary. This means that approaches used by the firms, with respect to managing DSO, DIO and DPO significantly vary within communications equipment industry. Since there are significant differences in the means of DSO, DIO and DPO, the analysis is extended to find which one of these three is significantly different from other. Turkey's procedure (the T method) is conducted on means of DSO, DIO and DPO using **Studentized range probability distribution**. The results of this analysis indicate that there is no significant evidence that a single mean among is significantly different from the two others. All three of these means are significantly different from each other. However box plot of these means show that DSO is very different from DPO.
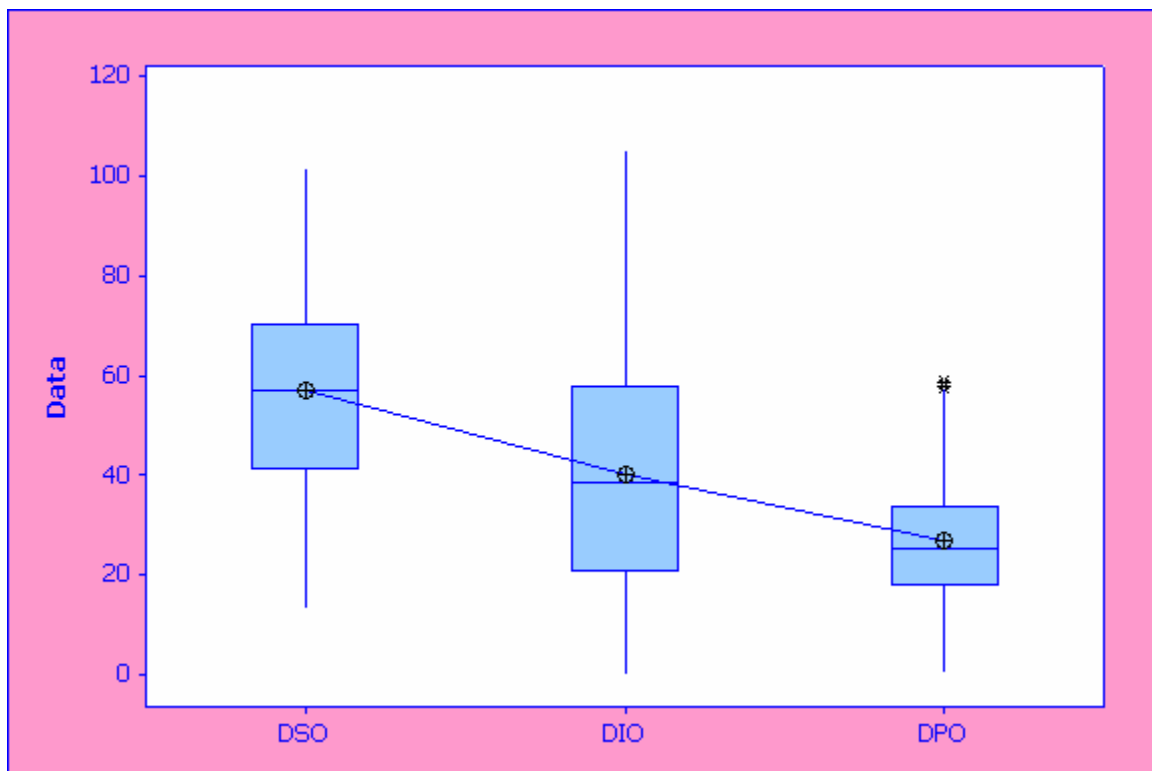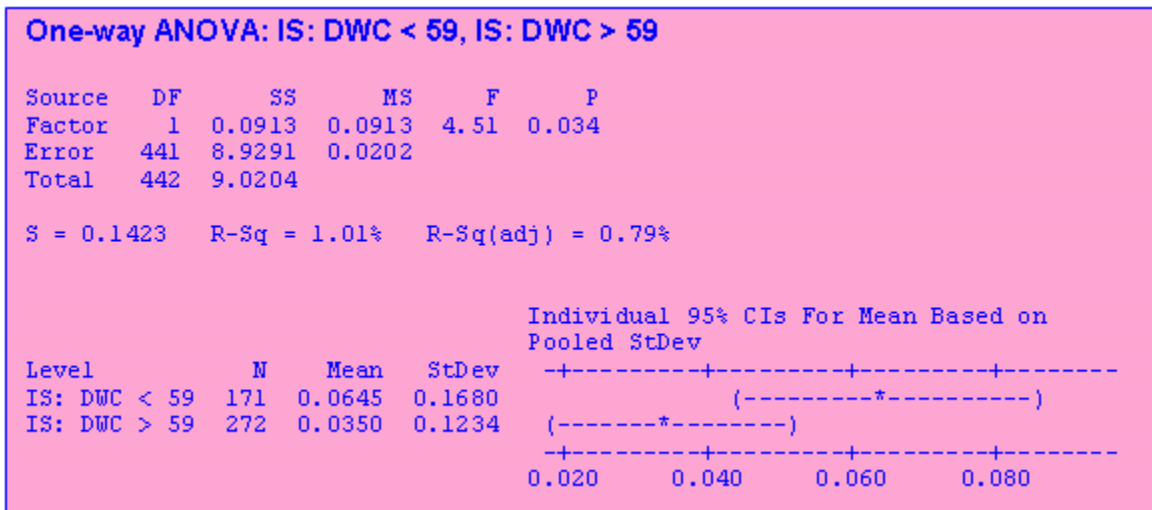

Figure 2. ANOVA of DSO, DIO and DPO – Box Plots

This means that no single component significantly contributes to the working capital management efficiency of the sample firms. For efficient working capital management, the level of DSO should be lower and DPO should be higher. The opposite is observed in the sample firms by this analysis. Higher difference between DSO and DPO indicate that there is poor management of both DSO and DPO. This may be due to the intense competition in the telecommunication industry. The firms are unable to set strict collection policies and revenues are made by higher credit sales. Also the telecommunication firms are unable to negotiate and get better credit from their suppliers to reduce the DPO.

Another analysis variance was done on the means of two groups of profit margins (IS). One group had DWC less than 59 days and other group had DWC greater than 59 days. The DWC of 59 days was chosen based on the industry average [6]. Following is result of the analysis.

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One-way ANOVA: IS: DWC < 59, IS: DWC > 59

Source    DF      SS      MS      F      P
Factor     1   0.0913  0.0913   4.51  0.034
Error    441   8.9291  0.0202
Total    442   9.0204

S = 0.1423    R-Sq = 1.01%    R-Sq(adj) = 0.79%


                             Individual 95% CIs For Mean Based on
                             Pooled StDev
Level              N    Mean    StDev   -+---------+---------+---------+--------
IS: DWC < 59     171  0.0645   0.1680              (---------*----------)
IS: DWC > 59     272  0.0350   0.1234    (-------*--------)
                                        -+---------+---------+---------+--------
                                        0.020     0.040     0.060     0.080
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Figure 3. ANOVA of IS groups (Minitab output)

The analysis of results indicate that there is no significant difference between the profit margins of group that had DWC less than 59 days and the group that had DWC greater than 59 days. This means that even though reducing the DWC gives better profit margin, the working capital management is not efficient enough to bring profit margin at significant level.

6 Conclusions

Analysis of working capital management efficiency was done on a sample of 349 telecommunication equipment companies. The analysis was done to find statistical evidence to support the four hypotheses. It is found that significant statistical evidence exists to support the hypotheses (H1 and H2) that the working capital management efficiency is negatively associated to the profitability and liquidity. When the working capital management efficiency is improved by decreasing days of working capital, there is improvement in profitability of the firms in telecommunication firms in terms of profit margin. It is observed that there is no significant statistical evidence to support the hypothesis (H3) that the firms in telecommunication equipment industry manage all the three components of WCM equally.

From the statistical evidences it is observed that DWC of the sample firms is higher than DWC of the industry average and the WCM components DSO and DPO are in line with their industry averages.

This indicates the inventory management among the sample firms may not be efficient. The statistical evidences indicate that the management of DSO does not have much impact on the return on assets and profit margin. This is mainly due to heavy fixed assets requirements in telecommunication industry. There is also evidence that there is poor management of accounts receivable and accounts payable. Overall there is evidence that the working capital management efficiency in telecommunication industry is poor. It is recommended that the telecommunication industry should improve working capital management efficiency by concentrating on reducing inventory and improving DPO by getting more credits from suppliers.

7 Acknowledgements

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