

# E-business success at Intel: an organization ecology and resource dependence perspective

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## Keywords

Internet, Business development, Value chain, Supply chain

## Abstract

Electronic business (e-business) today plays a major role in the world economic growth, thanks to the rapid advance in information technology. Recent estimates from Forrester Research show that by 2003 the value of e-commerce of US and Europe will reach US\$3 trillion, the number of households in the USA that have PCs will reach 64 million, those that have access to the Internet will reach 60 million, and the number of mobile phones will reach 69 million. There are many spectacular successful e-businesses but there are also numerous failures. Presents a study of e-business success at Intel Corp. Intel reached \$1 billion value in e-business in its first month of deployment in July 1998. For the year of 2000, Intel's profits climbed to \$10.5 billion to become the fifth most profitable company in the USA, up from the eighth rank last year. Concludes with lessons learned and success factors.

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## Introduction

Electronic business (e-business) today plays a major role in the world economic growth thanks to the rapid advance in information technology (IT). As ITs develop, novel ways of business process redesign emerged, creating turmoil in the industry. Organizations today frequently redesigned their processes in ways that provide new competitive advantages. Success breeds imitation, and invites more entries to e-business. There are many spectacular successes, but there are also many failures. As technology continues to develop, organizations are in constant search for new e-business technology and available resources to gain competitive advantages. Even the well-established software giant Microsoft is aware of that. Chairman of Microsoft, Bill Gates, has a fear that Microsoft is about two years away from failure, and that somewhere out there is a formidable competitor, unborn and unknown, who will use better business models to put companies like Microsoft into obsolescence. Turban *et al.* (2000) believe that the hottest and most dangerous new business models out there are using e-business.

In 1998, Intel approached e-business as a new way of doing business, and management wanted customers to know that Intel was serious with e-business. Intel created a self-service extranet called E-Business Program which focused on procurement and customer supports for its products. Access to the site was restricted to Intel's authorized business partners and customers.

## Literature review

Studying the effects of environment on organizations in organizations has received a great deal of attention in organization theory

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and MIS research in recent years (Phan, 1990). Similar to the approach that biologists used to explain the evolution and proliferation of different species in the environment, organizational theorists use the ecological theory to explain the formation and growth of organizations in the environment. Although they do not agree on a specific approach to use in studying organization life-cycle, major ecological studies on organizations in the past decade have been centered around three basic approaches: developmental approach, selection approach, and macroevolutionary approach (Carroll, 1984). The developmental approach theorists argued that organization structures change over time, the form of change being shaped by structural pressures and constraints. They also argued that organizations are highly adaptive. The selection approach theorists argued that organizations were primarily not adaptive, but largely inertial. Theorists using this approach believe that only the best organizations will survive. Finally, macroevolutionary approach theorists focused on the change over time in a community of organizations or industry rather than individual organizations. By focusing on large-scale changes in a community of organizations, they tried to describe the rise and fall of organizations within an industry.

Because organizations are not internally self-sufficient, they require resources from the environment, and thus become interdependent with those elements of the environment with which they transact. Pfeffer (1982), and Pfeffer and Salancik (1978) argued that organizations develop internal and external strategies which seek to minimize the uncertainty arising from dependence on the environment for resources.

To minimize transaction costs (Williamson, 1981), organizations will seek low-cost strategies where feasible. In order for the USA to compete effectively against Japanese firms in the *Keiretsu* system in the

1990s, Ferguson (1990) suggested that the US computer industry be networked into a high-tech chain industry.

As the technology advances and the computer industry develops and grows, market niches open and close frequently, creating rapid changes in the industry. The prevalence of technical innovations may be regular, sporadic, or only once; these patterns of change have different implications for organizational populations. When they occur often, a niche may open up and organization competes to take the advantage of cost savings and market penetration that often results in better profits and market shares.

Porter (1985) developed the value chain model which highlights interdependence activities in the business where competitive strategies can be best applied and where information systems are most likely to have strategic impacts. As IT developed, novel ways of business process redesign emerged. Organizations today frequently redesigned their processes in ways that provide new competitive advantages in which e-business is viewed as the most attractive solution. Andy Grove, chairman of Intel, boldly stated in 1998: "Within five years, all companies will be Internet companies or they won't be companies" (Intel Corp., 2000).

There are basically six categories of e-business: Business to Business (B2B), Business to Consumer (B2C), Consumer to Business (C2B), Consumer to Consumer (C2C), Non-business, and Intra-business. Without face-to-face, all e-business transactions are done electronically by using computer and communication networks. Applications of e-business are classified into three categories:

- 1 *Electronic markets*: Buying and selling goods and services or electronic markets.
- 2 *Inter-organizational systems*: Facilitating inter- and intra-organization flow of information, communication, and collaboration.
- 3 *Customer service*: Provide customer service, help, handling complaints, tracking orders, etc. (Senn, 1996).

The infrastructure of e-commerce can be built on the existing information technology. Kalakota and Whinston (1997) suggest that four infrastructures are necessary in implementing electronic commerce applications:

- 1 Common business service (i.e. security, authentication, electronic payment, and electronic catalog, portals, etc.).
- 2 Messaging and information distribution (i.e. EDI, e-mail and HTTP, etc.).

- 3 Multimedia content and network publishing (i.e. WWW, HTML, XML, Java, CGI, etc.).
- 4 Network information superhighway (i.e. Cable TV, Internet, telephone, wireless media, etc.).

### **E-business success factors and challenges**

Evolution in e-business processes has established a new value chain that links the core business with sales and distribution channels and supply chains. The new value chains, in turn, created tremendous demands on high-speed data communications. Studies have shown that, by applying new network technologies, companies can operate more efficiently, extend traditional to electronic markets, and create larger inter-organizational virtual structures that are composed of the company and its customers, distributors, and suppliers. To succeed, companies will need to evaluate innovative strategies that capitalize on both the power of the Internet and the change in consumer demands from both traditional and electronic markets. In order to manage resource interdependence, e-commerce companies are required to develop more responsive, and deeper and broader relationships with customers, suppliers, and distributors (Scarborough and Spatarella, 1998).

Furthermore, the supply chains within e-commerce companies also continue to change. The changes include the conversion of information systems from the legacy vendor centric model to the Web-based customer centric model and how delivery channels are operated. Businesses need to be sure that customers and suppliers can gain access to their Web sites to gain important product information for decision making. Information also will give customers and suppliers the ability to receive and ship products or services at the right price, time, place, and speed. The major barriers to customers' and suppliers' access to the Web is ease and speed of access. Other barriers include risk, privacy, confidentiality, and security. Customer expectations about convenience, speed, competitive price, and service are also key factors in the success of e-business (Hammel and Sampler, 1999).

Studies by Mougayar (1998) and Raisch (2001) suggested the following success factors for e-business:

- Cater to buyer e-business behavior and customer personalization.
- Maintain first-mover advantage, ensure quick time to market.
- Create right digital infrastructure.
- Reduce operational cost and leverage outside innovation.

- Control risk while allowing innovation.
- Conduct necessary education and training to employees, management and customers.
- Review current distribution and supply chain model to maximize company's gain.
- Understand customers' and partners' expectations from the Web.
- Improve products and services offered by e-business.
- Extend current systems to expand business.
- Track new competitors and market shares.
- Develop new Web-centric marketing strategy.
- Help to create company's own virtual market place.

### **Intel's e-business development**

Intel Corp., located in Santa Clara, California, is the world's largest producer of integrated circuits chips in the world today. Founded in 1968 to build semiconductor chips, Intel invented the microprocessor more than 25 years ago. Today, the company has evolved from a processor manufacturer into a supplier of network and server hardware, Internet hosting services, and other e-business components. Its technological leadership ranges from microprocessor design to advanced manufacturing and packaging, and it maintains production and research facilities around the world.

Most of its business is in the PC market. Intel is under intense competition from other chip makers such as Advanced Micro Devices (AMD), Cyrix, Texas Instruments, Motorola, and IBM. In the past, Intel customized catalogs and sent them to its potential customers along with product availability information. Until summer 1998, this process was done entirely on paper. However, when large customers such as Dell Computers and Cisco Systems started to use the Web to do their business in 1996, they pressured Intel to do the same.

In 1997, Intel began to investigate the feasibility of building the e-business system. The project started with the virtual worldwide e-business team. Because of the project emphasis on customer market needs, the team gave Intel's sales and marketing the responsibility to drive the project forward.

#### **E-business project organizational structure**

In 1998, Intel approached e-business as a new way of doing business and management wanted customers to know that Intel was serious with e-business. To better manage the resource dependence, Intel created a self-

service extranet called E-Business Program, which focused on procurement and customer support for its products. Access to the site was restricted to Intel's authorized business partners and customers.

As illustrated in Figure 1, the roles and responsibilities of teams that participated in the early development of the e-business system at Intel were:

- A project planning team, which consisted of customer, technical and logistical perspectives was created to define the scope and objective of the project.
- Business analysts were brought in during the early stages to help define the business workflow and assess how information is given to customers.
- Intel's sales and marketing staff were assigned to define how best to work with customers via the e-business system.
- Intel's planning and logistics group was also included on the planning team to help the IT department build a solution that integrated with existing business systems.
- The IT department was positioned as an "enabler" of business. Its role was to integrate e-business technologies and to prepare for implementation.

#### **Intel's mission and goals**

Intel's early mission was to design and deploy a worldwide e-business solution to strengthen its current business. The mission was accomplished by deploying an infrastructure that worked with existing business processes rather than requiring widespread change. The intent was to use the Internet to expand existing business, market current products and exploit sales channels.

With over 50 percent of its revenues and many customers coming from outside of the USA, the benefits of a global e-business system for Intel was too great to be ignored. With over \$25 billion annual sales in 1998 and a world wide network of business partners, resellers, and original equipment manufacturers (OEM), Intel needed to improve its efficiency by automating its B2B processes. Traditional business processes at Intel at that time was too slow and thus the decision was to deploy a Web-based order management system.

#### **Strategies**

Rather than attempt to build the entire business infrastructure from ground zero, Intel was conservative and focused on a relationship with direct customers, including OEMs and distributors online. "We picked one thing we could build very quickly and deploy to our customers", said Sandra

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Morris, Vice President of Marketing Group at Intel. These conservative strategies include broaden and deepened sales outreach, targeted middle-tier companies, and customized Web sites to personalize information delivery.

*Broaden and deepen sales outreach*

The first goal of e-business solution was to extend the reach of Intel's sales force. To do this, Intel automated its order management and information delivery system. The greatest opportunity for efficiency gains in 1997 was with the customers who were not already electronically connected to Intel. By converting the "unwired" to "wired", Intel replaced the traditional phone and fax as a means of communication with PC-based on-line communication tools.

*Target middle tier for greatest efficiencies*

Rather than aiming at a large number of small customers who accounted for 70 percent of total number of accounts world wide at the beginning, Intel wanted to go step-by-step by aiming the pilot program at the middle-tier customers who accounted for only 25 percent of total accounts in 35 countries. However, Intel's conservative goal was not so easy. Maintaining a consistently high level of one-to-one contact for a large number of middle-tier customers was difficult. These medium-sized customers typically are not invested in EDI as a backend system. The benefits of this pilot program to customers and Intel were numerous. By providing access to real-time information, Intel will allow them to be more knowledgeable of Intel products and future direction for better decision making. In addition, customers will feel more connected, have access to more Intel resources, and have closer contact.

For Intel, connecting this large customer segment electronically brought multiple benefits. The company was able to move resources away from the phone and fax

toward more efficient and productive tasks. Additionally, sales people seldom needed to hand-deliver confidential product information as they had done in the past. The stakes for the success of the pilot program were great. With this customer segment, Intel was dealing with at least one billion dollars per quarter of order processing right from the start.

*Improve customer service by delivering personalized information*

Intel took great efforts to convert its system and data from the old vendor-centric model to the new customer-centric model. The goal was to improve customer service by personalizing information delivery and then automating information delivery and routine sales tasks.

Because management, procurement, sales and marketing, and engineering all have different informational needs, Intel customized its Web sites within customer accounts. Being able to deliver personalized information online allows Intel to support multiple levels of the customer organization in a manner that best meets an individual's needs. This makes it easier for every customer to do his/her own research and to take the appropriate actions.

Customers visiting the Intel extranet Web site will find their name and specific applications available to them based on their personal profile. The user profile allows a customer to obtain confidential information that is important to that customer. The customer in this example can be a general manager with access to pricing and availability, order placement, backlog status, committed delivery dates, or the information desk.

**E-business deployment**

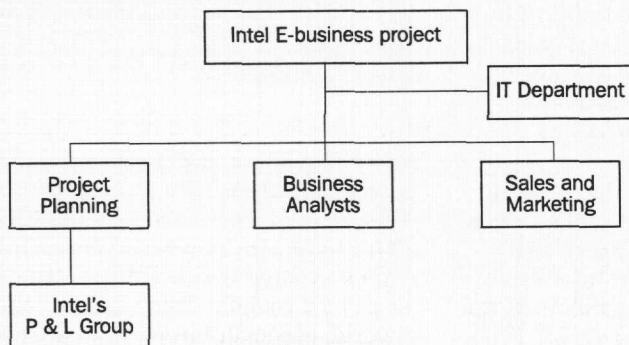
The initial e-business pilot system launched in 1998, was a one-stop, 240 shopping sites for customers throughout the world. Personalized data and applications are tailored to users' needs to provide an individualized experience.

*System architecture*

In order to simplify the system maintenance and supports, Intel decided to standardize the e-business architecture to one hardware vendor, one operating system, and minimized the number of database and application vendors. This architecture was flexible and scaleable to help manage the cost of ownership as the system grows:

- *Servers.* Intel's initial e-business system infrastructure was built around three main clusters of Internet servers: Web-servers, database servers, and data

**Figure 1**  
Intel's initial e-business project organization structure



analysis servers. Standardizing on one hardware vendor simplifies maintenance costs, makes growth easier, and allows Intel to interchange components as necessary without compatibility issues.

- *OS and Databases.* Intel's e-business system is standardized on one operating system. In the database area, Intel has limited it to two vendors.
- *Application development.* Intel provides a number of applications that serve specific needs and has made a great effort to use off-the-shelf applications.

#### *Deployment problems and challenges*

For transaction security, Intel sites let customers place and track orders using standard Web browsers with Secure Socket Layer (SSL) encryption. However, the 128-bit technology was banned from export by US law. To enable a strong encryption technology world wide, Intel encouraged its customers to acquire third-party 128-bit encryption application that was developed outside of the USA.

To increase network throughput, compressions were used. Intel found that, with SSL, encrypted file transfers are very sensitive to packet loss. When packet loss rate exceeds 15 percent, the download times for encrypted pages skyrocket. It was critical for Intel to reduce the packet loss rate. Intel also found that most of the transmission problems for customers were located in the connections between customer sites to end offices and tandem offices of the telephone companies. The solution is to reduce the number of elements that needs to be transferred through the network. This was done by redesigning the Web pages to store reusable artifacts such as graphics, menus, and icons at customer sites, so that only compressed data will be transferred. Intel also urged customers to upgrade its network connections to ISP servers with high bandwidth pipes, and high-speed network and routers.

#### **Results**

On 1 July 1998, Intel officially began taking orders from OEM and distribution customers using a new series of personalized Web sites. The new e-business system enabled approximately 200 of Intel's customers in almost 30 countries to place orders for Intel products, check product availability and inventory status, receive marketing and sales information, and obtain customer support - all in real time, 24 hours a day, seven days a week. Major successes at Intel e-business deployment are cited below:

- Intel moved \$1 billion in revenue to its online e-business system in the first 15 days, surpassing the company's initial launch goal of moving \$1 billion in the first three months.
- The company was able to eliminate most faxes to its customers worldwide. For Taiwan alone, it claimed that it eliminated 45,000 faxes per quarter. Intel revenues from Web orders are projected at 90 percent of Intel revenues by 2001.
- The company quickly "ramped" \$1 billion of online orders per month in 1998.
- Independent customer surveys rated Intel's e-business at 94 percent satisfaction level.

#### **Lessons learned and success factors**

Despite thorough planning by Intel's worldwide team, the most significant payoff from deploying the e-business solution was how much the company learned. Key success factors are:

- *Tailor to customer's needs.* The first and most important key learning is to focus on the customer. In order to move into e-business, Intel converted its systems from the vendor-centric model to customer-centric model.
- *Avoid unfamiliar market and risks.* Intel e-business systems was aimed at its current market with solid revenues and earnings. Unlike the recent Federated's Fingerhut fiasco (*Business Week*, 2000), Intel's management refrained from expanding e-business to unfamiliar markets or acquiring new e-business partners.
- *Follow conservative and traditional management principles.* Unlike most dot-coms, Intel managed its e-business conservatively by the books. It managed costs carefully and kept everything under control.
- *Deliver personalized Web content.* Web content must be accurate, current, and appropriate for each individual customer. Intel continues to work closely with salesforces to ensure that customers are getting what they need and are coming back to the site.
- *Quality focus.* It is necessary to anticipate frequent changes in both internal and external behaviors and processes. Intel moved into e-business on a continuous and iterative cycle of improvement. For a global company like Intel, connectivity can be a real challenge throughout the world, especially in parts of Europe and

Asia. Intel frequently tested the connectivity with customers in the real production environment. Because performance can vary significantly in different countries, Intel went the extra mile to bring customers' connections up to the global standard.

- **Robust and flexible e-business systems architecture.** A robust and flexible system will allow e-business to move ahead quickly. By separating front-end functionality of the Web site from the back office systems, applications can be developed for customers with frequent updates without being affected by enterprise-type applications. This is because enterprise applications commonly required longer development cycles.
- **Use the best security protection schemes:** To avoid costly Web site shutdown, Intel protected its e-business systems with the best security schemes and encryption available. This is because e-business systems use new technologies and components that are often not thoroughly tested. Intel went to great lengths to find ways to implement the 128-bit encryption worldwide despite that the US Government prohibited the export of this encryption.

A comparisons of e-business success factors between the success factors mentioned by the literature and Intel's study, is presented in Table I. While the literature did not mention network connection quality and security, these factors are important to Intel's success.

## Conclusions

With the rapid advance in technology, novel ways of business process redesign, which include e-business, emerged, thus creating turmoil in many US industries.

Organizations today frequently redesigned their processes in ways that provide new competitive advantages. Success breeds imitation, and invites more entries to e-business in many combinations. However, e-enterprises must manage their business conservatively and avoid rapid expansion into unfamiliar markets, or acquiring other e-businesses that do not have solid revenues and earnings. Besides good communication access speed and security, traditional management styles, such as focus to the customers, high quality service, and training, also play a major role in the success of e-business.

The strategies and success factors discussed in this paper can serve as a menu for e-business managers to choose in order to develop and improve their e-business operations.

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**Table I**

Comparison of success factors between the literature and Intel's study

Factors	Literature	Intel
Customer focus, personalization	Y	Y
First-mover advantage, ensure quick time to market	Y	Y
Right digital infrastructure	Y	Y
Operational cost control	Y	Y
Control risk while allowing innovation	Y	Y
Education and training	Y	Y
Distribution and supply chain	Y	Y
Customer expectations management	Y	Y
Products and services reevaluated	Y	Y
Human resources	Y	Y
Extension of current systems	Y	Y
Competitors and market shares tracked	Y	Y
Web-centric marketing strategy	Y	Y
Virtual marketplace participation	Y	Y
E-business management style	Y	Y
Quality of network connections for partners/customers	-	Y
Security	-	Y

Notes: Y = used and/or required; - = not applicable nor required

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