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Constructing Indices for Efficient Management of Working Capital in Indian Iron and Steel Sector

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ABSTRACT

Efficiency in managing the working capital is an integral part of the firm's goal in maximising the market value. The paper analysed the efficiency of working capital management of companies engaged in the Sponge Iron producing sector in India. In order to test the efficiency, three indices are applied viz., Performance index, utilization index, efficiency index and OLS Regression model is used to measure the efficiency of working capital management. It is evident from the highly significant statistical test results prove the regression model is well fitted into the sample data.

KEYWORDS*: Working capital management efficiency, Indian Iron and Steel industry, performance index, utilization index, efficiency index, OLS Regression.*

I. INTRODUCTION

In the financial management literature, at the time of increasing capital costs and scare finance, the part of working capital management takes added advantage as it deeply affects the solvency, profitability and liquidity of the firm. A firm may run without making profits but cannot sustain without liquidity. The present study has an aim to test the efficiency of working capital management and thereby help the fund managers to frame policies of working capital management for their firms. The importance of managing working capitalin Iron & Steel industry and the efficiency in handling it leads the problem statement in the study.

A. Current Scenario – India

The significance of the performance of the short-term assets is greatest within the Iron and Steel industry in India. As of 2017, India is the world's 2nd largest producer of crude steel, leaving behind United States (up from 8th in 2003) (India Brand Equity Foundation Report, July 2017).

India was the 2nd largest producer in 2016 (after Iran). The coal based route accounted for 79 per cent of total sponge iron production in the country in 2016-17 and capacity in sponge iron making too has increased over the years. The New Steel Policy, 2017 aims to achieve 300MT of steelmaking capacity and seeks to maximise per capita consumption of steel to the 160kg by 2030 (FICCI, Steel Report, 2017).

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II. LITERATURE REVIEW

Studies of *Ghosh and Maji (2004), Azhagaiah and Muralidharan (2009) and Farhan Shehzad et al. (2012)*found that the overall efficiency index of working capital management of the selected companies are good. Inversely, the results of studies made by *Aza and Nasir (2011) and Kasiran et al. (2015)* showed that the sample firms did not perform well in managing the working capital efficiently.

Literature review shows that researchers have conducted no study in the Iron and Steel industry in India applying alternative ratio model, which is the research gap to motivate to make the study.

III. RESEARCH OBJECTIVES

The study answers the following research questions:

1. Is there any significant efficiency in performance of components of current assets for enhancing sales in the Indian Iron and Steel industry?
2. Is there any significant efficiency of working capital management in utilizing the current assets of firms in the Indian Iron and Steel industry?
3. Is there any significant overall working capital management efficiency of Indian Iron and Steel industry?

IV. RESEARCH HYPOTHESES

In conformity with the objectives of the study, the following are the testable hypotheses:

H_0^1: Iron and Steel firms in India take efficient advantage of different components of current assets in enhancing sales.

H_0^2: Indian Iron and Steel firms are efficiently utilizing current assets for generating more sales.

H_0^3: Iron and Steel sector is efficiently managing their working capital.

V. RESEARCH METHODOLOGY

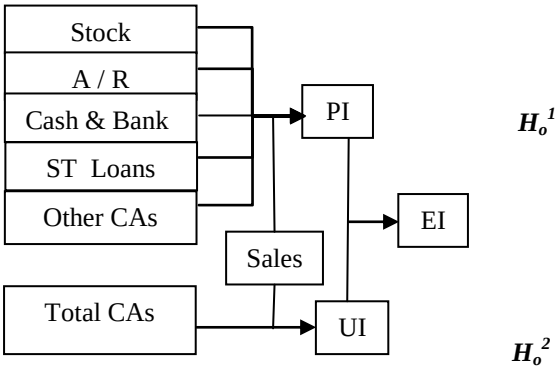
Though accounting ratios played a very important role in most of the studies, a choice of ratios or group of ratios is often a difficult task due to the absence of a proper theory of ratio analysis. To overcome this problem, Bhattacharya (1997) developed an alternative ratio model to measure the efficiency of managing working capital, which is employed in the study.

A. Sample and Period of Study

Fifteen Iron and steel (Sponge Iron) firms are listed in BSE considered as the sample for the study. The study is based on a secondary data collected from the database of Centre for Monitoring Indian Economy. The data related to a period of 12 years from 2005-06 to 2016-17 implying 180 observations for each index.

B. *Conceptual Models*

The following theoretical model explains the overall analysis adopted in the study:



Performance index and utilization index are calculated using different components of current assets, total current assets as a whole and sales of the firm. Efficiency Index is the result of the combination of performance index and utilization index, which is compared with the industry average efficiency.

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C. Formulae used for the Study

The following formulae are used to measure the three indices of WCME:

PI	$\frac{I_S \sum_{i=1}^{n} \frac{W_{i(t-1)}}{W_{it}}}{N}$
I_s (Sales Index)	$S_t/S_{(t-1)}$
W(Working Capital Index)	Average size of different components of current assets
N	Number of components in current assets
UI	$A_{(t-1)}/A_t$
A	Current assets / Sales
EI	PI x UI

D. Regression Model

Pooled ordinary least square model of panel data regression is used for the measurement of firm's efficiency during the study period. The-test and F-test are used to test the statistical significance of the regression results. The advantage of panel data analysis over either time series or cross-section modelling is that it captures the differences across individual cross sections much better. In order to measure the firm's efficiency in achieving the target level of efficiency during the study period, following OLS Regression model is used. The model used to test the hypotheses:

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it}$$

Where, $Y_{it} = Z_{it} - Z_{it-1}$

$$X_{it} = Z^*_t - Z_{it-1}$$

Z_{it}= Working capital index (PI, UI & EI) of firm 'i' at time 't'

Z^*_t= Average index (PI, UI & EI) of iron and steel industry at 't'

The coefficient of the above regression equation beta (β) represents the speed of the individual firm in improving its efficiency vis-à-vis the industry norms. In this regard, β, equal to one indicates that the degree of efficiency of firm in managing working capital is equal to the average efficiency level of the sector as a whole. Similarly, β less than one indicates that the need of further improvements by the firms in working capital management.

VI. RESULTS AND DISCUSSIONS

The results of the empirical evidence and interpretations are summarized in this section.

A. Industry Mean of PI, UI and EI

Table I depicts the industry mean of three indices. Performance index of the industry as a whole shows an average PI is greater than one for 10 out of 12 years. It is found that the industry average of PI (μ=1.213) indicates that the Indian iron and steel industry managed the components of current assets efficiently with respect to their performance.

The overall UI mean value of the Indian iron and steel industry for the selected period is 1.501 which indicates that the selected industry proved the efficiency in utilizing their current assets as a whole for generating sales. Average EIis greater than one for nine years.

B. Regression Analysis

Using industry mean as the target level of efficiency for each firm, an evaluation of the speed of achieving that target level has been analysed. Statistical tests, t-test, F-test are used to test the significance of results of the empirical study. The regression equation results of PI, UI and EI for all the firms are presented in Table II to IV.

Nova Iron and Steel has the β value, 1.5991 which is the most efficient firm in achieving industry norm in terms of PI and followed by MSP Steel and Power(β=1.5037) with an explanatory power 87.69 per cent and 86.98 per centre spectively at 1 per cent level significance. Table II proves that 12 firms are efficient and statistically significant at 1 per cent level. Table III shows Sarda Energy and Minerals(β=1.5989 and R^2=72.81 per cent) significantly proved its maximum efficiency in attaining the target level utilization index. All the

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firms are attained their target utilization index level. From the regression results for EI presented in Table IV, 12 out of 15 firms are having β more than 1with t-value at 1 per cent significant level.

VII. CONCLUSION, IMPLICATION AND LIMITATIONS

Empirical results reveal that except one firm are statistically significant at 1 per cent and 5 per cent level, it can be concluded that all the null hypotheses are rejected. Thus, it can be said that the scope for the improvement in managing the components of current assets for generating more revenue is well found in the study. In the context of the current challenging competitive market conditions, this scope should be properly utilized by the Iron and Steel firms in India.

A. Limitations

The study is limited to the small sample of Iron and Steel firms and the finding of the study can not be generalized to Iron and Steel sector. The quality of the study depends purely upon the accuracy and reliability of the secondary data source.

B. Scope of Further Study

The study also suggests that a further investigation may be helpful for identifying the forces that govern the nature of inefficiency present in some of the firms of Indian iron and steel industry in terms of working capital managing efficiency. Future research should investigate the generalization of the findings beyond the Indian Iron and Steel industry.

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Table I. Iron & Steel industry Average of PI, UI and EI Indices during 2005-06 to 2016-17

Index	Estimate	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	μ	SD
PI	μ	1.096	1.378	1.746	1.398	1.132	0.921	1.602	1.201	0.799	1.084	1.099	1.201	1.213	1.172
	SD	0.169	0.501	1.270	0.730	0.828	0.381	0.379	0.400	0.280	0.230	0.170	0.558	0.302	0.099
UI	μ	0.979	1.101	1.671	1.500	1.101	0.869	1.399	1.048	0.719	0.908	0.999	1.100	1.501	1.029
	SD	0.156	0.304	0.249	0.420	0.309	0.312	0.384	0.157	0.271	0.245	0.180	0.300	0.196	0.048
EI	μ	1.011	1.510	1.909	1.900	1.130	0.878	2.200	1.238	0.722	0.899	1.110	1.409	1.300	1.325
	SD	0.152	0.329	0.251	0.420	0.311	0.312	0.383	0.156	0.270	0.239	0.180	0.300	0.195	0.052

Source: Prepared by Author

Table II. Regression result for Performance Index of selected firms under Iron & Steel industry during 2005-06 to 2016-17

Firm	α	β	R^2	F value
Jindal steel & Power	-0.0310	0.8720*	0.49	9.24*
	-(0.24)	(3.06)		
Monnet Ispat	0.1063	0.5758	0.3186	4.66
	(0.42)	(2.15)		
Adhunik Metalik	-0.1575	1.3175**	0.7560	31.01**
	-(1.69)	(5.58)		
KIOCL	-0.0250	1.1902**	0.7640	32.41**
	-(0.21)	(5.70)		
Godawari Power & Ispat	-0.2075	1.0347**	0.6736	20.64**
	-(2.15)	(4.55)		
Jai Balaji Industries	-0.1560	1.1990**	0.7938	38.46**
	-(2.50)	(6.21)		
MSP Steel & Power	-0.1374	1.5036**	0.8700	66.79**
	-(1.75)	(8.16)		
Sarda Energy & Minerals	0.1313	1.3597**	0.6518	18.72**
	(0.71)	(4.34)		
Alliance Integrated Metaliks	0.13175	1.1418**	0.6679	20.13**
	(0.60)	(4.50)		
Tata Sponge Iron	0.0100	1.4075**	0.8402	52.60**
	(0.99)	(7.24)		
Scan Steels	0.0430	0.9728*	0.4706	8.90*
	(0.30)	(2.97)		
Nova Iron & Steel	-0.0499	1.5989**	0.8334	50.99**
	-(0.54)	(7.09)		
Gyscoal Alloys	0.0620	1.2469**	0.8770	71.20**
	(0.87)	(8.43)		

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Vaswani Industries	0.2200 (0.54)	1.2331** (4.19)	0.6360	17.47**
Aanchal Ispat	-0.0677 -(0.63)	1.0249** (4.43)	0.6630	19.70**

Figures in bracket are '**t**' values. * p< .05 and ** p < .01

Table III. Regression result for Utilization Index of selected firms under Iron & Steel industry during 2005-06 to 2016-17

Firm	α	β	R^2	F value
Jindal steel & Power	-0.0076 -(0.19)	0.9230** (6.11)	0.7890	37.42**
Monnet Ispat	0.0335 (0.26)	0.7810 (2.22)	0.3280	4.87*
Adhunik Metalik	-0.0396 -(0.78)	1.2204** (5.05)	0.7179	25.43**
KIOCL	-0.0436 -(1.05)	1.2611** (8.48)	0.8775	71.69**
Godawari Power & Ispat	-0.0850 -(2.54)	0.9265** (7.36)	0.8440	54.09**
Jai Balaji Industries	-0.0258 -(0.70)	1.1239** (5.89)	0.7779	35.05**
MSP Steel & Power	-0.0539 -(0.79)	1.3749** (6.93)	0.8269	47.85**
Sarda Energy & Minerals	0.0443 (0.50)	1.5989** (5.01)	0.7281	25.05**
Alliance Integrated Metaliks	-0.0193 -(0.14)	0.9700** (3.83)	0.5959	14.78**
Tata Sponge Iron	0.1369 (1.42)	1.3039** (7.13)	0.836	50.59**
Scan Steels	-0.0184 -(0.14)	1.2642** (3.99)	0.6126	15.80**
Nova Iron & Steel	0.0500 (0.63)	1.2865** (5.17)	0.7285	26.86**
Gyscoal Alloys	0.0997 (1.29)	1.4108** (7.99)	0.8639	63.64**
Vaswani Industries	-0.0270 -(0.50)	0.8294** (3.78)	0.5867	14.20**
Aanchal Ispat	-0.0015 -(0.04)	0.9567** (5.59)	0.7590	31.47**

Figures in brackets are '**t**' values. * p< .05 and ** p < .01

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Table IV. Regression result for Efficiency Index of selected firms under Iron & Steel industry during 2005-06 to 2016-17

Firm	α	β	R^2	F value
Jindal steel & Power	-0.0768	0.7507*	0.4630	8.65*
	-(0.41)	(2.96)		
Monnet Ispat	0.2201	0.5908	0.3047	4.37
	(0.46)	(2.10)		
Adhunik Metalik	-0.2750	1.1596**	0.7114	24.65**
	-(1.83)	(4.96)		
KIOCL	-0.1567	1.2031**	0.8250	46.82**
	-(0.99)	(6.85)		
Godawari Power & Ispat	-0.3468	1.0100**	0.7200	25.72**
	-(2.37)	(5.09)		
Jai Balaji Industries	-0.2501	1.0301**	0.7430	28.90**
	-(2.00)	(5.40)		
MSP Steel & Power	-0.2041	1.3953**	0.8454	54.41**
	-(1.20)	(7.40)		
Sarda Energy & Minerals	0.2039	1.2816**	0.6269	16.78**
	(0.55)	(4.21)		
Alliance Integrated Metaliks	0.3276	1.1129**	0.6259	16.77**
	(0.57)	(4.11)		
Tata Sponge Iron	0.2478	1.4110**	0.9005	89.40**
	(1.46)	(9.53)		
Scan Steels	-0.0401	1.1104**	0.5010	10.05**
	-(0.16)	(3.19)		
Nova Iron & Steel	0.0571	1.4201**	0.7540	27.60**
	(0.24)	(5.30)		
Gyscoal Alloys	0.2111	1.3222**	0.8909	81.87**
	(1.45)	(9.10)		
Vaswani Industries	0.2161	1.2590**	0.6433	18.04**
	(0.41)	(4.05)		
Aanchal Ispat	-0.1229	0.9040**	0.7101	24.48**
	-(0.81)	(5.01)		

Figures in brackets are '**t**' values. * p< .05 and ** p < .01

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