Design and Analysis of ERP-Sales Order Processing for Small and Medium Enterprises (SMEs)

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ABSTRACT

Organization receives lots of benefits by using enterprise resource planning. This can be applied both in small and medium enterprises (SMEs). ERP implementation cost makes the SMES unable to procure the system. Even if can implement the system it requires expertise for handling the software, hardware, nor ERP system infrastructure. In order to overcome this problem and to make the implementation and maintenance easily by SMEs we perform analysis and design of an ERP system in this paper. This paper focus only on the sales area which is one of the main business functions. Finally the research yields a generic process model of the ERP system for SMEs in the area of sales business function.

Keywords: ERP, sales processing, SMEs, sales function, web services.

I. INTRODUCTION

Most of the organizations perform the function of selling the goods or providing services to consumers for profit. While performing these functions, a lot of the transactions occur among the business people. Variety of data is involved in the transaction of an organization. Variety of documents such has invoice, sales order, quotation, etc.

Starting in 1975, a system was developed as a tool in addressing specific business function [1]. With the help of this system, business function can be automated. Since there is a specification in business function of the system and also there is no integration among the systems, data should be shared manually in the inter-area business functions in the organization. Thus, duplication of data is likely to occur in high rate. In order to avoid the duplication ERP is used. Enterprise resource planning integrates some or all business functions in an organization through a single database. By using this system it is expected that all the transaction that occur in an organization can be automated and there is no need to share the data manually.

ERP system developed vendors have set the system for very high price which makes the small and medium enterprises unaffordable. Even the availability of free ERP systems provided by the open source group, the SMEs still need expertise in order to install, configure and modify the system [3]. In order to overcome this problem we can use the cloud so that the SMEs do not have to provide and maintain server or to have skilled IT resources. SMEs need to provide computers and browsers to run their business using ERP systems. Therefore web-based application is designed for the ERP system.

Basically, an ERP system can support several functional areas of operation, e.g., sales & marketing, SCM (production planning, material management), accounting & finance, and human capital management [1]. Our main area of research is limited to sales business function area. We leave the remaining areas open for subsequent researches.

II. METHODS AND MATERIAL

A. ERP Architecture

In an enterprise, some systems may be developed by the enterprise itself, while others may be developed by different vendors using different databases, languages, and technologies. Each system differs from each other, which makes it difficult to upgrade the organization's businesses, strategy, and information technologies effectively. With the communication infrastructure and ERP functionalities encapsulated in components, an ERP system can easily meet these requirements. A

typical ERP system should at least have the following features:

- Componentized- different business functionalities are designed as different components.
- Integrated- components are integrated and seamless data flow between components allows them to collaborate as aone function.
- Flexible-system is expandable and compatible with the old systems, the change to the business processes and strategies are easy to fulfil.
- Real-time- the components work in real time, online, and batch processing modes should be available.
- Profitable-system must have the potential to reduce the cost or increase profit, since these are a company's basic requirements and motivations.
- Secured- security schema has to be enforced to protect various enterprise resources regardless whether it is appropriate or sufficient.

The business logic in ERP system employs client/server architecture to create a distributed computing environment. Generally, the three-tier architecture will be used, which contains three layers of logic:

1. **Presentation layer (front):** a unified graphical user interface (GUI) or browser that collects input, generates requests, and returns the results back to the user.
2. **Application layer (middle):** application programs that collect the requests from the presentation layer and process the requests based on the business rules, functions, or logics.
3. **Database layer (back):** DBMS that manages the operational and business data throughout the whole enterprise and the user access to this information.it may also include the operating system and the related hardware.
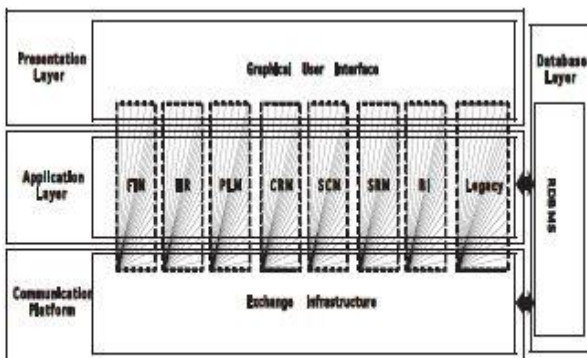

FIGURE 1   The Architecture of Enterprise Resource Planning

IMPLEMENTATION METHODOLOGY

In this research, waterfall process model is used in the development of ERP system. Planning, analysis and design of the ERP system are the stages carried out during the research.

A. ERP Technology

Initially, ERP systems were used for simple functions such as accounting and human resources planning. ERP systems are later developed as sutie of application with the advent of web technologies. The technology which has the major impact on ERP systems are web service and extensible markup language (XML).

B. Web Services

Integration made easy and the cost is reduced by the use of web services. Information can be accessed by the client without going through ERP software. Therefore, with the use of web services and the composition of web services, clients as well as outsourcing vendors can access many of the ERP application seamlessly. Checking bank accounts, placing orders and other services also included in this application. Client can communicate with legacy ERP software through web services which reduce the cost of the system. SAP offers this hub through mySAP and oracle via its e-business suite.

C. Security in ERP

Numerous industries like defence, intelligence, medical, and financial industries uses this ERP systems which leads to critical environment in providing security. First, we need to develop a security policy and a model for ERP systems. Confidentiality is the main aspects of the security which is mainly focused by the current system.

The presentation layer refers to the graphical user interface, browsers, and PCs. Since the transmission of GUI packets is impossible to restrict, ERP experts cannot secure the system by limiting user access to GUI. The better way to provide security may be to place a CITRIX server between the user and the ERP system.

D. Design

To model the design of the ERP system we use object oriented approach. The data requirements for the ERP

system are master data and the corresponding master forms (and fields). Thus, it is used as guidelines to design the system database. The database design is formulated as an entity- relationship diagram (ERD). Subsequently, a class diagram which covers the features of the ERP system is constructed. Next the deployment diagram show how the software component is deployed physically. All diagrams can be found in [2].

Material management, inquiry, quotation, sales order, shipment/delivery, invoice, receipt, payment, return rental order, return order are the features provided by the ERP systems.

III. RESULTS AND DISCUSSION

The sales business process model consists of 4 high-level business processes. They are pre-sales activities, sales activities, invoice & payment in, and payment out. The diagrammatic representation for each process is given. It clearly denotes where the ERP system is utilized.

A. Pre-Sales Activities

In pre-sales stage sellers can create and update the company's master data. Master data that can be created or updated are company (companies), employee (employee), material (material), organization (organization), and customers (subscribers). Using the "material movement/ transaction" menu procurement or goods production process can be recorded in the system.

Inquiry or quotation can be requested by the customer to the seller. For an inquiry, the seller can directly create through the system and subsequently print it for the customer. In advance the seller should think in advance whether he/she can fulfil the order or not for a quotation. Quotation is a legally binding offer, so the seller must be able to fulfil orders based on it. A pre-sales activity will continue to a sales activity if a customer creates order based on a quotation.
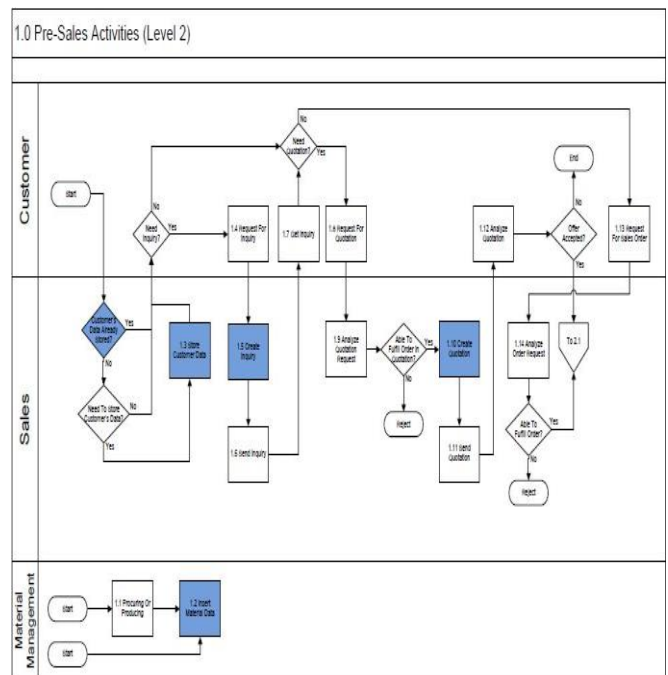

Fig 2. Pre-Sales Activities Business Process

B. Sales Activities

The sales activity begins when a sales order is made. An order is created when a customer comes to the seller to order and the seller feels he/she is able to fulfil the order. The seller can check the availability of the items through the "material master data> material" menu. The table of material is displayed in this menu. By using the "material in inventory" menu amount of goods available at the warehouse can be seen. The number in the "material in inventory" is calculated based on the data in the "material movement/ transaction", "sales order", "order return", and "return rental order" menu.

For the readily available stock items, the seller can directly provide goods and record it in the system through the "shipment/delivery" menu. If the stock is not available then the customer should wait until the product is produced, and then the goods are delivered to them. In some cases down payment is required to produce a new goods for the customer. Only after the payment of down payment goods are produced.

Using the field "notes" of the sales order in the system seller can record the problem in an order. The corresponding solution of the problem can also be recorded in the same field as well; "return rental order" menu is used to record the return delays, condition of the

goods being returned. If required, a customer must give compensation or pay for damages. The customer can return the goods to the seller if the delivered goods by the seller are not in good order or does not fit the order. If this happens, the seller must create a "return order" in the system. Goods that are returned can be replaced by other goods, money, or both.
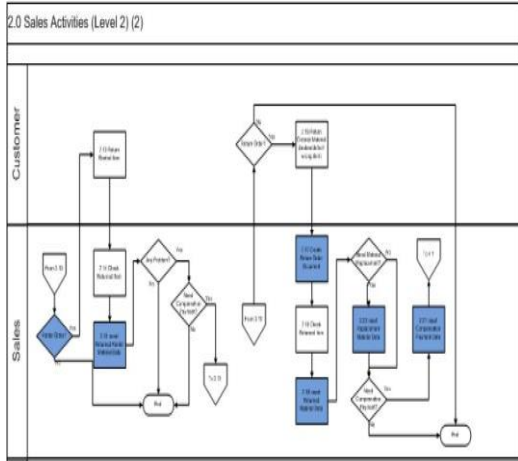

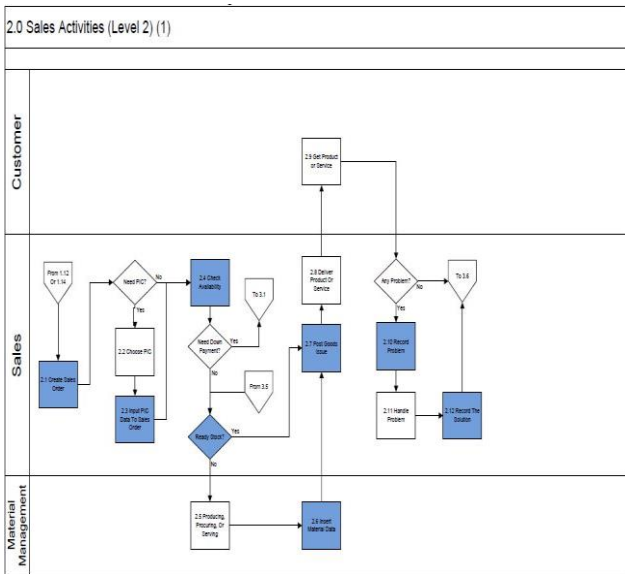Fig 3.Sales Activities (2) Business Process

Fig 4. Sales activities (1) Business Process

C. Invoice and Payment In

Incoming payments has three types, i.e., down payment, sales order payment (excluding down payment), and damage compensation for rental items. the payment process begins with the invoice sent to the customer. Through the "financial management> invoice" the seller can print an invoice. Through the menu "financial management> payment in" the seller can record the payment from a customer. As a proof of the payment,

the seller can also use invoice document because an invoice basically records all payments that have ever been made for a corresponding order.
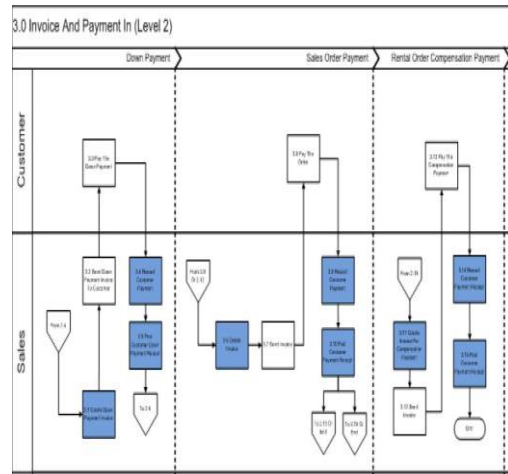

Fig 5. Invoice and Payment in Business Process

D. Payment Out

If a customer returns wrong/damaged items or experiences other problems and thus the seller pays the customer back payment out occurs. "Financial management> paymentout" menu is used by the seller to record a payment out. Since customer normally does not provide receipt for the payback, the seller can ask the system to print the receipt (the menu "financial management> receipt> order return receipt") and then ask the customer to sign it as a proof that the payback has been made.
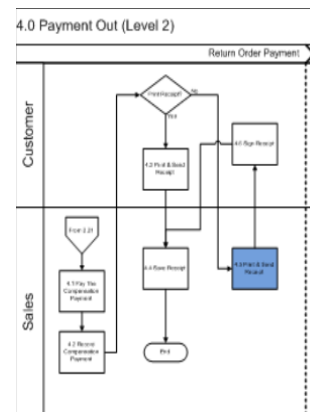

Fig 6. Payment out business process

Advantages

- The operational costs involved in manual tracking and duplicating data are reduced.
- Workflow across various departments is tracked easily.
- Individual department functions are integrated into a single software application.
- It provides complete visibility into all the important processes, across various departments of an organization.
- ERP vendors can extend their ERP systems to provide business intelligence.
- Unified and single reporting system is used to analyze the statistics/status etc. In real-time, across all functions/departments.
- Database system is implemented on the backend to store all the information required by the ERP system. It enables centralized storage/ back up of all enterprise data.
- ERP system are more secure as centralized security policies can be applied to them, all the transactions happening via the ERP systems can be tracked.
- ERP system is especially helpful for managing globally dispersed enterprise companies.

IV. CONCLUSION

The sales business process model for SMEs produced in this research can be adopted as a business process for SMEs in the sales business function area. Furthermore, it identifies business processes that can be supported by the ERP system as ERP system is intended to enable an organization to run more efficiently. Enterprise Resource Planning is the technology that drives the reformation in the realm of economy and impacts people's life style indirectly. ERP system now is going towards a system with more coordination/ collaboration higher heterogeneity and integrity, more intelligent, operating on the level of knowledge, and even wireless-enabled. The security issue within ERP has been there for a long time, but most of the solutions are based on the assumption that an ERP system is a closed environment. The design of the ERP system in this study is proposed to help data processing and information integration of the organization particularly to enable the sales process to become more efficient. The processed data and integrated information includes master data, pre-sales activity (inquiry, quotation), sales activity (sales order) up to payment data and information.

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