

IMPLEMENTING OLAP TECHNOLOGY TO LEVERAGE VALUE OF SUPPLY CHAIN MANAGEMENT SYSTEM

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Abstract Supply chain refers to the flow of materials, information, money, and services from raw material suppliers, through factories and warehouses, to the end users. The successful of company in the business competition is highly depend on how well the company capability to optimize and manage their supply chain process. ERP is an information technology solution that play the main role in the supply chain management with the aim to plan, organize, and optimize one or more of the supply chain's activities which is concentrate on supply chain efficiency.

The recent development of Supply Chain Performance Management (SCPM) Application, the OLAP based information technology solutions, will help supply chain managers to be more effective in managing supply chain activities due to its capability to provide the planning and controlling function to achieve a better operation performance.

This paper will describe the role of OLAP technology to leverage value of supply chain management system by complement the ERP functions and also provide the descriptions of the technology framework and development methodology for Supply Chain Performance Management (SCPM) Application.

Introduction

Supply chain refers to the flow of materials, information, money, and services from raw material suppliers, through factories and warehouses, to the end users (Turban *et al.*, 2006). A supply chain also includes the organizations and process that create and deliver products, information, and services to end customers, which invloved many tasks, such as purchasing, payment flow, materials handling, production planning and control, logictics and warehousing, inventory control, and distribution and delivery.

In the organizations operation, the problems along the supply chain mainly

come from the uncertainties of demand forecast, delivery times, setting optimal inventory level and the need for coordination of several activities,

internal units, and business partners. Supply chain problems have been recognized in business, government, and military for generations. A major symptoms of problems and ineffective supply chain is poor customer service, high inventory costs, loss of revenues, extra costs of expediting shipments, and more, that will caused the companies loss their competitiveness and even caused companies to go out of business.

The successful of company in today business competition is highly depend on how well the company capability to optimize and manage their supply chain process by implementing Supply Chain Management System. The function of Supply Chain Management (SCM) System is to plan, organize, and optimize one or more of the supply chain's activity.

Today the concept of SCM System is usually supported by SCM Software

which refers to software intended to support specific segments of the supply chain, such as in manufacturing, inventory control, scheduling, and transportation (Turban *et al.*, 2006). This software concentrate on improving decision making, optimization, and analysis.

Enterprise Resources Planning (ERP)

Enterprise Resource Planning (ERP) refers to large commercial software packages that promise a seamless integration of information flow through an organization by combining various sources of information into a single software application and a single database (Nah, 2002).

ERP software packages are designed to integrate information used by all the functional areas of a business into a single database to streamline business processes for an enterprise (Turban and Aronson, 2001). This software integrates the planning, management, and use of all resources in the entire enterprise by comprised of sets applications that automate routine back-end operations such as financial, inventory management, and scheduling that enable performance improvements in most transaction processing activities of a company. The ERP software also captures and structures transaction-based data from throughout the enterprise and generally broken down into business functions such as: financial management, distribution, human resources, and manufacturing, treasury management, materials management, and sales management.

Today, ERP is an information technology solution that play the main role in the SCM System with the aim to plan, organize, and optimize one or more

of the supply chain's activities which is concentrate on supply chain efficiency.

During the past decade, global and national companies in every industry have made significant investments to upgrade and improve their transaction systems and operational business processes via ERP software. As many of these large scale implementations are coming to an end, organisations are facing the harsh reality that these systems are not functionally rich in all areas especially planning, forecasting, reporting and analysis. In most companies ERP systems cannot support the management planning dan control activity because they focus on efficiency and, thereby, are anchored in the past and structured around internal operational processes.

In the area of ERP implementation to manage SCM System, measuring forecast accuracy and supplier performance, as the solution to address the supply chain problems, is still a hit-or-miss proposition. ERP focus on streamlining the flow of routine information is contrast with the aim of SCM Software which specifically designed to improve decision making in segments of the supply chain. Gartner Inc., a leading IT consultancy, estimates that less than 1% (one percent) of companies actually are capable of monitoring and measuring online supplier performance (Hennel, 2001).

Based on the above background and limitation of ERP System, the different kind of SCM Software must be considered as complement for ERP Software to build the better Supply Chain Management System within corporations

OLAP Technology

OLAP stands for “On-Line Analytical Processing” the term for new kind of technology introduced by EF Codd in a white paper entitled *“Providing OLAP to User Analysis: An IT Mandate”*, published in 1993.

In contrast to the OLTP (On-Line Transaction Processing) the technology based for every ERP software, OLAP describes a class of technologies that are designed for live ad hoc data access and analysis. OLAP has become synonymous with multidimensional views of business data, which are supported by multidimensional database technology. These multidimensional views provide the technical basis for the calculations and analysis required by Business Intelligence applications. The OLAP database are optimized for analysis and usually updated in batch, often from multiple sources, and provides a powerful analytical back-end to multiple user applications.

OLAP applications are used by analysts and managers who frequently want a higher-level aggregated view of the data, such as total sales by product line, by region, and so forth. The OLAP Applications is the generic name that refer to the application that build based on OLAP technology which is mainly used for analysis activity and then commonly called by Analytical Application. These application can be built on 3 tier framework which include the Database tier, Application tier, and Client tier.

The following (picture 1) are the framework of Analytical Application based on OLAP technology from Microsoft (Microsoft Analysis Services).

Supply Chain Performance Management (SCPM) Application

SCPM (Supply Chain Performance Management) Application is the analytics application based on OLAP technology that support the supply chain planning and controlling activity. IDC created the analytic application category in 1997 to call attention to application software that supported activities beyond the scope of transactional systems such as ERP and filling a need in enabling organizations to measure, analyze and optimize business performance (Morris, 2002). Analytical SCM information system have emerged as complementary to ERP System, to provide intelligent decision support or business intelligence capabilities at Corporate SCM System (Turban, 2006). Processes that can tracked by a SCPM system include production, materials management, procurement, manufacturing, warehousing, transportation, inventory, supplier management, fulfillment, customer relationship management, demand management, order fulfillment, product development and returns management. The most likely end users of analytics tools are those involved in key processes in the supply chain – such as transportation, procurement or manufacturing managers and analysts.

SCPM Application will complement ERP by accessing relevant base data from those systems and creating a focus on the future rather than the past. They are designed to add value to the raw information they are fed, and have specific functionality to support the complete Supply Chain process. In general the SCPM architecture at the enterprise describe at picture 2.

In the implementation and development of SCPM Application, there are 2 (two) approach that usually take by the enterprise. First, implement

the package application from package software vendor, i.e. Cognos, Microstrategy, Hyperion, etc, and second, develop the inhouse application basen on generic OLAP technology such as Microsoft Analysis Services and Oracle BI.

In the custom application development activity, there are 2 (two) main activities that must be considered, the development of OLAP database and application development. Implementation of SCPM Application will turn the supply chain management to be more analytics and better manage the supply chain and also improve the competitive capabilty for the organizations.

Some benefits received by the company who implemented SCPM Application are (Hennel, 2001):

- **Reduce costs** – SCPM Application help centralize production and purchasing operations by identifying processes that can be consolidated.
- **Increase working capital** – SCPM Application help companies manage and anticipate spikes in demand. By keeping inventory levels low, companies free up cash that would otherwise be tied up in inventory.
- **Improve business partners' decision making** – Trading partners or suppliers have access to new information, to enable them to more quickly address cost overruns, distribution bottlenecks and customer complaints. All supply chain members will also have access to the same customer questions or complaints.

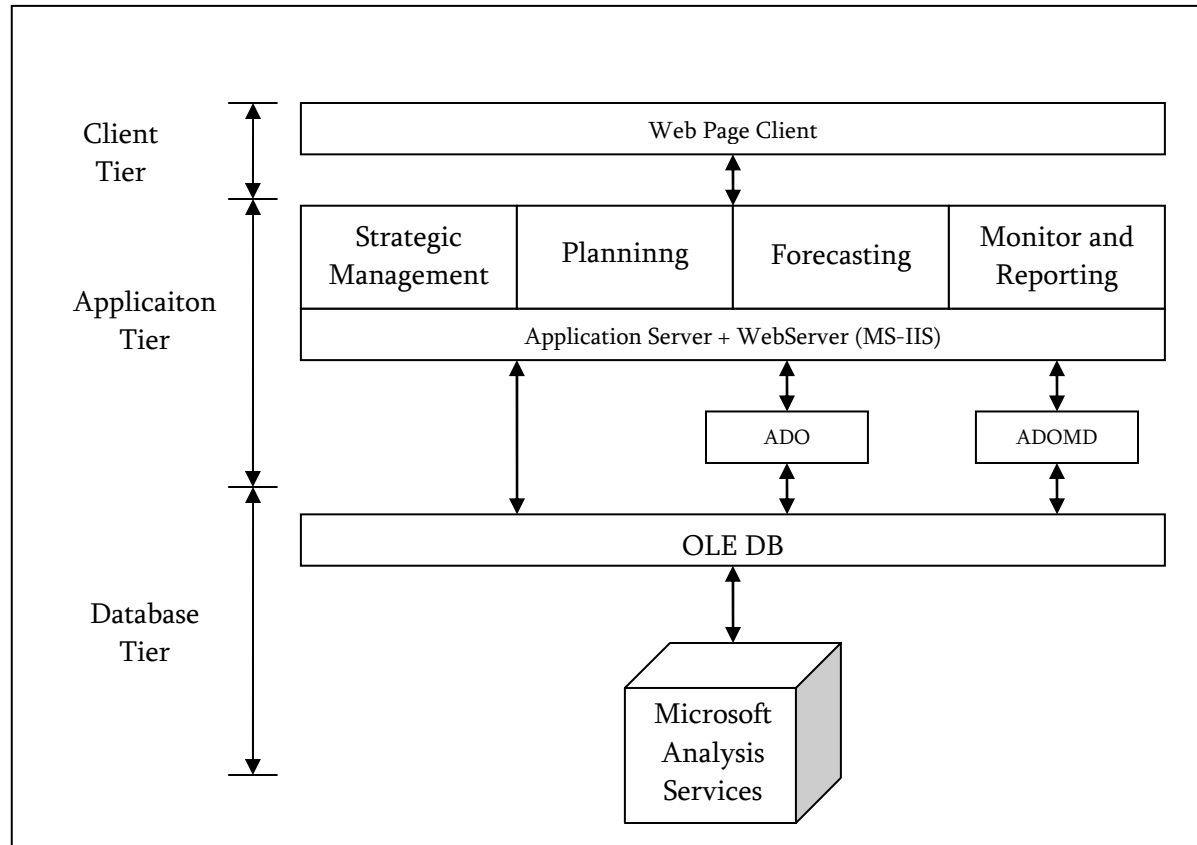
- **Open new markets** – SCPM Application provide visibility to the final customer and help companies track purchasing patterns by profitable customer segments. For example, a manufacturer that only sells through distributors and retailers and has no direct contact with end users will be able to analyze how its products are being used. Taking the concept a step further, companies with analytic warehouses and tools could turn these areas into profit centers by offering these tools on a fee basis to suppliers and customers.

- **Address channel profitability** – SCPM Application can help sales and distributor networks better target customer segments. For example, a boat manufacturer can provide its dealers with information about sales, inventory and deliveries. Dealers can measure quarterly performance against those of other dealers, which ultimately helps the manufacturer sell more boats and accessories.

- **Address quality issues** – SCPM Application can help track product quality issues to the original source. In addition, production problems can be identified as soon as they crop up, thus avoiding the back-end costs of customer returns.

- **Retain customers** – Sharing supply chain analytical data with channel partners and customers help build a relationship with them, and give you a long-term advantage over competitors that do not provide this capability.

Figure 1. OLAP Applications Architecture based on Microsoft Technology (Peterson and Pinkelman, 2002)



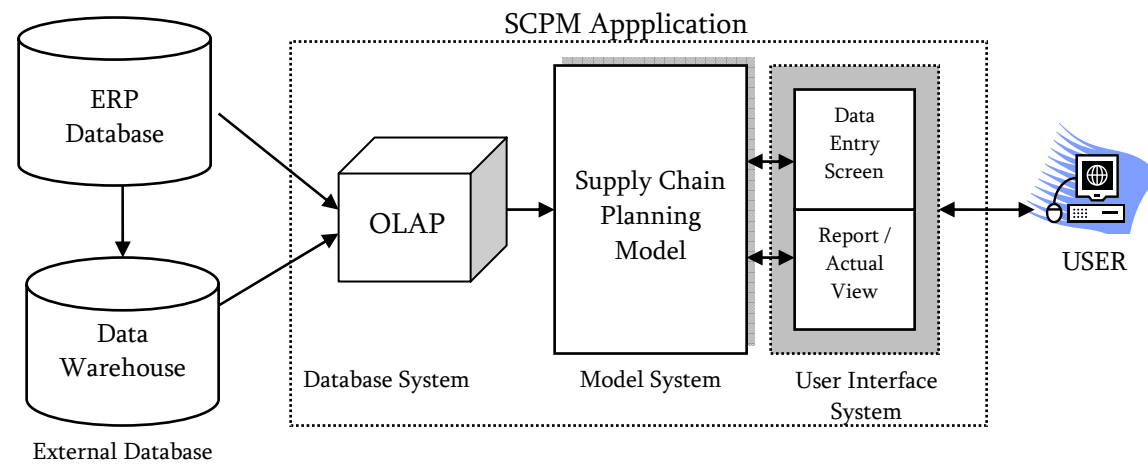


Figure 2. Architecture of SCPM in the Corporation (adopted from Codd et al., 1993)

Summary

In the global rivalry era and competition which currently hard and fast, every company should have a capability to find out the loophole and new innovation and use the whole environment and technology available for keeping a survival by locking the customers.

Information system is a media and tools which is a quite often alternative that has been chosen by many world class company to keep maintaining the customers and as a tool to compete and most of company choose ERP as their primary tools in helping them in daily operations activity including the supply chain activity.

After several years ERP implentation, the companies realise that ERP cannot

support the management and planning activity within a company, because they focus on efficiency and, thereby, are anchored in the past and structured around internal operational processes. SCPM (Supply Chain Performance Management) Application is the analytics application based on OLAP technology that support the supply chain planning and controlling activity. Implementation of SCPM Application will turn the supply chain management to be more analytics and better manage the supply chain and also improve the competitive capabilty for the organizations. Based on Gartner calculation, the potential return on investment on SCPM at about 40 percent after five years (Hennel, 2001).

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