

Effectuality of ERP in Relation to Sales and Distribution System: An Empirical Study on Orissa Mining Corporation in India

Ratikanta Biswal*

Kalpna Sahoo**

Enterprise Resource Planning (ERP) systems are widely used by large corporations around the world to sustain competitive advantages. In order to be competitive, organizations need real-time information on their orders, materials, production, sales, costs etc to increase the efficiency of information systems. The ERP system not only provides real-time information to the enterprise, but also improves business operation flow by means of advanced information technology. Many companies are now reliant upon these systems for their daily operations; maintaining and adapting them in parallel with their business as it evolves, adding new suppliers and customers. But still then many organizations that implemented ERP systems have reported negative impacts from these large investments. The basic objective of the present paper is to explore, how ERP system is doing its sales, marketing and production of different ores in Orissa Mining Corporation (OMC). This paper also focuses on assessing the role of Enterprise Resource Planning (ERP) systems on the success in OMC.

Keywords: ERP, Current Trends in ERP, Sales & Distribution System, OMCLtd

ERP at a Glance

Enterprise Resource Planning (ERP) systems are software packages that allow companies to have more real time visibility and control over their operations. It has been found that the ERP system is a virtual enterprise or model that has its own organizational structure and normative process and that can be managed scientifically. ERP solutions seek to integrate and streamline business processes and their associated information and work flows.

ERP systems, which provide system flexibility, quick response and resources integration, were introduced in the early 1990s to cope with the changing market requirements. The ERP system not only provides real-time information to the enterprise, but also improves business operations flow by means of advanced information technology. In addition, ERP systems improve the efficiency of management decisions and plans and increase the flexibility with adjustments of functionality to react to changes in business needs (Zheng, Yen, and Tarn, 2000). Furthermore, an ERP system is built up with core business operations by integrating aspects such as business strategy, sales and distribution operation, manufacturing process, finance and accounting methodology as well as human resource

functions. According to the comprehensive survey conducted by Robbin-Gioia (2002), 51% of American companies said that their ERP system implementation was unsuccessful. More surprisingly, 46% of the responding companies did not clearly know how to use the ERP system to improve the way they conduct business. As regard to the investment effort of ERP system in U.S. top 5000 manufacturing firms, more than 68% of companies would employ the Big Bang methodology to change their system and business processes at one time and ERP system implementation costs companies at the average of approximately one million dollars, as indicated by the survey results of Mabert et al. (2000). Success in ERP management takes on a special urgency because the costs and risks of these massive technology investments challenge their potential pay-offs. It is important not just how well the ERP system itself performs (e.g. accuracy, reliability, and response time), but how well the business improves its performance with the ERP system. As such, human and organizational learning that provides maximum benefit from the system are key success metrics. Metrics are employed to link operations to strategic goals (Hayes and Wheelright, 1984). Without measurements, organizations will not be able to identify what works well and what does not (O'Dell and Grayson, 1998).

* Assistant Professor in IT, Asian School of Business Management, Bhubaneswar, Orissa, India

** Professor in OB & HRM, Asian School of Business Management, Bhubaneswar, Orissa, India

Current Trends in ERP

The first ERP system was developed by two German engineers who founded SAP (Systems,

Applications and Products) in the early 1970's (Okrent & Vokurka, 2004). The Siemens company cooperated with SAP, a German based software company, was first to implement an enterprise-wide ERP system. In the mid 1970s, MRP (Material Requirements Planning) became the fundamental concept of production management and control in the manufacturing industry. In 1980s, the MRP evolved into MRP-II (Manufacturing Resource Planning) which used the MRP system as a basis and added scheduling and capacity planning activities. MRP-II attempted to integrate business planning, sales, support and other functions together so they could work in concert. By the nineties, MRP-II was further extended into ERP (Enterprise Resource Planning) incorporating all the MRP-II functionality in addition to Finance, Supply Chain, Human Resources and Project management functionalities.

Although challenged by extremely high costs, long duration, and high failure rate, enterprises today still keep struggling to implement ERP systems. In 1998, more than 27% of companies in Europe, especially large and international ones had already implemented ERP systems (Everdingen et al., 2000). However, the major ERP vendors such as SAP and Baan were suffering from the maturity-of-market problem and the price of their stock declined at the end of the 1990s. In addition, there were even articles predicting that ERP will be dead (Dempsey, 1999; Stein, 1999). Nevertheless, the ERP vendors are now trying to fight for the next generation of ERP systems and extend their market to companies in developing countries, small and medium-sized enterprises, and different kinds of industries.

Currently, most popular ERP systems adopt the modular concept in design and implementation. Under this concept, system developers have separated the ERP system into several modules according to the managerial functional area and provide different solutions to specific industry. SAP/R3 is a typical example of modular design. A different approach toward ERP systems design involves the operation process. Under this design concept, the ERP system focuses on integrating the business internal operation information to streamlining the information flow among all functional departments. Through this streamlining feature, the impact of asymmetric information between internal functional departments may be alleviated to the best possible extent and to facilitate customer-oriented production.

The importance of considering ERP success at

multiple points in time was determined by Kim and Peterson (2000) and Ahitur et al. (2002). Their research results show that a company's success or failure is not a reflection of a single action but rather a result of protracted process. Therefore, it is important to understand how the past ERP implementation experience impacts new ERP implementation projects.

Modern applications extend the role of traditional ERP. Apicella (2000) explains, "Today's ERP functions must be more adaptable than the financial, procurement, and human resources applications of old, because e-commerce and business-to-business integration have made it easier for companies to adjust their goals." Enterprise Resource Planning is increasingly being viewed as "the root from which data is pulled into a complex information technology organism that links with customers' and suppliers' systems or with clusters of trading partners in Internet hubs" (Mullin, 2001). If not replaced by now, the systems that businesses originally launched a decade ago are serving as the core of a much more elaborate system that has been branching out at a rapid pace. These branches serve functions with the purpose of yielding some competitive advantage. The new world economic system has been pushing these developments by forcing businesses to compete in a world arena. The standards for quality are global now and demands have increased. Customers expect quality of product and service all very promptly. Businesses must accept the fact that in many aspects their market is global, no matter how small a business may be or how local it thinks its market is. The Internet has narrowed all of the gaps. It embodies these ideas and is developing into a method that all competent businesses that wish to survive and prosper will adopt.

Sales and Distribution System and ERP:

Enterprise resource planning (ERP) software solutions have been implemented by many companies in their efforts to integrate and control their order management, purchasing, supply and logistics functions (Gunasekaran et al. 2007). ERP systems focus on the integration of business functions throughout the entire enterprise by facilitating the flow of information across the line of the business processes as they cross the departmental boundaries.

In today's competitive business environment, companies are increasingly being forced to

streamline business processes. In a world where it is no longer enough to simply have the best product; companies are focusing on core competencies and closer partnerships over the whole supply chain. India is expected to present ERP suppliers an important marketplace as manufacturing companies are significantly investing in technology solutions to improve their manufacturing operations. According to observation made by some experts in the field, the ERP market started showing solid organic growth since 2004 as IT spending improved.

Majority of Indian manufacturers are small by global standards, requiring easy-to-use ERP solutions to meet their specific process requirements, including localization needs to address the continually evolving tax and statutory requirements. Small and medium enterprises across industry verticals and micro verticals, such as automotive, pharmaceuticals, and textiles, are leveraging ERP solutions to gain sustainable competitive advantages.

Here, increased efficiency in sales and distribution is a key factor to ensure that companies retain a competitive edge and improve both profit margins and customer service. As an example, E-resource ERP system is tightly integrated with the Sales and Distribution module. This integration enables the mapping and supply of single-site or multi-site organizations. Developing precise logistics planning for just-in-time deliveries, this system can also generate replenishment orders by using defined warehouse requirements.

The sales related business transactions include Sales queries such as inquiries and quotations, Sales orders, Outline agreements such as contracts and scheduling agreements, Delivery/Shipment, Invoicing/billing, After sales support etc. During sales order-processing the following basic functions are carried out:

- Inquiry handling
- Quotation preparation and processing
- Contracts and contact management (order management)
- Monitoring the sales transaction
- Checking for availability
- Transferring requirements to materials planning (MRP)
- Scheduling the delivery
- Calculating pricing and taxes

- Checking credit limits
- Invoicing/billing
- Creating printed or electronically transmitted documents

Depending on how this particular system is configured, these functions may be completely automated. The data that results from these basic functions is stored in the system where it can be displayed. E-resource ERP's Sales and Distribution module very actively interacts with the material management and financial accounting module for delivery and billing.

Intervention of ERP at OMC:

The Odisha Mining Corporation Ltd. is a State owned Corporation of Govt. of Odisha which has mapped its business processes on the SAP (Systems, Applications and Products) in different functional areas like Material, Sales and Distribution, Finance and Control, Production Plan in Sales Operation, Human Resources and Quality Management in Sales and Procurement. Employee Self Service (ESS) system is a part of Human Resources functions. The OMC Ltd was established in 1956 as a joint sector with the Govt. of India to explore & harness mineral wealth of the State. Subsequently in 1962, it became a wholly State owned Corporation of Govt. of Orissa. OMC's impressive growth over the decades is hinged on its philosophy and commitment towards quality and value addition.

The skilled manpower and scientific business process have been adding to the Corporation's productivity. Reputed foreign firms and global mining giants have entered into joint ventures with OMC. It has mining leases at 35 locations spread over the State. The Corporate Office is situated at the State Capital, Bhubaneswar & Regional Offices at 6 locations in Orissa Daitari, Barbil, J K Road, Gandhamardan, Koida and Bangur. The major minerals mined by OMC mines are Chrome, Iron & Manganese ores and it caters to the requirements of mineral based industries such as Steel, Sponge iron, pig iron, Ferro Manganese & Ferro Chrome both within the country and abroad.

OMC has been steadily adding to the corporations mineral inventory. Today, OMC possesses a reserve of 400 million tons of iron ore, 19 million tons of manganese ore, 28 million tons of chromite, 220 million tons of bauxite, 19 million tons of limestone and other minerals.

Implementation of **Enterprise Resource Planning (ERP)** has brought about a sea change in the functioning of the Corporation by integrating various departments/functions and making available real time data for faster and more effective decision making. OMC holds the pride of being the first mining company in the country to map its business processes on **SAP (Systems, Applications and Products-an ERP tool)**. The ERP implementation commenced in OMC on 8th Sept'04 covering the following functional modules (i) Finance and Controlling (FICO) (ii) Materials Management (MM) (iii) Sales & Distribution(SD) (iv) Sales Operation Planning (PP-SOP) and (v) Quality Management(QM) in Sales & Procurement. The implementation which was confined to Head

Office and Regional Offices was subsequently extended to the mines. With the implementation of the above modules, the material procurement process has been streamlined, sales cycle period has been reduced, stock position of mines (storage wise) is available, online planning of cash and bank balances has been possible inter alia. Subsequently, different HR modules like Employee Self Service(ESS), Personnel Development (PD) and Workflow have been implemented which has helped the employees in the remotest mines to seek leave and loan approvals online; see their own personal information including salary slip, loan balances, IT returns. Self appraisal management is also possible on line.

Benefits in Sales and Distribution Module after Implementation of SAP at OMC:

Sl. No.	Before implementation of SAP	After implementation of SAP
1	Allotments of products in favour of customers were intimated to Regional offices /customers which take more than one month to issue contracts /sale order.	Allotment in respect of each customer is created in the system at H.O and viewed immediately by the user at Regional offices / Mines office & intimated to the customers forthwith by mail. The allotment can be accessed at any point of time.
2	Once a Contract/Sale order is created then the subsequent documents (delivery & billing) are created with same data manually which means duplication of works & subject to typographical error.	Once a Contract/Sale order is created, it copies the contents to the subsequent delivery & billing documents automatically & no error is visaged.
3	Status of allotment can not be assessed immediately & needs long period to ascertain it because information from regional office to H.O takes more time and may be prone to error.	Status of sale documents (contract, sale order, financial document, delivery order, materials quality, invoice etc.) can be ascertained immediately without any error.
4	Allotment vis-à-vis issue of delivery order can not be checked which triggers excess quantity supply than the allotted quantity at times.	System will not allow you to create excess delivery quantity than the quantity allotted.
5	It was not possible to ascertain stock position as on date at H.O & when intimated from R.O it was almost incorrect stock due to late information.	At any moment of time stock position as on date at mines with contract agency wise, and schedule for delivery wise can be ascertained.
6	It was not possible to know daily sales made in each mines immediately. Generally after end of each month or weekly sales data are intimated to H.O.	Daily sales can be ascertained on the next day from the date of despatch.
7	The payment made by the customer for a particular period was neither available nor tracking of delivery orders issued on that account was possible.	System displays the payment made by the customer as well as sale orders & delivery orders issued against that financial security.
8	It took unusual period to prepare invoice and tracking its status was not possible. Since the invoices are prepared manually there was every chance of error. Then manually one has to post it to G/L accounts.	Creation of invoice is automatic as conditions are maintained in the Masters and as soon as the invoice is saved, the different conditions (price, discount, royalty, tax, cess, freight etc. flows to different G/L account maintained in FI Module with out any error.
9	Immediately data was not available(Sales Information System)	Data are available immediately (SIS) and as back ups are done periodically one can archive data at any point of time.
10	No Process ownership	Process Ownership
11	Exact Sales tax amount/Turnover was not possible to generate immediately	Exact Sales tax amount/Turnover is possible to generate immediately

Research Methodology

Rationale and Objectives:

Looking at the above information on ERP, the present research has expanded in many directions. Although many agencies have implemented the ERP (Enterprise Resource Planning), but still there are certain gaps with respect to program integration and follow up actions plans. OMC is a Government agency functioning in Odisha since 1956 with the course of program expansion. It was constrained enough to institutionalize the ERP package for minimizing the human resource cost, logistic cost and to promote the close monitoring system with regard to sales and distribution. In Odisha this is the first agency who could implement the ERP strategy. Keeping these views into account, the present research has directed to study the sales and distribution module through ERP taking OMC as a case study.

The present research indicates two objectives;

- To find out the employee perception level on ERP process.
- To identify the perceptual difference of ERP users with respect to ERP process and sales and distribution process.

Sample:

12 employees are randomly sampled for the study, out of which one is the female employee and 11 are male employees. The employees were selected from the ERP division of OMC.

The study follows a comparative research design. The participants were individually administered with ERP management testing inventory and were assessed to state the employee perception over ERP system with respect to ERP Process in general and Sales & Distribution process in specific. The research presents an interesting result i.e. employees have better perception over the organization (OMC) right after the intervention of ERP. Apart from this, it is also indicated that Sales and Distribution system in OMC has grown a lot after ERP Intervention.

An Overview of Design:

The present study follows a single comparative design where OMC employees were randomly sampled from ERP division. The participants were of different positional background like Senior Assistant, System Administrator, Assistant Manager, and Deputy Manager. Participants were

individually administered with ERP management testing inventory comprising two specific indicative of assessment like ERP process and Sales & Distribution (S&D) process.

Measure:

The study includes ERP management testing inventory. This inventory (see Appendix-'A') presents 20 statements of 2 assessment indicators (ERP process and S&D process). Each statement comprising of multiple choice of five options starting from strongly agree carries 5 marks, agree 4 marks, doubtful 3 marks, disagree 2 marks and 1 mark to strongly disagree. In this case the participants have to select one out of 5 options for each of statement. At the end of the testing, the total scores for 20 statements along with the individual score of each statement taken into account for the study. The taste doesn't comprise any right or wrong answers.

Sample Statement on ERP Process:

- ERP systems improve the efficiency of management decisions and plans and increase the flexibility with adjustments of functionality to react to changes in business needs.
- All departments of OMC are getting integrated by using ERP system.
- ERP intervention has helped OMC minimizing resources.

As the above mentioned statements, it is understood that, the efficiency of management decisions and flexibility in work processes happens to the intervention of ERP module. Because the entire process of functioning is transferred to software in which any functional process happens with the support of an operating system. Secondly the ERP system also establishes a link between other departments of the organization like production, marketing and finance. Thirdly the entire organization mechanism is controlled through the minimum utilization of human resource i.e. 12 technical employees falling in the category of end user and key user.

Sample Statements on Sales and Distribution Process:

- There is missing or duplicity of data taking place about sales and distribution by implementation of ERP marketing model.
- By the help of ERP marketing module OMC is able to produce its gap analysis properly.

- Sales and distribution department will get a long stand benefit by implementation of ERP marketing module.

The above mentioned statements indicate that the intervention of ERP in relation to sales and distribution protects the organization from duplication of information relating to S&D of the product. Similarly through long standing tracking of S&D process can happen. In turn this can also support for a better market analysis.

Data Analysis & Result

The *t* test computed on employee perception over ERP processes and S&D processes. The result reveals significant perceptual difference, $p(2.508)=9.74$ (See-Table-1). It indicates that employee perceives ERP as a system intervention in an organization used for minimizing HR ,logistics ,and financial resource etc and sales and distribution the on process is a segment of total ERP package. As shown by Table -2, employee's average score is high ($M=4.69$) for S&D process than ERP process ($M=4.09$). the average score of the total user group is 4.11 is almost above the label of acceptance i.e. agree. Looking at the total score in an average employee performance better on Sales & Distribution process ($M=49.17$) than on ERP process ($M=33.00$) (see Table-2).

The analysis on ERP process indicates that employee have higher perception on ERP process

considering the intervention has supported OMC in managing Human Resources ($M=4.58$), and secondly, the intervention is supporting for advance data banking system and tracking the process of storage& disbursement of material ($M =4.50$) (see-Figure-1). Again Employees have equal perception on two of the statements like the intervention of ERP in OMC has increased employee job satisfaction and the process ensures high degree of confidentiality and transparency of organization data ($M=3.83$). Similarly employee having equal label of perception indicating that inter departmental integration is possible through ERP system ($M=4.33$); the intervention of ERP has geared the label of customer satisfaction. ($M=4.25$); and ERP system improves the efficiency, competency and flexibility of management decision. ($M=4.23$). but it is unfortunate to say that employee shave average label of perception in relation to implementation based training on ERP at OMC($M=3.17$).

Figure-2 indicates the employee's perception on sales and distribution process comprises 12 items out of which the employee score is very high on item no. 17 ($M=5.54$) (see Figure-2).looking to the statement of employee's perception that the implementation of ERP package will alter the traditional management technology of sales and distribution departments. Similarly employees do have equal perception on item no 14 stating that starting from inquire to invoice can easily be

Table-1 : 't' Test Performed on Employee Perception over ERP Process and S & D Processes.

Sources	ERP Process	S & D Process
Mean	33.00	49.17
SD	3.28	4.76
Observations (N)	12	12
Df	22	
Hypothesized Mean Difference	0	
't' Stat	9.74**	

**P \geq 2.508 is Significant at .05 level.

Table-2 : Mean and SD Score Performed on ERP Process and S & D Processes with respect to Average Score and total score:

Groups	ERP Process		S & D Process		Total	
	M	SD	M	SD	M	SD
User Group (Average Response)	4.09	0.46	4.69	0.68	4.11	0.57
User Group (Total Score)	33.00	3.28	49.17	4.76	--	--

Figure-1: Employee Perception on ERP Process:

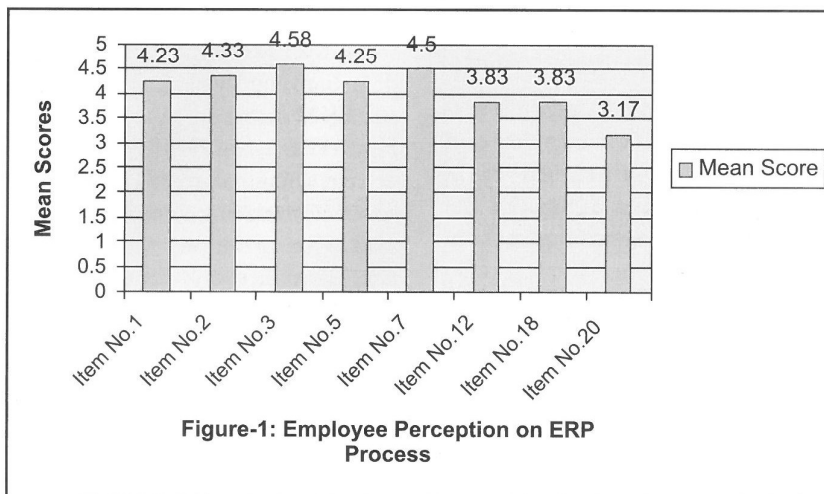
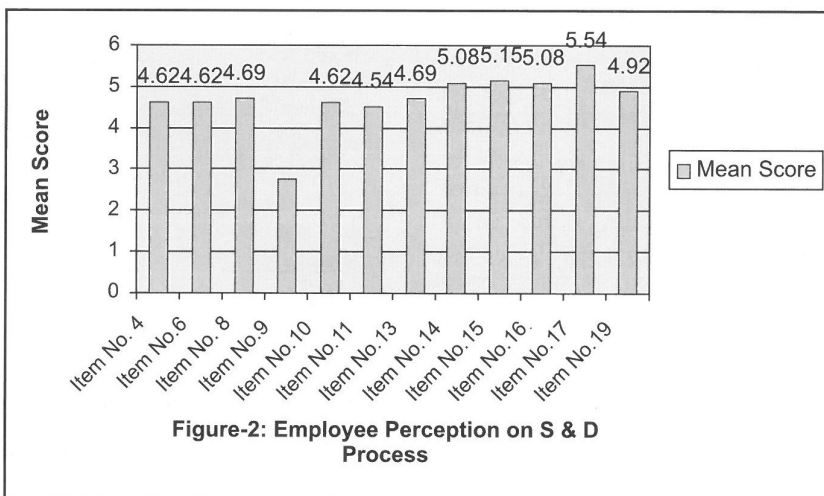


Figure-2: Employee Perception on S & D Process:



possible through ERP intervention and for item no.16 i.e. marketing module through ERP can certainly be effective in running the sales and distribution department ($\bar{M}=5.08$). It is interesting to note that employees have equal level of average perception for 3 independent items like item no. 4 stating that ERP intervention has increased the ratio of sales and distribution of iron ores ($\bar{M}=4.62$); item no. 6 stating that the outcome of ERP is positive with respect to business transactions, order entry and receipt, supply and payment, employee's benefit etc ($\bar{M}=4.62$); and finally on item no.10 stating that ERP intervention has reduced the rate of time consumption on sales and distribution process ($\bar{M}=4.62$). It is also indicated that employee has poor perception on item no.9 considering that i.e. missing or duplicity of data in S&D process is happening through ERP intervention ($\bar{M}=2.77$).

Summary and Conclusion

The comparison indicated a number of interesting features. It was shown that there is significant difference among employees in relation to the utility to ERP process and S&D processes. It is also interesting to note that employees are more acknowledged about the ERP module with respect to S&D processes than ERP as a process for supporting other units of an organization apart from sales and distribution mechanism. Looking at ERP as core functional unit of organization, it has supported Orissa Mining Corporation in managing human resources. Secondly, the process also supports the organization in keeping an up to date track of storage and disbursement of iron ore. It also indicates the label of employee's effort and amplifies the employee's job satisfaction. Again, the implementation of ERP module supports the

organization in maintaining high degree of confidentiality and transparency. Equally the customers are also benefited receiving up to date information at any point of requirement.

The present study has been focused to investigate the effectuality of ERP in relation to sales and distribution system. It is important to recognize that the investigation has employed to asses only one area of ERP intervention i.e. sales and distribution. Hence in future other areas of ERP module should be taken into consideration to explore a prominent effect on ERP mechanisms.

Secondly, the study has included less number of samples which is very difficult for gaining clarity of research analysis. Hence, in future large sample size should be taken into consideration. Finally, the present study has surveyed only one unit of OMC i.e. ERP cell and it is also the corporate office. The future research may be extended to include not only other departments of OMC but also of other ERP units like JAJPUR ROAD, SUKINDAA, BANGUR etc. Similarly the research has never gone into depth into analyzing employee's perception over ERP with respect to age, gender, experience, location of posting etc. It is likely that such as extended comparison would provide more meaningful information.

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