

Integration of E-Business with ERP Systems

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ABSTRACT

It is very important for the businesses in our country to understand the concepts and terms of e-business and to start applying them. In the 1990's, ERP systems were introduced to fulfill some of the technological requirements across functional areas within a corporate boundary. Moreover, with the exponential growth of Internet technology and the emergence of e-business, the focus of ERP systems has changed from an integrated functional focus within an organization to one reaching outside the organization throughout the value chain system. It is expected that an ERP system can facilitate an e-business effort of an organization. In order to serve as a platform for e-business, an ERP system must also be able to be extended to support a range of external constituents for a firm. The process must involve an investigation of ERP technological factors along with any other emerging Enterprise Systems solution of the firm. This article offer a short but concise perspective about ERP systems used today in e-business all over the world.

Keywords: ERP Implementation, Fundamental Issues, System Integration, Management Support

1. E-BUSINESS BASICS

E-business stands for "electronic business," which involves communications and doing business electronically through the Internet. E-business is defined as "the use of electronically enabled communication networks that allow business enterprises to transmit and receive information" (Fellenstein and Wood, 2000). It can significantly improve business performance by strengthening the linkages in the value chain between businesses (B2B) and consumers (B2C). Besides increasing efficiency in selling, marketing and purchasing, e-business achieves effectiveness through improved customer service, reduced costs and streamlined business processes. Furthermore, ebusiness creates a strategic, customer-focused business environment for shared business improvements, mutual benefits and joint rewards. Companies use the Internet to implement customer-relation-management (CRM) and supply-chain-management (SCM) capabilities, which enable them to link their operations seamlessly with customers and suppliers.

By definitions and by their respective functions, traditional ERP systems take care of internal value chain (i.e., within a company) whereas e-businesses establish the value chain across the market and the industries. More and more companies construct their systems' architectures by integrating ERP systems with e-business. They use Web-based interface (corporate portals) with outside entities plus add-on modules such as CRM, SCM, etc. in the integration.

1.1. Business Networking Model for ERP AND e-Business Integration

ERP is a structured approach to optimizing a company's internal value chain. The software, if implemented fully across an entire enterprise, connects the various components of the enterprise through a logical transmission and sharing of data (Norris et al., 2000, pp.12-13). When customers and suppliers request information that have been fully integrated throughout the value chain or when executives require integrated strategies and tactics in areas such as manufacturing, inventory, procurement and accounting, ERP systems collate the data for analysis and transform the data into useful information that companies can use to support business decision-making. ERP systems, if implemented successfully, enhance and redesign business processes to eliminate non-value-added activities and allow companies to focus on core and truly value-added activities. The following are two examples where ERP systems have dramatically increased the efficiency and productivity of companies: IBM has used ERP to reduce the processing time for updating pricing data from 80 days to five minutes and Chevron has used ERP to decrease its annual purchasing cost by 15%. To address the challenges described above, we have developed a conceptual model which helps to focus on relevant elements towards providing a solution. It focuses on standardization, and outsourcing or partnering required for Business Networking. Business Networking is defined as the design and management of IT-enabled

relationships between internal and external business partners.

1.2. Elements of a Business Networking Model

In a traditional business process, after a customer order is received, the order information flows from department to department through order entry, manufacturing, warehousing, distribution and finance until the product is delivered to the customer and the payment is received. The key elements of the value chain have been controlled by separate and disparate information systems that could not communicate with one another. Not only did the companies not take an integrated view of their own business processes, but they also had an equally vague understanding of how their systems relate to the systems of their suppliers, competitors, business partners, distributors and customers. Hence, these transactions are typically carried out with minimal or no shared business processes.

In recent years, there has been a revolution in systems planning and design. Management takes an integrated company-wide view of its IT investments and choices, and implements an ERP system that integrates the core business processes of an entire company into a single software and hardware system. Customers, suppliers and business partners are consciously included in the business process, systems operation and systems development.

An ERP system is analogous to the internal technological hub of a company. When fully implemented as an integrated suite, it can be thought of as a company's central repository. The five major processes in a typical ERP system are: finance, logistics, manufacturing, human resources and sales/marketing. The focus of ERP systems is on the efficiency and effectiveness of the internal process. It offers a way to streamline and align business processes, increase operational efficiencies and bring order out of chaos.

E-business is focused on efficiency and effectiveness of external, crossenterprise processes. While ERP technology supports business strategy, e-business opens the door to new strategic opportunities, which forces ERP to take one step further to move from the single ERP system model to the extended ERP system model. The Web technology provides the bridge between companies and their business partners to make e-business possible, while e-business makes the ERP system more transparent and outward. Instead of thinking about ERP within a company, we may view the ERP system along the value chain of companies in the same industry, or across industries. Companies are now turning their attention outward to engage in business with customers, suppliers and business partners through the use of the Internet and Web-based technologies. ERP functionality has to move

onto the Web because that is where most of the core business processes are being carried out. The earlier example on the flow of a customer order and the steps in the process flow across the boundaries of the companies would now be handled by a number of different companies behaving as if they are one.

If a corporation decentralizes autonomous business units, they need to be able to access and share data between departments, managers and employees. With ERP systems, a transaction only needs to be entered once. The system can process the transaction across different software modules, resulting in highly comprehensive and integrated information that can be used for decision-making. While an ERP system can be viewed as a repository for data, information and knowledge, and it extends beyond functional boundaries by redefining enterprise wide processes, a Web-enabled ERP system forces companies to look at processes that span multiple enterprises.

When e-business is integrated with ERP, the whole extended system provides a vision of business processes that span multiple businesses and enterprises. In the most ideal case, companies should be able to connect disparate platforms, applications and data formats across the value chain, including not only suppliers, but also customers as well. Furthermore, companies should retain the flexibility to change and add functions to applications as business needs evolve. Companies need to be able to adapt their ERP systems to the emerging world of e-business.

One underlying design element is componentization which can be highlighted by specialized components for supply chain management (SCM), customer relationship management (CRM), electronic commerce (eC) and supplemented by knowledge management (KM) and data warehouse (DW) tools. Componentization can be also applied to eServices offered or contracted (e.g. payment services or logistic services offered via the Internet). These can represent alternatives to inhouse applications and have substitutional effects.

A New Vision of Enterprise = ERP + E-business

Although ERP integrates core business functions such as logistics, finance, human resources and sales-order administration, there are still many business processes that ERP cannot address. ERP falls short of meeting today's demands from customers for better services. With Web-based technology, information can move swiftly through the value chain, making companies anxious to add functionality to implement specialized applications that can meet their needs.

1.3. Componentization

The Butler Group, a British IT consultancy group, indicates it has seen a backlash against the inadequacies

of monolithic application packages and argues that techniques to integrate applications can lead to better solutions without the stranglehold of inflexible functionality (Economist, 1999, p.32). The key question is how to continue adding new functionality rapidly at low cost while making it easier for organizations to implement and upgrade to a platform appropriate for e-business. The ERP vendors and customers are relatively quick to recognize the benefits of componentization.

Before e-business was taken into consideration, most of the ERP systems that have been implemented were delivered as monolithic code and did not employ the componentization concept. Barricaded behind complex, proprietary application Program Interfaces (APIs) and based on complex, nearly indecipherable relational database schemas, ERP systems do not readily extend to e-business. With the popularity and widespread practice of the object-oriented approach, component-based techniques become essential quality requirements.

Componentization is the action of breaking up a large, monolithic ERP system into individual modules that would work together. Components are pieces of code that can be interchanged between applications. This idea is similar to the assembly of automobiles, airplanes and mobile phones. They are combined from parts that work together within an architecture. The parts are not a homogeneous set, but comprise many different types and standards.

According to Sprott (2000, p.65), a component can be any form of implementation, provided it adheres to the concepts of separation, interfacing and standardization. Most ERP vendors are converting their ERP systems to a component-based architecture. When ERP is componentized, the internal functions performed by the system are represented using object-oriented blocks of code that can be used to create new applications (Callaway, 2000, p.116). The componentization of functionalities in ERP will make the internal and external systems more adaptable and reliable. Therefore, it will smooth the information flow along the value chain.

Based on the object-oriented concept, each functionality of ERP can be viewed as a separate encapsulated entity and treated as a component. By virtue of the independence of components, it is easier to manage, upgrade and modify a component-based ERP system. Granularity, scope boundaries and internal cohesion are important attributes of a component. A fine-grained component will be simple to upgrade because it involves fewer relationships but requires more management since there is likely to be many more parts needed to meet the requirement. In contrast, a larger component may be easier to manage but would require more effort to modify and implement because the scope

of the functionality is much broader and the impact of changes is much greater. Since the components encapsulate individual business processes that other components can freely access, companies can more precisely control individual business processes. This divide-and-conquer approach allows the companies to do rapid concurrent development (Erlikh, 2000, p.17). Componentization breaks large-scale business processes into self-contained units of manageable size and makes it easier to deploy ERP systems in an e-business environment.

ERP and e-business applications can be assembled from Web-based components such as Online Analytical Processing (OLAP) components, batch components, application components and database components. A company implementing an ERP system would be able to select different modules or components from multiple vendors instead of picking a single vendor. Since an ERP system can be broken down into components by functionalities, the vendors would be able to quickly fix or add functionality to ERP systems. An individual component of ERP can be enhanced without affecting any other functional components. IBM research shows that only 20% of companies use a single ERP vendor. Almost 80% of companies use multiple vendors (IBM, 1999).

It is very important that the interface and service provided are independent of the underlying implementation. For example, an implementation of ERP may be provided by a legacy database. With componentization, the legacy database can be replaced by an object-oriented database with no effect on the user of the service, provided the interface remains unchanged.

1.4. Flexible Customization

ERP vendors will come under considerably increasing pressure as they are forced to open up their products and to market components separately before the ERP market becomes saturated. It is becoming increasingly popular for components to be assembled by customers since companies need flexible ERP systems where new applications can be added fairly quickly and business intelligence can be extracted to fit into B2B and B2C solutions. The successful ERP vendors are beginning to provide customers with flexible and economical operational infrastructure that easily integrate with open market components. These vendors allow customers to exercise considerable choice in procurement to create customized solutions from readily and widely available building blocks.

A major advantage of component-based ERP is the incremental release and upgrade process. This is a benefit in the initial implementation as well as ongoing enhancement. Many ERP vendors and existing customers

underwent considerable upgrade pain before they could achieve this result. The realities of upgrading are also not as simple as one might think. A complete integration test should be undertaken because of the high levels of interdependence between the components. The ultimate goal is to develop ERP components that are compatible with one another and that can be easily integrated with ebusiness and other applications.

2. COMMON ERP/E-BUSINESS PLATFORM (ORACLE & SAP)

Today, customers expect more than ever before. To meet these expectations, companies need to reach out and bring customers closer to their information systems and have them engage in product configuration, selection and Internet self-service (*Economist*, 1999, p.32). Also, it is essential for the vendors to set up a compatible e-business platform for system integration. Some major ERP vendors launched their Web-enabled ERP in the early part of the year 2000 to create the B2B and B2C solutions. Both Oracle and SAP set up Internet portal (hub) and use eXtensible Markup Language (XML) to manipulate data from internal ERP and push information flow across the value chain.

The portal (hub) technology could provide the necessary access, while adding a variety of new features and capabilities for the users. XML is a metalanguage for describing data so it can be interpreted in a more intelligent way.

XML is designed to provide structured to semi-structured or unstructured data, the kinds of data that abound on Internet and e-business settings (PriceWaterhouseCoopers, 1999). XML uses a native Web approach that enables extensible data-exchange formats and provides the flexibility to create one's own data tags to develop a shared Internet file system (Fingar et al., 2000, p.253). XML revolutionizes the Web since it allows structured data – with standard names and consistent semantics – to be moved around the Web in a simple and straightforward way, as easily as HTML does today.

2.1. Oracle (Oracle, 2000)

Oracle, the number one player in ERP, and the dominant supplier of relational database to the Windows NT and Unix market, became a leading independent software company worldwide. Oracle's Internet Platform provides a comprehensive solution for ERP integration. Based on the popular hub-spoke-adaptor architecture, Oracle uses XML to extract information from legacy and ERP applications. The information will be renderable through "Portlets" on the desired site.

Its e-business (WebDB) platforms have the following functions:

- *Reduce Complexity from Interlinked Applications*

and Packages: The change in business requirements over the years has inextricably linked applications in a confusing tangle of connections across departments and business segments. However, no company can scrap its entire IT infrastructure and begin jam scratch again. Therefore, the portal platform has been used to provide better employee access to tools, applications and data.

- *Legacy Heterogeneous Environments:* Legacy applications need to coexist with best-of-breed supply-chain, knowledge management and customer-relation applications on the Internet. It serves as a consistent mechanism for inter-application communication that facilitates cooperation among heterogeneous legacy applications.
- *Global Operations:* E-business breaks the boundaries of regions and countries. All operations are globalized. The portal platform is a better way for the companies to link applications and business processes to achieve their ebusiness goals.

3. CONCLUSIONS

Today's ERP systems are required to address more than the processes taking place within the walls of an enterprise. Ebusiness is the solution to dictate a successful information economy. Today, extended ERP systems with front-end e-business connect an organization's "front office" (customer facing) and "back office" (business processes) operations to meet its global emerging market. Extending ERP means unleashing critical information and making it accessible to employees, customers and business partners, so that the various entities along the entire value chain can make better decisions.

Indeed, best practices consist of real-time, cross-enterprise, Internet based flow of information, documents and processes, that is routed and driven in the most efficient and effective way. From a technical point of view, development and deployment of e-business models never stop. Companies should constantly reinvent to leverage changes in e-business technology and its ERP integration, or other business applications. New e-business models are emerging as companies in all industries are transforming themselves to compete in the Internet economy. Successful transformation requires new ebusiness strategies and processes, as well as robust and scalable application and technology platforms. With the right strategy and solid execution, an enterprise can transform itself to compete and grow in today's rapidly changing business environment.

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