Developing e-business: a strategic approach

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Abstract
While e-business is often mixed with electronic commerce (e-commerce), they are completely different concepts. E-business encompasses e-commerce as well as many other applications. There are more benefits to be derived from e-business than from e-commerce. Electronic business (e-business) is revolutionizing the way of communication between internal and external stakeholders within an organization. Connecting numerous information systems and integrating data streams can significantly increase the operational efficiency of the firm. E-business can lead to competitive advantage as well as profitability.

Introduction

Information technology (IT) made a tremendous impact on the business world. With the help of IT, business processes and operations that used to take days or weeks can now be done in a matter of seconds. This makes individuals and customers to be better served than in the past.

Every firm that seeks to be successful in the future is striving for the implementation of a successful e-business strategy. It is a hot issue in the business world and is affecting every type of organization as they attempt to improve efficiency and stay ahead of their competitors. Waters (2000) indicated e-business has become an inescapable fact of life, nearly as essential to commerce as the telephone. For all intents and purposes, you cannot compete nowadays without some kind of e-business strategy. While e-commerce focuses primarily on a firm's customers, e-business expands the connectivity of the organization to include its suppliers, employees, and business partners. The expanded connectivity makes e-business solutions much more prominent than that of e-commerce. E-business is the next wave in the technological revolution created by the Internet (Biggs, 2000).

Organizations aspire to realize the potential gains made available from e-business. For example, Cisco and IBM have saved hundreds of millions of dollars in operating expenses as a result of redesigning their business processes to incorporate Internet technologies. These potential savings are turning companies' focus towards e-business (Evans, 1999).

This article discusses various issues of implementing e-business in the business world. It first provides an overview of e-business and its current status. The implication and operational details of e-business and e-commerce are presented next. The functions of e-business solutions are then provided. The advantages and disadvantages of implementing e-business solutions are then presented. Finally, the implementation process and critical success factors of creating a successful e-business solution are identified.

An overview of e-business

Defining e-business

E-business allows for the extended organization to be connected. This means that all employees, customers/clients, suppliers, and other stakeholders, regardless of geographic region, are interconnected. E-business uses:

> Common electronic data standards with computer automation technology to electronically interconnect information systems, integrate internal and external data streams, and automate business processes between trading partners (*Health Industry Today*, 1999).

E-business facilitates data flows in business-to-business or system-to-system processes.

The most important function of e-business is its interconnectivity and system interaction. As a result of the automation, many human functions are eliminated from various processes such as unnecessary key input, intervention, and internal reprocessing of electronic business information. Efficiency improvement resulting from faster processing and reduced errors is then realized in routine data processes and business interaction. E-business allows service providers to interact with their suppliers and customers

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(Follit, 2000). This improved relationship causes increased loyalty, and then results in increased profits and a competitive advantage for the firm.

E-business functions

E-business provides links to customers, suppliers, business partners, and employees through the Internet, intranets, and extranets. Web systems handle transactions for customers and also provide them e-commerce services. Intranets and Web portals are used to link employees so they can have access to more information. Intranets are commonly used for transactional and interactive processes and information sharing purposes. The increased data availability improves corporate productivity.

Information flowing to and from business partners is facilitated through the growth and improvement of extranets. Extranets allow more and more firms to implement e-business solutions. The suppliers of a firm are also linked to their customers through these extranets. This allows for logistics improvements such as systems interconnection, production streamlining, and automatic material order. The integration of logistics is commonly referred to as supply chain management.

E-business components

With the expanded functionality, e-business has gradually increased its complexity. It is evidenced by the problems occurring at dotcoms during the holiday season, such as Toys-R-Us (Bury, 2000). E-business sites were originally focused on their customers. Expanded e-business applications are expected to handle other parties such as partners and suppliers, thus increasing complexity.

E-business has caused a need for high-end, highly available computing platforms (Day, 1999; McGee, 2000). The increased complexity of e-business applications has made many believe that:

> Client/server applications are not going to do the job in the near future (Vizard, 2000).

As a result, organizations may be forced to dispose of legacy systems if they wish to meet the requirements of e-business. If they decided to keep legacy systems, it is likely that they would be unable to compete in the long term because their success is tied to the efficiency of their IT infrastructure.

E-business technology consists of operating systems such as Windows NT, server hardware, and management platforms scheduled to arrive in the near future. This will enable IT managers to make significant changes to their system architectures (Wagner *et al.*, 1999). System or server consolidation has also emerged as an approach to solving these problems. Infrastructures will then become more important to managers as systems are re-engineered to become more flexible. Managers also look for scalability as they experience continuous pressure to expand hardware and software service levels (Wagner *et al.*, 1999; Roberts and Hersch, 2000). They look for hardware and software that can handle performance scalability as well as maintaining the flexibility required to handle a mixture of workload requirements. Partitioning of architectures has been one approach to addressing these data center requirements. Also, many computer firms are striving to provide various servers that are able to handle e-business functions. Sun Microsystems and Hewlett-Packard make servers available and IBM has just recently presented its RS/6000 S80 server, which is expected to be a large success (Garvey, 2000; Simison *et al.*, 2000). These products are more powerful, reliable, and scalable than previous systems, thus improving the quality of e-business solutions.

Organizations will have a need for alliances from their hardware, software, and service providers. As a result of the increased reliance on these systems, managers will focus closely on their infrastructure's quality assurance and performance (Evans, 1999; Garvey, 2000).

E-business versus e-commerce

Similarities

Although e-business and e-commerce are two separate concepts, there are some similarities between the two. E-business and e-commerce solutions incorporate newly developed Web technology into organizational and business processes. The use of Web technology results in improved efficiency.

Since new technology is required for e-business and e-commerce implementation, the firm needs to improve its system hardware, software, and technological infrastructure. While similarities exist between e-business and e-commerce, there are differences that distinguish both concepts.

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Dissimilarities

E-commerce refers primarily to the buying and selling activities over the Internet. This includes such transactions as placing orders, making payments, and tracking delivery of orders on the Internet. In an e-commerce transaction, an individual remotely has access to electronic information, products, or services, typically within a client/server based environment, via the Internet, proprietary intranet, or extranet. Thus, e-commerce transactions require human interaction when the information is processed by the client and then stored in databases. Therefore, e-commerce activities are considered as contact-driven processes since the client needs to get in touch with the firm. This makes the business process slower when compared to an e-business approach. E-commerce basically increases the amount of information available to prospective customers, thus improving a firm's marketing capabilities. The focus of e-commerce is typically on the customer side as well. All other stakeholders of the organization, including employees and suppliers, are generally not the main concern for e-commerce. Another characteristic of e-commerce is that it is typically limited to client/server software with a high degree of system functionality. It therefore relies on client-to-server or port-to-port data flow (*Health Industry Today*, 1999; Moltzen, 2000).

On the other hand, e-business infrastructure is much more technologically advanced than e-commerce. E-business generally refers to the use of the Web and Internet-related technology to connect the extended organization. As mentioned earlier, this extended organization goes beyond customers/clients to include such entities as suppliers, employees, and regulatory authorities. Therefore, e-business encompasses e-commerce. E-business allows for the sharing of files among different locations and firms, as well as the remote connection of suppliers and customers.

As discussed above, e-business and e-commerce are two different concepts. While e-commerce uses the Web to connect customers with firms, e-business includes the Web as well as other means necessary to interconnect information systems and data streams, both internal and external. Also, e-commerce requires human interaction for form filling during the purchasing process. However, e-business allows many processes to be fully automated, thus improving the efficiency of business processes and removing the error of human interfaces.

Relationship between e-commerce and e-business

Although "e-commerce" and "e-business" are meant differently, they possess a certain relationship. Since e-commerce is generally less complex than any e-business solution, a firm must start with e-commerce initiatives before creating e-business tasks. This project usually requires the creation of a technological infrastructure that allows for various parties to interconnect. Once a firm has successfully implemented its e-commerce functions, it may then begin to work on e-business solutions. Without the e-commerce infrastructure, it will be difficult for firms to incorporate e-business functions. A firm can use the knowledge collected from the e-commerce project to make the e-business implementation much easier. If a company should decide to skip the e-commerce part and jump directly to e-business, this project would be much more costly and time consuming. Therefore, it is necessary for a firm to create an e-commerce capability before it pursues e-business solutions.

Advantages and disadvantages of implementing e-business

Advantages

While companies strive for e-business initiatives in order to experience cost savings, a recent survey has identified that it is not the most common reason. Many companies do admit that they are inclined to implement an e-business solution in order to operate more efficiently, but a larger percentage of executives indicated that improved customer service is their primary reason. This includes serving the company's customers as well as being better served by its suppliers. In a recent survey, 94 per cent of executives stated that the main reason they launched e-business initiatives was to provide or receive superior customer service and satisfaction (Violino, 1999; Rosa, 2000). This result shows that organizations intend to develop a better tie with their own customers, thus leading to increased loyalty. It also shows that a firm integrating with its own suppliers will receive improved service and satisfaction. This will lead to increases in the efficiency of operations and the performance of the business.

The increase in the speed of fulfilling orders is another benefit of e-business. By interconnecting with suppliers, orders will be received faster and should be filled at a

quicker speed. This allows a firm to substantially reduce its inventory levels. By bringing the organization closer to a just-in-time (JIT) inventory scheme, storage costs as well as the cost related to obsolete inventory would become virtually nonexistent. This technology provides a positive impact on the profit figures of a corporation. E-business also allows for organizations to continually track their orders. This makes a large impact on the planning and scheduling functions. Once again, operations become more efficient as a result of the improved scheduling capabilities of e-business applications (Yasin, 2000).

Another advantage of e-business is the interconnectivity that it creates for organizations. The Internet allows organizations to get in touch with suppliers who never had access to them. However, the Internet also increases competition among suppliers and thus results in lower profit margins. E-business provides all suppliers with the information necessary to bid on orders. As the number of bids increases, the price of each will tend to decrease. This will lead to lower costs of materials and thus significantly increase the profitability.

By connecting the extended organization, e-business improves the capability of internal communication. As each employee can interact with others, it will enhance workgroups' collaboration and coordination. This significantly reduces the possibility of work overlapping and delay in an organization. It also allows separate departments to work together. The collaboration and coordination capabilities among departments tremendously improve productivity in the workplace.

Disadvantages

Development cost is one of the primary concerns for e-business. A significant expenditure is needed in order to make e-business proficient. Because e-business applications are complex, a firm may need to completely restructure its current systems. This means new hardware and software to be purchased and new employees to be hired and trained. The adoption of an e-business solution implies a high risk of failure. The high cost and risk associated with e-business projects has made many executives and managers apprehensive of it. In a recent survey, 87 per cent of European firms rated e-business as a medium or low priority and not a fundamental part of their business. Also, 90 per cent of the firms in this survey stated that the main concern of e-business solutions was their budget (*Management Accounting*, 1999). This shows that the cost of e-business is too high to handle in many corporations. They simply view e-business as a luxury, not a necessity.

The chance of being attacked by hackers will increase as corporate information is transmitted electronically. Thus, security becomes another concern while implementing e-business. As evidenced by recent service outages on prominent Internet sites such as Yahoo, eBay, Amazon.com, CNN.com, and Buy.com, the Internet is extremely vulnerable and:

> Determined hackers can wreak havoc across the global computer network (Nickles, 2000).

This concern becomes significant since information assets are now exposed over the Internet via e-business applications.

Another problem associated with e-business is the lack of a common framework to help companies efficiently execute transactions over the Internet. While there are not standards associated with it, many organizations are using extensible markup language (XML). XML is a widely used strategic technology for implementing e-business. XML can be used to categorize and tag data for exchange within heterogeneous systems.

Although XML appears to be promising, it does have inherent problems. XML has the following three layers: technology, protocols, and document layers. The technology layer is the bottom one and it provides the common building blocks for XML-based integration. Unlike the other two layers, the technology layer standards have reached stability, thus making it common to all XML. The second layer, protocols, and the third, the document layer, are not common yet. This situation causes different technology frameworks and data definitions to be created by various standard and industry groups as well as vendors. These variations across different organizations result in incompatibility in e-business applications. The lack of standards causes work duplication, conflicting data exchange protocols, and incompatible business models within an organization. The lack of standards could increase the cost of e-business solutions by requiring additional investment in time and resources for the development and maintenance of their own standards. The wide use of XML is causing new XML-based vocabularies and protocols to be introduced by users and vendors who attempt to establish their own standards (Costa, 1999). This wide array of standards then weakens the value of XML as a tool to be used in e-business.

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Challenges to e-business

The economic issue is difficult to overcome since the cost of implementing this new technology is always high. Executives and management need to be aware of the necessity of implementing e-business in their organizations. They need to recognize that their competitors are doing e-business and, if the firm does not respond, it would result in a competitive disadvantage. This situation would cause long-term impacts to the firm. Executives and managers, on the other hand, should recognize the potential benefits of achieving e-business applications. A firm should analyze its business process and determine which sectors would benefit most from e-business. This would allow the company to invest in the most beneficial e-business application.

The security problem needs to be solved. To help minimize this risk, there are numerous steps that a firm can undertake. First, they should consider security in all stages of development. Technology that can improve security should be implemented in every aspect of e-business, including applications, system software, and networks. This will minimize the risk of security breaches.

The adoption of XML can partially solve the problem of lacking a common language, however, XML is not standardized. A common way to remove the language variance is to have industry groups to create their own standards. IT professionals accept this way because they recognize the quality of standards set by global authorities.

Other professionals feel that the recent innovation of e-business XML (EbXML) may be the path to follow. Just recently, a group from the United Nations Centre for the Facilitation of Procedures and Practices for Administration, Commerce and Transport and the Organization for the Advancement of Structured Information Standards (OASIS) began developing this markup language. This language aims at defining protocols, security mechanisms, architecture, and business process models. However, the support for this initiative is too difficult to assess as the process has just begun. Others also feel that software designed by committee does not always result in the simplest, most efficient solution. Due to the fact that previous efforts to standardize EDI vocabularies have proven only partially successful, there could be further problems associated with these standardization attempts. This is because each user is unique and has his/her own requirements, thus making the creation of a comprehensive standard difficult (Costa, 1999; Gomes, 2000).

An alternative solution to this problem is to let the firms play it out. This calls for letting the various organizations continue to work at defining acceptable standards for themselves. These individual vocabularies developed will eventually lead to a consistent standard that can be implemented by many organizations and be easily adjusted to needs. Users will share their work with others and benefits will be derived as industry-wide standards are produced. Common general-purpose frameworks are also produced to facilitate this process, such as Microsoft BizTalk and CommerceNet (focus on supply chain issues). These frameworks will emerge in the protocol layer and:

> ... allow a starting point for users building custom protocols to eventually standardize when a sufficient level of maturity is reached (Costa, 1999).

Currently, BizTalk has gained the most support from vendors. Although the life of some of the current XML based vocabularies will be short, those firms investing in XML skills and infrastructure will reap benefits as newer vocabularies become standardized.

Firms must recognize the importance of XML in the future of e-business. Therefore, they should start to educate employees on XML and establish an architecture group with the responsibility of maintaining minimal standards to help in the development of new XML vocabularies (Costa, 1999). However, the first step in this process of developing an XML strategy is to learn about XML's capabilities and limitations.

E-business implementation steps

Before implementing an e-business solution, a firm must first identify its capability of handling an e-business solution. *Health Industry Today* (1999) indicated five major concerns on preparing e-business, they are:

1. Are electronic business transactions with trading partners currently sent or received?
2. Are the EDI (electronic data interchange) communications and internal application systems integrated to eliminate re-keying of electronic transaction information?
3. Are ANSI X12 EDI standards currently used for transactions?
4. Do the firm and its suppliers use universal identifiers, codes and definitions to identify products and procedures within its electronic documents?

5 Are common barcodes, automatic data capture and shared databases used to capture and communicate point-of-sales data?

If answers of most of these questions are positive, the firm is ready for e-business implementation.

It is necessary for an organization to carry out its own processes toward e-business solutions. A number of organizations have named a chief e-business officer to help coordinate e-business initiatives. This setting allows for centralized control of e-business across an organization, thus resulting in a greater efficiency. Companies must be cautious when they start e-business initiatives; this attitude would help firms quickly move to real-time processes (Karpinski, 1999). However, the speed of implementing these strategies has inspired strategic working alliances across a broad range of industries. This has been demonstrated through the alliances that have occurred between infrastructure organizations and Web boutiques.

Firms implementing e-business solutions should recognize the challenges that face their organizations. First, they should comprehend the dot-com advantage. This occurs as a result of clients/customers' preference for dealing with what they know and trust. This situation is often called the click-and-mortar integration; it occurs not only to the customers, but also to the suppliers. Another challenge is about catching the marketplace rules. That is, the Web will support the supply chain more than ever. The third challenge is that customers should be dealt with first. A quality e-business solution, while being electronic and integrative, should improve connectivity, knowledge management, and performance. It thus improves the efficiency of the firms.

Hayes (2000) identified seven steps to implement a successful e-business solution. Specifically, they are:

1 *Start high.* Start high implies that the executives in the organization must embrace the e-business initiative. A company must recognize that the e-business functionality is a business project instead of a technical task.
2 *Think fresh.* Think fresh signifies that the firm must disregard all of its old ideas and paradigms on how business is operated and develop radical new ways to conduct business.
3 *Know your market.* The firm's brand identity, customers, competition, and supply chain should be analyzed in the "know your market" phase.
4 *Set vision.* A firm must set a vision for what it wants to do.
5 *Define strategy.* While the vision outlines what the organization should do, a company must also define strategy, which should dictate how the company will reach its vision.
6 *Create.* The firm must then "create" its e-business solutions.
7 *Refresh regularly.* The firm must revise its e-business solution regularly as speed and innovation are the keys to the e-business world.

Critical success factors of e-business

Identifying the critical success factors allows a firm to realize the full advantages of achieving e-business solutions. The first critical success factor is to identify a suitable vision for the firm. This vision is important as it provides everyone in the organization with direction on where to go. The second critical success factor is that the firm must also have an e-business champion who will help make this vision a reality. This person must be a strong leader who owns the e-transformation process at a company. This person must also be visual, energetic, and passionate about the transformation. The third critical success factor is the creation of a healthy company culture. With this energized corporate structure, all employees will be involved in the corporate decision-making process. The fourth critical success factor is the development of a plan to achieve the e-transformation (Marzulli, 2000). This plan needs to be in document form and include milestones and metrics that describe the e-transformation journey. The e-business champion and senior management should review this plan regularly.

The fifth critical success factor deals with corporate communication (Marzulli, 2000). A rigorous communication strategy must be implemented within the firm. This allows the organization to receive more feedback from constituents. This is imperative when e-business solutions are complex.

Another critical success factor for an e-business firm is its ability to create flexible e-business solutions. This will allow the firm to grow in the future as well as personalize to various suppliers and customers. Currently, this is a drawback for e-business because of the complexity of implementing integrated software, especially dealing with legacy

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systems. If an organization can observe all of the above critical success factors, the expected e-business solutions can be achieved.

Case studies

Although e-business is a relatively new technology, firms are investing in such projects related to business-to-business transactions at an alarming rate. For example, to reduce the cost of raw materials, numerous industries have begun the creation of Internet marketplaces (see Table I). The volume of these transactions is expected to increase significantly in the future as well (see Table II). A recent report concluded that business-to-business on-line sales will expect to:

> ... rise to nearly $2.7 trillion in 2004, up almost sevenfold from the $406.2 billion in B2B Web sales (Blackmon, 2000).

GM, Ford, and DailmerChrysler

Currently, both GM and Ford offer Internet exchanges. On their Web sites, suppliers bid for providing these automakers with the parts they need. Usually, the lowest bid price wins. This marketplace significantly reduced procurement cost for GM and Ford, and their cost of production materials has been decreased substantially (Simison *et al.*, 2000).

GM, Ford, and DailmerChrysler have recently announced a plan to create a Web marketplace to be used for all their purchases. This marketplace is projected to handle around $240 billion from the automakers and $250 billion from their suppliers in annual purchasing volume. This project is expected to set a global standard for online purchasing. As a result, the prices of the products will be forced down, thus reducing profit margins.

This case exemplified a major trend in e-business. The trend is for traditional companies to start setting up their own trading communities over the Internet. They are no longer allowing technology companies to come in and reap the rewards that they could be realizing. Firms recognize that the real value of e-business is not created by technology suppliers, instead, it is by the trading communities. The role of technology companies is being scaled back accordingly. Traditional companies figure that if:

> ... there's a fortune to be made putting industrial purchases on the Internet, industrial companies want it for themselves (Gomes, 2000).

As a result of this effort, economists estimate that online transactions between companies will account for 10 per cent of the total transactions by 2004, up from the current 0.5 per cent.

Table I
Internet supply networks

Industry	Name	Date announced
Steel	MetalSite	9/18/1998
Aeronautics	MyAircraft.com	2/14/2000
Automobile	TBA	2/25/2000
Retail	GlobalNextXchange	2/28/2000
Farming	Rooster.com	3/01/2000
Consumer products	TBA	3/15/2000
Paper	TBA	3/23/2000
Medical products	TBA	3/29/2000
Retail	WorldWide Retail Exchange	3/31/2000

Source: Ansberry (2000)

Table II
Business-to-business projected sales

Industry	2000	2001	2002	2003	2004
Computing and electronics	230.2	343.3	427.3	506.2	592.9
Motor vehicles	35.1	90.0	190.2	311.5	411.5
Petrochemicals	27.0	53.9	103.2	184.5	299.2
Utilities	29.9	56.5	101.3	170.1	266.4
Consumer goods	13.2	28.1	58.5	116.5	216.5
Food	22.5	41.2	73.9	128.1	211.1
Construction	6.3	15.1	34.6	74.2	141.0
Industrial equipment/supplies	7.0	13.1	23.8	41.9	70.3
Aerospace and defense	9.1	15.8	23.1	29.0	32.9

Note: All figures are in billions of US dollars
Source: Blackmon (2000)

The big five

As the big five accounting firms have attempted to switch their traditional consulting practices to e-business, they have experienced many challenges. They have attempted to replace their traditional consultants with e-business experts, however, it caused many consultants to be laid off recently. Among them, PricewaterhouseCoopers cut 1,000 jobs, Ernst & Young laid off 5 per cent of its total consultants, and KPMG cut 350 consulting staffers. While these job cuts occur, there are many new consultants hired later. These new hires come from a background of e-business.This change allows their workforce's skill sets to match with the new Internet economy.

The reason these consulting firms changed was due to the stiff competition from smaller consulting firms. While it is an advantage to be a large organization when performing traditional consulting services, it is also a disadvantage when dealing with e-business.

In e-business, being small and flexible is a key.

Aerospace industry

Just recently, Microsoft has announced that it will enter the business-to-business market through the creation of a business exchange for the aerospace industry. The companies involved in this exchange include Boeing, Lockheed Martin, Raytheon, and BAE Systems.

This marketplace is similar to the one created by the big three automakers, but for a different industry. This marketplace will better connect the aerospace companies with the 38,000 global suppliers. This marketplace will improve the supply chain between the two sites, thus resulting in significant savings and revenue gains. Boeing expects to realize hundreds of millions of dollars in gains over the next three years from the efficiencies related to this new innovation. This just demonstrates the impact that e-business solutions can have on a firm.

Conclusion

E-business is revolutionizing the way that business is conducted. E-business does more than e-commerce as it interconnects the whole and extended organization, thus allowing for improved communication among suppliers, employees, and customers. The high quality communication then leads to high efficiency, as processes take less time and cost. The organization thus enjoys improved profitability and competitive advantages over its competitors. E-business also allows the organization to provide service to many new parties that it never knew before.

The costs of implementing and maintaining e-business are high. This situation is typical to any new technology adopter. However, the benefits generated from e-business far outweigh its costs.

Before a firm undertakes e-business projects, it must first determine if it is capable of handling it. Various studies need to be done to validate the firm's capability. While implementing e-business, the firm should have various critical success factors, such as vision, flexibility, and security, in place. If implemented correctly, the e-business solutions will pay off tremendously.

While larger firms have already implemented e-business solutions, small- and mid-size firms must also start such initiatives now. The benefits provided by e-business will be realized by most businesses. If firms have not thought about e-business, they should consider doing so before it is too late. The e-business trend is just beginning. Before long, e-business will change our business world.

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