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Does the Working Capital Requirement Vary Across Different Industrial Manufacturing Companies in Ethiopia?

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Abstract
The purpose of this paper was to investigate whether the working capital requirement vary across the manufacturing companies of different industrial sub sectors in Ethiopia. The study used four years data from 2011 to 2014 on a sample of 85 manufacturing companies in Ethiopia that were selected using stratified random sampling. Univariate analysis of descriptive statistics and Analysis of Variance (ANOVA) was employed as method of data analysis and then results were presented using tables followed by brief description to interpret the result. The result of the study manufacturing companies in Wood and Wood Product Industry (WWPI) exhibit the highest working capital requirements, while Non-Metallic Mineral Product Industry (NMPI) have lowest working capital requirements. The result of one way ANOVA showed that there exists significant difference in working capital requirements of the different industrial sector of manufacturing companies of Ethiopia. Based on the result of the study, the researcher recommended that the design and implementation of working capital policy shall consider the sub industrial sector in which the manufacturing companies operate.
Keywords: Industrial Sub Sector, Manufacturing Companies, Analysis of Variance, Working Capital Requirements

1 Introduction

Van Horne & Wachowicz (2009) and Ross, Westerfield & Jordan (2003) describe working capital management as the administration of the firm's current assets and the current liabilities. Identifying the various determinants of working capital requirement is essential so as to decide whether the firm has to keep much of current assets and less of current liability or in the opposite side. Ross et al. (2003), Fabozzi & Peterson (2003), Ehrhardt & Brigham (2011) and Brigham & Houston (2006) argued that the nature of the business is one determining factors of the working capital requirement. In other word they argued that the level of working capital needed for heavier business is not the same as those that are light businesses. Heavy industries are characterised by making huge investment in fixed assets and less of in working capital, where as light industries need small investment in fixed assets and less more of working capital. This study aimed to know whether the working capital requirement differ across different manufacturing industrial sub sectors or not.

2 Review of Literature

Different finance scholar has studied by incorporating internal and external determinants of working capital requirement. These scholars have used how the fixed assets ratio has affected the working capital requirements of firms. Roughly speaking, the fixed assets ratio will be higher for heavy industries and vice versa.

Wasiuzzaman and Arumugam (2013) examined the determinants of working capital investment of 192 firms in Malaysia spanning a period of 8 years from 2000-2007. Wasiuzzaman and Arumugam considered corporate governance, financial and economic variables to identify the determinants of working capital requirements. They examined also whether there exists significance difference in working capital requirements across the firms of different industrial sub sector using one way ANOVA an the result of F statistics was 47.479 with P-value of 0.000, which was significant at 1% level. The result thus indicated that there was significant difference in the working capital requirements of the manufacturing companies of different industrial sub sector.

Jayan (2015) studied the Working Capital Structure in Micro Industries with special reference to Kerala State, India using a sample of 100 companies from ten industries for the period between 2004 to 2014. One way ANOVA was used in the study to investigate whether there exist significant mean difference in working capital requirement as measure by current ratio and current asset to total asset ratio. Jayan (2015) found that there exist significant differences in the working capital requirement of the different industries since F statistics was significant at 1% significance level.

Bereźnicka (2014) investigated the relative importance of corporate working capital determinants of 13 sectors of 9 European Union countries for the period between 2000 to 2009. Bereźnicka (2014) obtained the data from Banque de France (2012) (Bank for the Accounts of Companies Harmonised - European Sectoral references Database). and employed ANOVA to examine whether industry as factor is important while setting the working capital requirement as measured by inventory turnover, receivables turnover, payable turnover and operating cycle turnover as a whole . The study found that there exist significant differences in all measures of working capital requirement across the thirteen sectors.

3 Statement of Problem

There exists strong theoretical ground to say that the nature of the business influence the working capital requirements. The theory indicates that there exists difference in the working capital requirements across the manufacturing companies of different industrial sub sector.

Considering the nature of industrial is relevant for companies while setting working capital policy. To the extent of the existing body of knowledge, only few studies like Wasiuzzaman and Arumugam (2013), Jayan (2015) and Bereźnicka (2014) empirically examined whether there exist significance difference in working capital requirement across different nature of business. Even these studies only examined whether there exist significant mean difference in working capital requirement across different industrial sectors and never seen how large the difference is and where the exact difference lies on. In addition, In Ethiopia, such study was not considered and documented well. Therefore, it is essential to raise the question: does the working capital requirement differ across different manufacturing industrial sub sectors of Ethiopia?

4 Objectives of The Study

Owing to the underlying problem, this study was designed to address the question: does the working capital requirement differ across different manufacturing industrial sub sectors of Ethiopia? Particularly, this study was designed:

i. to describe the working capital requirement of manufacturing companies in Ethiopia.
ii. to investigate whether there exist significant difference in working capital requirement of manufacturing companies of different industrial sub sectors in Ethiopia.

5 Hypotheses

Ross et al. (2003), Fabozzi & Peterson (2003), Brigham & Houston (2006), and Ehrhardt & Brigham (2011) argued that a number of microcosmic and macroeconomic variables have to be considered while setting the level of working capital requirement to be kept by a specific firm. Among others, the type of product produced and the nature of operation or the type of industry in which the firm is operating determine the working capital requirements. For example Fabozzi and Peterson (2003) discussed that a firm may engage in bulky sector such as production of metal and metallic products, which tend to have more invested in long-term assets than current assets. Thus, the hypothesis is stated as follows:

Ho: There is no significant difference in working capital requirement of manufacturing companies of different industrial sub sectors in Ethiopia.

6 Variable and Measurement

To test the hypothesis of the study, one way ANOVA was used where the response variable was the working Capital requirement and the factor variable was industrial sub sector, which were measured as follows.

i. Response/Dependent Variable: Working capital requirement (WCR) measured by working capital deflated by total asset as used in Gill (2011), Suleiman and Rasha (2013) and Nazir and Afza (2009).

$$WCR = \frac{\text{Working Capital}}{\text{Total Assets}} = \frac{\text{Current Assets - Current Liability}}{\text{Total Assets}}$$

ii. Factor Variable: manufacturing companies were stratified in to ten industrial manufacturing sectors on the basis of the nature of their operation using criteria set forth by International Standard Industrial Classification, ISIC (2008).

7 Research Methodology

Quantitative research was appropriate and thus used in order to investigate whether there are significant differences in working capital requirement of manufacturing companies of different industrial sub sectors in Ethiopia.

7.1 Data and Sampling Method

In order to address the objectives, secondary data were collected from Ethiopian Revenue and Custom Authority (ERCA) Large Taxpayers Office (LTO), where financial statements are reported for the purpose of tax by companies. Regarding the sampling method, a list of manufacturing companies were obtained and those that have four years balance sheets for the period 2010/11 to 2013/14 were stratified in to ten industrial manufacturing sectors on the basis of the nature of their operation provided by industry classification criteria of International Standard Industrial Classification, ISIC (2008). As such, four years balance sheet from 2010/11 to 2013/14 (2003 to 2006 Ethiopian Fiscal Year) of 85 manufacturing Companies from nine manufacturing industrial sub sectors in Ethiopia were obtained from Ethiopian revenue and Custom Authority (ERCA) Large Taxpayers Office (LTO) and were used

7.2 Method of Data Analysis

Sekaran and Bougie (2010) suggest that before starting the data analysis, the need for some preliminary matters of data cleaning so as to ensure that the data are accurate, complete and suitable for further analysis. Based on this, outliers were identified using boxplot and looking at the box-whisker plots (Pallant2007). Field (2005) provided some solutions to remedy such observation in the data set. Field (2005) discussed that removal of the case that has outlier values is one solution, however removing case ultimately reduce the observations. The other method is winsorization which encompasses changing the value of outliers to be one unit above the next highest value in the data set which is not seriously suspected being an outlier. As such the identified outliers were winsorized.

After the data collection and cleaning task have been finalized, univariate analysis of descriptive statistics of mean as a measure of central tendency and standard deviation as a measure of dispersion were used. And also one way ANOVA was used to identify the existence of mean difference in working capital requirement of manufacturing companies of different industrial sub sectors with the aid of Statistical Package for Social Science (SPSS) Version 21. Eta squared effect size statistics was calculated to measure how large the difference is. In addition, Games-Howell post hock test for unequal variance was used to identify where the exact difference lie on. Finally, results were presented using tables followed by brief explanations.

8 Result and Discussion

The result and discussion part is divided in to two sections where the first section presents the descriptive statistics and the second section does the result of analysis of variance and hypothesis test.

8.1 Descriptive Statistics

Due panel attrition, 85 manufacturing were usable and used in the analysis. The sample distribution and the average working capital requirement (WCR) of manufacturing companies by industrial sub sector are reported in Table1.

As presented in Table 1, the sample manufacturing companies were from ten manufacturing industrial sub sectors and there was 1 manufacturing company from Tobacco Product Manufacturing Industry (TPMI) which is excluded due to panel attrition. Based on this the study was investigated using four years data of 85 samples from which 6 (7.06%) were from Agro Processing Industry (API), 5(5.88%) from Chemical and Pharmaceutical Industry (CPI), 9 (10.59%) from Leather and Leather Product Industry (LLPI),16 (18.82%) from Metal and Engineering Industry (MEI), 2 (2.35%) from Non Metallic Mineral Product Industry (NMPI), 10 (11.76%) from Paper and Paper Product Industry (PPI), 22(25.88%) from Rubber and Plastic Industry(RPI), 12(14.12%) from Textile and Apparel Industry (TAI) and the rest 3(3.53%) were from Wood and Wood Product Industry (WWPI). Tobacco Product Manufacturing Industry consists only one company and was excluded from the analysis.

The descriptive statistics in Table 1 shows that the overall working capital requirement of sample manufacturing companies has a mean value 0.393 with a standard deviation of .245. The positive mean value indicates that 0.393 cents are tied in the net working capital of manufacturing companies, which also means that companies employed relatively conservative policy in managing their working capital.

Table 1 also shows the mean values and standard deviation of WCR across the nine industrial manufacturing sectors. The highest mean value of 0.555 cents was observed in Wood and Wood Product Industry (WWPI) with standard deviation of 0.134 which means that 0.555 cents are tied in the net working capital of WWPI. In other word, the manufacturing companies in WWPI relatively adopt conservative working capital policy. On the other hand, the lowest mean value of -0.48 was observed in Non-Metallic Mineral Product Industry (NMPI), with standard deviation of 0.192, which means that the manufacturing companies NMPI are following aggressive working capital policy.

Table 1: Sample Distribution and Working Capital Requirement

No	Industrial Sectors	N Obs	No. of Firms	Precent of Firms	Mean WCR	Standard Deviation
1	API[1]	24	6	7.06	.268	.325
2	CPI[2]	20	5	5.88	.367	.326
3	LLPI[3]	36	9	10.59	.484	.188
4	MEI[4]	64	16	18.82	.398	.211
5	NMPI[5]	8	2	2.35	-.048	.192
6	PPI[6]	40	10	11.76	.479	.231
7	RPI[7]	88	22	25.88	.424	.185
8	TAI[8]	48	12	14.12	.300	.251
9	WWPI[9]	12	3	3.53	.555	.134
	Total	*340*	*85*	*100%*	*.393*	*.245*
ANOVA			**Sum of Squares**	**Df**	**Mean Square**	**F (Sig.)**
Between Groups			3.353	8	.419	8.187[a]
Within Groups			16.946	331	.051	(0.000)[*]
Total			20.299	339		
Welch			df1 (8)	df2 (70.55)	Stat. = 9.78	Sig= 0.000[*]

[a]***F-statistic,*** [*]***Significance at 1% level***
Author's Own Compilation with the aid of SPSS V.21

8.2 Analysis of Variance and Hypotheses Test

To see whether the working capital requirements vary across industrial manufacturing sector, one way ANOVA was employed. The WCR was normally distributed across the treatment groups of the industrial sectors, however the assumption of homoscedasticity was violated as indicated by the Levene's statistics of 4.588 which is significant (for brevity reasons not shown here). To account for this violation, Welch statistics was used to robust the tests of equality of means as recommended by Pallant (2007). As such, an evidence of significant difference (p-value < 0.01) was obtained in the mean value of working capital requirement across nine manufacturing industrial sectors as indicated by Welch statistics (F-statistics of 9.778). The results support the findings of previous study of Wasiuzzaman and Arumugam (2013) who found the influence of industry on a firm's working capital investment.

In order to see how large the difference is, eta squared effect size statistics was used and it was found that the difference was large (0.165) as per the Cohen's effect size classification (Pallant, 2007). According to Pallant (2007) and Field (2005), while one-way ANOVA is used to measure the statistical variation between two set of economic variables or groups; however, it does not tell where the exact difference lies on, which raise the need to conduct post-hoc tests. To see where the exact differences lie on, Games-Howell post hock test for unequal variance was used (Pallant, 2007).

As per the result of Games-Howell multiple comparisons, the mean WCR of API is significantly lower than WWPI. The WCR of CPI is significantly higher than NMPI. The WCR of LLPI is significantly higher than NMPI and TAI. The WCR of MEI is significantly higher than NMPI. The WRC of NMPI is significantly lower than all manufacturing industrial sectors, except with API which is not significant. The WCR of PPI is significantly higher than NMPI, but significantly lower than TAI. The WCR of RPI is significantly higher than NMPI. The WCR of TAI is significantly higher than NMPI and API, however significantly lower than LLPI, PPI and WWPI. The WCR of WWPI is significantly higher than API, NMPI and TAI. Based on the result of Welch statistics, the null hypothesis that state there are no significant differences in working capital requirement of manufacturing companies of different industrial sub sectors in Ethiopia, is rejected as there was no statistical evidence to support it.

[1] Agro Processing Industry (API)
[2] Chemical and Pharmaceutical Industry (CPI)
[3] Leather and Leather Product Industry (LLPI)
[4] Metal and Engineering Industry (MEI)
[5] Non Metallic Mineral Product Industry (NMPI)
[6] Paper and Paper Product Industry(PPI)
[7] Rubber and Plastic Industry(RPI)
[8] Textile and Apparel Industry (TAI)
[9] Wood and Wood Product Industry (WWPI)

9 Conclusion

The paper employed quantitative analysis to identify whether the working capital requirements vary across industrial manufacturing sectors. The result of the study manufacturing companies in Wood and Wood Product Industry (WWPI) exhibit the highest working capital requirements, while Non-Metallic Mineral Product Industry (NMPI) have lowest working capital requirements. The result of one way analysis of variance revealed that the working capital requirement varies significantly across the nine manufacturing industrial sub sectors which could be due to certain industrial characteristics such as asset tangibility. The implication of the finding implies that different industrial manufacturing companies require different level of working capital which has to be set in accordance with their needs for smooth and efficient operation.

10 Recommendation

Manufacturing companies should keep an optimal level of working capital which is neither inadequate nor excessive for the efficient utilization that would contribute for operating success and creation of wealth for shareholders. In this regard finance managers should consider the industrial sub sector where the company is operating at since the working capital requirements of different industrial manufacturing sub sectors differ significantly.

11 Limitation and Future Research Direction

This study has limitation just like any other studies. Since the study focused on whether there exist working capital requirement difference among industrial sub sector or not, thus, upcoming researchers can study further in the area by incorporating merchandise and service firms to see if any difference exists in the working capital requirement and can further investigate the optimal level of working capital to be kept by the manufacturing companies of different industrial sub sectors using an improved sample size.

References

Brigham, E.F. & Houston, J.F. (2006), "*Fundamentals of Financial Management",* 10th ed. Cram101 Incorporate, United States of America.

Bereźnicka, J.K. (2014), "On the Relative Importance of Corporate Working Capital Determinants: Findings from the EU Countries", *Contemporary Economics*, **8**(4),415-434.

Ehrhardt, M.C & Brigham, E.F. (2011)." *Financial Management: Theory and Practice, 13th* ed. United States of America: South-western.

Fabozzi.F.J & Peterson, P.P. (2003), "*Financial Management and Analysis"*, 2nd ed. Canada: John Wiley & Sons: Hoboken, New Jersey.

Field, A. (2005), "*Discovering statistics using SPSS"* , 2nd ed. London: Sage Publications.

Gill, A. (2011), "Factors that influence working capital requirements in Canada", *Economics and Finance Review*,**1**(3),30 – 40.

Department of Economic and Social Affairs Statistics Division. (2008), "International Standard Industrial Classification of All Economic Activities", *Statistical papers Series* **4**(4). United Nations, New York.

Jayan V.K. (2015), "Working Capital Structure in Micro Industries With Special Reference to Kerala State, India", *Global Journal For Research Analysis*, **4**(4), 1-2.

Nazir, M.S. & Afza, T. (2009), "Working Capital Requirements and the Determining Factors in Pakistan", *The Icfai Journal of Applied Finance*, **15**(4), 28-38.

Pallant, J. F. (2005), "*SPSS Survival Manual: A step by step guide to data analysis using SPSS for Windows (Version 12)"*. Ligare, Sydney.

Ross, S. A., Westfield, R. W. and Jordan, B.D. (2003), *Fundamentals of Corporate Finance*, 6th ed. McGraw-Hill, United States of America.

Sekaran, U. & Bougie,R.(2010), *Research Methods for Business: A Skill-Building Approach,* 5th ed. Britain: John Wiley & Sons.

Suleiman M. A. and Rasha T. A.(2013), "The Determinants of Working Capital Requirements in Palestinian Industrial Corporations", *International Journal of Economics and Finance*; **5**(1), 65-75.

Van Horne, J. C. & Wachowicz, J. M. (2009), *Fundamentals of Financial Management*, 13th ed. Pearson Education Limited, London.

Wasiuzzaman, S. & Arumugam, V. C (2013), "Determinants of Working Capital Investment: A Study of Malaysian Public Listed Firms", *Australasian Accounting, Business and Finance Journal*, 7(2), 63-83.

APPENDIX 4

Games-Howell Multiple Comparisons

Dependent Variable: WCR

INDU (I)	INDU (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
API (.268)	CPI	-.09800	.09853	.984	-.4207	.2247
	LLPI	-.21667	.07328	.111	-.4595	.0261
	MEI	-.13031	.07132	.665	-.3680	.1074
	NMPI	.31500	.09497	.065	-.0123	.6423
	PPI	-.21100	.07566	.153	-.4600	.0380
	RPI	-.15648	.06915	.397	-.3890	.0760
	TAI	-.03250	.07552	1.000	-.2810	.2160
	WWPI	-.28750*	.07669	.017	-.5416	-.0334
CPI (.367)	API	.09800	.09853	.984	-.2247	.4207
	LLPI	-.11867	.07933	.848	-.3863	.1490
	MEI	-.03231	.07753	1.000	-.2957	.2310
	NMPI	.41300*	.09972	.011	.0708	.7552
	PPI	-.11300	.08153	.894	-.3859	.1599
	RPI	-.05848	.07553	.997	-.3175	.2005
	TAI	.06550	.08140	.996	-.2070	.3380
	WWPI	-.18950	.08249	.377	-.4667	.0877
LLPI (.484)	API	.21667	.07328	.111	-.0261	.4595
	CPI	.11867	.07933	.848	-.1490	.3863
	MEI	.08635	.04089	.473	-.0440	.2167
	NMPI	.53167*	.07487	.001	.2437	.8196
	PPI	.00567	.04806	1.000	-.1480	.1593
	RPI	.06019	.03697	.786	-.0585	.1788
	TAI	.18417*	.04784	.007	.0317	.3366
	WWPI	-.07083	.04966	.878	-.2381	.0965
MEI (.398)	API	.13031	.07132	.665	-.1074	.3680
	CPI	.03231	.07753	1.000	-.2310	.2957
	LLPI	-.08635	.04089	.473	-.2167	.0440
	NMPI	.44531*	.07295	.003	.1585	.7321
	PPI	-.08069	.04502	.687	-.2244	.0630
	RPI	-.02616	.03292	.997	-.1301	.0778
	TAI	.09781	.04478	.425	-.0445	.2401
	WWPI	-.15719	.04673	.056	-.3168	.0024
NMPI (-.048)	API	-.31500	.09497	.065	-.6423	.0123
	CPI	-.41300*	.09972	.011	-.7552	-.0708
	LLPI	-.53167*	.07487	.001	-.8196	-.2437
	MEI	-.44531*	.07295	.003	-.7321	-.1585
	PPI	-.52600*	.07720	.001	-.8160	-.2360
	RPI	-.47148*	.07083	.002	-.7582	-.1848
	TAI	-.34750*	.07706	.015	-.6372	-.0578
	WWPI	-.60250*	.07821	.000	-.8961	-.3089
PPI (.479)	API	.21100	.07566	.153	-.0380	.4600
	CPI	.11300	.08153	.894	-.1599	.3859
	LLPI	-.00567	.04806	1.000	-.1593	.1480
	MEI	.08069	.04502	.687	-.0630	.2244
	NMPI	.52600*	.07720	.001	.2360	.8160
	RPI	.05452	.04149	.923	-.0788	.1878
	TAI	.17850*	.05141	.022	.0149	.3421
	WWPI	-.07650	.05311	.874	-.2529	.0999
RPI (.424)	API	.15648	.06915	.397	-.0760	.3890
	CPI	.05848	.07553	.997	-.2005	.3175
	LLPI	-.06019	.03697	.786	-.1788	.0585
	MEI	.02616	.03292	.997	-.0778	.1301
	NMPI	.47148*	.07083	.002	.1848	.7582
	PPI	-.05452	.04149	.923	-.1878	.0788
	TAI	.12398	.04123	.081	-.0077	.2556
	WWPI	-.13102	.04333	.125	-.2835	.0215
TAI (.300)	API	.03250	.07552	1.000	-.2160	.2810
	CPI	-.06550	.08140	.996	-.3380	.2070
	LLPI	-.18417*	.04784	.007	-.3366	-.0317
	MEI	-.09781	.04478	.425	-.2401	.0445
	NMPI	.34750*	.07706	.015	.0578	.6372
	PPI	-.17850*	.05141	.022	-.3421	-.0149
	RPI	-.12398	.04123	.081	-.2556	.0077
	WWPI	-.25500*	.05291	.001	-.4304	-.0796
WWPI (.555)	API	.28750*	.07669	.017	.0334	.5416
	CPI	.18950	.08249	.377	-.0877	.4667
	LLPI	.07083	.04966	.878	-.0965	.2381
	MEI	.15719	.04673	.056	-.0024	.3168
	NMPI	.60250*	.07821	.000	.3089	.8961
	PPI	.07650	.05311	.874	-.0999	.2529
	RPI	.13102	.04333	.125	-.0215	.2835
	TAI	.25500*	.05291	.001	.0796	.4304

*. *The mean difference is significant at the 0.05 level.*