Oracle JDE Enterprise One ERP Implementation: A Case Study

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Abstract—The paper intends to bring out a real life experience encountered during actual implementation of a large scale Tier-1 Enterprise Resource Planning (ERP) system in a multi-location, discrete manufacturing organization in India, involved in manufacturing of auto components and aggregates. The business complexities, prior to the implementation of ERP, include multi-product with hierarchical product structures, geographically distributed multiple plant locations with disparate business practices, lack of inter-plant broadband connectivity, existence of disparate legacy applications for different business functions, and non-standardized codifications of products, machines, employees, and accounts apart from others. On the other hand, the manufacturing environment consisted of processes like Assemble-to-Order (ATO), Make-to-Stock (MTS), and Engineer-to-Order (ETO) with a mix of discrete and process operations. The paper has highlighted various business plan areas and concerns, prior to the implementation, with specific focus on strategic issues and objectives. Subsequently, it has dealt with the complete process of ERP implementation, starting from strategic planning, project planning, resource mobilization, and finally, the program execution. The step-by-step process provides a very good learning opportunity about the implementation methodology. At the end, various organizational challenges and lessons emerged, which will act as guidelines and checklist for organizations to successfully align and implement ERP and achieve their business objectives.

Keywords—ERP, ATO, MTS, ETO, discrete manufacturing, strategic planning.

I. INTRODUCTION

IN the present highly competitive business environment, apart from the price and quality of products and services, customers expect organizations to be highly responsive to their changing needs, which may consist of new features, functionalities, delivery time, place of delivery, services, personalization etc. Organizations, which have systems to access these dynamic customer requirements on a real-time basis and respond in a timely manner, have distinct competitive advantages in terms of gaining market share and profitability. Integrated information systems like ERP combined with use of the latest digital tools like SMAC (Social, Mobility, Analytics and Cloud) enable organizations to manage their customer needs on a real-time basis.

While organizations manage layers of data and information i.e. at product level (design data), manufacturing process level (operations data), and functional level (planning & scheduling), these discrete systems operate in an isolated manner and there is a lack of integration and interfacing among these systems due to disparate technology platforms on which those are built. Due to these isolated islands of information, organizations fail to reap the benefit of the available data, as they fail to give an organizational perspective to management for decision making [1]. In this environment, senior leadership fail to justify any investment in IT systems as there is no clearly defined tangible benefits. Keeping this in view, Enterprise Applications like ERP, Customer Relationship Management (CRM), Supply Chain Management (SCM), Product Lifecycle Management (PLM), Supplier Relationship Management (SRM) etc., started evolving in the early 1990s, which provided an integrated business process perspective to organizations with a central data repository to facilitate interactions between business functions in a seamless manner and also, to provide management a common platform for activity monitoring and decision making [2]. Since then, organizations have never looked back in adopting these enterprise applications to boost their transactional efficiency. However, organizations still face a lot of challenges in adopting and implementing these integrated systems. Organizations, who fail to manage these challenges effectively, leave midway abandoning the implementation [6].

The present paper discusses a specific case of ERP implementation, which involves Oracle JDE Enterprise One, in a medium-sized auto component manufacturer. The installation is a success story and is running live. Without naming the organization, the paper will try to highlight the business environment prior to the implementation, various business issues and concerns faced during the implementation and some suggested approaches to avoid any unanticipated roadblocks before taking the initiative.

II. COMPANY PROFILE IN BRIEF

The subject company is a medium-sized manufacturing conglomerate in India, which is involved in manufacturing of auto components and aggregates for domestic Original Equipment Manufacturers (OEM's). The group has six state-of-the-art manufacturing facilities in India, which are geographically dispersed. These manufacturing facilities support various manufacturing technologies for sheet metal stampings and fabrications, heavy fabrications, precision machining of castings and forgings, fully finished gears and shafts, drive shafts, and live axles. All these manufacturing facilities are TS16949 certified for quality systems. The presence of a certified quality system has ensured that some of the critical business processes have been documented and there is a platform to build an integrated information system.

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III. BUSINESS PAIN AREAS

The company's activities can be categorized as Discrete Manufacturing, which means that there is a clear 1: N parent-child relationship for all the products they manufacture. The business issues and challenges are mostly similar for all companies in discrete manufacturing space irrespective of their size and nature of products and services. Some of the generic business challenges faced by companies in discrete manufacturing space [1]-[3] are:

1. How to meet and sustain customers' expectations in terms of product development time, delivery response time, cost and consistency in quality of products and services?

2. How to create visibility in total supply chain operations and efficiencies?

3. How to ensure that internal controls related to operational and financial transactions do exist and operate effectively?

4. In the complex, multi-product, multi-location and hierarchical production environment, how to facilitate real-time availability of information and decision-making related to various business performance parameters?

A. Typical Business Challenges

The company's diversified and geographically dispersed activities posed a number of other challenges for the management. Some of the typical challenges are produced below.

1. Erratic Delivery Schedule: Frequent changes in customers' dispatch plans adversely impacted the production planning and scheduling activities. This resulted in carrying more system inventory at all stages and low capacity utilization of production facilities. Under-utilization of facilities has resulted in lost sales for some items and increased cash out-flow on account of outsourcing of operations or activities.

2. Low Capacity Utilization: Frequent changes in customers' delivery plan in a multi-customer environment provided a challenge to optimally schedule the production activities, which would both maximize capacity utilization of production facilities and minimize the loss in sales. Plants resort to frequent changes in machine setups for critical machines which cater to various products and this increases their idle time. In spite of this underutilized internal capacity, plants depend on outside sources to carry out the operations to meet the dispatch exigencies.

3. Inventory Tracking: In the absence of an integrated enterprise information system, it was difficult to find out the inventory status at various stages in the supply chain starting from materials at supplier's end, incoming materials in transit, in store, at various work centers, ready for dispatch, and finally, outbound materials in transit. This affected the complete planning process including both materials procurement plan and production plan.

4. Cash Flow Management: It was a challenge in terms of age monitoring of creditors and debtors and taking timely action to bridge the gaps between cash inflows and outflows.

5. Internal Controls: Although procedures are in place for various purchase approval limits at the operating level, implementation and compliance were found to be major issues. This was partly responsible for adversely affecting cash flow situation.

IV. LEGACY IT LANDSCAPE: PRIOR TO ERP IMPLEMENTATION

The company has been using various stand-alone desktop software packages like Tally and Excel spreadsheet for financial accounting, PC Soft for purchase and inventory, and other MS Office tools to support information requirements of day-to-day operations. However, there were problems related to consistency, integrity and timely availability of information. Thus, there was a need for some kind of integrated enterprise application to address various management issues. With a view to address some of these business concerns through automation and integration of various business processes, a separate business unit was formed and it was assigned the responsibility of developing an ERP package to meet the requirements of the company. Normally, this approach is adopted by most of the small organizations considering the exorbitant cost of acquiring and maintaining a good ERP from outside. The company set three mandates for the development team, which were supposed to be incorporated in the product.

1. Use of Business Process Reengineering (BPR) to address anomalies and differences in business practices across the plants

2. Support of Activity Based Costing

3. Support of Quality Management System's documentation requirements

With these three mandates, the development team could bring out with a small team of about five developers. The team used Power Builder and Oracle as platforms and the solution was implemented in a staggered manner in all the plants.

A. Salient Features of Customized ERP

1. Functional Features/ Modules

It covers all the activities/tasks in various business processes including Procure to Pay, Order to Cash, Receipt to Issue, Accounts Receivables, Accounts Payables, Cash and Bank, Pay-roll Processing, Production Planning and Plant Maintenance. The solution provides various user friendly GUI's for data enquiry, updating and reporting needs. Basic user security was implemented for access control. It was developed for multi user environment.

The modules covered are Purchase, Inventory, Sales, Excise, Finance, Production, Production Planning, Quality and Pay-roll. Features like purchase order approval; online query facilities and quality approval for incoming materials are also available. It also had features like graphical analysis in sales, interfacing with customer's computer system, automatic generation of discrepancy and rejection notes for suppliers, reporting financial statements etc. to mention a few.

2. Development and Deployment Architecture

The solution was developed with client-server architecture

with Power Builder as front end and Oracle 8i as back end. It works on the Windows platform.

3. Reports

The solution was equipped with a number of customized reports to take care of both statutory requirements and management's information needs. Reports like Vendor Performance rating, Financial Statements, Ratio Analysis, Stock Valuation etc. are few worth mentioning apart from many other reports.

B. Problems Encountered in Customized ERP

In spite of having the strong functionalities and technology base, users encountered a lot of serious problems during the course of use, which are given below.

1. The solution called for a high degree of enhancements and modifications in the original features to address the real physical constraints in the shop floor. Consequently, due to the high degree of local customization, solutions were different in all the plants and this gave rise to five different products.
2. The original product did not have the features to support shop floor activities related to manufacturing, quality and maintenance in terms of generation and monitoring of work orders. Features like standard costing and manufacturing accounting, resource and materials planning, job shop scheduling, and finite capacity planning were not available, which were identified to be major gaps. Apart from this, specific customers and suppliers have been requesting to provide access to selected internal information online related to their orders and supplies and this was not possible in the existing client server architecture.
3. Maintenance of these five different products in five plants was difficult due to attrition of internal IT resources.
4. Enhancement of the product to support additional features was not possible due to design constraints.
5. Consolidation of data at the central location was not possible both at company and organization level.

With a view to overcome these problems and keeping in mind the long term strategic information needs of the organization, top management decided to migrate to a standard ERP solution platform. The company looked into various alternate standard ERP solutions and after a thorough evaluation, Oracle JDE Enterprise One (Discrete Manufacturing Bundle) was found to meet large part of the organization's information needs at the budgeted price. The company also finalized one implementation partner to provide consulting, training and hand-holding to the user team during implementation.

V. ERP IMPLEMENTATION AT A GLANCE

A. Software and Hardware

The ERP package consisted of Finance, Sales and Distribution, Manufacturing and HR modules directly licensed from Oracle India. IBM AS400 server with OS400 operating system and Universal Database (UDB) was found to be the best configuration to achieve optimum performance of the selected ERP product.

The AS400 server was selected as Enterprise and Database server due to following advantages:

1. JDE Enterprise products work seamlessly with IBM servers and UDB. It is a proven platform worldwide for optimum performance.
2. UDB comes free with the server. So no licensing cost for RDBMS is involved.
3. OS400 is robust and free from virus attacks.
4. User security and access control features are more rigid compared to other OS.
5. Inbuilt RAID technology and backup devices are available.
6. Easily scalable.

For Deployment and Web servers, X-series servers from IBM were good enough.

B. Connectivity Infrastructure

The approach adopted was to host the application and database centrally at the corporate office and connect to all plant locations through broadband data circuits. Apart from data transfer, the intranet was also to support Voice, Video Conferencing, Internet and centralized mail services.

Some of the salient technology features of the WAN Topology are:

1. High bandwidth Leased Data Circuits and Modems from BSNL
2. ISDN backup circuits from BSNL
3. Internet Lease Line from VSNL
4. CISCO network elements like Routers and Firewall
5. Network Management Software(NMS) and Bandwidth Management Software
6. CISCO switches

C. Team Structure and Implementation Strategy

After a lot of deliberation on the implementation, methodology it was decided to go ahead with *big bang implementation* with simultaneous implementation at all plant locations. This approach facilitated to standardize the business practices across all the plants and evolved a common system configuration for easy central maintenance. Secondly, the mandate was given to adopt the best practices available in the system as far as possible without any customization of the features [4].

D. Implementation Phases

1. Business Analysis (BA)

During first phase of the project implementation, after a *project strategy workshop (PSW),* the consultants conducted a thorough *business analysis (BA)* in all the plants. The respective functional consultants interacted with various levels of management and functional users to get a better understanding of their business practices and expectations. This exercise helped them to consolidate the practices and identify business gaps at organizational level. During this phase differences in practices were identified and documented.

This phase was about for one-month duration.

2. Product Training

In the next phase, ***product training*** was organized for the core team members after grouping them function-wise. During training, a thorough conceptual and practical hands-on training was given on various features and functionalities of the product. This was conducted for about 20 days.

3. Conference Room Pilot (CRP)

The third phase was the ***conference room pilot (CRP),*** in which the core team members started mapping the business processes into the system in a prototype environment and tested the performance of the mapped processes or setups. During this phase they created various setups to meet their process needs and tested the setups. The testing was carried out with dummy data and at the end of CRP, the tested setups where finalized and frozen. At the end of this phase, any differences in business practices between plants where eliminated and a common system configuration was established. It continued for two months.

4. Configuration and Integrated CRP

The next phase was called the ***configuration and Integrated-CRP*** phrase. The frozen process configurations and setups from the previous phase were transferred to a new environment. The purpose of I-CRP phase is to test the system performance in an integrated environment. The integration can be among the various available modules in terms of process flow or it can be the integration and interfacing with other legacy software already operational in the organization. Fortunately, the company did not have any legacy software, which needed to be integrated with JDE ERP. Thus, the testing was only confined to process and data flow within the modules like Finance, Sales and Distribution, Manufacturing and HR. The time period consumed was about two months.

5. Product Go-live Preparations

The next phase was the ***Go-Live Preparation***. In this phase, a number of preparatory tasks were performed including transfer of all setups and processing options to the live environment, which is called production environment. Some of the major tasks performed are given below:
1. Creation of various application versions, menus, end user profiles and security features.
2. Uploading of various master data like Address Book, Item Master, BOM, Routing, Work-Centers etc. into this environment.
3. Uploading of opening balance figures including stocks, accounts-payable, accounts-receivables etc.
4. End-user training on web clients at various plant locations
5. Preparation of end-user manual
6. Audit of Go-live preparedness
7. System testing (Both Functional & Stress test)

E. Benefits Derived and Challenges Faced

Some of the major benefits achieved by the company through this implementation are given below [5]:

1. Standardization of business practices across the plants.
2. Data and information consolidation at organization level.
3. Real-time availability of information for decision support.
4. Information access to customers and suppliers.
5. Better internal controls on purchases.
6. Visibility in shop floor activities and online progress monitoring.
7. Better planning of materials and resources.
8. Cost management through standard costing and variance analysis.

The team faced a lot of challenges during the go-live phase. Some of the major challenges are:
1. Data availability to update masters like BOM and Routing was a major constraint. These data were available for regular production items. However, the production process was not frozen for a lot of development items, which constitute about 15 to 20% of total number of items.
2. Connectivity in all the locations was not ready. Three out of six plant locations were not connected due to problems with local service providers. At other locations, the speed was found to be slow and thus onsite activities like end user training and data updating were affected.
3. Various locations were not free of viruses. Network virus infected the central servers like Deployment and Web servers immediately through intranet. It took about 72 hours to clean the total setup and restore the system.

F. Future Scopes and Opportunities

While the existing implementation is being used by the users, the central technical team has been busy in few other things, apart from providing necessary trouble shooting and training support to end users. Some of the new features were in the process of getting ready to be bolted to the existing system. The features and functionalities are given below:
1. Customer Self Service and Supplier Self Service
2. Real-time access of data through Cell Phones
3. Plant and Equipment Management
4. Data Ware Housing and Business Intelligence
5. Internal Controls through Work Flows in other areas

VI. LESSONS AND FUTURE STRATEGY

Some of the prominent lessons from any large-scale ERP implementation give rise to a number of unexplored areas, which business organizations must contemplate before undertaking this journey. ERP implementation should not be considered as a fashion or show piece to be presented to client organizations if it does not add value to organization. Thus, business leaders should address the following queries to identify the need of any such large enterprise wide system, which are very cost-intensive in terms of onetime expenditure and also on a recurring basis [6].
1. Is ERP strategy aligned with the business strategy and goals?
2. Will it help in creating a seamless organization with transparency and increased responsiveness?
3. Has the organization requisite skills, both business and technical, to implement and use ERP system effectively?

4. What will be the expected ROI?

5. Should the system be installed in-house (captive) or deployed in cloud?

6. Which business processes will be covered by the system and which are to be excluded?

7. Who should take the executive ownership of the system in the organization?

8. What is the long-term roadmap for enhancements, migration, add-ons etc.?

9. Which ERP or any integrated system will best suit the business environment of the organization?

10. Which implementation partner will be appropriate to provide hand-holding during implementation and knowledge transfer process?

These strategic questions, which may not be exhaustive, are needed to be deliberated at senior management level to understand the pros and cons of adoption of any ERP with the objective of minimizing any unforeseen risks and surprises at a later stage.

VII. Conclusion

ERP implementation in any organization should be considered as the start of a journey rather than a goal to be achieved. It has to continuously evolve and change as the organization grows with additional products and services. Functionalities are reconfigured continuously along with changes in business processes and regulatory environments. Secondly, data ownership is one of the key challenges in any ERP installation. Master data are continuously cleaned and updated. Transactional data are to be maintained properly with timely backup so that there is no data crisis in case of any contingency. User security is one of the major concerns, which needs policies to be implemented rigorously. Regular system audit is necessary for the health checkup of any ERP system. However, organizations should strive to use the data available in the central repository effectively using various analytics so that the massive investment in any ERP installation is justified. Nowadays, organizations resort to SaaS, PaaS & IaaS modes through clouds to minimize capital investments for in-house ERP installations. Whatever may be the approach, organizations have no choice but to adopt enterprise systems if they want to remain in business and survive competition.

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