

The Impact of ERP Systems on financial Performance of Central Public Sector Enterprises Working in Mineral and Metal Sector

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Abstract: *The Central Public Sector Enterprises have been performing vital macroeconomic objectives of a country such as economic growth, development of infrastructure, and contribute to the positive market situation. ERP Systems implementation in CPSEs working in mineral and metal sector enhances the financial performance. Financial indicator like Return on Assets, Return on invested Capital, return on equity, and Return on sale have a significant impact on ERP Adopter when it compares with ERP non-adopter working in mineral and metal sector*

Keywords : ERP, ERP System, CPSE, Financial Performance

I. INTRODUCTION

Enterprise resource planning systems have been designed to integrate the various functions of any enterprise so that critical business processes can be handling effectively and the different MIS data can be obtained in an easy way to make the decision in times. There are many advantages to ERP Systems, and for that reason, many industries have already adopted implementing ERP systems since the year 1990. Central public sector enterprises (CPSEs) are those companies where 51% or more holding are held by the Central Government or other CPSEs. The Central Public Sector Enterprises have been performing vital macroeconomic objectives of a country such as economic growth, development of infrastructure, and contribute to the positive market situation. The CPSEs also contribute to economic growth by putting technology advancement in the manufacturing sector and involve in socio-economic development like the generation of employment and upgrading skills of unemployed youth. According to the public enterprise survey 17-18, there were 339 CPSEs with total financing of Rs. 13,73,412 crore as on 31st March 2018. The CPSEs are significant and strategic performers in the country's economy by delivering crucial goods and services and possessing a leading market policy in critical segments

such as Coal, Power, Steel, Mining, Petroleum, and Transport & Logistic Services. The Central public sector enterprises are also operational in competitive markets like telecommunication, Hospitality and Information Technology, etc. The Central public sector enterprises are progressively under tremendous pressure because of the open economy, change in market demand policy of the government and competitive business environment to attain their objectives.

Due to more open-up the global economy in the recent past, Commercial companies are facing more pressure to encounter the competition in a dynamic market situation. The CPSEs are not out of this situation. This pressure has led CPSEs to redesign and re-engineering their business process to effectively utilize all their available resources. Enterprise Resource Planning helps businesses by integrating different functionalities as per the need of business to make a smarter decision and serve better customer satisfaction and work more efficiently by automating process workflows.

II. LITERATURE REVIEW.

Though there were enough articles published on Enterprise Resource Planning during the last decade emphasizing different divisions and in a different region, we selected the articles that are highlighted regarding the post-implementation issues for our review. Some of the basic issues highlighted in this literature were related to issues of organizational impact after the implementation of ERP. Most of the kinds of literature emphasized user performance, organizational agility, operational performance, and financial performance of the organization after the implementation of ERP. We did not find any article highlighted the issues of the financial performance of CPSE in India after implementing ERP. It may also happen that there exist more of such papers that are not evaluated in this article but an attempt has been put to gather to accessible such journal papers published on the web. Compiling such paper an attempt has been taken out more than a time of six months by an extensive web search. However, it may be always feasible few of the papers are left out unintentionally during our internet search.

This literature review reveals that ERP implementation has a very positive impact both in the financial and operational efficiency of the implementing organization. (Aburub, F. 2018) ERP usage is undeniably linked with the competence of different operations of the organization, connect to customer satisfaction, and relevance to organizational design.

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Attaining organizational efficacy is not completely dependent on information technology, particularly Enterprise Resource Planning. But, it may rest on other aspects such as structures, routines, technology management, and innovation. (Ali Mohammad Ghanbari, Leila Soleimani 2017).

The Implementation of Enterprise Resource Planning has a certain and meaningful impact on financial processes effectiveness compared to the traditional systems. (Suraj Kumar Mukti 2017) Individual productivity, individual performance, management control, and customer satisfaction are enhanced after ERP system implementation. (Handoko, B. L., Aryanto, R., & So, I. G. 2015) The implementation of ERP systems helps the organization to attain its competitive advantages by improving the process of information flow through the associated functional system among the trader, manufacturer, different merchant, even up to end-user. ERP systems are positively related to competitive advantage ERP system has a positive impact on firm performance. (Madanhire, I., & Mbohwa, C. 2016) The implementation of ERP systems helps in improved employee competence as the different useful data and facts could now be captured and make updates at a single point without having a chance in duplication. The implementation of ERP systems largely improved the outcome of operational efficiency like the greatly enhanced method of communication and co-operation from all sections. (Ms. Kavita Thori, Dr. D. N. Sharma 2018). Regardless of some shortcomings, the use of ERP systems causes many advantages, including the delining of the cost of logistics, the better information, etc. These benefits are well marked not only for the specific employees but for the organization as a whole. The implementation also has a progressive impact on business associations with different suppliers and customers.

III. OBJECTIVE.

This research article attempts to explore the impact on financial performance in implementing the Enterprise Resource Planning in the central public sector enterprises working in mineral and metal sectors. This research articles will measure different financial parameter responsible for a financial performance like Profitability, Cost Reduction, Capital Structure and Revenue growth of the CPSEs those have already implemented ERP called as ERP adopter over a while and it will compare with ERP Non-adopter.

IV. VARIABLE & HYPOTHESIS

Different Central Public Sector Enterprises working in the Mining Sector (Other Mineral & Metals, Coal & Crude Oil) were chosen based on the ERP implementation status of the enterprise as an independent variable. There were 24 different CPSEs are working on this as per the information published on the website of the Department of Public Enterprise. We separated the Enterprises into two different groups that have implemented an ERP system called as ERP adopter and from those enterprises not implemented ERP - ERP Non- Adopter.

4.1 ERP & Financial Performance

ERP implementation not only enhances the operational performance of the organization rather it enhances the financial performance too. Implementation of ERP systems

helps in improving financial performance by decreasing IT infrastructure expenses (Shang & Seddon, 2002). In addition to this, there are some indirect effects in the organization related to the performance of non-financial parameters. However, Velcu (2007) indicated that technologically-led Companies have financial benefits by lowering headcount costs and lower selling, general and administrative costs. Lee, Hong, and Katerattanakul (2004) segregated performance of a company into two different groups: the performance related to finance and another is performance-related non-financial matters and they come across that ratio related to profitability, such as ROA (return on assets) and ROIC (return on invested capital) are primarily common indicators related to financial performance. de Andrés, J., Lorca, P., & Labra, J. E. (2012) used return on assets (ROA) to measure profitability because the return of assets is commonly used by different researchers as a measure of firm profitability and the ratio of ROIC (return on invested capital) is also used as a cross verification of the robustness of the outcomes using ROA. They also used Profit Margin (PM), Asset Turnover (AT), Operational Income (OI), and sales figures are indicators to measure financial benefits. Ali, Irfan (2016) also worked out the variables like return on assets, return on invested capital, return on equity, return on sale, total assets turnover, profit margin, operating income, and Sales growth to analyses the financial health of an organization. Based on the above analysis, it is envisaged that the implementation of the ERP system influences a change in the performance financial parameter. Furthermore, the following important financial ratios and their definition used in this study depicted below.

4.2 Definition of Variable

$$\text{ROA} = \text{Return on Assets} = \frac{\text{Operational Income}}{\text{Average total asset}}$$

ROA is frequently used to evaluate the firm profitability by many studies, and the calculation of ROA has been figured out in a different way from different studies. Aral et al. (2008) used income as income prior to different taxes, whereas Hunton et al. (2003) calculated ROA as income prior to extraordinary items with over an average of opening and closing of total assets. Following (De Andres et al., 2012) operational income has been used as measuring ROA in this study considering different financial expenses like interest are mainly non-operating expenses. These expenses may considerably disfigure the overall income of the firms if it has excessively borrowing or accrued interest, etc. In our study, we have also excluded other income components considering this as a non-operating income.

$$\text{ROIC} = \text{Return on invested Capital} = \frac{\text{Operational Income}}{\text{None Current liabilities} + \text{Equity}}$$

ROIC is equivalent to operating income (Income prior to financial expenses and tax) divided by whole capital employed, which is the sum of equity of the shareholder and non-current liabilities, in this study. Current liabilities are not considered in this computation as capital employed because current liabilities are fluctuating and these are short-lived. The word capital primarily indicates the long-term obligation of anything. ROIC is being used by many authors as an alternative to performance.

$$\text{ROE} = \text{return on equity} = \frac{\text{Operating Income}}{\text{Total Equity}}$$

In this study we have used two more commonly used variables for the profitability of the firm in several studies are a return on equity (ROE) and (ROS). ROE is reasonably altered from that of ROA and ROIC as it represents the interest of the different owners.

ROE calculates the value generated from the firm's operations as an operating income on each amount invested in equity. In our study Reserve & surplus included in total equity considering this as owners' equity.

$$ROS = \text{Return on sale} = \frac{\text{Operating Income}}{\text{Total Sales}}$$

ROS calculates the effectiveness with which the firm is generating the output on each rupee of revenue. Atkinson, Banker, Kaplan, and Young (2001) take ROS into consideration to determine the efficiency return from the capacity to handle the cost at a given sales level.

Other dependent variables like TAT, ITO, OX, COGS, DER and SG are less frequently cited by other studies but we have included in this study

$$TAT = \text{Total assets turnover} = \frac{\text{Sales}}{\text{Total Assets}}$$

The asset turnover ratio indicates the significance of a firm's sales or revenues comparing to the value of its assets. The indicator of the efficiency can be measured through an asset turnover ratio in which we may identify how the company is using its assets to generate revenue.

$$ITO = \text{inventory turnover} = \frac{\text{Sales}}{\text{Average Inventory}}$$

Inventory turnover is a ratio that measures how many times a company has sold and replaced its stock during a particular period. A company divides the average inventory with Sales to calculate the days it takes to sell the inventory on hand.

$$OX = \text{operating expense to sale} = \frac{\text{Operating Expenses} + \text{Cost of Goods Sold}}{\text{Sales}}$$

The competence of a company's management can be measure by the operating ratio, computing by the gross operating expense (OPEX) of a firm to net sales. The operating ratio indicates how effective the management decision concerning keeping the costs minimal while making revenue or sales. The lesser the ratio, the more effective the firm is at generating revenue vs. total expenses.

$$NP = \text{Net Profit Margin} = \frac{\text{Net profit after tax}}{\text{Sales}}$$

The net profit margin is equal to the generation of net profit as a percentage of total sales. The higher the percentage the better is the financial position of the company.

$$SG = \text{Sales growth} = \frac{\text{Sales}_T - \text{Sales}_{T-1}}{\text{Sales}_{T-1}}$$

Sales growth indicates the increase in sales over a period of time. Higher growth always considers a better financial position.

4.3 Hypothesis

H1a: There is a significant impact of financial performance on ERP implementation with respect to ROA, ROIC, ROE, and ROS.

H1b: In terms of ROA, ROIC, ROE, and ROS perform better by adopters, in the post-implementation period than that of their matching non-adopting firms.

H2a: ERP adopters significantly achieved better in the post-implementation period in terms of TAT, and ITO compared to Pre-implementation period,

H2b: Adopters achieve better in terms of TAT and ITO in the post-ERPs implementation period than that of their matching non-adopting firms.

H3a: In the post-implementation period ERPs adopters perform significantly better with respect to OX and NP compared to the pre-implementation period.

H3b: Adopters significantly achieve an improved position in terms of OX and NP, in the post-ERPs implementation period than that of their non-adopting matching firms.

H4a: ERPs adopters considerably possess better sales growth in the post-implementation period compared to the pre-implementation period.

H4b: In post-ERP implementation period adopters achieve a better result in terms of sales growth than that of their non-adopting matching firms.

V. STATISTICAL DATA & METHODOLOGY

There are 24 CPSEs as mentioned before working in the mineral and metal sector. These CPSEs working in these sectors were segregated in two different groups like the CPSEs already adopted ERP as "Adopter" and the CPSEs that have not adopted ERP as "Non-adopter". To identify the financial impact and to make a comparison of the impact of ERP implementation, two different sets of data also collected from the group of CPSEs adopters. The Year of ERP implementation was found out based on the information published in the respective annual report of the CPSEs or otherwise published in data on the web. Collected different secondary financial data mainly from the balance sheet and profit and loss statement published in the annual report of the CPSEs. We have taken the help of another financial website also, where this financial information is not available in the respective CPSEs website. Five years of post-implementation data were compared with five years of pre-implementation data of the Adopter Group. Some of the CPSEs, ERP implementation have not been completed 5 years. We have taken the data accordingly to match the analysis. During the period different companies have changed their financial format at different times. Some of the data were regrouped based on the best applicability. Descriptive statistics were used to find out the mean of the different parameters during the different comparison period and analysis was made. A total of 8 CPSEs were selected out of the 24 CPSEs available in the mining and metal sector. These eight CPSEs are Central Coal Field Limited, Nalco, Hindustan Copper, MOIL, NMDC limited, KIOCL limited, Western Coal Field Limited, and Bisra Stonelime company. Out of these Eight CPSEs, 1st four are in the adopted group and the last four are in the Non-adopted group.

VI. FINDINGS

As shown in table-I, Return on Asset (ROA) which determine the sign of effective use of assets to generate its earning has a significant impact after implementing ERP comparing the figure with implementation year. ROA has increased from 7% in the year of implementation to 11% on average of 5 years after implementation. Though the value of ROA before ERP implementation was higher than the average value of after ERP

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implementation, the outcome shows more stable as it is varying from 10% to 13% in each year instead of varying it from 9% to 29% in different years before ERP Implementation. Like ROA the ROIC, ROE, and ROS have shown the significant financial impact of ERP implementation.

Study shows ROIC has increased from 9% in implementing year to 15% on an average of 5years after ERP Implementation and it shows more secure varying from 11% to 17% compared to prior implementation period i.e. 14% to 28%. .ROE and ROS have increased on an average of 8% and 2% respectively in five years after ERP implementation comparing with implementing year. It may be concluded that the hypothesis H1a is partially supported.

Table-I

ERP Adopter – Pre & Post												
Variable	Parameter	5YA	4YA	3YA	2YA	1YA	IY	1YB	2YB	3YB	4YB	5YB
ROA	Mean	10%	11%	11%	13%	13%	7%	9%	15%	15%	20%	29%
ROIC	Mean	11%	15%	14%	18%	17%	9%	14%	20%	20%	28%	23%
ROE	Mean	11%	23%	19%	26%	21%	12%	19%	26%	28%	31%	23%
ROS	Mean	16%	17%	13%	21%	21%	15%	13%	28%	29%	34%	27%
ITO	Mean	5.11	6.37	5.54	7.57	7.79	6.05	5.23	6.34	9.02	8.2	14.22
TAT	Mean	0.57	0.64	0.70	0.61	0.64	0.57	0.57	0.63	0.59	0.62	1.28
OX	Mean	43%	50%	56%	38%	49%	51%	50%	49%	53%	48%	21%
NP	Mean	15%	20%	13%	18%	19%	17%	19%	30%	28%	28%	21%
SG	Mean	6%	1%	8%	1%	19%	8%	3%	16%	18%	8%	1%

Table-I, summarize the mean value that has been considered for this study for ERP adopter. Variable in column 1 has been selected in this study. Column 2 shows the parameters (mean value). Column 3 to 7 shows the value of (5YA) Five years after to (1YA) one year after. Column 8 shows the value of (IY) implementation year and column 9-13 shows the value of 1YB(one year before) to (5YB) 5year before.

As shown in Table-II and based on the study ROA, ROIC, ROE, and ROS have a significant financial impact on ERP Adopter when it compares with ERP non- adopter. ROA in adopting companies for 5 years starting from FY 14-15 to 18-19 show 9% comparing to non-adopted company -34%. Likewise in the case of ROIC adopted company shows the average value of 13% comparing to the non-adopted company

of 6%. In the case of ROE and ROS also adopted companies show 5 years average value of 18% and 17% comparing to non-adopted 5 years average value of -19% and -30%. Hypothesis H1b proven to be true “Adopters perform better in terms of ROA, ROIC, ROE, and ROS, in the post-implementation period than that of their matching non-adopting firms”

Table-II

Variable	Parameter	Adopted					Non-Adopted				
		18-19	17-18	16-17	15-16	14-15	18-19	17-18	16-17	15-16	14-15
ROA	Mean	14%	10%	7%	6%	10%	-28%	-22%	-32%	-30%	-59%
ROIC	Mean	19%	13%	11%	9%	12%	9%	-3%	3%	5%	16%
ROE	Mean	26%	17%	19%	12%	15%	-16%	-87%	-7%	3%	14%
ROS	Mean	23%	17%	13%	9%	22%	-7%	-7%	-10%	-38%	-88%
ITO	Mean	8.88	7.27	5.65	5.21	6.19	22.82	21.52	13.97	8.82	8.02
TAT	Mean	0.64	0.63	0.54	0.47	0.49	0.92	1.04	0.98	0.96	0.49
OX	Mean	49%	57%	36%	40%	34%	65%	72%	69%	92%	134%
NP	Mean	17%	15%	14%	15%	24%	-6%	-2%	-6%	-9%	-81%
SG	Mean	10%	21%	26%	-3%	-15%	8%	33%	94%	85%	-30%

Table-II, summarize the mean value that has been considered for this study for ERP Adopter and ERP Non-Adopter. Column 1 shows the variable that has been selected in this study. Column 2 shows the parameters (mean value). Column 3 to 7 shows the value of different Financial Year starting from 14-15 to 18-19 for ERP Adopter Group. and column 8-12 shows the value of FY 14-15 to 18-19 for ERP Non-Adopted group.

TAT helps us to understand how effectively companies are using their assets to generate a sale. Company is performing better if the asset turnover ratio is higher, It signifies that the company is creating more revenue per value of assets. In the same way, the ITO ratio shows how many times a company has sold and replaced inventory during a given period. The higher rate considers better sales. The study shows, there is no significant change in TAT and ITO between the pre and post-implementation period as well as for ERP adopter and

non-adopter companies hence this study not supporting hypothesis H2a & H2b.

In terms of operating expenses present study shows a very negligible impact in the post-implementation period in comparison with the pre-implementation period.

In implementation year the operating expenses to sales show 51% whereas when it compares with 5 years average value of the post-implementation period, there is a marginal financial impact of 4% less in OX. In most of the year both in the Pre-implementation period as well as in the post-implementation period OX ratio indicates more or less 50%. As depicted in table-II when the OX ratio compares between adopted and non-adopted, it shows a significant difference. When the average OX ratio of non-adopted companies shows 86% the average value of adopted companies marked exactly 50% less.

Since the profit is relatively linked to operating expenses the study observed the same behavior in case of NP ratio as it was with the OX ratio. Adopted companies have a significant financial impact in terms of NP ratio comparing with Non adopted companies. The study indicates 5 years average of NP ratio as 17% whereas -21% recorded in non-adopted companies. Hence the study does not support hypothesis 3a but the study shows a significant impact and it supports hypothesis 3b.

In the case of sales growth, the present study shows an average 7% growth in the post-implementation period with a comparison average of 9% in the pre-implementation period. When this sales growth compares between adopted and Non-adopted companies present study shows an average 8% growth in Adopted companies and in the case of Non-Adopted the average growth is 38%. hypothesis H4a & H4b are not supported by this study.

VII. CONCLUSION

The present study shows, some ratios perform better where it can be concluded that there is a significant financial impact in the case of the CPSEs in the mining and metal sector adopting ERP. Some of the financial ratios have not performed well though ERP is implemented in those CPSEs working in the mining and metal sector. Most of the ratios taken in this study like TAT, ITO, OX, and NP linked to overall sales of the company. As per the present study, the SG ratio has also not performed well in both the case of ERP adopter and Non-Adopter hence the hypothesis H4a & H4b are not supported by this study. Different factors are responsible for Sales growth like market demand, export facilities, Govt Policies, etc. We can't conclude only ERP implementation will responsible for the sales growth of an enterprise. The ratios linked to sales growth may significantly be performed well if in future if sales growth is marked in these CPSEs. Further to this, The study covers only 5 years of data in both the cases of comparison between pre-implementation with post-implementation as well as with another with non-adopter. The outcome of ERP implementation may require some more time to come.

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