Enterprise Resource Planning Effects on Supply Chain Management Performance

Approved: _Wendy A. Brooke_ Date: _7|28|2014_

Paper/Project Advisor

Enterprise Resource Planning Effects on Supply Chain Management Performance

A Seminar Paper

Presented to

The Graduate Faculty

University of Wisconsin-Platteville

In Partial Fulfillment

Of the Requirement for the Degree

Master of Science in Integrated Supply Chain Management

By

Joshua Wadley

2014

Acknowledgments

First and foremost, my advisor deserves acknowledgement. Mr. David Heimerdinger invests a tremendous amount of time and effort into every one of his students, and has been a wonderful advisor to me. His tireless effort and generosity to his students is truly astounding and I could not have asked for a more dedicated mentor. With Mr. Eric MacKay now taking on the reasonability of being the advisor for the Integrated Supply Chain Management program, I wish him all the best of luck but am sure he will be ok with a great teacher such as Mr. Heimerdinger.

Additionally, Dr. Wendy Brooke deserves recognition. From the moment I took my first course with her in my first semester of my masters program, until now, nearing completion of my seminar research, she was always there if I needed assistance along the way.

Although I have had to start and complete my degree via distance learning in the war torn country of Afghanistan, my family, teachers and company, have always supported me and my goals one hundred percent, and again I say thank you!!

Abstract

This research investigates the impact of enterprise resource planning systems when integrated into supply chain management. The research challenges enterprise resource planning system vendors to substantiate their claims about the benefits organizations enjoy from their products and provides evidence of the benefits of coupling supply chain management with enterprise resource planning systems. Three types of software—SAP, Oracle, and Microsoft Dynamics— are also compared and described in terms of their relevance to this initiative. This study collects data on the performance of organizations that use enterprise resource planning systems in their supply chain management system and on the organizations' software preferences.

The research confirms the scholarly view that coupling enterprise resource planning systems with supply chain management offers many benefits to a business. Furthermore, firms with a longer experience with enterprise resource planning systems enjoy better supply chain performance. Integrating enterprise resource planning in supply chain management was also found to reduce the risks involved in the supply system. This research also confirms that SAP has a largest market share, Microsoft Dynamics has the smallest market share and Oracle has the longest software implementation duration.

Table of contents

Enterprise Resource Planning Effects on Supply Chain Management Performance

Introduction

An enterprise resource planning system (ERP) is software integrated into an organization consisting of several components necessary for the organization to plan, produce, sell, market, distribute, account, manage human resources and projects, and perform service and maintenance. In addition, enterprise resource planning systems assist enterprises in automating and integrating corporate cross-functions such as inventory control, procurement, distribution, finance, and project management (Beaumont, Tarn & Yen, 2002).

An organization that implements an ERP will likely have effective information exchanges between departments because information has been integrated throughout the whole organization. Integrating ERP into a supply chain management (SCM) department allows the organization to reduce its dependency on human effort and eliminates the need to maintain a number of scattered and distinct systems. The global success of enterprise resource planning has captured the interest of business, information technology, and information systems researchers. Companies have spent billions of dollars buying and implementing enterprise resource planning exploring the rationales for ERP and SCM integration. Nonetheless, companies have been able to achieve measurable, positive returns on ERP investments. But despite the many benefits of ERP–SCM integration, some companies are lagging behind for several reasons. This is mainly due to the initial investment to acquire and implement an ERP system. This investment is substantial and even after the system is up and running, the costs continue to mount (Business Intelligence Center 2012), this keeps many organizations from implementing ERP software.

SAP is a business software application that is very versatile and can be customized to meet the user's requirements. More specifically it is an ERP tool. According to Leon (2008) ERP is an abbreviation for enterprise resource planning, and is business management software that helps the business as a whole from the viewpoint of the effective use of management resources to improving the efficiency of enterprise management. The SAP application was created in Germany by the SAP AG Company in 1972 by a group of ex- IBM engineers with the concept that it would be used as a standard application to help businesses process information in real time.

Anderson, Davis & Tim (2009) stated that SAP purposely broke away from the monolithic technology architecture model that defined mainframes and their business applications, instead modelling its software to run on a variety of operating systems and databases. By being flexible SAP gave its customers numerous choices which helped propel SAP into the forefront of IT and business alike by the early 1990s.

Less than 20 years after its inception, SAP was not only Germany's top software vendor but was gaining major attention from its competitors such as Oracle, JD Edwards and others. Into the mid-1990s, SAP started supporting Microsoft Windows, then onto Linux and that's when SAPs place in the enterprise software mart was firmly planted (Anderson, Davis & Tim 2009).

SAP Components and Modules

SAP is built on the foundation of specialization and integration from a business application perspective that the software can be all things to nearly every business that operates

in today's market though the software's modules and components. There are several modules within SAP that make up several components within the software.

Some specific modules in SAP are as follows: SCM - Supply Chain Management , FI - Financial Accounting, MM - Materials Management, HR - Human Resources, WM - Warehouse Management, IM - Investment Management and many more. These modules and others make up the many components of SAP.

Each component within the SAP family of products, meets a particular need, which is why they were created. There are four main components of SAP (Anderson, Davis & Tim 2009) which each conducting very different functions. These four components are SAP Customer Relationship Management (SAP CRM), SAP Product Life cycle Management (SAP PLM), SAP Supply Chain Management (SAP SCM) and SAP Supplier Relationship Management (SAP SRM).

SAP CRM is a comprehensive solution to the management of customer relationships because it supports all customer-oriented business divisions, from marketing to sales to service. SAP PLM offers all functions necessary for product planning and product data distribution. SAP SCM offers planning-based as well as execution-based functions for logistical processes and the SAP SRM enables for the strategic planning and central control of relationships between a company and its suppliers (Kappauf, Koch, & Lauterbach 2011).

In addition to SAPs more notable components, SAP NetWeaver plays a vital role. SAP NetWeaver is an ambitious vision for improving information technology but not only is the software a vision, but a set of tools and methodologies as well. Woods & Word (2004) state in their book: SAP NetWeaver is a set of capabilities that are provided by many different SAP

products constructed to work with each other to make applications work together, build new applications on top of existing applications, and lower the total cost of owing applications. These goals are reached by utilizing SAP NetWeaver to create portals that bring together functionality from many different programs and present them in one consistent easy-to-use interface and by collecting information from many different applications to create one consistent version of the date for the company to interpret.

<div align="center">**Oracle**</div>

The Oracle software is based off the relational database theory. This theory was invented by Dr. Edgar Codd in 1970 in a paper titled "A relational Model for Data for Data for Large Shared Data Banks" (Fernandez, 2009) which appeared in a journal entry of the June 1970 issue of Communications of the Association of Computer Machinery (ACM). Little did they know that from the moment the public learned about this theory, it would change the world of computing information forever through relational database management.

Dr. Codd's theory was unique because it was based on rigorous mathematical principles and he used these mathematical principles relations in the same way that the term table is used loosely. While table is not a mathematical term in itself, it is used the same way the word relation is used when being described as a mathematical term.

According to (Kreines, 2000): Codd's model theory (model) required a new language to access the database, so IBM developed Structured English Query Language and first gave it the name SEQUEL in 1974. Unfortunately, a trademark already existed for SEQUEL, so "English" was dropped from the name and the new language was renamed SQL, or Structured Query Language.

Five years later in 1979, two individuals by the names of Larry Ellison and Bob Miner founded a company by the name of Relational software, INC (RSI) that began developing the first commercially viable implementation of Dr. Codd's model along with the SQL language (Kreines, 2000). Shortly after the company's creation it released Oracle V.2 as the world's first relational database and a few years later in 1982, RSI officially changed its name to the name it is today, Oracle Systems Corporation.

Oracle E-Business Suites, Applications and Modules

Oracle is a highly versatile and complex ERP tool covering over 130 business functional areas though it's numerous E-Business suites that act the same way as components do to the SAP software. Within Oracles ERP packages the following E-Business suites are the most notable: Financials, Project Portfolio Management, Procurement and JD Edwards EnterpriseOne Supply Chain Management (SCM).

Oracle's Financials provides information in a format so that companies have the ability to work not only smarter, but globally and securely through its modules and applications. Stanford University (2007) stated that Oracle Financials is the core of its accounting systems because it gives users the ability to process transactions (expense reports, purchases, payments, billings, receipts and journals), apply "burdens" (indirect cost, fringe benefits), and create an post allocations which give the ability to track activity in funds, allowing for reporting to sponsors and donors, and the departmental management of funds and expenditures.

As stated earlier, within Oracle Financials there are numerous modules and applications; Lyer listed the following modules in his 2012 Oracle Functionality Guide: General Ledger, Sub-ledger accounting, Accounts Payables, accounts Receivables, Cash management, Treasury, Fixed Assets, Inventory, Purchasing, Order Management and Credit Management.

While the Project Portfolio Management suite within Oracle has numerous modules, Primavera P6 is the most notable. Krazer & Williams (2012) note that Primavera P6 is the most sophisticated and widely-used project portfolio management software in the world today. This is because not only can it be used to plan a simple one page project, it can also be used to plan and manage a multi-year, globally-distributed set of engineering projects involving tens of thousands of workers, machines and materials.

Oracle Procurement is an interesting suite because it aims to cut supply management cost across the board. If used efficiently it will help to reduce spending on goods and services and stream line the procure-to-pay process. The Boss Corporation (2002) provided the public with a list of the following modules that are key to using the Oracle Procurement Suite: Oracle Payables, Planning, Process Manufacturing, Project Manufacturing, Projects, Purchasing, and Receivables.

JD Edwards EnterpriseOne SCM suite aims to help organizations by enchaining their interactions with its suppliers. Of the numerous modules in the suite, Rasheed (2012) states that the inventory management module is the core of this suite. This is because it is a necessary to understand how to set up and manage an inventory in order to have an effective supply chain and work with all the other modules within the suite.

Microsoft Dynamics

Microsoft has had customer relationship management (CRM) tools for quite some time, even before those tools and applications were rebranded and named Microsoft Dynamics in 2005, they were known as Microsoft Business Solutions. Microsoft designed this system to integrate seamlessly with Microsoft Outlook and the web so that organizations already using Outlook could upgrade comfortably if they were in the market for ERP software. As Oracle is

based on SQL, Microsoft Dynamics is based on the .NET (pronounced dot-net) platform. Since computers can't understand English, it takes a special program such as.NET, to take English words and symbols and convent them into a language a computer can understand (Walnum, 2002).

Microsoft Dynamics Applications

Within the Microsoft Dynamics ERP there are four primary products. These applications are Microsoft Dynamics AX, GP, NAV and SL.

Microsoft Dynamics AX, formerly Microsoft Axapta, is an ERP solution that integrates financial resource management, operations resource management, and human resource management processes. In addition Microsoft Dynamics AX provides a centralized source for business data and enables the client to consolidate and standardize their business processes to help improve productivity and provide visibility across the organization.

Microsoft Dynamics GP is the financial component of Microsoft Dynamics. It is used throughout many organizations in numerous sectors due to its renowned strengths in financial management. These strengths extend beyond the standard finance modules of the General Ledger, Fixed Asset management, and the Accounts Payables and Receivables to include a number of modules, which add additional finance management capabilities to the core systems (Walnum, 2002). These modules include Analytical Accounting, Cash Flow Management, Budgeting and numerous others to help control purchasing and spending.

Microsoft Dynamics NAV, formerly Microsoft Navision, helps simplify and streamline business processes such as supply chains, CRM and more through its three-tiered web services which help to integrate the NAV system with other components within Microsoft Dynamics and other Microsoft programs such as Microsoft office and excel (Raul, 2013).

Microsoft Dynamics SL is a business solution that supports industry-specific and operational business processes mainly to support the human resource management function of an organization (Bellefroid & Shankar, 2014).

Claims by Vendors

Just as any product, ERP vendors are trying to sell the user a product by promoting their claims. This promoting should be done though facts and evidence which can convince the buyer to make that purchase but that does not always happen. Some companies try to promote their product though scare tactics and the lack of knowledge of the product to the user. This literature review will over numerous claims made by ERP vendors to convince the public to chose and purchase their product.

Increased Supply Chain Visibility

Nothing impacts a company's competitive position more than the management and versatility of its supply chain, but both of those factors are dependent on visibility. As the complexity of organizations supply chain networks continue to increase, partners involved in the process (specifically ERP providers) strive to make things a little easier or at least controllable.

SAP claims to increase supply chain visibility through its Supply Chain Event Management (SCEM) application and Supply Chain Management (SCM) module. The SCEM application is responsible for managing events that occur within and between organizations and their supply chain partners through the following five business processes: Monitoring, Notification, Simulation, Control and Measurement (Ceyp, Emmerich & Ijioui, 2008).

By monitoring inventory volumes, SAP works to ensure delivery capability within the supply chain to keep working capital cost low. SAP also has the capability to provide notifications real time. Those real time notifications work to improve information flow and

incorporate real time decision making support. The SCEM application also supports target-costing simulation abilities which provide "what-if" situation abilities. These abilities can predict changes in product costs due to changes in design, engineering and materials; and make-or-buy decisions can be modelled and simulated by the software (Deshmukh, A. 2006).

Finally supply chain "measurement" capabilities are granted through the SCEM application which allows supply managers to develop a preferred supplier list, identify continuous performance opportunities, provide feedback that supports when corrective action is needed and track the results from improvement initiatives (Giunipero, Handfield, Monczka & Patterson 2009).

The SAP Supply Chain Management (SAP SCM) specific module has helped companies overcome challenges by providing the following important benefits (Wood, 2012): *Real-time control of the supply chain*: the companies fully control the access to and visibility of supply chain data, allowing them to collaboratively generate scenarios and model the impacts of decisions, factors, or options in real time and thus increase supply chain revenue. The improved visibility of the supply chain process has provided insights into the transformations impacting product delivery and quantity. Next, *coordination of the entire international network* is given using true demand variables such as social media, research data, and point-of-sale to determine customer demands and provides the ability to respond immediately by integrating those demands into the planning process. Lastly, the SCM module grants the ability of overall *efficiency execution of the supply chain*: the increasing complexities of supply chains and transportation costs have made delivering the perfect order difficult. SAP integrates the required efficient real-time execution into logistics and business forces.

In addition to the SCEM application and SCM module, SAP Advanced Planner and Optimizer (APO) application has helped businesses conduct collaborative real-time supply chain scheduling together with their business partners. Knolmayer, Mertens and Zeier (2002) note that SAP has supported business planning and decision making. SAP APO has transformed significant collaborative planning activities such as those below:

- Supply planning rooted in customer needs and the availability of supplier material in the early stages.

- Transportation planning to simplify work processes involving manufacturers or producers and the means or providers of transportation.

- Demand planning founded on the time-based primary estimates of retailers and manufacturers.

Supply chain management has been instrumental in helping many businesses withstand the global economic recession (Knolmayer, Mertens & Zeier, 2002). The more a business focuses on supply chain management, the more efficiency is gained, and the more they trim costs. Businesses' expectations for cost control are high, but the limits are shifting. Therefore, many businesses are focusing on their supply chains to achieve growth by attempting to maintain a disciplined expenditure arrangement while attaining the flexibility required taking the business to the next step.

Oracle, like SAP, has a Supply Chain Event Management (SCEM) component. This component of the software addresses requirements across procurement, order management, manufacturing, product life cycle management, maintenance, logistics and supply chain planning and execution (Dalmia, S 2008).

Oracle Purchasing claims to give the user the concept of centralized procurement when using its applications. Siddiqui (2010) states this is done by having the ability to create various purchasing documents and keeping track of previous purchases. The procurement process of Oracle Purchasing starts when the user creates a purchase requisition in the Oracle application. Once the purchase requisition is completed and verified by the requestor, it is forwarded toward its approval hierarchy for manager's approval.

Oracle Order Management gives the ability to create, maintain and track different types of orders. Siddiqui (2010) states that order processing in Oracle Order Management initiates when an order is either created in or imported into the application from another integrated sales application.

The Oracle Manufacturing applications are used to define and value the items produced within the supply chain. Crum (2002) states that the Oracle Manufacturing application helps users plan, schedule, track progress and manage the production process as a whole through the following sub applications: Bills of material (BOM) and Engineering (ENG), Work in Progress (WIP), Cost Management (CST), Materials Requirements Planning (MRP), Master Production Scheduling (MPS) and Capacity Planning (CPP).

Oracle's Product Life Cycle (PLM) Management application was designed to help managers understand the cost and profitability of products throughout their entire lifecycle, from design to deployment, as well as examining the profits created by sales of the product over time. Greenwald, Rayman, & Stackowiak (2007) state that Oracle PLM tracks the overall complexity of a product throughout the development lifecycle based on objective measures such as part count and the number of levels in the bill of materials for the product.

Microsoft Dynamics too claims to increase visibility across the supply chain. Microsoft Axapta (AX) is the supply chain component of Microsoft Dynamics. It connects sales and purchasing processes with logistics, production, and warehouse management to provide real-time visibility throughout the supply chain. Moore (2013) states that supply chain integration for Microsoft Dynamics increases supply chain visibility by integrating with the user's subcontractors, vendors and trading partners.

The three ERPs have helped further improve supply chain visibility, which has provided businesses with the following benefits (Russell & Taylor, 2006): The first benefit is reduced exposure to risks in supply chain operations by improving timeliness through an anticipation of unexpected events, delays, and changes. This has also enabled quick recovery from supply chain failures through ERP analytics and a reporting of the best measures for countering such failures. The second benefit is that there is real-time insight into all aspects of products, with comprehensive, measurable inventory data sourced from material usage and real production rates. The third benefit is that these ERPs exploit the advantages of globalization in transportation, logistics, and cross-enterprise ordering, which enhances planning and thus produces more consolidated orders, enables a better selection of carriers, creates efficient loads, and optimizes delivery routing. The fourth benefit is that light is shed on contractor's abilities to determine outsourcing costs, helping companies make quicker and better decisions about ways of achieving efficient and effective supply chains. Lastly, the fifth benefit is reduced capital and time expenditure through complete replenishment cycles derived from management techniques. This is done through automatic replenishment signals to refine purchasing practices, reduced inventories, and implemented demand-oriented, timely, and dealer-managed catalogues.

RADIO Frequency Identification (RFID) visibility within ERPs

SAP, Oracle and Microsoft Dynamics all have the capability to integrate Radio

Frequency Identification (RFID) technology into the software to enhance supply chain visibility.

The combination of RFID's ability to provide near real time information and an ERP software

system's ability to quickly process that data, integrate it, and make it available across the

organization sounds like a match made in heaven (Zelbst, 2012).

While RFID is more expensive than common tracking alternatives such as bar codes, it

has significant additional benefits that enhance visibility. Zelbst (2012) gives the following

reasons why RFID is a better alternative than bar coding technology. RFID tags do not require

line of sight in order to be read, and, depending on the type of tag, it can be read from anywhere

in the world. RFID tags can also be read much faster than bar codes and simultaneously unlike

bar codes which are read sequentially. RFID has read and write capabilities which bar codes

lack. RFID tags are more durable than bar codes and may be implanted within products, ensuring

long-term traceability.

Even with all the benefits of RFID if it's not being used correctly it can become a

nuisance. Zelbst (2012) stresses that when RFID is implemented solely due to a mandate by a

customer or a desire to have the "latest technology", it becomes just an additional cost of doing

business and thus negatively affects profitability and performance.

Improved Customer Relationship Management

Good sales performance, top-notch customer service and enhanced customer relationship

management (CRM) are all goals that are seen within successful organizations. To achieve these

goals, an organization typically utilizes some sort of software and that "go to" software in this

day and age is an ERP. It's a good thing the majority of ERP vendors offer some type of CRM solution.

In fact, CRM software is one of the oldest applications available and has been released in numerous flavours by many vendors over the years (Stanton, 2012). Stanton (2012) also states that when it comes to technology, CRM software sits next to e-mail as the heart and soul of many companies because it's so vital to operations.

A lot has changed in the past 20 to 30 years in the business world but one thing that has stayed the same is the need for a company to capture data and retain the intellectual capital that it represents. Stanton (2012) states that every person who works in a company retains a certain amount of knowledge about the firm, his or her job specifics, and the people he or she works with (internal staff and customer contacts). That knowledge is often overlooked but in some cases is critical to the success of the business. In addition, the combined knowledge of all staff is the single most unique difference between two companies offering the same product or service (for example SAP, Oracle and Microsoft Dynamics). As staff turnover becomes more commonplace in today's society, a CRM application can help to capture some this vital information Stanton (2012).

Kumar & Reinartz (2012) define CRM as a strategy to gain a long-term competitive advantage by optimally delivering value and satisfaction and extracting business value from the exchange from the following standpoint:

> *CRM is the strategic process of selecting customers that a firm can most*
> *profitably serve and shape interactions between a company and these customers*
> *with the ultimate goal being to optimize the current and future value of customers*
> *for the company.*

Anderson (2001) states that CRM processes are typically very customer-focused, built around the needs of a particular business unit or organizational entity. The author later continued to list numerous industries and how CRM is used within them. Some examples are:

- Professional services industry – Use CRM to manage prospects, opportunities, client relationships, project resources, and the development of client deliverables.

- Automotive industry – CRM can also manage auto sales from start to finish through vehicle market planning, sales, financials, distribution, and post-sales management.

- Leasing entities – CRM provides end-to-end lease management by having the ability to identify financing opportunities for new leases or loans to remarketing existing leases and terminating lease as appropriate.

- Consumer products industry – Manage customer trade promotions, including brand management through activity planning, demand planning, budgeting, program execution, evaluation and subsequent analyses of each phase.

- Utilities vertical – Manage both commercial and industrial customers from a sales perspective by providing opportunity and quotation management, cross system contracts, and key revenue-producing accounts.

SAP Customer Relationship Management (SAP CRM) is a comprehensive solution to the management of the user's relationships. It does this by supporting customer-oriented business divisions, from marketing to sales to service, and even customer interaction channels, such as the internet and mobile clients (Kappauf, Koch & Lauterbach. 2011). This is done because involving as many potential users as possible is vital to the adoption of CRM within an organization. CRM

refs not only to establishing the necessary skills for operating the system but also to convince staff that the system will be beneficial.

Mohapatra (2012) takes a deep look into the numerous dimensions of CRM solutions that SAP provides. These solutions are Collaborative CRM, Operational CRM and Analytical CRM.

Collaborative CRM deals with applying collaborative interfaces (such as email, conferencing, chat and real-time services) to facilitate interactions between customer sand organizations, as well as among organizational entities dealing with customer information (customers to sales representatives, sales to marketing

Operational CRM is the automating of horizontal integrated business processes involving front-office customer points, such as sales, marketing and customer service, via multiple, interconnected delivery channels and integrations between front office and back office.

Analytical CRM involves analysing the data created on the operational side of the CRM equation for the purpose of business performance management. Analytical CRM is tied to data warehouse architecture; it is most often evident in analytical applications that leverage data marts.

Anderson (2001) states that SAP CRM takes the fundamental capabilities of CRM and brings them up a notch, helping firms manage and deliver customer-focused value to their unique industry. And because SAP CRM can be adapted to different industries, it's uniquely positioned to service multi-provider organizations For example, SAP CRM enables trade promotion management, which enables account and trade managers to improve control and visibility into the promotion process.

SAP CRM's business benefits are as far-reaching as they are diverse based on the above supporting claims. With visibility into customer data effectively spread across a firm's enterprise

(from financial systems to its supply chain, ERP and HR repositories), CRM expedites decision making just as much as it enables strategic objectives to be balanced against tactical needs. Similar to SAP SCM, SAP CRM can provide the kind of measurable and achievable return on investment necessary to justify its implementation and support cost (Anderson, 2001) through the software's capabilities.

Oracle, like SAP, has CRM functions as well. The first is Oracle Siebel CRM. Originally it was Siebel Systems, Inc, which was founded in 1993 to address the growing need of organizations of all sizes to acquire, retain and better serve their customers. In 2005 Siebel Systems was taken over by Oracle but acts as a different division than Oracle Siebel CRM even though Oracle is the controlling party (Kale, 2009).

Oracle's other CRM solution is the PeopleSoft software. PeopleSoft was also acquired by Oracle in 2005 and catered to the human resources department of an organization but has changed a lot since its purchase. Kale (2009) states Oracle's PeopleSoft CRM solution offers a broad range of functionality across all the major components of CRM with particular strengths in sales, customer service and analytics. PeopleSoft's background in human capital management renders PeopleSoft CRM particularly suitable for HR and IT help desk applications. The software also has industry specialization in sectors including higher education, public services telecommunications and financial services which all have strong ties to HR and IT as stated earlier.

The PeopleSoft Enterprise CRM is a family of applications in Oracle's PeopleSoft Enterprise which includes CRM analytics, CRM industry solutions, CRM operational dashboards, marketing solution, partner relationship management solution, revenue management solution, sales solution, and service solution (Leon, 2008).

Microsoft Dynamics also has its own CRM solution as well. Microsoft Dynamics CRM is a customer relationship management application, a sales force automation application, a customer service application, a marketing tool, a platform and framework for software development and an application that can be confirmed to meet a variety of relationship management needs (Stanton, 2012).

Microsoft Dynamics CRM is built on the .NET platform. .NET technology means connected to a server through the internet although there is a networked mode within the solution which doesn't require a direct connection to a server, this is known as *offline* mode (Lee, Scott & Weiss, 2008).

In addition to being built on the .NET platform, the Microsoft Dynamics CRM is unique within the world of customer relationship management because it is one of the only applications that offers businesses several choices for installing and deploying the software (Landers, Snyder & Steger, 2011).

The deployment options are: *Microsoft Dynamics CRM Online*, deployment in which a business uses the solution over the internet on servers hosted by Microsoft. *On-premise*, option in which a business purchases the software and installs it on its local network and depending on the configuration, employees might also be able to access the Microsoft Dynamics CRM system over the internet. *Partner-hosted*: option when a business deploys the software within a third-party hosting environment.

Microsoft Dynamics CRM like other applications is broken down into smaller components or modules. According to Lee, Scott& Weiss (2008) the CRM is divided into six major sections: Workplace, Sales, marketing, Service, Setting and Resource Center.

In addition to Microsoft Dynamics standard CRM offerings, they offer an "xRM" solution. Microsoft Dynamics xRM stands for anything relationship management and is the idea that Microsoft Dynamics CRM can be used as a platform for which to extend other applications that manage relationships beyond the standard "customer" definition (Bhaiya & Wolenik, 2010). xRM is based on the idea of anything management came about when trying to define what a customer actually is.

Bhaiya & Wolenik (2010) state that xRM deployments can consist of anything that uses the CRM platform for building a line-of-business application and might consist of regular Microsoft Dynamics CRM, a custom application embedded within CRM that exposes new/different ways of working with the data or application, or a customer application that doesn't use any of the existing Microsoft Dynamics CRM forms at all. The authors provide the following examples of some very common xRM deployments:

- Managing events

- Vendors or suppliers

- Grant management

- Resource management

- Membership management

- Constituents

- Sports management (teams, schedules, equipment)

Increased Supplier Relationship Management

Just as each ERP system discussed offers CRM solutions they also offer Supplier Relationship Management (SRM) solutions as well. In a similar way to how CRM manages the

relationship between a company and its customers, SRM helps to optimize and manage the relationship between a company and its suppliers (Anderson, Davis & Tim, 2009).

Kappauf, Koch & Lauterbach, B (2011) note that SAP SRM is a solution that enables the strategic planning and central control of relationships between a company and its suppliers. This is because it allows close connections between suppliers and the purchasing process of a firm with the goal of making the procurement processes simpler and more effective.

Anderson, Davis & Tim (2009) state that SAP SRM has the ability to integrate with other components found in the SAP Business Suite and provide the following example on how it's done:

> *SRM integrates with Product Lifecycle Management (PLM), enabling a high degree of collaboration between product buyers, parts suppliers and streamlines bidding processes. All of this naturally impacts SAP ERP as well, because financial and logistics data are updated and shared between systems.*

SAP SRM allows an organization to manage its bottom line by reducing the costs of goods sourced and used throughout the company, yet improving supply chain efficiencies (Anderson, Davis & Tim, 2009).

SAP SRM has many benefits which Anderson, Davis & Tim (2009) have listed as some of the most notable to an organization. *Sourcing strategy improvements,* which includes improved access to each supplier's performance and improved management of supply which decreases supply related risk. *Compressed cycle times are made faster* through the use of online approvals to speed up the procurement cycle and improve supplier responsiveness. *Reduced process costs* through simplification, process automation, low-cost connectivity with other systems, and the elimination of maverick buying. *Lower overall unit prices* made possible due to

the consolidations happening in multiple departments along with the reduced costs for carrying inventory as a result of being able to competitively bid.

Oracle too, offers a few different Supplier Relationship Management (SRM) solutions with the most notable being found within the Primavera suite. These solutions are very much like the offerings from SAP but there is one distinct module which is the Primavera P6 Contract Management suite.

According to Williams (2012), Oracle Primavera P6 is one of the most sophisticated and widely-used project portfolio management software's in the world today. The software can be used to plan a project as simple as writing one book, and then on the other hand it can also be used to plan and manage a multi-year, globally-distributed set of engineering projects involving tens of thousands of workers, machines and materials. When used to its fullest it can give an organization the ability to manage current and plan future projects and contracts (Williams, 2012).

Within the Primavera Contract Management suite there are 6 distinct modules to help manage contracts. Kelly (2012) list these 6 modules as follows; *Reports*: report writer for Primavera Contract Management, *Change Management:* Module that tracks and controls changes from inception to resolution keeping complete history, *Payments*: Module that provides the ability to cue, track and automate performance based progress payments to subcontractors to ensure unnecessary delays are avoided, *Content Repository*: solution that provides a structured and secure environment to store records and documents associated with projects, *Document Management*: module where documents are tracked and stored along with attachments in a single location providing a complete picture of the project, *Oracle User Productivity Kit (UPK)*:

solution that provides another option to provide end users with information on process and application usage.

Microsoft Dynamics Axapta (AX) and SL (formerly Solomon IV for Windows) are the SRM focused suites within Microsoft Dynamics. Microsoft Dynamics AX has already been discussed n this paper therefore in this section we will focus on Microsoft Dynamics SL.

Koop & Muris (2007) argue that Microsoft Dynamics SL is designed to meet the specific business management needs of project, service and distribution driven companies with the need to integrate with other systems to better serve customers and suppliers.

The authors Koop & Muris (2007) continue by giving the following benefits as how Microsoft Dynamics SL helps increase SRM:

- *Effectively manage subcontract agreements* through the creation and tracking of agreements from the pending stage through commitment.
- *Increased productivity* by being able to review budgets, margin and schedule impacts before work proceeds or changes are approved.
- Ability to *streamline change order approvals* by viewing, tracking and approving orders to help eliminate delays, reduce the risk of miscommunication and/or unauthorized work to turn orders into billable tasks.

Improved Sales and Order Fulfilment

Every organization is out to make some type of profit unless it's a non-profit, and even then, they still have operating costs to cover. Typically through organizational sales and by fulfilling those orders is how companies cover those costs. ERP providers saw that being able to

fulfil those orders was the key in successfully conducting organizational operations and created

solutions to assist these companies.

SAP has a strong focus on the order fulfilment process for service parts management.

This is done through the following four systems (Dickersbach, 2007): mySAP Customer

Relationship Management (CRM), SAP Advanced Planning and Optimizer (APO), mySAP

Enterprise Resource Planning (ERP) and SAP Extended Warehouse Management (EWM). The

following diagram gives an overview of the order fulfilment process and the flow between the

systems.
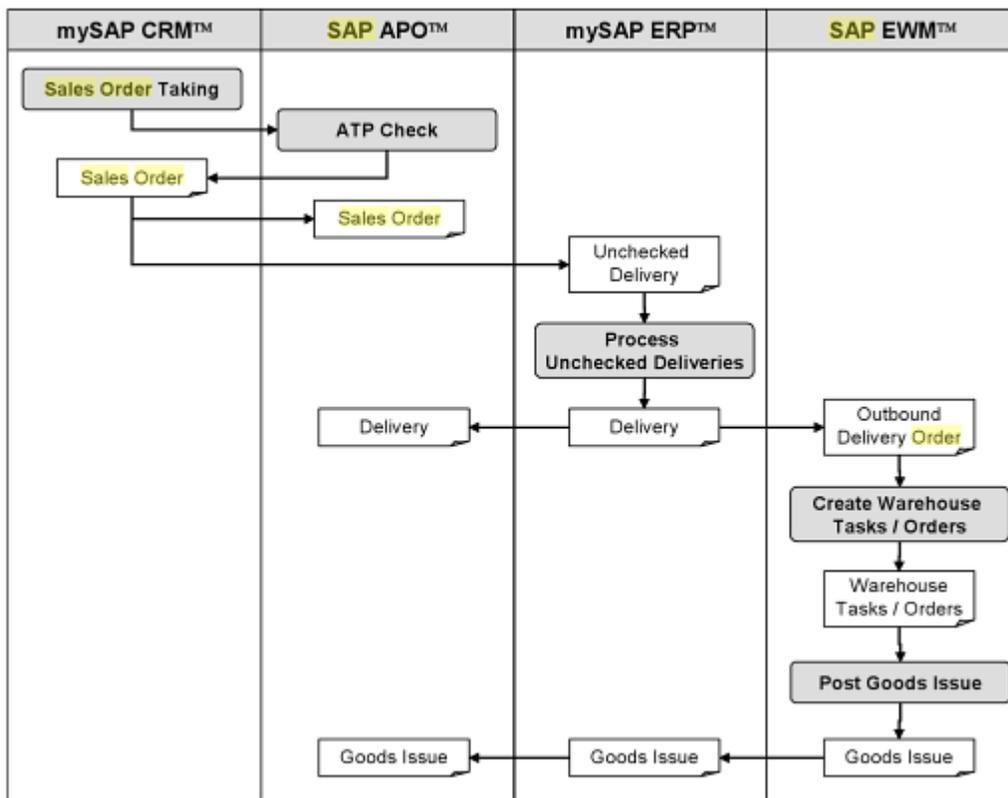
(Dickersbach, 2007)

Dickersbach (2007) states that the entire sales and order process starts within mySAP

ERP and the call of rules-based ATP in SAP APO. Assuming there is sufficient stock on hand,

the sales order item is confirmed and the sales order is saved in my SAP CRM. That sales order is then transferred to SAP APO and to mySAP ERP.

The author later states that while in SAP APO, this transaction is reflected as a sales order but in my SAP ERP it is reflected as an unchecked delivery while further changes in this sales order will be transferred to both SAP APO and mySAP ERP. The next step is to then process those unchecked deliveries in mySAP ERP which means to turn those unchecked deliveries into regular deliveries. At this point in time the ATP check is performed again and as a result a delivery is created and sent to SAP APO (where it replaces the sales order) and to SAP EWM (Dickersbach, 2007).

In SAP EWM the delivery is first reflected as an outbound delivery notification but can be activated in the background to become an outbound delivery order. For the outbound delivery order a warehouse task and subsequently a warehouse order is created and confirmed in SAP EWM and the goods issue is posted. This posting of the goods issued is then transferred and reflected to mySAP ERP and from there to SAP APO therefore fulfilling the order (Dickersbach, 2007).

Oracle, like SAP, offers solutions to assist in sales and order management. The majority of this function is conducted through the PeopleSoft Order Management module (sometimes just called Oracle Order Management as Oracle eventually acquired PeopleSoft).

Anandi (2006) describes Oracle Order Management as software that lets the user inquire about availability for any shippable item, as this user is usually placing or scheduling orders for an organization. The user can also indicate the quantity and date one would like to receive orders and if an item is not available on the users requested date, the software will automatically display the earliest date that the items will be available.

Anandi (2006) also list some capabilities and claims of Oracle Order Management:

- The ability to enter orders with a minimum number of keystrokes

- Time saved entering orders using standard information defaults based defined rules

- Copy existing orders to create new orders, returns or replacement orders

- View availability information for an item or group of items

- Ship an order or order line to as many locations as one wants with multiple shipment dates and methods

The above capabilities and claims of Oracle Order Management are sustained through the components of Oracle Order Control and Oracle Order Processing.

Oracle Order Control has the ability to monitor order cycles, order types, order entry defaults, pricing and price adjustments, sales credits, credit checking's, holds and approvals and security rules (Anandi, 2006).

Anandi (2006) gives the following information about the components of Oracle Order Control: Order cycles let the user define where in the business process functions such as releasing an order to the warehouse, confirming shipments and customer billing should occur. Within the order type's module, the user can group together orders that follow a similar business flow using order types by assigning various controls and default values to the order types for more efficient processing. Order entry defaults are user-defined, giving the user complete control over the source and prioritization of the order entry defaults. Oracle sales credits let the user assign sales credits on an order, return, order line or return line to as many salespeople needed. Credit checking lets one automatically check credit on customer orders and automatically hold orders that violate the established credit rules. Within holds and approvals one can manage

exceptions to the hold and approvals process by adding restrictions and limitations. Finally within the security rules component the predetermined rules provided by Oracle can be edited to activate when orders are added, deleted or cancelled.

Oracle Order Processing has the ability to drop shipments, handle multiple currencies, taxation, "configurations to order", make notes, cancel orders, create internal sales orders, provide order open interfaces and order inquires (Anandi, 2006).

Anandi (2006) gives the following information about the components of Oracle Order Processing: Oracle drop shipment lets the user enter drop-ship sales orders as well as standard sales orders. Oracle has the ability to process multiple currencies therefore allowing the user to enter or return an order in any currency defined as a valid currency for the business in addition to creating price list in the selected currency. The taxation component allows one to indicate customer tax exemptions and quote tax amounts for orders at entry time. Within "notes" management the user can add free-form text, images, OLE documents, spreadsheets or even links to web pages to the orders, order lines, returns and return lines. One can also partially or fully cancel orders, lines returns and return lines. In the order open interface component orders are imported and managed in the same way that online orders are managed, including credit checking holds and approvals, pricing and so on. Finally the order inquiry component lets the user view status, shipping, work order, purchasing and invoicing information about orders, returns and internal sales orders. Also within this component one can view detailed information about all shipments made on an order including quantity, date shipped, freight carrier and the waybill number.

Below is a diagram outlining the Oracle Order Management process:
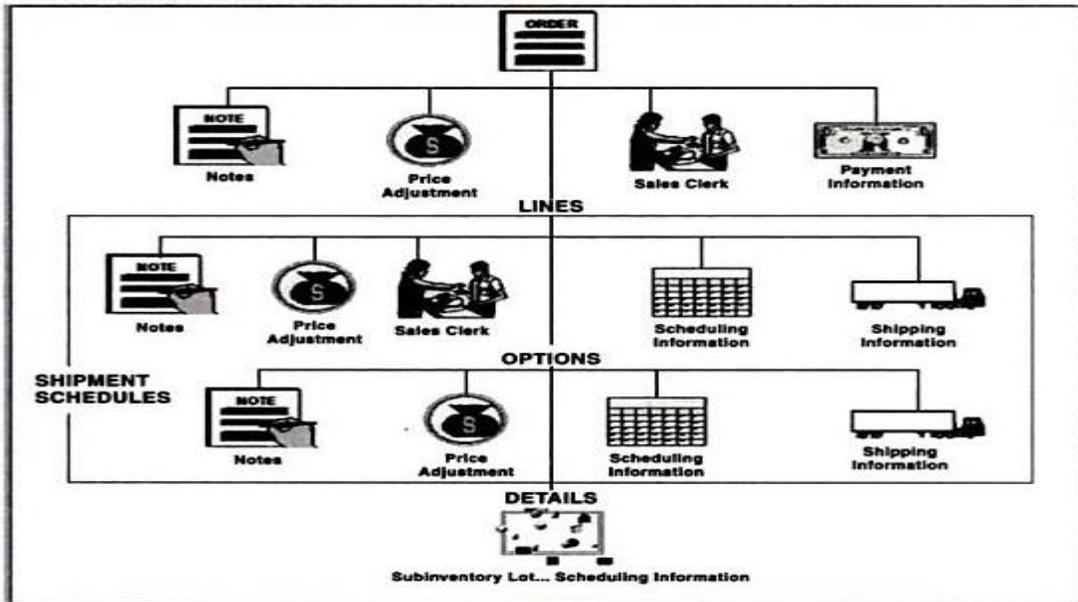
The Oracle Order Management module also offers billing solutions and solutions to bring in data from non PeopleSoft systems). Yadav (2011) gives a good example pertaining to this situation which is as follows:

> *For example, the PeopleSoft Order Management module includes a batch process that loads the customer order details into the billing interface tables. However, if the user brings in the data from a non-PeopleSoft system, a customized interface program needs to be developed to populate these tables. Let's say that an organization uses a non-PeopleSoft system to capture customer orders. To import this order data into PeopleSoft Billing, the user will have to analyze the data format in the source system, map the data with PeopleSoft Billing interface tables, develop a customized interface program to reformat the source data and load it into the interface tables.*

So while it is possible to bring in data from non PeopleSoft systems and utilize it within the order management module, it is not a simple task but when dealing with all PeopleSoft information, the order fulfilment process is much simpler.

Microsoft Dynamics GP handles the sales and order fulfilment function within the software. More specifically it is the Sales Order Processing (SOP) module that handles this task. According to Bellu (2008) the SOP module helps the user to create sales-related documents that contain detailed information. This information includes but is not limited to preparing quotes, sales orders, fulfilment orders, invoices, back orders and returns.

There is also special type of order within Microsoft Dynamics GP called a "fulfilment order" which are usually last minute orders. Bellu (2008) explains that fulfilment orders use six different document statuses that are established through the sales fulfilment workflow feature to provide the user with a structure to control typical work processes. These work processes are as follows: printing of tickets, picking goods from an inventory, printing packing slips, packing and shipping the goods and invoicing the customer.

Typically organizations find these "fulfilment orders" beneficial because they can help track the status of an order in the system and eliminate dependence on handwritten log books and external Excel spreadsheets (Bellu, 2008). On the other hand, some organizations find that fulfilment orders over complicate the process and require too much extra data time.

Increased Planning Capabilities

Planning is important in every organization. No matter how big or small the task is there should be a through process detailing how it's conducted. Some of the benefits of planning are that it increases the efficiency of an organization, reduces the risks involved in modern business activities, helps to achieve objectives of the organization, motivates the personnel of an

organization, as well as more priceless benefits. Each ERP being discussed in this paper claims to improve planning capabilities if their software is used.

Within the SAP software there are numerous ways to increase planning efficiency with the most notable being the Production Planning (PP) module found within the SAP Advanced Planning and Optimization (APO) component. Wood (2012) states that the planning procedure in general is the minimal requirement for PP and is an essential setting for the module. The author then continues that planning procedures determine which rules are applied to the product when planning events occur, such as the creation or change of an in-house or procurement order, the creation of stock or demand, or other master data changes.

The SAP APO comes with six off-the-shelf planning procedures which are Manual with Check, Manual without Check, Cover Dependent Requirements Immediately, Planning in Planning Run and Multilevel Available to Promise (ATP) Check (Wood, 2012).

Wood (2012) then provides a brief description of those planning procedures which are as follows: *Manual with Check* planning is done manually and an availability check is conducted automatically when a planning event occurs. *Manual without Check* planning is done manually and an availability check is not conducted automatically when a planning event occurs. Within the *Cover Dependent Requirements Immediately* section, no planning is applied for end-products but component parts (dependent requirements) that are necessary to complete end-products are immediately planned at the time of a planning event. Planning in Planning Run is conducted only during the Production Planning (PP)/ Detailed Scheduling (DS) stage and nothing occurs immediately from planning events. Finally within the *Multilevel ATP Check*, an ATP check is conducted across all levels and bills-of-materials are created at the time of the planning event.

Another feature of SAP APO is that if a product is procured (not made-in-house) then additional specifications can be applied under Procurement Planning (Wood, 2012). Within this module, the user can indicate whether the product is acquired as part of a package or otherwise to handle each purchase in the appropriate manner.

Anderson, Davis, & Tim (2009) states that within the PP module there is a component called Sales and Operations Planning, which is used for creating realistic and consistent planning figures to forecast future sales. In addition, depending on the user's method of production, one can use SAP's production order processing, repetitive manufacturing or KABAN production for controlled processing (Anderson, Davis, & Tim, 2009). In the end these same authors note that Production Planning and Control helps organizations manage basic data, sales and operations planning, master planning, capacity and materials requirements planning, production orders, product cost planning and plant data collection.

Furthermore the implementation of the Production Planning and Control module makes it possible to eliminate routine tasks for the end users responsible for production scheduling. Thus related reduction in time allows for additional time to be dedicated to more critical activities within the organization (Anderson, Davis, & Tim, 2009.

Oracle as well has software tailored to increase planning capabilities. This software is found within the Oracle Hyperion Planning suite. Reddy (2011) notes the Oracle Hyperion Planning suite is defined as a centralized web-based planning, budgeting and forecasting solution that drives collaborative event based planning processes throughout the enterprise. The primary focus of the Oracle Hyperion Planning product is to provide a planning, budgeting, and forecasting solution that helps the user manage and coordinate all of the organizations business planning and budgeting needs (Reddy, 2011).

According to Reddy (2011) the process of preparing for the future is planning and as a part of planning, an organization has two types of plans:

- **Strategic planning**: A strategic plan includes the goals and objectives of an organization. It looks into its current business and aims by setting goals of what it wants to be in the future.

- **Operational planning**: This is a set of detailed guidelines or a detailed plan to be executed to achieve the strategic plan. This planning involves the granular details of setting the responsibilities of people, departments and divisions.

Reddy (2011) explains what a budget is. In the author's terms, a budget in an organization is a formal plan that may be short term (one year) or long term (three years or more) and is aimed to control its operations and help management in the decision making process. Therefore, one can say that budgeting is a part of planning and without budgeting the planning cannot be successful in achieving the organizational or strategic goal (Reddy, 2011).

Finally there is forecasting which acts as a perquisite to planning and budgeting as a part of planning activities. With that being said, forecasting provides strategic assumptions about the future because the user needs to realize the fact that planning deals with the future as well (Reddy, 2011).

Almost every organization does some type of planning, budgeting and forecasting though spreadsheet making programs such as Microsoft Excel. While companies have been utilizing this method for many years this method has numerous disadvantages that the Oracle Hyperion Planning suite helps to eliminate. The disadvantages being addressed are (Reddy, 2011): *Time taken*: working manually with Excel templates consume more time. *Data integrity*: There is no

centralized data storage and data lies in many Excel sheets. Hence the information is more prone to errors. *Cost*: As a manually–driven process on Excel, the budgeting process needs many people to work on and it indirectly impacts cost. *Scalability and adaptability*: It's imperative that any organizational changes be captured right from the start in Excel, which is a very tedious, time consuming, manually driven activity.

Reddy (2011) argues that Oracle Hyperion Planning benefits organizations by providing solutions for the disadvantages of processes such as using excel through the following methods: *Time taken*: The first and foremost benefit is that it eliminates the cumbersome Excel template maintenance and it shortens the planning cycle time. *Data integrity*: Data is stored in a centralized place and with the security features of Oracle Hyperion Planning, the integrity of the data is upheld. *Cost:* It's a web-based centralized application and does not need manual intervention, unlike Excel spreadsheets. Hence, the cost of maintenance comes down dramatically. *Scalability and adaptability*: Oracle Hyperion Planning is highly scalable and at the same time it does not impact the performance. Because it is adaptable, changes are incorporated into the planning system with ease rather than starting from square one.

Other benefits from the software are listed as follows: Data entry, version control, process control, reporting and analysis are all done through a single interface in Oracle Hyperion Planning. Powerful workflows and process management are done through enhanced features for audit trials, task lists, email notification and alerts. Sophisticated reporting and analysis is conducted with drill down capabilities. The underlying planning and budgeting remains fundamentally unchanged but the software of Oracle Hyperion Planning does it in a more reliable and efficient manner (Reddy, 2011).

Within Microsoft Dynamics most of the planning is conducted in the Master Planning module found within Microsoft Dynamics Axapta (AX). Mourao & Weiner (2006) argue that the primary purpose of the Master Planning module is to make sure the user has what is needed when it is needed. Therefore it is the job of Master planning to run requirements calculations based on the user inputs, and then to recommend and create purchase orders, production orders and warehouse transfer orders. In addition, the functionality contained in the Master Planning module revolves around the process of executing Master Scheduling, which is the end process one may complete leading up to running Master Scheduling (Mourao & Weiner, 2006).

It is very beneficial to have experience with material requirements planning (MRP) and the master production schedule (MPS) when conducting planning operations within Microsoft Dynamics AX. According to Beech & Vissers (2005) MRP has been developed for production environments where a range of related end-products (featuring subassembly and component commonality) are produced that experience a dynamic type of demand, and where subassemblies and components are manufactured in different batch sizes with substantial lead times.

When using bill of materials (BOM) information, information about batch sizes and lead times, and information about the current inventories, work-in-process and outstanding purchasing orders, the MRP mechanism calculates for each item (subassembly or component) (Beech & Vissers, 2005). This information is calculated in the BOM time-pashed patterns of production orders to be released in order to fulfil the current master production schedule (MPS) (Beech & Vissers, 2005).

The MPS is a statement about desired future time-pashed output at the end-product level. The MPS mechanism provides good decision support if demand is dynamic and production

capacity can be easily adapted to the capacity requirements following the production order release patterns (Beech & Vissers, 2005).

If demand shows substantial stochasticity, actual demand deviates from expectations and the MPS must be frequently updated. Beech & Vissers (2005) state that as a result of this, the production order release patterns can change drastically over time. If the capacity cannot be easily adapted, or high capacity utilisation is a required factor, anticipation stocks should be built up at some points in the chain and MRP does not support the possibilities (Beech & Vissers, 2005).

Microsoft Dynamics AX also works hand in hand with the Microsoft Project software to help plan and schedule projects. While one can probably schedule small projects without the assistance of any software, for more complex projects it's highly recommended to use some sort of assistance. Microsoft Project claims to provide the flexibility to help users manage a project in a manner that closely reflects the way the user and the team would really work. In general if one needs to communicate the project plan with others, track project details such as task or costs, or use shared resources, a project manage program like Microsoft Project will defiantly make the job easier (Lowery & Stover, 2001).

When a user manages a project in Microsoft Project, the chief obligation is to achieve project goals on time and within budget. The user's chief strategy for doing this is to keep tasks, resources, time and money in the balance. According to Lowery & Stover (2001) the main set of task the user needs to perform in order to achieve these project goals are to: define the project, create a project plan, refine the project plan, track project progress and close the project.

Furthermore, Microsoft Project (Lowery & Stover, 2001):

- Provides essential assistance in building and tracking projects

- Calculates dates, costs and other project information

- Completes many fields automatically as the user enters or changes plan data

- Stores project information in a powerful database

- Displays and prints project information in different views an formats

- Enables the user to exchange task information with team members

- Supplies the tools to chare project information with outer programs (such as Microsoft Dynamics AX)

In closing, Microsoft Dynamics AX Master Planning is a powerful tool that can provide a great insight into an organizations planning and purchasing requirements but mastering this software does not happen overnight (Mourao & Weiner, 2006).

Summary

Enterprise resource planning is software comprising the components an organization needs to plan, produce, sell, market, distribute, account, and manage projects and human resources and to carry out maintenance and services. When ERPs are integrated into an organization's SCM department, they reduce the organization's dependency on manpower and eliminate the need for multiple disjointed and distinct systems. Integrating an ERP into an organization can result in: increased supply chain visibility, CRM, SRM, sales and order fulfillment, planning capabilities, and more which all effect SCM. It also allows an organization to respond to customer needs more efficiently, thus increasing its market share. However, ERPs also have disadvantages, including the high costs of their implementation and management and the high risks in their use. Three main types of software are involved in ERP implementation— SAP, Oracle, and Microsoft Dynamics—which have varied performances and capabilities.

SAP the main supplier of SCM technology, offers integrated and effective business solutions for full supply chain lifecycles. Its services include supply chain and policy planning, lifecycle management, sourcing, and procurement. The application's benefits include reduced operation costs and business risks, increased supply chain efficiency, and improved financial and operational performance. The SAP-SCM modules have enabled companies to overcome many problems through solutions such as the real-time control and efficient execution of supply chains. Meanwhile, the SAP APO application has helped businesses conduct real-time collaborative supply chain scheduling with their business partners. It has also improved major collaborative planning activities by, for example, facilitating planning founded on the time-based primary estimates of retailers and manufacturers.

Besides facilitating data import from SAP and external sources, SAP analytics has enabled the planning of an integrated financial model in real time. It also helps businesses minimize costs by adjusting their inventory levels. Moreover, SAP has helped organizations achieve holistic insights into product costs by extracting cost data from multiple sources. In the current era of volatile global supplier networks, SAP solutions help companies become agile and maximize the visibility of their performance metrics across their supply chain.

Applying SAP SCM helps businesses use their primary processes to identify the main challenges to streamlining future workflows, in addition to increasing the effectiveness of supply chain processes. Through their business-oriented architecture, SAP analytics allow businesses to optimize their processes and react quickly to risks and challenges. Businesses also constantly improve, as SAP SCM helps them accurately identify the appropriate supply chain enablers. It also sets targets and benchmarks based on industry best practices, enhancing SCM. With SAP,

businesses now rethink their supply chains' responsiveness, collaboration, operations, and distribution. Businesses' forecasting accuracy has also improved.

Oracle strives to provide streamlined, effective supply chains. With Oracle, enterprises can focus on initiatives for enhancing performance and reducing operational and inventory costs while improving customer service. Oracle's supply chain analytics produce plans for improving the production process. This application has also replaced conventional technology as a way to help businesses realize the need to have efficient and valuable supply chains. The effort and time required to extract data from various enterprise systems and re-format them has been minimized by the Oracle Supply Chain and Order Management Analytics, which provide source-based business adopters. In effect, it has enabled companies to efficiently manage their customers and supply chains, in addition to improving performance. It has also leveraged the power of real-time, actionable information to enhance decision making and optimize performance.

Oracle People Soft Enterprise Supply Chain Management has provided a flexible, synchronized, and cohesive solution for supply chains; businesses can retain firm control of their supply chains while cutting costs. Through Oracle, firms can cope with the factors affecting the timeliness, efficiency, and quality of their supply chains, including value chain complexities. Firms have met many market demands using this tool while safeguarding efficiency, reducing costs, and improving customer satisfaction, thus improving profitability. This application also impacts information technology; for example, Herbalife Inc. has used Oracle for planning, inventory, and applications.

The third software, Microsoft Dynamics, has provided full inventory and order transparency throughout the supply chain. It has helped users interact accurately and quickly

with their supply chain collaborators. Microsoft Dynamics helps businesses maintain their competitiveness by offering enterprise-wide buy-ins for supply chain excellence. Microsoft Dynamics has streamlined the distribution lifecycle and promoted the accessibility of accurate information, reducing input errors. World Vision used Microsoft Dynamics for its SCM to enhance its capacity to scale globally and improve its flexibility.

ERP implementation did slow down a bit during the 2008-2009 recession like most industries but since has slowly but surely made a comeback. Companies that postponed investment in enterprise systems during the difficult times have since begun to invest again in this software as business began to grow over time (Leon, 2014). ERP market size, impressive as it is, is not really much of importance to anyone except ERP software suppliers and the organizations they provide services to. Although there are quite a number of those suppliers, only a small handful enjoy a majority of the ERP market share (Leon, 2014).

In 2011 the top three ERP suppliers (known as "Big ERP") were SAP, Oracle and Microsoft Dynamics (Leon, 2014) but as stated earlier there are numerous more suppliers. The other top ERP suppliers are Consona, Sage, QAD, IFS, NetSuite, HansaWorld and HarrisData (Leon, 2014). To stay competitive, each of those companies has carved out a place in the ERP marketplace by offering alternatives to "Big ERP" that are affordable, quicker and easier to implement, and/or specially designed to address the unique needs of a specific market segment or industry (Leon, 2014). These ERPs fall into the mid-market portion of the market.

While "Big ERP" is vastly ahead of the competition, the mid-market remains a fertile area for growth as well as a key competitive battleground, with industry specialization representing the best opportunity for differentiation (Leon, 2014).

With that being said, the market has undergone a significant consolidation over the last 15 years. Many of the independent ERP suppliers that evolved in the 1980s and 1990s merged or were acquired as companies sought out additional functionality, technology or market share (Leon, 2014). For example the following acquisition occurred: **SAP** acquired Sybase, Success Factor, Syclo, Ariba, etc. **Oracle** acquired PeopleSoft, J.D. Edwards, Siebel, Hyperion, etc. **Infor** acquired GEAC ERP, SSA Global, Lawson Software, etc. This just shows that no one is safe from a merger because some of those companies were actually industry leaders before being purchased by the competition.

Conclusion

The accurate and timely delivery of products continues to be challenging as distribution operations become more sophisticated amid ever-changing consumer needs, electronic and global markets, compliance initiatives, and multiple distribution channels. These challenges can be met in ways that enhance competitive advantage, including the concrete coordination of enterprise-wide processes through all supply chain phases and the whole enterprise.

Supply chain management is extremely complex. Business managers must seek to attain a comprehensive end-to-end visibility concerning their business's supply chain performance as well as improves flexibility to quickly respond to risks and disruptions and capitalize on their competitive advantages (Russel & Taylor, 2006). Simultaneously, they need to devise ways of identifying and adapting to emerging supply chain trends. ERP acts as the "go to" software technique in this case. In the real world, these techniques help supply chain personnel align their processes and models with their organization's primary business policies and provide visibility into supply chain processes.

Every company expecting to achieve tangible benefits from its SCM must invest in an information system. Many companies have opted for an ERP suite such as Oracle, SAP, and Microsoft Dynamics, enterprise-wide software implementations that encompass the complete supply chain, from the acquisition of raw materials to sales and warranties. These complex software suites require significant expenditure in terms of the money, time, and other resources required for successful implementation and optimal SCM performance. Among the key implementation success factors are the need for a buy-in from the company's strategic management and personnel that are sufficiently trained. Every company must evaluate its ICT infrastructure, staff training and expertise, and supply chain needs when selecting the best ERP from among the many choices. Moreover, companies must consider their financial capacity, as ERPs carry various costs for licensing, personnel training, upgrading, annual subscription, and internal expertise.

Given the global inclination towards non-PC and Internet-based applications, companies must seek to take advantage of Internet communications and ERPs with web-based abilities. Companies that fail to move with emerging technologies will lack competitiveness in the fast-growing global economy. Companies can exploit these emerging trends to enjoy real-time communication with their partners, customers, and suppliers and improve the timeliness of the informational updates vital to effective SCM.

Ultimately, ERPs help businesses obtain additional value from their supply chains in the following ways (Russell & Taylor, 2006):

- *Optimizing business networks* by supporting their assets, aligning conversion costs, focusing on valuable clients, and synchronizing demand with supply. In these areas, unsuitable for manual processes, ERPs can produce differences and value.

- *Enforcing compliance and reducing material costs*: ERPs enhance sourcing, planning, and procurement and offer the capacity to convert data into useful information from which better decisions can be made. Thus, ERP forms a platform for reducing costs and meeting crucial requirements.

- *Removing unnecessary operations* through complex data collection to enhance reporting abilities and ensure that performance is adequately tracked and production scheduling is strengthened.

- *Reducing the time expended between creation and marketing and pursuing product innovations*: integrating product lifecycles streamlines product creation and reduces the time from production to marketing. In this way, ERPs can produce labor savings of approximately 31% to 49% and reduce product lifecycles by approximately 50%.

- Pro*viding the correct product at right time and place*: ERPs enable the fast communication of accurate information throughout the business and the synchronization of logistics and transportation with all critical elements involved in the supply chain. These improvements produce related benefits such as increased on-time deliveries, reduced delivery costs, reduced inventory requirements, and enhanced reverse logistics.

References

Anandi, R. (2006). Oracle 11i - The Complete Reference. Firewall Media: New Delhi, India

Anandi, R. (2006). Oracle 11i - The Complete Reference [Diagram]. Firewall Media: New Delhi, India (p.837)

Anderson, G., Davis, J & Tim, R. (2009). Sam's Teach Yourself SAP in 24 Hours. New York, NY

Beech, R & Vissers. (2005). Health Operations Management: Patient Flow Logistics in Health Care. Routledge Publishing: New York, NY

Bellefroid, V & Shankar, S. (2014). Customer Success with Microsoft Dynamics Sure Step: United Kingdom: Packt Publishing

Bellu, R. (2008). Microsoft Dynamics GP for Dummies. United States

Bhaiya, R & Wolenik, M. (2010). Microsoft Dynamics CRM 4 Integration Unleashed. Pearson Education

BOSS Corporation. (2002). Using Oracle 11i. USA: Que Publishing

Carvalho, M. (2011). Microsoft Dynamics AX 2009 Administration: United Kingdom: Packt Publishing

Ceyp, M., Emmerich, H & Ijioui R. (2008). Strategies and Tactics in Supply Chain Event Management. Germany: Springer-Verlag Berlin Heidelberg

Chorafas, D. (2001). Integrating ERP, CRM, Supply Chain Management, and Smart Materials. Boca Raton, FL: CRC Press LLC

Crum, J. (2002). Using Oracle 11i. Indianapolis, IN: Que Publishing

Dalmia, S. (2008). Financial Supply Chain. West Patel Nagar, New Delhi: Tata McGraw-Hill

    Publishing Company Limited

Deshmukh, A. (2006). Digital Accounting: The Effects of the Internet and ERP on Accounting.

    Hershey, PA: IRM Press

Dickersbach, J. (2007). Service Parts Planning with mySAP SCM™: Processes, Structures, and

    Functions. Springer-Verlag Berlin Heidelberg

Dickersbach, J. (2007). Service Parts Planning with mySAP SCM™: Processes, Structures, and

    Functions [Diagram]. Springer-Verlag Berlin Heidelberg (p. 256

Fernandez, I. (2009). Beginning Oracle Database 11g Administration: From Novice to

    Professional: New York, NY: Kinetic Publishing Services

Fjermestad, J., Romano, N. (2006). Electronic Customer Relationship Management. Sharpe Inc:

    United States of America

Giunipero, L., Handfield, R., Monczka, R & Patterson, J. (2009). Purchasing and Supply Chain

    Management. Mason, Oh

Grieve, I. (2013). Microsoft Dynamics GP 2013 Financial Management: United Kingdom: Packt

    Publishing

Greenwald, R., Rayman, J. & Stackowiak. (2007). Oracle Data Warehousing and Business

    Intelligence Solutions. Indianapolis, IN: Wiley Publishing

Harwood, S. (2003). ERP: The Implementation Cycle. Burlington, MA: Butterworth-Heinemann

Kale, V. (2009). A Guide to Implementing Siebel CRM. Tata McGraw: New Delhi, India

Kappauf, J., Koch, M. & Lauterbach, B (2011). Logistic Core Operations with SAP: Procurement, Production and Distribution. New York: Springer Heidelberg Dordrecht London New York

Kelly, S. (2012). Oracle Primavera Contract Management Bi Version 14. Packt Publishing: Birmingham, UK

Knolmayer, G.F, Mertens, P., & Zeier. A. (2002). Supply chain management based on SAP

Koop, R. & Muris, E. (2007). Successfully Implementing Microsoft Dynamics. Springer Berlin Heidelberg: New York

Krazer, E. & Williams, D. (2012). Oracle Primavera P6 Version 8: Project and Portfolio Management. United Kingdom: Packt Publishing

Kreines, D. (2000). Oracle SQL: The Essential Reference. Sebastopol, CA: O'Reilly & Associates, Inc

Kumar, V & Reinartz, W. (2012). Customer Relationship Management: Concept, Strategy, and Tools. Springer Heidelberg New York Dordrecht London

Landers, B., Snyder, M. & Steger, J. (2011). Microsoft Dynamics CRM 2011 Step by Step

Lee, D., Scott, J. & Weiss, S. (2008). Microsoft Dynamics CRM 4 For Dummies. Wiley Publishing: Hoboken, NJ

Leon, A. (2008). Enterprise Resource Planning. New Delhi, India: Tata McGraw-Hill Publishing Company Limited

Leon, A. (2008). ERP Demystified. Tata McGraw-Hill Publishing: New Delhi, India

Leon. (2014). Enterprise Resource Planning. McGraw hill Education: New Delhi, India

Lowery, G & Stover, T. (2001). Managing Projects with Microsoft Project 2000 For Windows.

   John Wiley & Sons: Canada

Lyer, M (2012). Oracle E-Business Suite 12 Financials Cookbook. United Kingdom: Packt

   Publishing

Mohapatra, S. (2012). Case Studies in Strategic Management: A Practical Approach. Dorling

   Kindersley: India

Moore, C. (2013). Microsoft Dynamics High Tech Industry Solutions. Retrieved from

   http://bcpsg-bgrm-sn-

   2/?cfru=aHR0cDovL3d3dy5hbWxscC5jb20vcHJlc3MtcmVzZWFzZXMtZmlsZXMvZG

   9jX2Rvd25sb2FkLzI2My1keW5hbWljy1heC1zdXBwbHktY2hhaW4taW50ZWdyYXR

   pb24=

Mourao, L & Weiner, D. (2006). Dynamics AX: A Guide to Microsoft Axapta. Springer-Verlag:

   New York, NY

Pallai, D. (2009). SAP SD. Sudbury, MA: Jones and Bartlett Publishers

Rasheed, K. (2012). Oracle JD Edwards Enterpriseone 9.0: Supply Chain Management

   Cookbook. United Kingdom: Packt Publishing

Raul, R. (2013). Microsoft Dynamics NAV 7 Programming Cookbook: United Kingdom: Packt

   Publishing

Reddy, E. (2011). Getting Started with Oracle Hyperion Planning 11. Packy Publishing: Birmingham, UK

Russell, R., & Taylor, B.W. (2006). Operations management (5th ed). Hoboken, NJ: John Wiley & Sons, Inc.

Siddiqui, M. (2010). Oracle E-Business Suite R12 Supply Chain Management. Birmingham, UK: Packt Publishing

Stanford University (2012). About Oracle Financials Systems. Retrieved from http://www.stanford.edu/group/fms/fingate/staff/finauthority/oracle_systems.html#top

Stanton, A. (2012). Sams Teach Yourself Microsoft Dynamics CRM 2011 in 24 Hours. Person Education: U.S.A

Walnum, C. (2002). The Complete Idiot's Guide to Visual Basic .NET: Indianapolis, IN: Marie Butler-Knight

Williams, D. (2012). Oracle Primavera P6 Version 8: Project and Portfolio Management. Packt Publishing: Birmingham, UK

Wood, D. (2012). SAP SCM: Applications and modelling for supply chain management. Hoboken, NJ: John Wiley & Sons.

Woods, D & Word, J. (2004) SAP NetWeaver for Dummies. Hoboken, NJ: Wiley Publishing, Inc

Yadav, R. (2011). Oracle PeopleSoft Enterprise Financial Management 9.1 Implementation. Packt Publishing: Birmingham, UK

Zelbst, P. (2012). RFID for the Supply Chain and Operations Professional. New York, NY: Business Expert Press