



Full Length Research

Measuring financial performance through principal component analysis: A study of selected iron and steel companies in India

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The present study attempts to analyse the financial performance of the fifteen selected Iron and Steel companies in India during the post-reform era. The financial performance index was designed by considering profitability index, liquidity index and asset management efficiency index. Principal component method was applied in constructing three sub-indices and finally financial performance Index. An attempt was also made to identify the nature of the trend in financial performance index of the selected companies during the study period. Based on the average financial performance index, Rashtriya Ispat captured the top most position while Jindal Steel was able to find place in the first rank in respect of consistency coefficient. The study revealed that out of the fifteen companies, only two companies followed significant positive trend while six companies adopted notable negative trend. Special attention should be given to the liquidity and profitability aspects of the companies to enhance their overall financial performance.

Keywords: Financial Performance Index, Iron and Steel Companies, Profitability, Liquidity

JEL Code: M21, M41

INTRODUCTION

In the modern world, the power of business firms has reached such a stature that it can influence our lives to a large extent than ever before. It has the potential to affect substantially a good number of stakeholders in our societies in terms of providing basic goods and services, generating employment, paying taxes, sponsoring education and health, compensating the environmental degradations and most of all acting as an engine for economic progress at the face of shrinking role of governments at the backdrop of globalization and open market capitalism. On the contrary, business failures cause tremendous harm on individuals, on communities and on environment. The success of a business firm entirely depends on its ability to survive and to grow consistently. The business firms cannot flourish themselves if they are unable to enhance their financial

performance and strengthen their financial soundness. Strong financial health not only plays a vital role in the successful operation of a business firm, but also builds up shareholders' confidence and gains stakeholders' support; while poor financial status threatens the very existence of the firm and leads to business failures that affect the interest of all the legitimate stakeholders of a firm, embarrass the people of the society where the firm exists and hurt social harmony. At the time of analysing financial performance of a company, generally, three major aspects, namely liquidity, profitability and asset management efficiency are need to assessed. In the context of financial performance analysis, the term 'liquidity' implies the ability of a company to meet its short term obligations. It reflects the short-term financial strength/

solvency of the company. The term 'profitability' indicates the earning capability of a company. It acts as a yardstick to measure the operating efficiency of the company and also reflects the ultimate effect of various policies and decisions adopted by it. The efficiency of a company depends, to a large extent, on the efficiency with which the assets are managed. The asset management efficiency of the company has a favourable influence on its liquidity as well as profitability.

The Iron and Steel industry is one of the most important industries in India. It not only provides a large number of products necessary for making infrastructural development of the country but also generates a considerable number of direct as well as indirect employments in India. The income as well as the consumption patterns of the Indian people has marked noticeable changes in the post reform era. As a result most of the leading companies in the Indian Iron & Steel sector have also been trying their best to adapt themselves by making suitable changes in their business policies to face the different challenges emanated from the liberalization process initiated in India. India is expected to become the world's second largest producer of crude steel in the next 10 years, moving up from the third position, as its capacity is projected to increase to about 300 MT by 2025. A significant number of studies have been made to analyse the issue associated with the financial performance of the Indian corporate sector during the last few decades and also a few studies on the same issue have been carried out considering the effects of the post liberalization regime. But almost all the studies as conducted so far except a very few have not used any composite financial performance index which is designed by accounting for the sub-indices of the different aspects of financial performance. In this backdrop, the present paper seeks to analyse the financial performance of the selected Iron & Steel companies in India during the post-reform era applying a suitable financial performance index.

The remainder of this paper is structured as follows. Section 2 presents the related literature review and identifies the research gap. Section 3 deals with the objectives of the study. Section 4 narrates the sources of data used as well as the methodology adopted in this study. Section 5 is devoted to design the overall financial performance index applied in this study. Section 6 discusses the results obtained from the study. Finally, section 7 provides concluding observations.

Literature review

Srinivas (2005) carried out a study in which the performance of the eleven Indian steel companies for the period 1999 to 2003 was evaluated using an overall performance index. The overall performance index used in this study was designed by applying the globally popular "Taxonomic Method" based on eleven selected financial ratios. The study revealed that the overall composite index as constructed in the study proved itself as a better performance indicator as compared to the conventional stand-alone operating profit margin. The outcome derived from the regression analysis indicated the size of business which was expressed in terms of 'log (assets)' as dominant factor of the

company's performance.

Arab et al. (2015) in their study assessed the financial performance of five selected companies in Indian Iron & Steel industry in terms of liquidity, solvency, efficiency of managing assets and profitability using ratio analysis. The selected companies were Tata Steel Ltd., Jindal Steel & Power Ltd., J S W Steel Ltd., Bhushan Steel Ltd. and Steel Authority of India Ltd. In this study ANOVA Test was applied in order to examine whether there was any difference in the financial performance of the selected companies in the Iron & Steel industry with regard to liquidity, solvency, efficiency of assets management and profitability. The study revealed that there was significant in the financial performance of the selected companies in respect of the different aspects of financial performance.

Paul and Mukherjee (2017) carried out a study in which the financial efficiency of the five Indian steel companies for the period 2006 to 2015 was evaluated. In this study five selected ratios like inventory turnover ratio, debtor turnover ratio, investment turnover ratio, fixed assets turnover ratio and total assets turnover ratio were used in measuring the efficiency of the selected companies. The results obtained from the two-way ANOVA made in the study indicated that significant differences with regard to all the selected efficiency ratios among the groups of the selected companies in the Indian steel industry were noticed.

Mukherjee and Roy (2015) in their study analysed the liquidity management of Durgapur Steel Plant and Tata Steel Plant in India for the period 1996-1997 to 2009-2010. While carrying out the study the liquidity of the selected units was assessed using three financial ratios, namely current ratio (CR), inventory turnover ratio (ITR) and debtors' turnover ratio (DTR). Hotelling's T^2 statistic was also used in making a comparison between the selected steel plants in respect of their performance of liquidity management. The study revealed that mean and variance of CR, ITR and DTR of the two selected units were considerably different. The study concluded that based on CR and ITR Tata Steel Plant proved itself as a more consistent performer as compared to Durgapur Steel Plant while the reverse pattern was observed in the net outcome derived from the analysis of DTR.

Sinku and Kumar (2014) in their study evaluated the financial performance of Steel Authority of India Limited (SAIL), the leading steel making company of the country for the period 2005-06 to 2009-10 by using Multivariate Discriminate Analysis. In this study, Altman's Z-Score was ascertained on the basis of selected ratios, namely net working capital to total assets ratio, retained earnings to total assets ratio, earnings before interest and tax to total assets ratio, market value of equity to market value of debt ratio and sales to total assets ratio. The study revealed that the computed values of Z-Score of SAIL varied between 3.532 and 7.837 during the study period indicating that the company was able to keep itself in a safe position by maintaining a considerable distance from the bankruptcy zone.

Chavali and Karthika (2012) in their study evaluated the financial soundness of the Indian Steel industry for the period

2001 to 2010 using Altman's Z score analysis India. In this study twenty large and medium sized listed steel companies were considered. The study analysed the possibility of business failure with reasonable accuracy. The study revealed that the steel industry was in good financial performance in spite of the impact of sluggish demand and global economic slowdown with an exception of two companies during the study period.

Pandey and Kumar (2011) in their study attempted to make a comparison between the two giants in Indian Steel industry, namely Tata Steel Ltd. (TSL), a private sector company and SAIL, a Maharatna CPSE in respect of their profitability for the period 2001-02 to 2010-11 using several profitability ratios. The study revealed that TSL performed better in terms of profitability as compared to SAIL during the study period. The study also reflected that the bonus issue and dividend payment in TSL made a positive contribution towards enhancing its share price while the dividend payment in SAIL positively influenced its share prices during the period under study. Further, the study indicated that the effect was much more significant in TSL as compared to SAIL.

Burange and Yamini (2010) in their study examined the competitiveness of the fourteen selected firms in the Indian Iron and Steel Industry through composite competitiveness indices as well as financial and non-financial aspects of competitiveness for the year 2006-07. The study revealed that only five firms out of the fourteen selected ones were placed in the 'above the industry average' category whereas the remaining nine found place in the 'below the industry average' cell. The study also observed that eight firms such as Tata Steel Ltd., JSW Steel Ltd., Jindal Stainless Ltd., Uttam Galva Steels Ltd., Bhushan Steel Ltd., Shree Precoated Steels Ltd., National Steel & Agro Industries Ltd. and Lloyds Steel Industries Ltd. were able to keep their competitive positions better in terms of financial indicators of competitiveness during the study period.

Ramaratnam and Jayaraman (2011) conducted a study in which the financial soundness of four selected companies in Indian Iron and Steel industry, namely JSW Steel, SAIL, Steel exchange of India, Tata steel and Visa steel was analysed for the period 2006 to 2010 by applying Altman's Z score. The net working capital to total assets ratio, retained earnings to total assets ratio, earnings before interest and tax to total assets ratio, market value of equity to market value of debt ratio and sales to total assets ratio were used in estimating Altman's Z-Score. The study analysed the consistency, stability and overall trends of Altman Z Scores.

The study found that the determinants of a firm's operating performance were certain key financial ratios like turnover ratios, profitability ratios, asset utilization ratios etc. The study concluded that all the selected units were financially sound during the study period while the operating efficiency of JSW steel and that of TATA steel were good.

The study carried out by Mayank (2010) compared SAIL with other steel companies like TATA, ISPAT, JINDAL and ESSAR in respect of their financial performance during the study period 2003 to 2009 by making trend analysis, analysis of common size statement and ratio analysis. More specifically, profitability, liquidity, management efficiency, and solvency

ratios of the selected companies were measured in this study. The empirical analysis of the study found that the debtors turnover ratio of SAIL was lower as compared to the other companies under study while the reverse pattern was observed in the net outcome derived from the analysis of liquidity position. Finally, the study showed that SAIL was in a position to accept more debt in designing its capital structure as the company had lower debt-equity ratio during the study period.

The study conducted by Pal (2012) analysed the financial performance of ten selected steel companies in India during the post-liberalization period (1991-92 to 2010-2011). In this study an attempt was made to establish the linear relationship between liquidity, leverage, efficiency and profitability of the selected companies. Using the multiple regression analysis, the study found that overall profitability of the selected companies was influenced by several financial indicators like liquidity, profitability, activity and financial leverage during the study period.

A considerable number of studies have been carried out to analyse the issue relating to the financial performance of the Indian corporate sector during the last few decades and also a few studies on the same issue have been made, emphasizing the effects of the post liberalization period. A good number of studies in the post liberalization period have also been conducted on the analysis of financial performance of the Indian Iron & Steel industry in which different aspects of financial performances, such as liquidity, profitability, asset management efficiency etc. have been analysed. But in most of these studies, no composite financial performance index based on the sub-indices of the different aspects of financial performance has been applied.

Moreover, in the post liberalization period, the matter connected with the financial performance of companies belonging to the Indian Iron & Steel industry has not been addressed with due importance. In fact, no significant study using sub-indices and composite index has so far been conducted to make an in depth analysis of the financial performance of the Indian Iron & Steel industry in the post-reform era, although the significance of this sector in Indian economy cannot be ignored. In order to bridge the gaps, the present study was carried out.

Objectives of the study

In this context it seems pertinent

- (i) To study the different aspects of the financial performance, such as liquidity, profitability and asset management efficiency of the selected Iron & Steel companies during the study period.
- (ii) To construct a company-specific composite financial performance index to measure the overall financial performance of the companies under study.
- (iii) To analyze the company-wise pattern of financial performance indices of the selected companies over the study period.

DATA SOURCE AND METHODOLOGY OF THE STUDY

Data source

The study is based on fifteen major companies in Indian Iron & Steel industry, namely Ahmedabad Steelcraft Ltd, Ashirwad Steels & Industries Ltd, Bajaj Steel Industries Ltd, Bhushan Steel Ltd, Essar Steel Ltd, India Steel Works Ltd, Jindal Steel & Power Ltd, JSW Steel Ltd, MSP Steel & Power Ltd, Rashtriya Ispat Nigam Ltd, Steel Authority of India Ltd, Tata Steel Ltd, Visa Steel Ltd, Welspun Corp Ltd and Mahamaya Steel Industries Ltd., which were selected for the study following purposive sampling procedure. The data of the companies under study for the period 2000-01 to 2014-15 used in the study were collected from secondary sources, i.e Capitaline Corporate Database. An attempt was made in the study to examine the financial performance of Indian Iron and Steel industry during the period 2000-01 to 2014-15. In this study fifteen major Iron and Steel companies having significant contribution in the industry were taken. Though the number of companies selected for the study was not large, the data set for fifteen years was considered. So, while making the analysis in the study altogether 225 numbers of observations were included. Thus, it can be said that the study was free from small sample bias. It is also found that most of the studies on the Indian Iron and Steel industry as carried out in India were based on not more than ten companies. Thus the review of literature on the issue addressed in the present paper also justifies that the adequate number of samples was in place. As a result, the authors of the paper were in a position to draw inferences on the basis of the fifteen selected companies. The financial performance of the companies under study was assessed using composite financial performance index. The financial performance index was designed by considering profitability index, liquidity index and asset management efficiency index.

Methodology

While constructing the profitability index used in this study, profitability measures like return on capital employed (ROCE), return on owners' equity (ROE), earnings per share (EPS) and operating profit ratio (OPR) were considered. At the time of designing the liquidity index, liquidity indicators, namely current ratio (CR), quick ratio (QR), stock to current asset ratio (SCAR) and working capital to current asset ratio (WCAR) were considered. To construct the index of asset management efficiency, fixed assets turnover ratio (FATR), inventory turnover ratio (ITR), debtors turnover ratio (DTR) and cash turnover ratio (CTR) were considered in this study.

Principal Component Analysis (PCA) was applied in ascertaining liquidity index, profitability index, asset management efficiency index and finally financial performance Index. PCA is a statistical procedure that uses an orthogonal transformation to convert a set of observations of possibly

correlated variables into a set of values of linearly uncorrelated variables. The relevance of this method lies in the fact that it transforms the impact of a rather greater number of variables (which may be correlated) into a smaller set of uncorrelated factors. The number of principal components is less than or equal to the number of original variables (Singh & Sur, 2018). Since a number of indicators are involved in each category of performance, use of PCA appears to be most appropriate index, to derive a single index reflective of overall financial performance of the companies. A primary benefit of PCA arises from quantifying the importance of each dimension for describing the variability of a data set (Shlens, 2009). PCA can also be used to compress the data, by reducing the number of dimensions, without much loss of information. While using PCA to analyse a data set, it is usually possible to explain a large percentage of the total variance with only a few components. Principal components are selected so that each successive one explains a maximum of the remaining variance. The review of literature on the issue addressed in the present paper shows that while constructing a composite index two types of weights, namely equal weights and differential weights were used. In some cases, equal weights were given on the individual variables of sub-indices whereas in some other cases differential weights were assigned to the sub-indicators. In the present paper, weights were derived on the basis of statistical consideration. PCA is one of the important composite index methods in which a number of correlated variables transformed into a smaller number of uncorrelated variables called the principal components. PCA is a suitable technique where the correlations between different indicators are high. One of the notable points in favour of a composite index is that at the time of designing such index the complex and multidimensional indicators are transformed into one indicator which helps the stakeholders in taking their decisions. In fact, a composite index can reduce the number of indicators without reducing the underlying information base. So, it facilitates communication to the stakeholders and promotes accountability.

An attempt was also made to identify the nature of the trend in financial performance index of the selected iron and steel companies during the study period. The linear trend model which was fitted for each company is:

$$FPI = \beta_0 + \beta_1 T + \varepsilon$$

Where FPI denotes the financial performance index, T indicates the time period and ε is the error term.

Construction of overall financial performance index

Preparing an overall financial performance requires the consideration of individual sub-indices of performance viz. liquidity, profitability and asset management efficiency. These respective sub-indices again are based on several components pertinent to specific sub-index category. Both the overall performance index and sub-indices are considered as latent or unobserved variable. Here the problem is the weight

Table 1. Indicators and Measures of Components of Financial Performance

	Indicator	Measure
Liquidity	Quick Ratio (QR)	Firm's ability to pay off its immediate obligations.
	Current Ratio (CR)	Firm's ability to meet its short-term obligations.
	Stock to current asset ratio	Presence of the proportion of non-liquid assets in short term assets.
	Working capital to current asset ratio	Firm's ability to meet its current obligations.
Profitability	Return on capital employed (ROCE),	Firm's overall earning capability.
	Return on owners' equity (ROE)	Firm's earning capability from the viewpoint of its owners.
	Earnings per share (EPS)	Firm's ability to earn profit from owners' viewpoint.
	Operating profit ratio (OPR)	Firm's operating profitability.
Asset Management	Fixed assets turnover ratio (FATR)	Firm's efficiency in managing fixed asset.
	Inventory turnover ratio (ITR)	Firm's efficiency in managing inventory.
	Debtors turnover ratio (DTR)	Firm's efficiency in managing debtors.
	Cash turnover ratio (CTR)	Firm's efficiency in managing cash.

assignment to the indicators or sub-indices which is critical to maximize the information from a data set included in an index. A good composite index should comprise important information from all the indicators, but not be strongly biased towards one or more of these indicators (Datta and Singh, 2019). Taking a cue from Cámara and Tuesta (2014), two-stage principal components methodology was applied in estimating the degree of overall financial performance as an indexing strategy. Since the sub-indices are likely to contain inter-correlated indicators, the sub-indices were estimated first, rather than directly estimating the overall index (Table 1).

First, all the three individual sub-indices (liquidity, profitability and asset management efficiency) are constructed by using Principal Component Method. Second, we estimate the dimension weights and overall financial performance index by using the dimensions as explanatory variables. Hence we assume that the latent variable like overall financial performance index (**FPI**) can be expressed as a linear function as follows:

$$FPI = \alpha_1 I_i^L + \alpha_2 I_i^P + \alpha_3 I_i^A + e_i$$

Thus for instance, liquidity index (I^L) as a latent variable is supposed to be determined by variables like current ratio (CR), quick ratio (QR), stock to current asset ratio (SCAR) and working capital to current asset ratio (WCAR). Here I^L can be considered as a latent variable, which is unobserved. In linear form it is represented as:

$$I_i^L = \beta_1 (CR)_i + \beta_2 (QR)_i + \beta_3 (SCAR)_i + \beta_4 (WACR)_{4i} + u_i \quad (1)$$

Similarly in case of profitability, the corresponding index I^P as a latent form is supposed to be determined by a number of variables like return on capital employed (ROCE), return on owners' equity (ROE), earning per share (EPS) and operating profit ratio (OPR). In linear form it stands as:

$$I_i^P = \gamma_1 (ROCE)_i + \gamma_2 (ROE)_i + \gamma_3 (EPS)_i + \gamma_4 (OPR)_i + v_i \quad (2)$$

Further in case of asset management we consider the corresponding inclusion index (I^A) as a latent variable linearly determined by four relevant components like fixed asset turnover ratio (FATR), inventory turnover ratio (ITR), debtors turnover ratio (DTR) and cash turnover ratio (CTR). In latent form the environmental inclusion can be expressed as:

$$I_i^A = \delta_1 (FATR)_i + \delta_2 (ITR)_i + \delta_3 (DTR)_i + \delta_4 (CTR)_i + w_i \quad (3)$$

We denote λ_j^L ($j = 1, 2, 3, 4$) as the j^{th} Eigen value in case (1), λ_j^P ($j = 1, 2, 3, 4$) as the j^{th} Eigen value in case (2) and λ_j^A ($j = 1, 2, 3, 4$) as the j^{th} Eigen value in case (3). Subscript j refers to the number of principal components in each respective case that also coincides with the number of corresponding indicators. Noting that the values of λ_j gradually falls as the suffix increases in each case, we denote P_j^L as the j^{th} principal component in case (1), P_j^P as the j^{th} principal component in case (2) and P_j^A as the j^{th} principal component in case (3). We get the corresponding estimator of each dimension according to the following weighted averages:

Table 2. Financial Performance of the Companies in terms of Liquidity Index

Company	Average	Consistency Coefficient	Slope of Trend Line	t- statistic
Ahmedabad Steel	0.715	2.101	-0.036***	-1.93
Ashirwad Steel	1.074	6.867	0.0258*	3.94
Bajaj Steel	0.512	2.147	-0.412*	-4.38
Bhushan Steel	0.532	2.017	-0.0492*	-5.45
Essar Steel	0.319	1.248	-0.021	-1.42
India Steel	0.258	1.920	0.0026	0.31
Jindal Steel	0.433	2.414	-0.033*	-5.55
JSW Steel	0.188	0.912	-0.0083	-0.88
MSP Steel	0.691	2.163	-0.062*	-6.46
Rashtriya Ispat	0.651	1.699	-0.0432**	-2.10
SAIL	0.377	3.341	-0.01***	-1.83
Tata Steel	0.305	1.066	-0.0148	-0.86
Visa Steel	0.327	0.926	-0.056*	-6.07
Welspun Corp	0.420	1.793	-0.038*	-3.84
Mahamaya Steel	0.618	2.884	-0.036*	-4.29

Source: Authors' calculation from secondary data.

$$I^L = \frac{\sum_{j=1}^4 \lambda_j^L \cdot P_j^L}{\sum_{j=1}^4 \lambda_j^L}$$

$$I^P = \frac{\sum_{j=1}^4 \lambda_j^P \cdot P_j^P}{\sum_{j=1}^4 \lambda_j^P}$$

$$I^A = \frac{\sum_{j=1}^4 \lambda_j^A \cdot P_j^A}{\sum_{j=1}^4 \lambda_j^A}$$

$$P_2' = \theta_{21}I^L + \theta_{22}I^P + \theta_{23}I^A$$

$$P_3' = \theta_{31}I^L + \theta_{32}I^P + \theta_{33}I^A$$

Hence overall financial performance index can be expressed as:

$$FPI = \frac{\sum_{j=1}^3 \lambda_j' (\theta_{j1}I^L + \theta_{j2}I^P + \theta_{j3}I^A)}{\sum_{j=1}^3 \lambda_j'}$$

Although usually the whole set of causal variables is replaced by a few principal components, which account for a substantial percentage of the total variation in all the sample variables, here we consider as many components as the number of explanatory variables. This is due to our concern to estimate accurately the sub-indices of inclusion rather than truncating the data in order to avoid discarding information that could affect our estimates. Thus this procedure accounts for 100 percent of the total variation in the data.

Second stage principal component analysis is run to compute the overall financial performance index by following the steps outlined above, whereby we get:

$$FPI = \frac{\sum_{j=1}^3 \lambda_j' P_j'}{\sum_{j=1}^3 \lambda_j'}$$

The highest weight, λ_1' , is attached to the first principal component since it accounts for the largest proportion of the total variation in all explanatory variables. As the suffix increases, the proportion of variance explained by the respective principal components decreases. Using algebra, each component, P_j' can be expressed as a linear combination of the three sub-indices as:

$$P_1' = \theta_{11}I^L + \theta_{12}I^P + \theta_{13}I^A$$

RESULTS AND DISCUSSION

Table 2 shows the financial performance of the selected Iron & Steel companies in terms of liquidity. It is observed from the table that Ashirwad Steel captured the first position with respect to both the value of average and consistency of liquidity index while JSW Steel was in the last position. As per the average values of liquidity index, Ahmedabad Steel and MPS Steel secured the second and third positions respectively. Based on the consistency coefficient, SAIL and Mahamaya Steel occupied the second and third ranks respectively. This table also discloses that in ten companies (Ahmedabad Steel, Bajaj Steel, Bhushan Steel, Jindal Steel, MSP Steel, Rashtriya Ispat, SAIL, Visa Steel, Welspun Corp and Mahamaya Steel) out of the fifteen selected ones, the slopes of the trend lines of liquidity indices were found to be negative as well as significant whereas only in Ashirwad Steel, the slope of the trend line was positive which was found to be significant. It implies that the liquidity trend in most of the companies under study was declining during the study period.

Table 3 depicts the financial performance of the selected companies in terms of profitability. Based on the average values of profitability index, JSW Steel captured the top most position, followed by Jindal Steel and Tata Steel. As per the consistency coefficient, Jindal Steel was placed in first rank. It implies that Jindal steel became more efficient in maintaining

Table 3. Financial Performance of the Companies in terms of Profitability Index

Company	Average	Consistency Coefficient	Slope of Trend Line	t- statistic
Ahmedabad Steel	0.218	1.114	-0.0083	-0.69
Ashirwad Steel	0.228	1.093	-0.03*	-3.02
Bajaj Steel	0.421	1.704	0.0402*	3.81
Bhushan Steel	0.412	2.413	0.0086	0.83
Essar Steel	0.175	1.103	0.0014	0.14
India Steel	0.089	0.816	0.0047	0.71
Jindal Steel	0.650	2.995	-0.0289**	-2.66
JSW Steel	0.731	1.828	0.0788*	6.72
MSP Steel	0.245	1.758	0.0143***	1.87
Rashtriya Ispat	0.496	2.041	-0.0058	-0.38
SAIL	0.369	2.130	0.0153	1.55
Tata Steel	0.621	2.815	0.0226***	1.85
Visa Steel	0.218	1.463	-0.0087	-0.97
Welspun Corp	0.292	2.206	-0.0033	-0.46
Mahamaya Steel	0.226	1.753	0.0152**	2.23

Source: Authors' calculation from secondary data.

its profitability as compared to its competitors during the period under study. On the other hand, India steel secured the last position with respect to the average value and consistency coefficient of profitability index. This table also shows that the slopes of trend lines of profitability indices in four companies out of the fifteen companies under study were positive which were found to be statistically significant while the slopes of the trend line in only two companies negative which were found to be statistically significant.

Table 4 discloses the financial performance of the selected companies in terms of asset management efficiency. Based on the average values of asset management efficiency index, Mahamaya Steel captured the top most position, followed by Tata Steel and Bajaj Steel. Relatively poor performers in respect of average value of asset management efficiency were Visa Steel, Ahmedabad Steel and SAIL during the study period. The above table also shows that the slopes of trend lines of asset management efficiency in ten companies out of the fifteen selected ones were positive which were found to be statistically significant while Ashirwad Steel only showed negative trend which was found to be significant. It reveals that a large number of companies became efficient in managing their assets to improve their financial performance over the study period.

Analysis of overall financial performance index

Table 5 shows the relative status of the selected iron and steel companies in terms of overall financial performance index. A wide variation in overall financial performance across the selected companies over the years under study was noticed. The higher the value of index, the higher is the efficacy of the companies in generating surplus and in maintaining sound

liquidity status with the help of proper management of different assets. For the purpose of analytical convenience, companies having values of index greater than 0.6 were considered as high performing companies. Companies having values within the range (0.3-0.6) were recognized as medium performing companies and companies with index values less than 0.3 were considered as low performing companies.

In the year 2001, only Ahmedabad Steel found place in the category of 'high level of financial performance' while other nine companies, such as Ashirwad Steel, Bajaj Steel, Bhushan Steel, Jindal Steel, MSP Steel, Rashtriya Ispat, Visa Steel, Welspun Corp and Mahamaya Steel were placed in the 'medium level of performance' class. Essar Steel, India Steel, JSW Steel, SAIL and Tata Steel found place in the category of 'low level of financial performance'.

The study also reveals that in the financial year 2015, JSW Steel, and Tata Steel were placed in the category of 'high level of financial performance' while four companies, namely Bajaj Steel, Essar Steel, India Steel and Visa Steel found place in the category of 'medium level of financial performance'. The remaining nine companies (Ahmedabad Steel, Ashirwad Steels, Bhushan Steel, Jindal Steel, MSP Steel, Rashtriya Ispat, SAIL, Welspun Corp and Mahamaya Steel) were placed in the category of 'low level of financial performance'. If the performance achieved in the year 2015 is compared with that reached in the initial year of the study period, it is observed that Ahmedabad Steel shifted from the category of 'high level of financial performance' to the category of "low level of financial performance" while JSW and Tata steel moved in the reverse direction. Essar Steel and India Steel shifted from low performing category to the category 'medium level of financial performance'. However, Ashirwad Steels, Bhushan Steel, Jindal Steel, MSP Steel Rashtriya Ispat, Welspun Corp and Mahamaya Steel moved in the opposite direction.

Table 4. Financial Performance of the Companies in terms of Asset Management Efficiency Index

Company	Average	Consistency	Slope of Trend Line	t- statistic
Ahmedabad Steel	0.157	0.913	0.0146	1.48
Ashirwad Steel	0.310	1.102	-0.0335**	-2.27
Bajaj Steel	0.344	1.938	0.0209**	2.24
Bhushan Steel	0.194	1.703	0.0012	0.17
Essar Steel	0.164	2.031	0.0128*	3.65
India Steel	0.338	1.789	0.022**	2.20
Jindal Steel	0.282	2.056	0.0143***	1.90
JSW Steel	0.324	2.766	0.0209*	4.79
MSP Steel	0.262	2.004	0.0052	0.65
Rashtriya Ispat	0.274	2.899	0.0023	0.386
SAIL	0.144	2.304	0.0073**	2.26
Tata Steel	0.366	1.775	0.0409*	6.87
Visa Steel	0.158	1.155	0.0218*	3.64
Welspun Corp	0.160	2.228	0.0132*	5.12
Mahamaya Steel	0.470	1.765	0.0273***	1.86

Source: Authors' calculation from secondary data.

Table 5. Company-wise Overall Financial Performance Index

Company	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Ahmedabad Steel	0.671	0.685	0.243	0.700	0.267	0.503	0.355	0.261	0.216	0.149	0.338	0.315	0.305	0.375	0.133
Ashirwad Steel	0.592	0.693	0.631	0.639	0.387	0.634	0.471	0.678	0.717	0.143	0.027	0.346	0.393	0.150	0.128
Bajaj Steel	0.424	0.500	0.311	0.529	0.219	0.507	0.378	0.270	0.589	0.268	0.206	0.476	0.445	0.721	0.306
Bhushan Steel	0.575	0.539	0.234	0.506	0.173	0.392	0.320	0.268	0.351	0.287	0.357	0.334	0.473	0.128	0.216
Essar Steel	0.182	0.054	0.224	0.456	0.312	0.326	0.115	0.051	0.323	0.003	0.106	0.146	0.100	0.113	0.336
India Steel	0.286	0.170	0.170	0.051	0.009	0.142	0.289	0.251	0.255	0.023	0.122	0.270	0.208	0.327	0.395
Jindal Steel	0.520	0.610	0.465	0.412	0.338	0.392	0.292	0.378	0.432	0.280	0.492	0.440	0.603	0.278	0.225
JSW Steel	0.096	0.177	0.180	0.339	0.373	0.331	0.146	0.093	0.266	0.574	0.638	0.579	0.902	0.651	0.796
MSP Steel	0.589	0.563	0.438	0.325	0.428	0.577	0.517	0.490	0.571	0.135	0.318	0.277	0.323	0.236	0.073
Rashtriya Ispat	0.339	0.294	0.448	0.674	0.727	0.803	0.618	0.858	0.533	0.109	0.415	0.502	0.224	0.204	0.274
SAIL	0.277	0.203	0.128	0.300	0.389	0.325	0.222	0.425	0.418	0.204	0.311	0.281	0.267	0.193	0.267
Tata Steel	0.267	0.275	0.369	0.178	0.267	0.242	0.290	0.809	0.422	0.231	0.693	0.532	0.656	0.601	0.690
Visa Steel	0.458	0.532	0.217	0.426	0.235	0.387	0.263	0.069	0.143	0.137	0.321	0.102	0.025	0.193	0.400
Welspun Corp	0.420	0.416	0.254	0.457	0.218	0.291	0.195	0.157	0.297	0.217	0.320	0.209	0.174	0.168	0.232
Mahamaya Steel	0.531	0.496	0.247	0.296	0.104	0.732	0.689	0.456	0.618	0.169	0.463	0.478	0.253	0.299	0.275

Source: Authors' calculation from secondary data.

On this basis of average value of index it is observed in Table 5 that out of 15 companies, five companies namely Essar Steel, India Steel, SAIL, Visa Steel and Welspun Corp experienced 'low level of financial performance' during the study period. Again ten companies, namely Ahmedabad Steel, Ashirwad Steels, Bajaj Steel, Bhushan Steel, Jindal Steel, JSW Steel, MSP Steel, Rashtriya Ispat, Tata Steel and Mahamaya Steel Industries Ltd achieved only medium level of financial performance. It is important to note that none of the selected companies found place in 'high level of financial performance' category. On the whole, looking at the year-wise worst performing companies, it can be said that special attention need to be given to the companies like Essar Steel and India Steel. One significant outcome of the study is that out of 15 companies, 11 companies registered declining trend in the

financial performance over time. It is observed that companies like Essar Steel, India Steel, JSW steel and Tata steel the value of financial performance index improved in the year 2015 as compared to that in 2001.

The analysis of average financial performance indices (Table 6) also discloses that Rashtriya Ispat captured the top most position in respect of financial performance whereas Tata steel and Ashirwad Steel secured the second and third positions respectively. The last three positions were captured by India Steel, Essar Steel and Visa Steel respectively. The analysis of consistency coefficient of the financial performance indices reveals that by occupying the first and second positions, Jindal Steel and SAIL established themselves as the most consistent performers in respect of financial performance during the study period. It is also observed that Essar Steel and India Steel found

Table 6. Ranks and Trend analysis of Overall Financial Performance Indices

Company	Average value of Overall Index	Rank	Consistency of Overall Index	Rank	Slope of Trend Line	t-statistic	R - square
Ahmedabad Steel	0.368	9	1.963	10	-0.0267**	-2.98	0.4071
Ashirwad Steel	0.442	2	1.862	11	-0.0381*	-3.72	0.5163
Bajaj Steel	0.410	5	2.777	3	0.0023	0.25	0.005
Bhushan Steel	0.344	10	2.567	5	-0.0147***	-2.02	0.2399
Essar Steel	0.190	15	1.433	15	-0.0053	-0.66	0.0322
India Steel	0.198	14	1.739	12	0.0101	1.56	0.1582
Jindal Steel	0.410	4	3.526	1	-0.0103	-1.55	0.1562
JSW Steel	0.409	6	1.559	14	0.0489*	5.44	0.6949
MSP Steel	0.391	8	2.364	6	-0.0268*	-3.78	0.5241
Rashtriya Ispat	0.468	1	2.024	9	-0.0186	-1.39	0.1297
SAIL	0.281	11	3.301	2	0.0008	0.14	0.0016
Tata Steel	0.435	3	2.083	8	0.0327*	3.54	0.491
Visa Steel	0.261	13	1.692	13	-0.0181**	-2.21	0.2757
Welspun Corp	0.268	12	2.770	4	-0.014*	-3.07	0.4198
Mahamaya Steel	0.407	7	2.147	7	-0.0083	-0.72	0.0388

Source: Authors' calculation from secondary data

Note: *, ** and *** indicate 1 percent, 5 percent and 10 percent level of significant respectively.

place in the last two benches. The analysis of trend in financial performance indices reflects that out of the fifteen companies, only two companies (Tata Steel and JSW Steel) followed significant positive trend while six companies (Ahmedabad Steel, Ashirwad Steel, Bhushan Steel, MSP Steel, Visa Steel and Welspun Corp) adopted significant negative trend.

Ahmedabad Steel, Ashirwad Steel, Visa Steel and Welspun Corp showed significant negative trend in the overall financial performance index. This is due to the fact that out of three sub-indices, liquidity and profitability indices had significant negative trend over the time.

In the companies like JSW steel and Tata steel, significant positive trends in profitability and asset management indices made notable contribution towards achieving significant positive trends in their overall financial performance indices. In fact, the issue associated with the relationship between working capital and overall financial performance is a controversial one. On this debate, academicians and finance experts are sharply divided into two schools of thought. One school of thought argues that the adequate amount of working capital keeps the liquidity status intact which makes a positive contribution towards enhancing the overall financial performance while the other school of thought opines that investment in working capital reduces fixed asset investment which ultimately hurts the overall financial performance. The results obtained from the present study conform to the theoretical arguments as raised by both the schools of thought.

Conclusion

The present study focuses on the financial performance analysis of fifteen selected companies in Indian Iron & Steel

industry for the period 2000-01 to 2014-15. The overall financial performance was represented by overall financial performance index which was constructed by taking into consideration of three sub-indices of liquidity index, profitability index and asset management efficiency index. The study reveals a wide variation in the level of financial performance across the selected iron and Steel companies in India during the study period.

With respect to the average financial performance index, Rashtriya Ispat captured the top most position. The analysis of consistency coefficient of the financial performance indices reveals that Jindal Steel was able to occupy the first position. It is important to note that Essar steel secured the last position in terms of both average and consistency of financial performance index. Another significant outcome of the study is that Tata Steel and JSW Steel were able to keep their trend in financial performance positive as well as noticeable whereas the trend as established by Ahmedabad Steel, Ashirwad Steel, Bhushan Steel, MSP Steel, Visa Steel and Welspun Corp in respect of their financial performance was negative and significant during the study period. It implies that in majority of the companies the financial performance deteriorated over the time period. This is due to the fact that in most of the cases the liquidity and profitability indices declined significantly. So special attention should be taken to improve the liquidity and profitability of the concerned companies.

Conflict of interest

The authors have none to declare

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