

# Impact of Management Information System Implementation Using Virtualized Oracle Database on Manufacturing Enterprises: A Case Study

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**Abstract**— Manufacturing enterprises mostly continuously deal with variability and complexity. In today's increasingly complex supply chains and manufacturing processes, raw materials, production resources and delivery schedules are prone to constant change. In order to get the right products to the right customers at the right time, manufacturing operations should have the greater synchronization and predictability. An abundant amount of information is generated by manufacturers from their data warehouses operations, machinery and quality systems. The manufacturers must ensure that their IT systems are continue to ensure user productivity and are able to scale accordingly to accommodate the future demand and growth of the enterprise. Therefore this paper focuses the impact of Oracle based Information System on ERP Processes of manufacturing company as Oracle is a simple solution that delivers an integrated approach of functionalities in order to translate the business into less risk and lower costs. To get a realistic and holistic view of the MIS, MIS of EPC Limited (Name disguised) was taken as a case study. To get a more detailed understanding of a particular function of the company, we studied the need, uses and benefits of MIS with respect to the Material Department of the company. Various modules of MIS were of prime focus in our study.

**Index Terms**— Variability, Manufacturing, Oracle, Information System, Business, EPC Limited.

## 1 INTRODUCTION:

Technology supports all business processes performed across the enterprise and is fundamental to the growth and success. Technology is therefore considered a principal risk, requiring an appropriate level of control across the Enterprise to ensure that it is effectively managed.

The Information Systems governance framework sets minimal control requirements for all Information Systems that must be met by all businesses. It also lays down the various policies related to management, usage and protection of information systems provision. In Oracle the ERP solutions are integrated with the Internet and have introduced several applications in the electronic commerce and Internet based commerce areas. Fig. 1 shows the main advantages of Oracle in manufacturing project resource management. Moreover Oracle databases in manufacturing enterprises are moving towards virtualization as it defines the modern architecture of enterprise IT. The latest software and hardware advances have shifted the thinking about virtualization and is enabling many organizations around the globe to improve manageability, increase speed and agility, and shed costs. Virtualization of Oracle databases on VMware is fully supported by Oracle. TABLE 1 demonstrates the performance benefits achieved by deploying virtualized oracle databases in enterprises.

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**Fig 1: Advantages of oracle database in manufacturing enterprises.**

## 2 OBJECTIVE OF THE STUDY

The objective of this project is to study the MIS implementation using virtualized oracle database of EPC Limited and with the help of this domain, to get an insight into the needs of MIS in business setups on a big scale. The study focussed on the key challenges and functional requirement of the MIS and the currently implemented IT solution of that challenge. EPC Limited requires MIS to map internal processes and interaction with the external environment to the technology and ensure the solution delivers real benefits to the business.

## 3 SCOPE OF THE STUDY

The scope of our study is to understand the reasons behind the need of Management Information System in Manufacturing Enterprises. The study would develop knowledge of what information is needed on a regular basis for decision making purposes

and how that knowledge helps to manufacturing enterprise using Virtualized Oracle Database MIS. During the study, the MIS support to the Company as a whole with special emphasis on Order Management Module and Accounting management module.

## 4 METHODOLOGY

The Primary Data was collected from Oracle Implementation Head IT Infrastructure Managers in the Information System department of EPC Limited by collecting documentation and conducting interviews which gave an insight into the procedures being followed with regards to the functioning of MIS.

The Secondary Data was taken from various online sources like the website of the company.

Benefit	Description
Near-native performance	Similar to those of virtual system, Oracle databases run at the same performance with minimal virtualization overhead.
Database I/O scalability	More than 60,000 database I/O's per second is driven by VMware ESXI hypervisor.
Large memory	The scaling of memory is 64 GB per database, 255 GB per host.
Better availability	By providing options that help limit both planned and unplanned downtime Most Oracle Database implementations, virtualization with the vSphere platform can enhance the overall availability of Oracle Database
Multicore Scaling	With the help of virtualized oracle database, organizations can scale up using multiple database instances.
Higher quality of service	Virtualized oracle database addresses the challenges of drops in performance due to unplanned growth. To meet changing throughput requirement, virtualization helps in managing performance and capacity in a far more proactive and predictive manner.
Server consolidation and lower costs	With virtualization, the Oracle Database infrastructure can typically be consolidated by a factor of 5 to 10 compared with a physical environment. The money can be save not only on the hardware but also on corresponding database licenses as the oracle database can be consolidated with the hardware require to run the database environment.

**TABLE 1: Benefits of virtualization in oracle database**

## 5 BUSINESS AT A GLANCE IN EPCL

EPCL is a fully integrated chemical complex of its kind in Pakistan. It is conscious of its duty towards maintaining the highest standards of ethics, safety and environmental responsibility. To ensure sustainable standards and practices, the Company constantly stands on guard to meet new challenges and opportunities. EPCL is the sole manufacturer of PVC (Poly Vinyl Chloride) resin in Pakistan, besides the production of caustic soda, sodium hypochlorite and EDC (Ethyl dimethylaminopropyl carbodiimide). The Company is actively involved in ensuring the sustainability of the domestic PVC industry, along with providing support through provision of quality products and technical services. New markets are continuously being tapped by its Business Development team for its product applications. All practices within the domain of the Company are ensured to comply with its Core Values of ethics, health, safety and environment on a constant basis.

EPCL was established in 1997 and is the only fully integrated Chlor Vinyl Chemical Complex in Pakistan. It is involved in the manufacturing, marketing and distribution of PVC and Chlor Vinyl allied products. Resin is mainly used to manufacture PVC pipes; in the domestic market of PVC. Approximately 55% of the resin consumption is in this sector alone. Artificial leather, shoes, rigid and soft sheets, garden hose, windows and doors etc are the other sectors of importance in this regard. PVC domestic sales volume has steadily been increasing at the rate of 5% per annum. Fig. 2 shows the PVC plant information, PVC resin products and domestic markets. EPCL very quickly made its way in the domestic market for the very first time by launching caustic soda. The issues which are faced by the caustic soda industry are rectified by EPCL. Caustic Soda is largely used in the textile industry for processing, soap industry as a raw material, as well as several other industries for water treatment. The caustic plant information is shown in Fig 3.

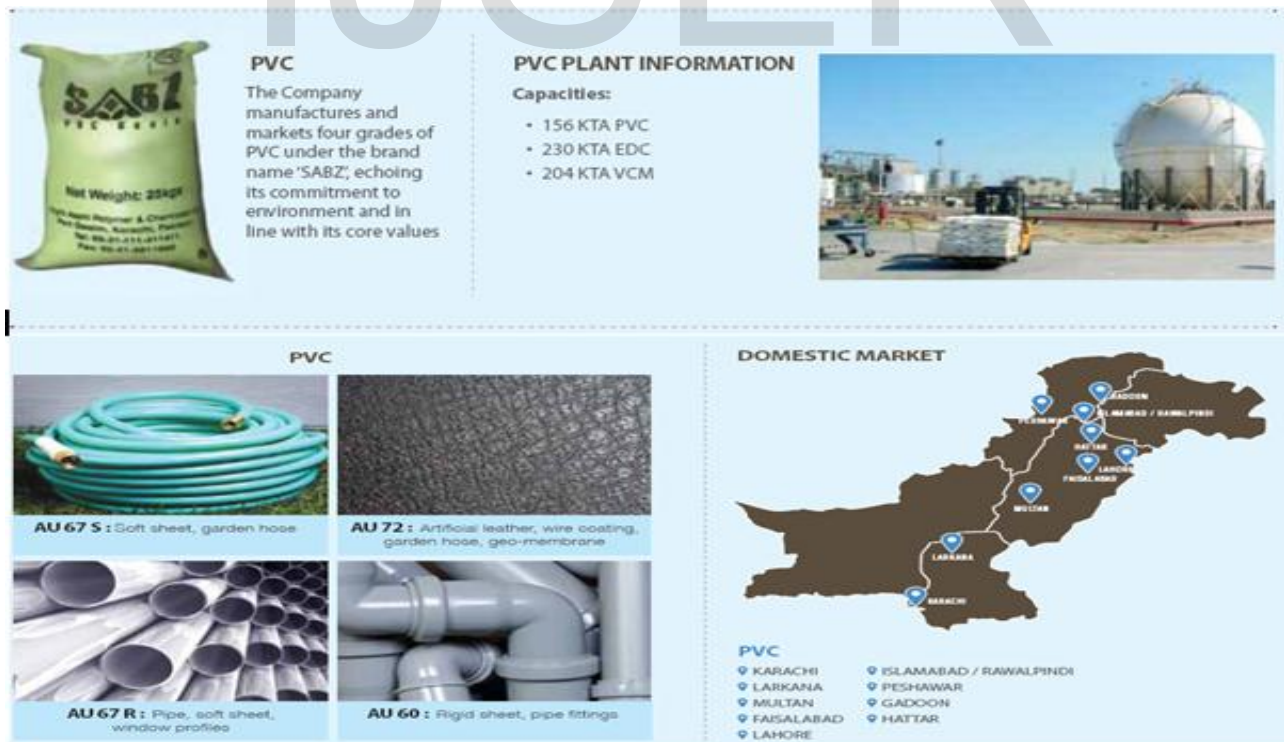


Fig.2: PVC Plant Information and Domestic Market



Fig.3: Caustic Plant Information

The organizational division and IT divisions of the company is shown in Fig 4(a) & Fig 4(b) respectively.

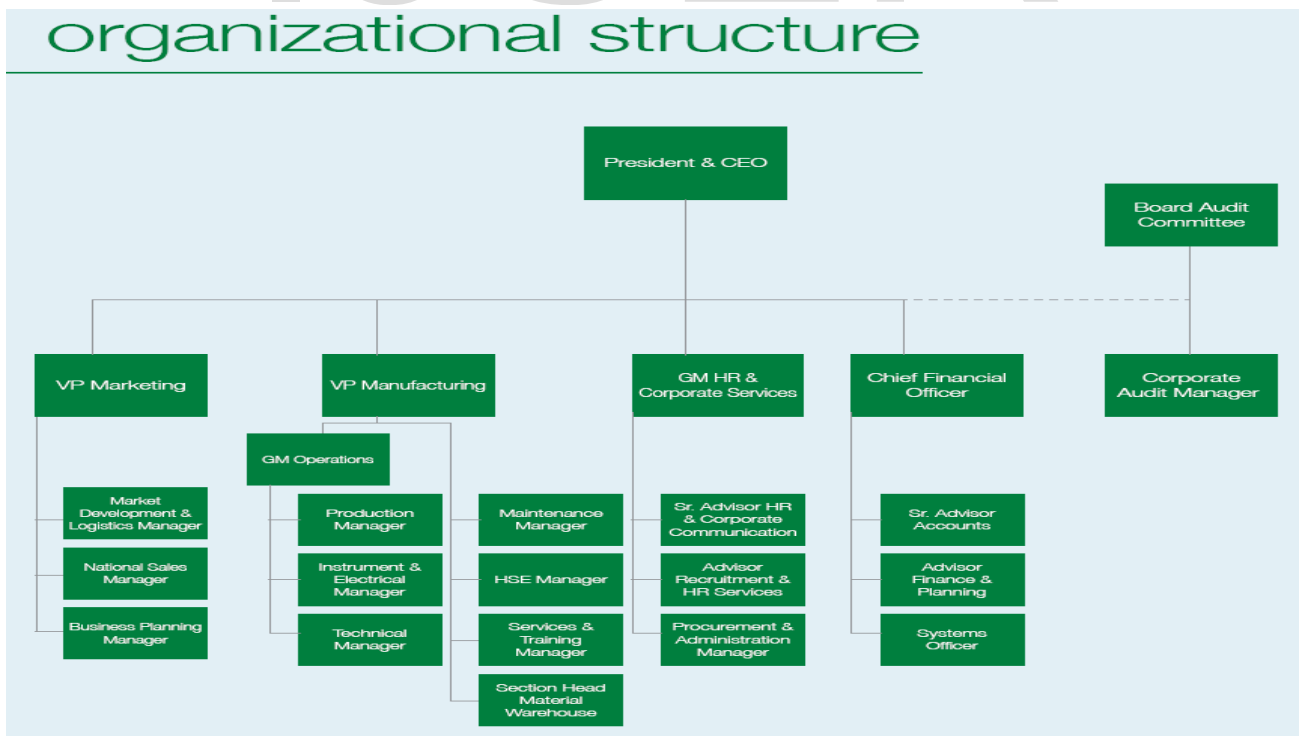


Fig 4(a): Organizational Structure of EPCL



## System Officer

---Application Administrator-----Application Assistant

---Oracle Functional Officer

---Oracle Developer

---Database Administrator-----Asst. Database officer

---Network Administrator-----Asst. Network officer

Fig. 4(b): IT division of EPC Limited

## 6 MANAGEMENT INFORMATION SYSTEM IN EPCL

Among the first Pakistani companies to realize the potential and importance of information Technology, EPC Limited is one of those to adopt automation and IT. Significant improvements have been made in the application systems and infrastructure. Technology supports all business processes performed across the organization and is fundamental to EPCL's continued growth and success. Technology is therefore considered a principal risk, requiring an appropriate level of control across the Company to ensure that it is effectively managed. The Information Systems governance framework sets minimum control requirements for Information Systems that must be met by all businesses across EPCL. It also lays down the various policies related to the management, usage and protection of EPCL's Information Systems provisions. The framework is aligned to the industry standard Control Objectives for Information and Related Technology (COBIT), EPCL has made a quantum jump from in-house developed systems using Oracle 11i and Developer 6i to an ERP based solution. This decision was solely based on its strategic objectives and the business benefits that are expected to follow. With this move people,

business processes and technologies across the country are aligned.

Oracle (V.11i) ERP is being used in EPCL's to integrate and automate the following processes:

- Inventory Management
- Order and Shipment Management
- Receivables
- Purchasing
- Payables
- Fixed Assets
- General Ledger
- Cash Management

Other Systems in place

- Maximo for work management
- SAP for HRM
- Both SAP and Maximo are integrated with Oracle Financial

Benefits and challenges of ERP are as follows:

- Improvement in Quality and efficiency
- Decreased costs
- Decision support
- Enterprise agility

## 7 BENEFITS OF INTEGRATED MIS

The following benefits are associated with an integrated MIS [1]:

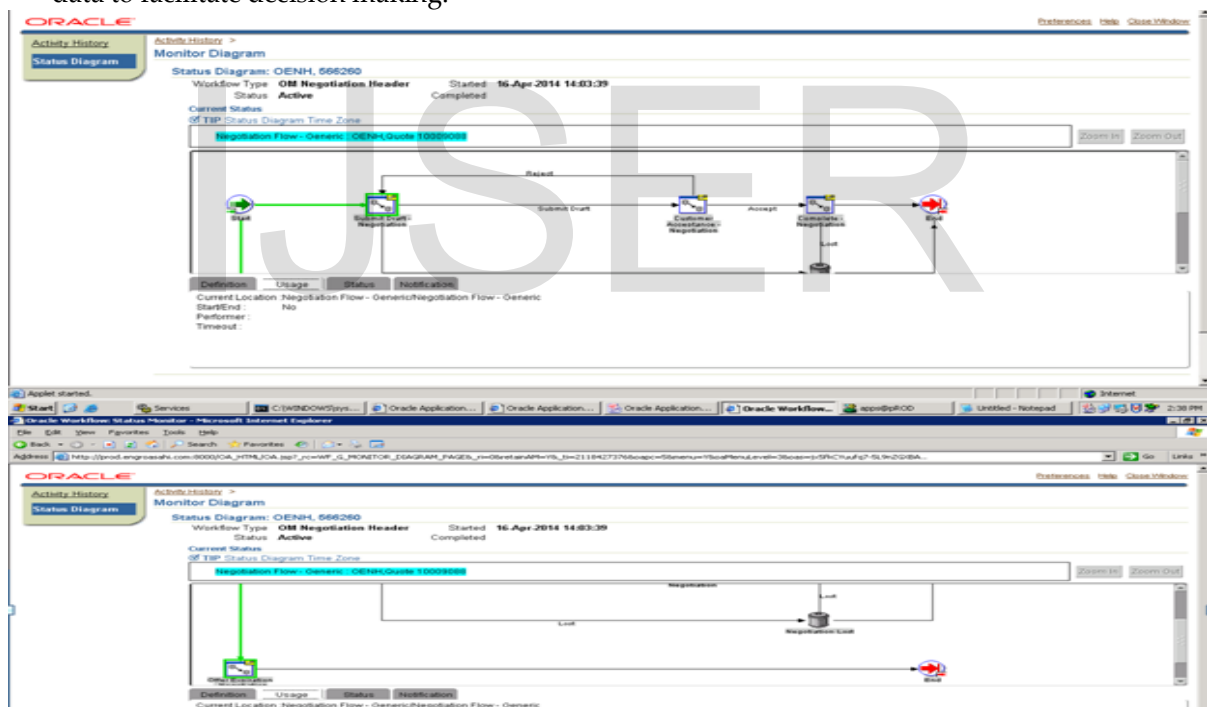
- The large volume of data is better processed in an organization.
- Data redundancy can be reduced in case of separate packages.
- A common system is responsible for the availability of all the required information about any department.
- The system provides support to the managers in making decisions.
- Integrated MIS facilitate the communication between the corporate office and various regional offices.
- Information flow of the organization becomes speedy with the use of online data to facilitate decision making.

## 8 VIRTUALIZED ORACLE DATABASE MIS MODULES

### 8.1 Flow Diagram of Order Management Module

The streamlining and automation of entire sales order are managed by the Order management applications, from order promising and order capture to transportation and shipment [2].

Order management also includes EDI, XML, telesales and web storefronts. Fig. 5 shows that the order management module consists of the three main tasks:



**Fig.5: Workflow in order management module**

- Capturing of order which consists of various functions such as, cross/up sell, product selection, pricing etc.
  - To determine the specification of order, workflow logic is maintained for flawless fulfilment of that order.
  - Timely Execution of order information such as manufacturing, inventory, procurement and financial tasks.
- Some of the benefits of integrated order to cash process are as follows [3]:

- The experience of customers is enhanced by selecting right product at the right price.
- The order entry is faster and there is reduced error rate which ultimately reduce the operational cost.
- Targeted cross/up selling and margin maximization helps to increase the revenue.

### 8.2 Flow Diagram of Accounts Receivable Module

The managing of outgoing invoices to customers who purchased goods or services as well as the collection and applications of all payments is the responsibility of accounts receivable module. The Oracle Receivables module (a part of the

Oracle EBS Financials Suite) helps the Accounts Receivable departments to manage this function effectively and efficiently [4]. The account receivable module is shown in Fig 6. A new framework is developed in oracle 11i called the trading community architecture. It is a centralized repository of business entities such as Partners, Customers, and Organizations etc. Oracle Receivables creates one row for each accounting distribution, and at least one accounting distribution must exist for each invoice or credit memo line. Auto invoice is a tool used to import and validate transaction data from other financial systems and create invoices, debit-memos, credit memos, and on account credits in Oracle receivables.

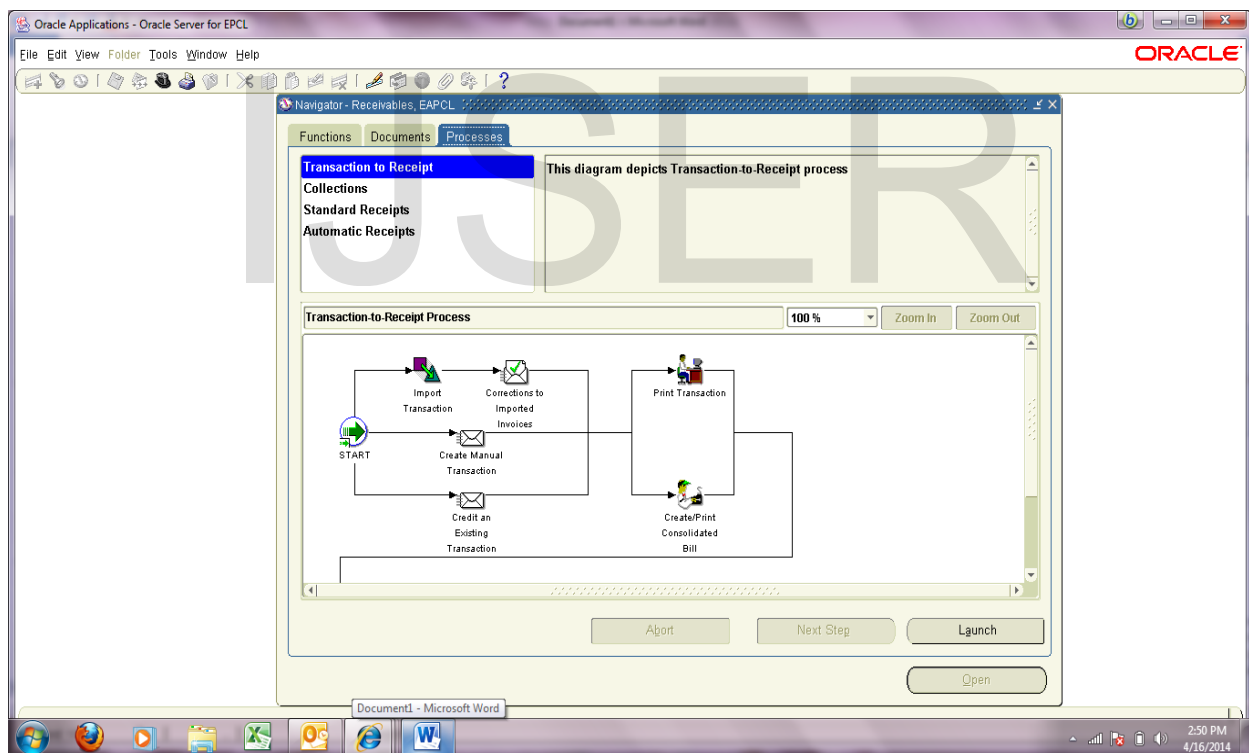


Fig.6: Accounts Receivable Module

### 8.3 Flow Diagram of Accounts Payable Module

The accounts payable module enters, validates and finally pays the invoices as shown in Fig.7. Each organization has its own specification of

accounts payable operating environment. The modules that interact with accounts payable include cash management, oracle iExpenses, oracle, Global accounting engine etc. The creation of the payment schedule lines for an

invoice is automated by the defined Payment. The due date for every invoice shall be determined by the Payment Term associated with it. While scheduling, the payment term determines the following with regard to an invoice:

- Number of installments in which the invoice needs to be settled
- Amount in each installment
- Due Date of each installment
- Discounts available for early payment of each installment.

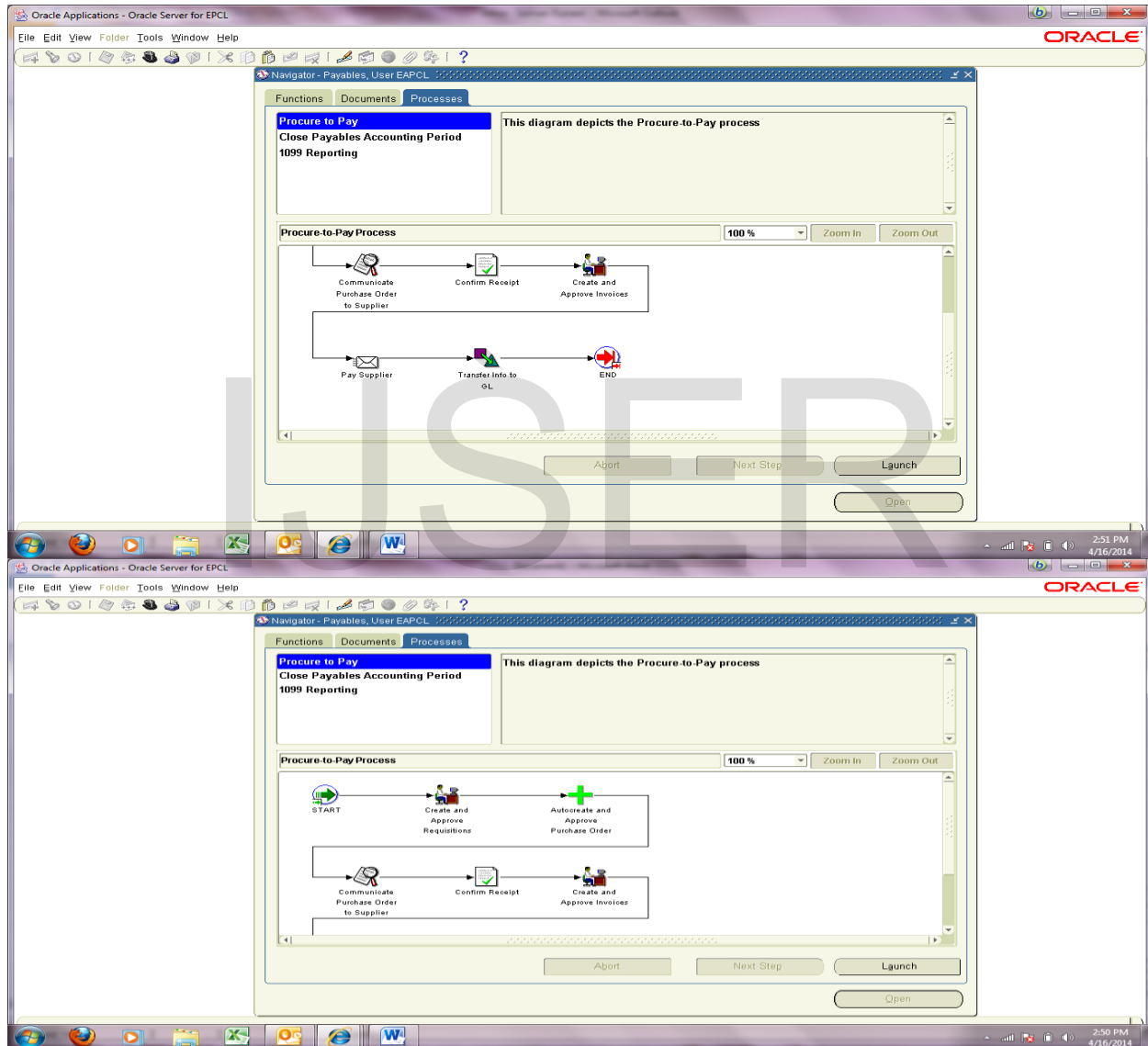


Fig 7: Accounts Payable Module.

#### 8.4 Flow Diagram of General Ledgers Module

Oracle General Ledger provides highly automated financial processing. It can import

and post 42 million journal lines per hour, making it the fastest and most scalable general ledger on the market. The flow diagram is shown in Fig. 8.



General Ledgers provide the following benefits:

- Better decision making, optimized business processes and regulatory compliance are derived at the lower cost because the oracle general ledgers enhances value by seamlessly work with other oracle E-Business Suite.
- Conversion and loading of raw data from external systems or upload mass journal entries via spread sheets.
- In order to accelerate the reporting time several processes run in parallel such as posting, reporting, and translation and consolidation process.
- It guaranteed the data integrity to manage all financial information.
- The visibility of enterprise is increased as Oracle Applications Desktop Integrator provides a desktop-based extension of Oracle General Ledger to analyze financial statements, create budgets, upload conversion rates, create reports, and more.

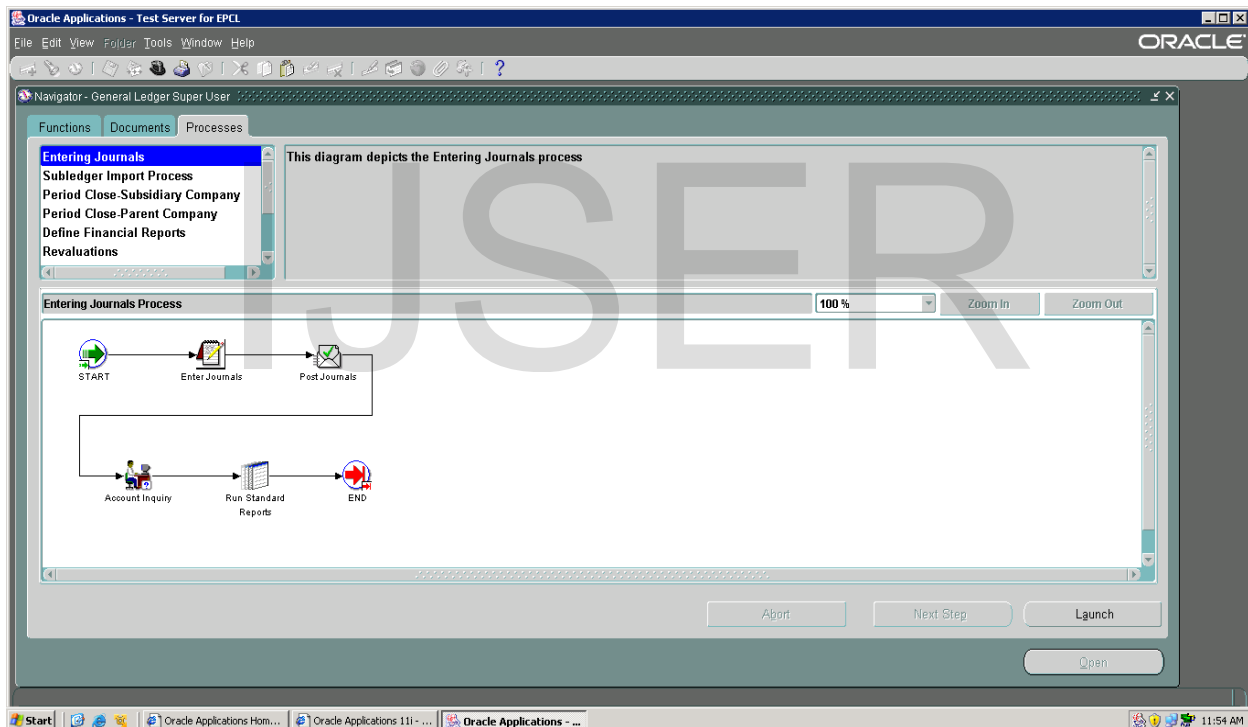


Fig 8: Oracle General Ledgers flow diagram

## 8.5 Flow Diagram of Accounting Module

Fig. 9 shows the Accounting module flow diagram. It allows you to efficiently create a variety of source systems. It includes an accounting transformation engine with

extensive validations plus accounting and rules repositories.

The benefits of accounting information hub are as follows:

- To create the accounting methods and various accounting events once it

provides a flexible rules builder for users.

- To meet new requirements the accounting rules are update quickly.
- It has the ability to rapidly integrate new systems.
- Sophisticated error and exception handling provides prompt resolution of accounting errors. Users can quickly

isolate, research, and resolve exceptions with business oriented exception management and on-line inquiries.

- The centralized architecture of Oracle Financials Accounting Hub provides an internal control structure to ensure successful audit and compliance reviews

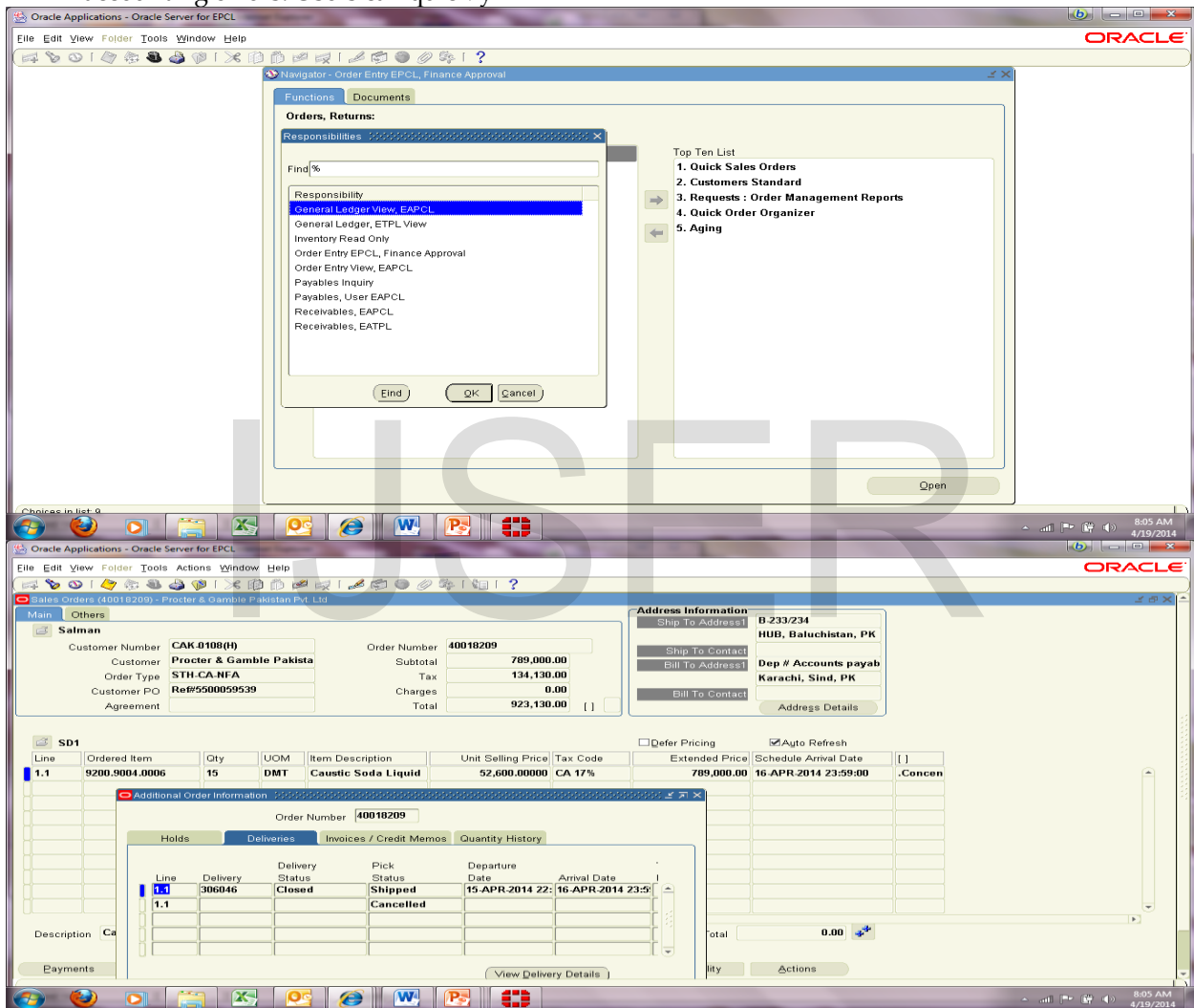


Fig 9: Diagram of Accounting Module

## 9 CONCLUSION

Considering the MIS that has been used in EPCL, their analysis and research on comparative MIS systems used in the similar kind of industries, following recommendations for the company are suggested.

- ⊙ IT department of the company should now work towards integrating the system in a much better way by minimizing the manual intervention in everyday processes.
- ⊙ A web-support should also be incorporated and the network system should be upgraded. For this reason it is recommended to tie-up contracts with IBM or CISCO.
- ⊙ The managers should be trained continuously with each up gradation in such a way that they effectively be able to add functionalities in the existing system. A handbook and online manuals should be provided with each up gradation.

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