An Alternative Framework of Open Source Enterprise Resource Planning (ERP) System for Small and Medium Enterprise (SME)

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ABSTRACT

Integrated enterprise systems deserve intensive research because of their great potential for financial, technical, managerial, human, strategic benefits, costs, and risks. As ERP is an important tool that offers full package of managing and integration of data's, Open source was a package in the business world for optimization which offers organization with lowest cost and perfect reliability suite to SMEs. However, facing challenges of SMEs today the right solution should have every goods and best from both of these tools. Therefore, Open Source ERP is the new evolution that derives from both tools promising more extensive functionality in business demands.

Keywords

Software Engineering, ERP, Open Source, SME.

1. INTRODUCTION

An enterprise resource planning or ERP system is an information backbone and reaches into all areas of the business and value-chain. It is a set of applications with a structured approach to optimizing an organization's internal and external value chain. According to a study by the ARC Advisory Group (Clouther, 2000) ERP systems have become very important in modern business operations and ERP market is expected to recover from the sharp downturn in 2000 and 2001 and grow to $9.5 billion by 2006. The studied (Clouther, 2000) come out same as what all researchers studied the most important and the goodness of ERP. So that, we believe that ERP is an integrate all data and processes in organization into a unified system (database) consist of more modules, such as marketing, inventory control, production, procurement, distribution, human resource and accounting.

Nowadays, ERP are continuously growing up and most companies use these system for make it their management going with no much trouble but more effortlessly and efficiencies. Although in recent years most ERP system suppliers have increased their focus on SMEs, but the current ERP systems are still expensive. In a study done by Meta Group, surveyed by 63 companies including of small, medium and large enterprise in a range of industries, it was found that the average cost of implementation of ERP system was $15 million, with minimum at $400 thousand and maximum at $300 million (Kumar, 2002). Corresponding with impacts of information technologies and Web services, all companies open their eyes for looking a new brand offered as known as Open Source software. Open Source Software is software for which the underlying programming code is available to the users so that it may read, make changes, and build new versions of the software incorporating their changes. Open Source ERP Systems are arriving to be appropriate ERP suitable for SME's according to their minimal budgeting. The first adopters of open source ERP were in Latin America, Europe, and Asian countries because of economic reasons (Stafford, 2005).

This paper is structured as follows. Section 2 discusses concerning about open source ERP software, the important of ERP for business and the evolution until relief of fully open source ERP. Section 3 presents the related works speak in the open source ERP system studied by some researchers, centre of attention in their cost. While, section 4 show the framework of open source ERP system and several tasks to deploy a new open source ERP system for more costless. Lastly, in section 5 we elaborate some contribution that will possible give it by our new framework and finally we conclude our research.

2. OPEN SOURCE ERP SOFTWARE

Technological issues in ERP adoption go hand-in-hand with organizational factors. (Markus & Tanis, 2000) stated that choice of technology, or software configuration in particular, should be aligned to the organization's structure and operations. This is especially important in multisided implementations where an organization may have centralized or decentralized operations. In their Delphi study of issues important in ERP life cycle management, (Chang et al., 2000) identified technology based factors that are crucial for ERP adoption. Other studies have focused on enhancing the actual technology to be implemented, for example, a steering committee of seven organizations helped augment the US Treasury module of SAP software (Scott & Kaindl, 2000). (Willcocks & Sykes, 2000) proposed that one of the problems that may have contributed to failure of some ERP implementations is

that organizations considered IT to be a cost rather than a strategic resource. They emphasized the need for IT architecture planning before implementing an ERP system. The technology platform within an organization should be considered carefully in any ERP implementation, whether single or mu lti-site (Markus & Tanis, 2000).

2.1 The Evolutionary

The evolution of ERP systems closely followed the spectacular developments in the field of computer hardware and software systems (Rashid et al., 2002). During the 1960s most organizations designed, developed and implemented centralized computing systems. They automate their inventory control systems using inventory control packages, but mostly without Web Services. These were legacy systems based on programming languages such as COBOL, ALGOL and FORT RAN. Material requirements planning (MRP) systems were developed in the 1970s which involved mainly planning the product or parts requirements according to the master production schedule (MPS). Following this route new software systems called manufacturing resources planning (MRP II) were introduced in the 1980s with an emphasis on optimizing manufacturing processes by synchronizing the materials with production requirements. ERP systems first appeared in the late 1980s and the beginning of the 1990s with the power of enterprise-wide inter-functional coordination and integration. During the 1990s ERP vendors added more modules and functions as "add-ons" to the core modules giving birth to the "extended ERPs." These ERP extensions include advanced planning and scheduling (APS), e-business solutions such as customer relationship management (CRM) and supply chain management (SCM) (Rashid et al., 2002 and more concerning to web services. Nevertheless, extended ERP almost exactly to Open Source ERP nowadays, which is it offer more strengths rather than weaknesses such as Compiere, Open MFG, and OFBiz. Figure 1 summarizes the historical events related with ERP, since 1960 until 2000s.
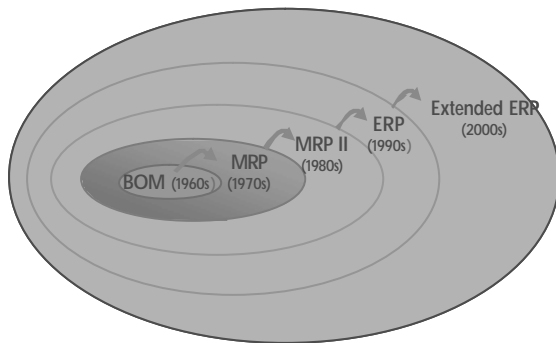

Figure 1: The Evolution of Open Source ERP

2.2 The Open Source ERP Software - Compiere

Open Source was structured by Eric S. Raymond and Bruce Perens and widely use in 1999 since now for commercial business, to associate with zero cost, which seem an anti-commercial. Open source is not just a free access to the source code (Coar, 2006), but it is costless almost to free of charge. The distribution terms of open-source software must comply with the complete criteria and it is studied by (Laurent, 2004) and OSI. But, for make it simple to understand, (Raymond, 1997; Raymond, 1998) uses the term "Open Source" for its usual meaning as a software which has its source code freely available to use, view, modify and redistribute. As searching at free encyclopedia, (Wikipedia, 2007) defined the open source software is computer software whose source code is available under a license (or arrangement such as the public domain) that permits users to use, change, and improve the software, and to redistribute it in modified or unmodified form. It is often developed in a public, collaborative manner. It is the most prominent example of open source development and often compared to user generated content (Willcocks & Sykes, 2000).

Open source ERP software could be very cost-effective; however, the cost and benefits of using such packages should be analyzed carefully. Now, with many open source software coming out, it is possible for SMEs to go in for ERPs at an earlier stage. There are several open source software package in the market including Compiere. Companies have to carefully study individual requirements and test out these softwares to determine suitability. Compiere is an integrated ERP and Customer Relations Management (CRM) software solution that combines the power of point of sales (POS), distribution, inventory, e-commerce, accounting, and workflow systems within one robust application. Compiere is fully customizable to SMEs and was created to handle the challenges of global commerce. Compiere was originally designed and written by Jorg Janke. Jorg has over than 20 years experience in packaged ERP systems, is Java Certified, and is an Oracle Certified DBA. The ComPiere, Inc. team is the lead developer of the Compiere Open Source ERP software solution.

2.3 Migrating Compiere as Fully Open Source ERP System

A recent development of Compiere has used Oracle 9i for the DBMS. As known, Oracle 9i has developed with many features that can be useful for warehousing large data transactions. But for the small and medium enterprises, the main problem for using oracle as DBMS is highly cost that they have to pay for licensing and upgrading Oracle product. By doing the migration from Oracle 9i to open source DBMS, like PostgreSQL, Compiere (Open source ERP System) will be developed in fully open source software. So, this version of ERP has lowest operation cost and it can be implemented to

small and medium enterprises for their benefits and the improvement. The main reason for choosing PostgreSQL as Compiere back end is because PostgreSQL much more suitable for the casual database developer, such as Java developers who need a back end for Java Database Connectivity access. Table 1 and Table 2 shown the comparison in response time (Compiere 2.5.3) with oracle has slightly better than PostgreSQL performances. However, for the comparison in cost, Compiere system can be reduced about $30,000 for Oracle Application Server Enterprise Edition (CPU license) by using open source DBMS software – PostgreSQL. Advantages of using PostgreSQL in Compiere are;

1. Compiere can be fully open source ERP system because of using open source DBMS.
2. Compiere is become easier to set its DB configuration up.
3. Reducing development and utilizing cost because it is not necessary for industries for licensing their DB software.
4. Less hardware requirement for establishing ERP system.
5. PostgreSQL is well known. So, Many documentation and user forum to discuss and solve about troubleshooting.
6. Free Upgrade for new component or features that newly released.

Table 1: Oracle 10.2.0.1.0 to (X86-64) using SQLJ

Process	Time Need ed (seconds)
Time to show Role	01 to 02
Time to show Menus	07 to 08
Time to show Business Partner Window	11 to 12
Time to show Sales Order Window	07 to 08
Time to show Product Window	06 to 07
Time to show Preview the Sales Order	26 to 27
Time to show Sales Detail Rep	05 to 06
Time to show Product Info View	01 to 02

Table 2: PostgreSQL 8.2.0 to (X86-64) using PLJAVA

Process	Time Needed (seconds)
Time to show Role	02 to 03
Time to show Menus	08 to 09
Time to show Business Partner Window	09 to 10
Time to show Sales Order Window	07 to 08
Time to show Product Window	06 to 07
Time to show Preview the Sales Order	30 to 31
Time to show Sales Detail Rep	05 to 06
Time to show Product Info View	03 to 04

3. THE RELATED WORKS

The most relevant researches with related to our new framework of low cost open source ERP are described in the following. (Kumar, 2002) in their studied defined that there are many benefits of implementing open source ERP like Compiere. He said the open source ERP software are very cost effective, very robust and user friendly, but the business should be analyzed the cost and benefits carefully for mission critical business processes. (Kumar, 2007) in others article, give the comparison within open source ERP versus commercial ERP by doing analyzing of pros and cons, included the cost of implementation. Open source ERP give a lots of freedom like free redistribution, freedom to access and modify the source code and freedom for end user to it for any purpose. It is also no hidden cost because it is free at all differed to commercial ERP. So, he conclude that open source ERP would be gaining popularity not only in developing country, but also in US market and able to challenge the domination of commercial ERP. However, Kumar state a few limitation of open source ERP such;
1. Limited warranty of the software.
2. Less incentive for commercial outfit to provide on going support.
3. No defined product roadmap and timelines as most of the enhancements and bug fixes.

(Naik, 2006) state many open source software appear in market and it is possible for SMEs to go in ERPs but, the companies have to study the individual requirement and test out these software to determine the suitability. She selected the CK-ERP, an open source ERP system to view of its excellent features. She said the software was easily installed on internet if employees are in various locations or on the internet for more secure transactions. So that, SMEs companies will cut off many cost in their operations and migrate to a low cost ERP system. In Marena Group's case study, (Rogelstad & Knezevic, 2007) reveal that company want to change their ERP system according to the lack of old system. In 2005, after comparing functionality and cost of some others alternative open source ERP, she decided to select Open MFG to replace the old system. The biggest factors in the decision were minimal cost and the software itself. They no need to purchase the cost of implementation like others ERP system, but only spend a little bit time for do the downloading of open source ERP by link it to Web store.

(Gruman, 2007) carry out a case study on Vertex Distribution, which is the COO is Mark Alperin, whereas Mark went looking to replace his aging ERP system in 2006 because of he was not happy with two main packages (Activant Solution and Microsoft) anymore. He frustrated with their lack of flexibility and difficulties of customization when they acquired other companies or needed to integrate with new customer. So that, he decided to choose Compiere open source ERP suite, and share that desires with others SMEs, and more of them

are now tapping into, for the reason of flexibility and costly. (Heylighen, 2007) deliberate the open access, open content and open source information as a good contravenes the conventional wisdom that markets and commercial organizations are necessary to efficiently supply products. He proposes a theoretical explanation for this phenomenon, using concepts from economics and theories of self-organization. Once available on the Internet, information is intrinsically not a scarce good, as it can be replicated virtually without cost.

4. THE FRAMEWORK AND INITIAL TASK METHODOLOGIES

All those studied and researches share their ideas and approaches by make a statements of the beneficial of open source ERP. Among those, however, drawbacks studied by (Kumar, 2002) put up with some related to our new framework. Hence, we will pull through the weaknesses and make the new framework for more easiness, qualities and costless. Over the years, the model of ERP's framework for SME has been changed to become more effective. From Figure 2, it can be seen a new proposed model for open source ERP for SME. It covers a large range of critical functions that have implemented by ERP such as Business planning Material including its strategy and resources, Operational

Planning and material resources, distribution management, planning analysis and implementation. The framework will take an advantages from the last models with improved and recover the drawbacks, thus, we figure up several tasks performed to create the structured methodologies needed in any ERP deployment to make better than before, included;

1. Designing and developing a custom integration by sending the shipping name and details over to auto-print.
2. Integrating receiving the tracking number from companies and storing that in compiere automatically, in order to reduce the double keying of information into two systems.
3. Customizing many of the screens in compiere, reducing the total numbers of fields and tabs at least 50% to provide a cleaner look and quicker data entry capabilities.
4. Creating a security model in compiere. In the security model, establishing the best practices for defining roles in their systems.
5. Providing business process training to select users on the customer service, financial and fulfillment staff
6. Integrating applications, external Web site with functionality in back-end compiere ERP.
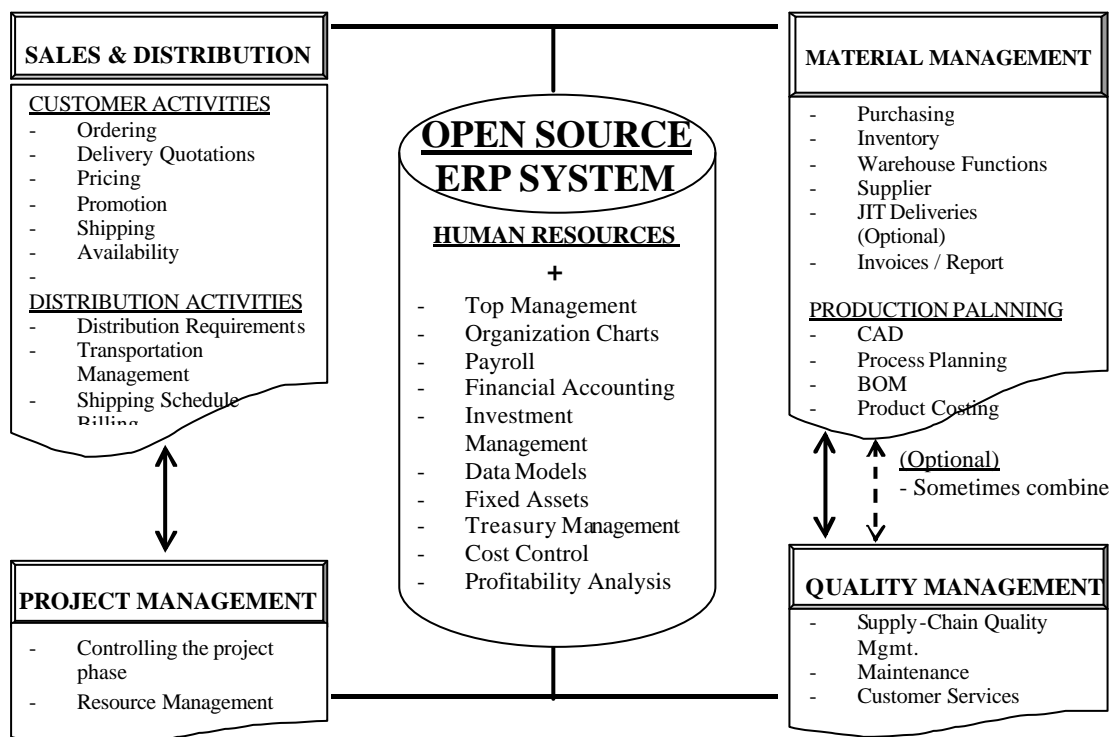

Figure 2: The Open Source ERP Framework

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5. CONCLUSION & FUTURE WORK

In this paper, a new model called Low Cost Open Source ERP System has been proposed for small and medium industries. We plan to develop the system by using fully open source software from web store and make it suitable and logical to SME's uses, especially in developing country. As reference and guidance via Compiere open source software and PostgreSQL database, we improve the late open source ERP system to provide an alternative system for their efficiencies, effectiveness and costless.

Currently, we still in developing process and assume this research willpower give their contributions in implementation of open source ERP system for industrial. Lastly, we expect our system have the own strength to give an impact to e-commerce society of World Wide Web.

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