Web-based ERP Systems

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Internet-based ERP allows companies added flexibility and increases the flow of information for better decisions at all levels of the business. Web access helps the entire enterprise customize its core business processes to the customers and suppliers in developing competitive advantage. The Web is an asset to any company when properly integrated into the ERP applications.
Enterprise resources planning (ERP) systems are the information foundation of a company. The system is a solid structure designed to improve performance and achieve company goals. The result is a functional system that provides a framework for operational excellence. ERP must deliver real-time information to an entire enterprise and be the backbone for future advancement. A competitive advantage can be reached with the application of such a valuable system (12).

A web-based ERP system has the capabilities of Internet access, real time information, and more accurate business solutions. In this respect, ERP is a proven asset if integrated properly and used to enhance the decision making abilities and information flow of the company. Internet-based ERP equips companies with insight into supply chains and helps to coordinate the direction of e-commerce.

Net-ready ERP software solutions do have some challenges associated with them. Companies must look for industry specific applications with the ERP package. Integration into either the core business processes or the existing software systems can be a lengthy and costly process. Finally, questions have been raised about Internet security. As a company becomes accessible online for the use of customers and partners, questions arise of how this company might be affected by hackers or even competitors.

Internet-based ERP offers an entirely new outlook on competition with the flexibility to meet the needs of consumers quicker and with better accuracy. Companies are looking at ways to extend to the Internet existing business processes hosted on an ERP software package and to complement them with new functionality. Decision making and overall managerial improvements are produced through the Web's capacity to
provide all the necessary information and ability to tighten relationships with customers, trading partners, and suppliers.

**ERP Systems Today**

Manufacturing resources planning (MRP II) systems are software packages that help to organize companies from the shop floor with respect to inventory, scheduling, manufacturing, purchasing, line balancing, and other functions. These different processes are integrated with the use of the MRP II applications. MRP II eliminates the need for bills of materials and prevents data entry errors. This integrated approach helps the firm keep inventories in check, track costs on a real-time basis, and run its manufacturing operations with just a few administrative staff members. "Suppliers to Dell Computer Systems, for instance, say that Dell is often 50 percent inaccurate in its manufacturing schedule projections. As a result, they are being whipped around constantly. With increased coordination that could be largely eliminated." (7, pg. 30). Tracking inventory at any given instant helps to meet manufacturing forecasts and projections and produce financial statements without problems because the information is already in the system (13).

ERP systems integrate even further the MRP II functions flowing deeper into the enterprise. ERP has evolved into a complete system that supports the organization as a whole rather than just individual pieces of that organization. ERP solutions provide a variety of functions to automate just about any business process. These solutions provide some immediate business value and return on investment. The emphasis is now shifting
from simple automation of business transactions to the convergence of ERP with other
software solutions. This is in efforts to use all tools available and make better decisions.

The trend in today's business intelligence is the use of the Internet to download
data and gather information. Internet-ready ERP may be used to extend into management
of the supply chain. Virtual enterprises will be used to allow customers' and suppliers'
separate ERP systems to be tied to other companies through the Internet to coordinate the
supply chain. The goal is to take a Web-enabled ERP system and achieve closer
coordination along the supply chain. The challenge begins at how far along the supply
chain the virtual enterprise can extend (5).

The Need For Web-based ERP

Integrating the Internet with the ERP system offers access to all necessary
information as well as the flexibility to coordinate these individually functioning modules
constructing a complete and competitive tool for companies to use. ERP's role in today's
market is to enable companies to be in touch with their customers and markets as to
significantly reduce response time. The ability to respond to changing markets will
separate companies from their competitors. Manufacturers are looking to ERP systems
for competitive advantage. Their success ultimately depends on what new products
vendors deliver and whether or not manufacturers can see ERP as a true advantage (11).
ERP must gather all available information in the manufacturing enterprise and make this
relevant data available to those who need it. To reach this goal ERP must become a more
flexible, modular system. Response to order changes, late deliveries, and new markets
demands extensive flexibility from the ERP network (}
Today ERP keeps the inward focus on the enterprise that it inherited from manufacturing resource planning II (its predecessor - a system focused on the materials and supply chain of the company, but not the entire enterprise). In the future it will focus not only on the internal processes of the enterprise but also on the supply chain (5).

Future enterprise resource planning systems may or may not run inside the manufacturer's shop. The power of the World Wide Web connects to ERP and allows the system to run from outside the plant or office. This is a significant advantage to businesses in today's markets. The present trend for many companies has been to expand market share by covering certain areas and having different offices running throughout the country and for some even throughout the world. As the ERP system evolves into a fully integrated asset of the company's software solutions it will continue to save the company money.

For example, the Internet will allow the ERP system to run from the home office and branch out to the subsidiaries and sister companies. The integration of the software only for the parent company rather than the entire matrix of businesses is a reduction of costs. This integration also exhibits sufficient control over internal processes of the firm, the supply chain, and the improvement of the abilities of management, which will have great impact on the way business is done (7).

Better Decision-making for Stakeholders

The Internet cannot connect the separate modules of the ERP system, but can reduce the time it takes ERP to evolve into the full enterprise system that connects all the processes of the firm (7). The Web has evolved into the perfect vehicle for ERP software
solutions. It will carry manufacturers outside their facilities to better customer service, tighter relationships with supply chains, and extend their interaction with people. Web applications help to avoid redundancies, and minimize complexities. Companies who wish to receive the greatest gains from the Web will use it to their advantage. This includes Web integration into the internal operations of the company.

Enterprise resources planning now has the ability to connect suppliers and trading partners. These benefits now extend to these groups with better accuracy and ease with the use of the Internet. This will require a tightly integrated infrastructure that enables Web-based applications. The key lies in successful integration of the ERP system without disrupting the operations of the business (3). Oracle and IBM have come together to provide an affordable comprehensive enterprise application solution that can be tailored to the company. Oracle offers award-winning manufacturing and financial software that gives a total solution no matter what the concern. Industry-specific templates can adapt the solution to the company's needs to take full advantage of the information and businesses processes (7).

Integration of the ERP system with the Internet must not cause problems with the core business processes. The operations and customer service of the company are the things that produce the revenues to keep the business alive. The ERP system enhances the ability of the company to meet expectations and demands through increased efficiencies and cost-effectiveness. Any problems with the business information systems or inability of the business intelligence software to integrate perfectly are added liabilities to the company (8).
"The real challenge is not providing a single user interface but rather integrating the business process. In five years companies will pick modules from different ERP systems and integrate them" (7, pg. 32). The modules do not necessarily have to be owned by the company. Some might be found on the Internet, running on the service company's or vendor's host computer. With the use of the Web, users can move from a focus on supporting transactions through their organizations to using ERP to manage their business. The ERP systems gather needed information that the user can use to make better business decisions.

Executive decisions may also be improved with the ERP integration. Core enterprise software must be integrated smoothly as to gather data from every available source and create key indicators that the executives can use to make better decisions. Executive decisions may relate to shareholder wealth, stock price, profit margins, and future earnings. The enterprise software package may be used in this capacity. The package has the ability to project and forecast values into the future (6). By gathering all available information and relaying that information accurately and timely, the Net-ready ERP system is a valuable asset for strategic planning and analysis at the executive level. Stockholders and prospective investors can rely on this system for complete information about the company (8)

Cost Advantages

With a Web-based system companies can use the Internet to find research for marketing analysis or project management that is already directly linked to the system. The executives of the company making decisions for the firm have added another form of
information flow to the company. The integration of the ERP system allows this flow into the business, but also allows for the flow of research and basic company information out of the business to other branches or sister offices. The costs involved with relaying information are reduced with this software solution (4).

Other cost advantages of the Web-integrated ERP system exist. Not only can this system alleviate the burden of gathering information, but is also allows for the lowering of costs from outsourcing projects to other companies. With the increased abilities of the firm to perform its business processes with the ERP system, costs of performing other projects are reduced. The Web is a readily available source of information that allows the company to find and use all necessary means to better its capacities. Success depends on the ease at which the Web can be integrated into the core business software solutions and if the users can deal with the change effectively (4).

Furthermore, other specific benefits of the ERP system occur not only in research but also with concern to actual products. Back-office and front-office applications are linked through ERP software. This is now an enterprise solution that allows the front office to track products better than before. "Life cycles of a product can now be monitored from a sales lead to an order, through production, and on to product delivery and customer support. The integration of the front-office technology takes ERP and warehouse management solutions to new levels and narrows the complexity of the supply chain." (11, pg. 46)

Fully integrated enterprise software platforms provide the optimal environment for analysis and communication. The Web and e-business factors have enabled companies to gain a competitive advantage with customers. The Internet has allowed
customers and vendors vast choices between different products and services. The selection of a certain vendor for many is initially based on price. The choice of a certain one then comes from the visibility of some specialized service feature that is not offered elsewhere. Customer service is very important, but this level of service effected by the ERP system does not deal with consumers and producers alike. The focus in the system lies in order placement and delivery, which is not as prevalent to individual consumer as it is to vendors and manufacturers. The service feature in the system is a business to business relationship. Therefore, business processes and decision making have changed with the invention and development of the Internet and its integration with the ERP system (4).

Flexibility is Key

Flexibility is a key concern for ERP. Rapid changes in market conditions and customer demands must be met with real time information and industry-specific consideration. Enterprise resource planning systems change from business to business and industry to industry. Flexibility remains essential in each. Further, the integration of the Internet does not solve all the problems, but it does aid in this issue of flexibility. The Web also aids in the flow of information to give businesses that competitive edge (2).

Flexibility of the enterprise is enhanced as Internet technology provides integrated transaction processing for business generated through a Web interface. "OneWorld, an ERP provider, acts as the information backbone and transaction processing engines joining Internet technology in integrated layers to make up a larger solution." (13 pg. 4) Customers can embrace new Internet technologies without reengineering the existing
information flow. The flexibility allows businesses to develop new and complimentary technologies without disrupting established practices (13).

The face of business has changed dramatically over the last few years. Not only have markets become more electronically and technologically based, but flexibility and service are more prevalent than before. Software systems to manage the large number of customers and vendors are needed for this flexibility. Also, decisions can now be made more easily as information is available from the Internet. The key is to sort and organize only the needed information so that the user can make the best decision. Integration of a system saturated with information and one that can organize that information would make any business a competitor. This is provided with an ERP system that is integrated with the Web (1).

Industry-specific, global enterprise solutions based on an open foundation and proven technology facilitate faster integration. Companies use these solutions to improve the directions of the corporate growth strategy. Typically, as companies grow and want to compete globally, multi-language and multi-currency functionality become increasingly important (9).

**ERP and Optimizing the Core Business Processes**

ERP applications are designed to optimize an organization's underlying business processes - primarily accounting/financial, manufacturing, and distribution. Today's ERP solutions must offer even more. Many vendors have begun to enhance their offerings with extended supply chain applications in an effort to create seamless, integrated information flow from suppliers, through manufacturing and through distribution. A core
ERP system for manufacturers must include applications for financials, procurement, sales, marketing, order fulfillment, operations management, manufacturing, and distribution (11).

In addition to these core functions, integrated industry-specific applications can add significant value. For example, in mill industries such as pulp and paper, converting, and steel manufacturing, an enterprise solution must be based on production attributes and customer specifications being active throughout the production, inventory, and order fulfillment process. These systems also must have an exact outline of the plant floor for tracking work center costs, quality of work in progress, customer order status, and product movements (11).

A web-based ERP system can allow different companies in different markets to improve their own processes. The Internet enables the company to find the industry's best practices and information on adopting those practices. Industries are different from each other, which may require a different ERP system. In the process of choosing the vendor or system provider, the company must be informed of all available options and choose the one that best fits the industry or market that the company is in. For example, integrated trim management and rough-cut capacity planning are crucial elements for mill industry enterprise solutions in order to connect production activities to customer order fulfillment. Integrated advanced planning further optimizes output, reduces costs, and eliminates the need for redundant systems or customization being developed between applications (2).

Moreover, in the apparel industry, the ability to configure products and produce an accurate bill of material based on a multilayered, user-defined relationship greatly
simplifies the complexity of order entry and production. Another key is the ability to handle flexible pricing structures and customization of packaging, products, and shipping options (11).

In the food and beverage industry, one challenge is to provide rapid, timely information flow through global food and beverage manufacturing and distribution enterprises. Because of the volatile nature of the business, with consumer tastes and government regulations constantly changing, the enterprise system also must accommodate rapid product development, efficient replenishment, accurate forecasting, and customer quality demands (11).

Challenges toward integration of Internet-ready ERP

Implementation of an ERP system is not without its challenges. One major hurdle is integrating ERP software to gain a return at the shop floor level where profits are determined and customer satisfaction is built into products. Also, poor fit of an ERP system can create problems for users, particularly in the areas of production planning, manufacturing, and customer order fulfillment, where individual ways of doing business are most evident (11).

Net-ready ERP systems do raise other concerns separate from the basic ERP implementation. Security issues are questionable as hackers have used the Internet to accessed confidential information and control what were secure web sites. However, this should not be a concern as ERP providers are finding ways to assure companies of security. For example, OneWorld has opened complementary technology (encryption, electronic storefronts, and firewalls) to ensure ongoing viability as an information
infrastructure for Internet commerce. Web-based ERP systems are protected from corruption. Customers can restrict public access to designed subsets of information and functionality, granting access only to the function relevant to each transaction (13).

Additionally, PeopleSoft, another ERP provider, enables systems to fine-tune performance of the overall web applications. Information on users and groups is stored in the Netscape Directory Server, which is a highly scalable directory. The directory allows applications to leverage the security features of PeopleSoft and, using standard and certificate-based authentication, adds the additional layer of security necessary when exposing internal PeopleSoft applications to extranet access by customers and partners.

The increased traffic through Internet access is of further concern. With an Internet-ready service it is inevitable that customers, prospective investors, suppliers, and others will access companies' services in search of information. Increasing the number of people that will use the company's directory puts a strain on the system. A highly scalable package is then required to handle this increased flow. The challenge of finding such a system is something that companies face as they research different ERP providers trying to match processes and industry-specific applications. ERP companies, therefore, have the burden of offering a system that can handle the Internet traffic with no problems (5).

Furthermore, shortfalls of ERP are evident in the process of implementation of this new system and the accommodations needed for the workforce. ERP provides unlimited capabilities for industry-specific solutions and the improvements of efficiency and effectiveness. However, problems can arise when coordinating the new system with the core business software and processes. The budget for this implementation is also a
concern. Some of the smaller companies do not have the ability to purchase such a system, which could effect competitiveness over larger firms (11).

The solution is to look for an ERP system designed specifically for the business. Software that combines industry-specific functionality with the flexibility to accommodate each company's unique processes goes a long way toward improving the fit of the system. This combination also helps speed up the implementation process. This pragmatic approach helps companies close the gap between system performance expectations and final results achieved. The two main elements that drive the ultimate success of an ERP implementation are management involvement and a focus on the needs of system users. Executive involvement from the outset is essential. The commitment of time, money, and personnel required to buy and implement ERP could not happen without the support of top management. As employees then buy in to the new change and become more comfortable with the new tasks stress levels decrease and efficiency increases. It is critical to understand the nature of this process and the anxiety that employees feel about radical changes in the work environment, therefore, management must convey its goals and needs clearly (1). This implementation is a complex and costly experience that demands budgets for time and money and clearly laid plans as management eases the stress levels and tempers the process.

Another major area to consider is the up-front cost of this technology. A host of factors from software to maintenance make forming a budget for ERP systems absolutely necessary. Savvy managers and selection teams are necessary to prepare the budgets and negotiate the terms on how the system will be paid. Setting a budget enables the firm to focus not only on what will be spent for the system, but also what is really needed from
the Net-ready ERP solution. Following industry standards in setting this budget will take out some of the guesswork and give the company understanding of all costs involved to better negotiate terms and discounts (1).

Software represents only a portion of the ERP expenses. The implementation costs include the education and consulting required to assist the work force through the process. Prices vary considerably based on the size of the vendor. Likewise implementation costs vary by vendor, tier, and implementation partner. Hardware costs are any servers required to run the system. Maintenance costs include the fees to provide phone support, error correction, and new versions of the software. Ideally, the chosen vendor will provide upgraded technology in the years to come (1).

Finally, in implementing an industry-specific application, it's important to ensure the implementation team includes its members with in-depth knowledge and experience in that industry. This will significantly reduce implementation time by eliminating a lengthy vendor or integrator learning curve. The Web integration learning curve also may be compressed if the integration team knows the basic needs of the company as related to the industry (9).

**Competitive Advantages Toward E-Commerce**

The Web is an added convenience for commerce for both business to consumer and business to business transactions. Presently, customization of service has become critical. Suppliers are demanded to provide "tailor made" options to customers simply as a cost of doing business. This ranges from specific handling instructions to the printing and delivery of invoices. ERP systems are needed to meet these demands as they are
multiplied out over thousands of customers. The next generation of ERP systems will emphasize the service requirements of all the different vendors and customers. The focus is toward flexibility to support the needs to design processes uniquely for (1).

Rapid implementation tools and industry-specific templates add value to the ERP investment by streamlining the process-modeling phase. This reduction helps for fast implementation and timely return on investment. In fact, software implementation time reduction is a key element of success in any enterprise-wide technology project. Speed and accuracy increase the firm's competitiveness and edge over rival companies (1). Enterprise systems must be equipped to accommodate the explosive growth of e-business. E-business solutions are saving millions of dollars whether they are business-to-business relationships such as dealer networks, or business-to-customer applications such as on-line catalogs (11). The impact of the Internet on business production and trade capabilities demands a Web-based ERP system. Others who neglect to recognize the potential for increased profits will be eliminated by competitors. For this reason, ERP vendors are beginning to enhance their ERP systems built on open architecture to enable easier integration and to interface with third-party shop floor systems. The Web-based ERP system gives a company the ability to truly take advantage of their industry-specific practices and matches that with the ability to perform all aspects of e-business (9).
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