E-Business Strategy: An Industry Clockspeed Perspective

By

Sanjeev Kalanidhi

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M.S in Information Systems (1996)
The University of Maryland, College Park

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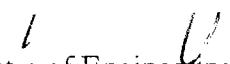## Massachusetts Institute of Technology

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Signature of the Author........   ....
Engineering Systems Division
May 5, 2000

Certified by......   ....
James B. Rice, Jr.
(Director, Integrated Supply Chain Management Program
MIT
Thesis Supervisor

Accepted by.............................   ....
Yossi Sheffi
Director, Master of Engineering in Logistics Program
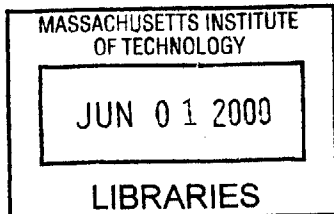
To my parents,

and to my sister Sharada

E-BUSINESS STRATEGY: AN INDUSTRY CLOCKSPEED PERSPECTIVE

ABSTRACT

By Sanjeev Kalanidhi

The Internet is a communications network that connects computers around the world. It has been around since 1960's. The Internet Phenomena – the recent upsurge in business use of the Internet can be attributed to the World Wide Web or the web. The web uses universally accepted communication protocol and presentation language (i.e. Internet Protocol and Hyper Text Markup Language) that makes it a standard interface – a ubiquitous interface. Businesses are leveraging the Internet to obtain a variety of business benefits. Based on an extensive literature review, this thesis presents a catalogue of 35 distinct business benefits.

To obtain these benefits, businesses are undertaking a variety of projects and initiatives. The projects and initiatives, termed as E-business apply the Internet technologies for improving existing business processes, removing barriers within a business, and or among businesses in the supply chain. This thesis organized E-business projects into eight different areas.

This thesis explores the Internet Phenomena – it attempts to understand the potential Impacts of the Internet on the supply chain, and proposes some guidelines for management teams interested in choosing E-business projects.

By mapping E-business benefits along a typical supply chain, this thesis observes that the Internet is creating structural and operational impacts in the supply chain. The structural impacts appear to result from (a) the growth of a direct channel (b) the presence of new economic agents and (c) new marketplaces. The operational impacts appear to be that (a) the scope of supply chain operations change (b) the scale of supply chain operations are enhanced and (c) the speed of supply chain operations increase.

The thesis suggests ten perspectives that may help a management team choose E-business projects. It examines one perspective in detail – the Industry perspective. The industry perspective suggests that differences in industry structures should lead to differences in business needs and requirements, and therefore lead to different e-business opportunities. A hypothesis, based on an industry classification system (proposed by Charles Fine of MIT), was developed.

The findings suggest that industry perspective, can, indeed provide some guidance to the management team.

The thesis concludes by providing ideas for further research – including some ideas on developing an integrated E-business strategy model.

Thesis Advisor: James B. Rice, Jr.
Title: Director, Integrated Supply Chain Management Program, MIT

BIOGRAPHICAL NOTE

Sanjeev Kalanidhi is a candidate for the Masters in Engineering program in Logistics at MIT, Cambridge, MA. He holds an MBA and MS in Information Systems from the University of Maryland, College Park.. Prior to attending MIT, he was an Advisor for the Strategy and Alliances Group of the Electronic Commerce Department at FedEx Corporation, Memphis, TN. At FedEx, he was also a leader of key projects such as ISO 9001 Audit and Software Process Improvement. His professional training included, inter alia, Scenario Planning and Strategy Formation from Global Business Network, Advanced Project Management from Project Management Solutions, and Process Development and Requirements Engineering and Capability Maturity Models from the Institute for Software Process Development. He is a member of professional bodies such as Council for Logistics Management and the Strategic Management Society.

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ACRONYMS

EDI   Electronic Data Interchange

BTO   Build-To-Order

DOD   Department of Defense, US Government

ARPANET   Advanced Research Projects Network

CPFR   Collaborative, Planning, Forecasting and Replenishment

ROI   Return on Investment

ACKNOWLEDGMENTS

CHAPTER 1: INTRODUCTION

1.1 The Internet Phenomenon

Before the advent of computers and electronic networks, business communication was primarily paper based. Since the 1960's, businesses have found it both economical and efficient to use computers for supporting essential business processes (e.g. accounting, finance, human resources management). The growth of electronic business communication was further enhanced with the development of Electronic Data Interchange (EDI). EDI is defined as "(set of) standardized electronic message formats for business documents such as requests for quotations, purchase orders, purchase change orders, bill of lading, receiving advices and invoices."[1] By reducing manual intervention, EDI increases the speed and accuracy of business processes, especially when compared with paper based systems. However, EDI has major limitations - the cost of implementing and operating EDI applications is high, the standardized formats are difficult to change and do not keep pace with changing business practices, and businesses face the prospect of being locked into proprietary technologies developed by software vendors.

The Internet presents the business community with the ability to overcome some of the limitations of EDI. The Internet has been around for a while[2]. During the 1960's, the US Department of Defense (DOD) developed ARPANET to inter-link defense institutions and select educational institutions in a communication network. By 1980's, the ARPANET network covered a large number of academic institutions. In the 1990's, the growth of the Internet users increased exponentially. The reason for this growth has been credited to the World Wide Web (WWW) or the web. The World Wide Web is "a global information sharing architecture that

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[1] Kalakota, Ravi and Andrew Whinston "Electronic Commerce – A manager's guide" p.376

[2] For an historical perspective on the Internet and World Wide Web, see Kalakota and Whinston, 1998 p. 64

integrates manifold online content and information servers in a fast, cost effective and easy-to-use manner." The two important attributes of the web are

i.   Ease of use: The Web uses Internet protocols[3] and universal presentation language called HyperText Markup Language. The language is well documented, and tools make it easy for anyone to publish manuals and catalogs on the Internet.

ii.   Real time computing: The Web makes it easy for every one to communicate more information on a real time basis without regard to the systems in the backend.

These attributes have made the Internet ubiquitous; it has been transformed from a simple communications tool to a versatile information sharing and collaboration tool both within a business and among business partners. For a manufacturer, the Internet could be used for collaboration among product design teams placed anywhere in the world, for information sharing with suppliers, distributors, retailers, and for communication with consumers.

Before I delineate the scope and the research outline of this thesis, a reference to definitions of a few terms is in order.

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[3] Protocol: In information technology, a protocol (pronounced PROH-tuh-cahl, from the Greek *protocollon*, which was a leaf of paper glued to a manuscript volume, describing its contents) is the special set of rules for communicating that the end points in a telecommunication connection use when they send signals back and forth. Protocols exist at several levels in a telecommunication connection. There are hardware telephone protocols. There are protocols between the end points in communicating programs within the same computer or at different locations. Both end points must recognize and observe the protocol. Protocols are often described in an industry or international standard.

Internet Protocols: On the Internet, there are TCP/IP protocols, consisting of:
TCP (Transmission Control Protocol), which uses a set of rules to exchange messages with other Internet points at the information packet level.
IP (Internet Protocol), which uses a set of rules to send and receive messages at the Internet address level.
HTTP (Hypertext Transfer Protocol) and other protocols, each with defined sets of rules to use with other Internet points relative to a defined set of capabilities.
(from www.ask.com)

1.2 Working Definitions

- Supply Chain: According to Poirier, a supply chain is "a system through which organizations deliver their products and services to their customers"[4]. The important players in the supply chain are – suppliers, manufacturers, distributors, retailers and consumers. An example of supply chain is the paper supply chain. In this chain, the suppliers are the owners of natural raw materials (i.e. wood). They provide logs to manufacturers who process the wood into printing paper. The manufacturers then sell the production to office products distributors. Finally, retailers like Staples order paper products from the distributors for sale to consumers. Figure 1.1 shows the basic inter-company supply chain.

Figure 1.1 The Intercompany supply chain

Key:
- funds
- information
- material processing

Adapted from presentation by Metz, Peter "Logistics and change management" Center of Transportation Studies, MIT
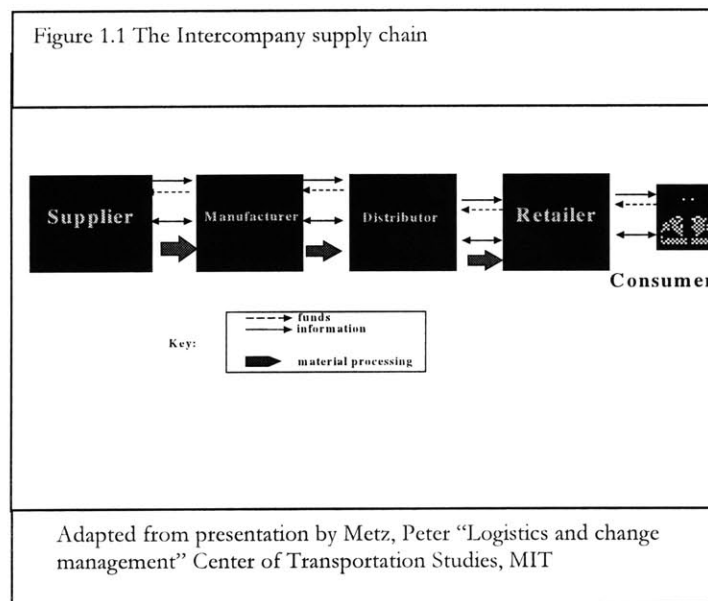
- E-business: E-business refers to projects or initiatives that leverage the Internet technologies for easy and inexpensive real-time communication, and provide *business benefits*

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[4] Poirier, Charles C. and Stephen Reiter "Supply Chain Optimization: Building the Strongest Total Business Network." p.3

by (a) improving existing business processes and, or (b) removing barriers within businesses, and among businesses in the supply chain[5].

Chapter 2 presents a sample of thirty-five distinct E-business benefits identified from a literature review of over seven hundred business articles. Further, a classification system is developed to classify E-business benefits into eight project areas.

- <u>B2B</u>: Commercial activities and processes that take place between business entities over the Internet (e.g. purchase orders, exchanging product design plans, sharing manufacturing plans and forecasts)

- <u>B2C</u>: Commercial activities and processes that take place between businesses and consumers over the Internet (e.g. communicating product information, taking orders over the Internet, providing order status information)

1.3 Thesis Outline

The increasing use of the Internet for achieving business benefits presents a business researcher with a number of interesting research opportunities. A few examples of research questions are[6]:

- How is the Internet effecting the global economy?

- How is the Internet changing business relationships?

- What impact does the proliferation of E-business benefits have on a typical supply chain?

- On what basis should managers select, and prioritize E-business projects?

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[5] This definition was derived from a number of sources (e.g. Gartner Group website www.gartner.com) and from discussions with my classmates of the MLog program.)

- What are the different business models spawned by the Internet?

Each of the above research questions can be a topic for a Masters or even a Doctoral thesis.

The scope of this thesis is:

1. To understand potential impacts the Internet may have on a typical supply chain

In Chapter 3, thirty-five distinct E- business benefits[7] are mapped in different supply chain domains[8] and observations are made. The observations - discussed in the chapter, suggest that the Internet is inducing structural[9] and operational[10] changes in the supply chain.

2. To propose guidelines for assisting management teams in choosing different E-business projects.

A management team interested in choosing different E-business projects may benefit from examining different business parameters or "perspectives". Chapter 4 briefly outlines ten "perspectives" that can potentially influence or shape the selection of E-business projects within a company (e.g. asset ownership, customer needs, and industry).

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[6] These research ideas were developed from the taxonomy of business literature relating to the Internet phenomenon. The literature covered areas such as supply chain management, Internet, E-business, Internet-enabled benefits, supply chain integration, globalization etc.

[7] See section 2.2

[8] Supply chain domains: e.g. the supplier-manufacturer domain, the manufacturer-distributor domain, retailer-consumer domain etc.

[9] Structure of Supply chain - What type of business entities does one notice in the supply chain? How is the supply chain organized?

[10] Operation of Supply chain - How does the supply chain work? What types of transactions, relationships and processes are seen in the supply chain?

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In chapter 5, one of the ten perspectives – the industry perspective - is examined in detail. This perspective suggests that industry structure vary a great deal and, as such, E-business needs, requirements and opportunities differ across industries. Bearing this in mind, a hypothesis, based on an industry classification system (proposed by Charles Fine of MIT), is developed. The findings appear to suggest that the industry to which a company belongs may offer some guidance on the choice of that company's E-business projects.

By examining one perspective in detail – the industry perspective – this thesis makes a modest contribution to the development of an integrated E-business strategy model. The full articulation of such a model would likely depend on the results of research on the other nine perspectives. In Chapter 6, I conclude by offering two possibilities – a system dynamics approach and an econometric approach – for an Integrated E-business strategy model.

CHAPTER 2: LITERATURE REVIEW

2.1 E business benefits Identification process

Following the definition of E-business in Chapter 1, a two-step process was used in identifying and cataloguing E-business benefits from a review of the literature:

First, a broad review of secondary research of well-known business publications was done, using the definition of "E-business" as a guide for identifying business benefits.

Second, the identified business benefits were then catalogued and referenced. Whenever necessary, the unique attributes of the Internet or web-based applications that were essential in obtaining business benefits are discussed.

Over seven hundred business articles were reviewed. This review enabled me to identify thirty-five distinct "E-business benefits". In the following section (2.2), the identified 35 business benefits are categorized into eight E-business project areas. Table 2.1 shows the 35 E-business benefits distributed across the eight project areas.

2.2 Catalogue of E-business benefits

The 35 distinct E-business benefits identified from the extensive literature review are now discussed below:.

1: The ubiquity of the Internet is enabling businesses, especially those which are predominantly brick and mortar operations, to gain newer customers.

Nationally, Office Depot has over 750 stores and 30 warehouses. In 1998, the Internet operations made sales of over $250 million. Though these sales account for only 3% of total operations, the Internet operations are growing at the rate of 200% per year. Office Depot attributes a part of this rapid growth to the proliferation of the Internet – for being able to

reaching new customers who are not near an Office Depot store[11]. Some may argue that Office Depot can just as easily lose customers to other online retailers like Office Supplies.com, and to other retailers such as Staples (which also has Internet based operations). So far, Office Depot has been able to stymie the threat to an early focus on Business–to–Business (B2B) electronic commerce. It has set up over 37,000 web pages for corporate clients. These websites offer employees different office supply selections based on the their levels of authority (usually determined by the customers procurement department).

2. The Internet is enabling businesses to reduce order-processing costs by allowing customers to input the orders.

Office Depot began selling office supplier over Internet in 1996. Typically, processing an order of $100 by telephone costs $2.00. Over the Internet, Office Depot has seen the processing costs for similar order reduced by half to $1. With customers entering orders at the office deport website, the business has seen a lesser need for dedicated customer service representatives[12]. Also, orders from the web have lesser order entry errors- since customers are in control of the ordering process. The ease of Internet for Office Depot's customers has meant that the returns for merchandise for online orders are 50% lower than orders taken over the telephone.

3: By linking billing with web base order entry processes, businesses are using Internet to Reduce their customers' order processing costs

Office Depot reports that many of its customers incur cost up to $100 simply for sending out purchase orders and paying invoices. By integrating billing with the web-based order entry processes, Office Depot has helped its customers streamline purchase order generation and invoicing activities. MCI has reported that its annual expenditure for obtaining office supplies has reduced from $3.5 million to $3.15 million – resulting in savings of over 10%[13]. Urban Sommer, Director of Procurement at MCI says, " We went to Office Depot primarily because of their web systems, which translated to greater efficiency in ordering." Another side benefit – MCI reports that calls to the purchasing department fell by 60% after employees began to order online. For purchasing personnel – this can mean a higher job satisfaction.

4: Internet is enabling businesses to establish new sourcing relationships through (a) use of online catalogs (b) online bidding/quoting systems and (c) online auctions.

[11] Rocks, David, "Why office depot loves the net?", Business Week, September 27, 1999

[12] Rocks, David, "Why office depot loves the net?", Business Week, September 27, 1999

[13] Rocks, David, "Why office depot loves the net?", Business Week, September 27, 1999

GM recently announced that it would be setting up its own trading exchange. This system will allow GM to conduct transactions with a wide array of suppliers. Some of the suppliers will participate in GM online sourcing catalog. Still others can put their bids in an online bidding/quoting system. And, perhaps all can participate in a GM hosted online auction. These arrangements will help GM increase the supplier base, and reduce the purchasing cycle time – from the time orders are placed, bid or quoted – to final payments[14].

Major manufacturers like GM have been technologies like EDI for purchasing goods electronically for a long time. According to Neil Gross of Business Week, " (the ability of) EDI in specifying orders and inventory is both limited and slow"[15]. The electronic conversation is structured – If GM wants 100 tires, it sends out an EDI request to a supplier. The supplier then sends out structured information on item availability and pricing. If GM wanted to add some unique specifications (e.g., tire quality) the dialogue would have to be made over phone or e-mail. Now, over Internet GM can broadcast the requirements, and use web-based programs to rank responses from various suppliers. The ubiquity and interoperability of Internet enables GM to maintain conversations (both structured and interactive) with a wider number of suppliers. Also, Internet gives GM's sourcing processes added flexibility – the flexibility needed to adapt new manufacturing paradigms e.g. build-to-order. GM trading exchange is using Commerce One's MarketSite global trading portal system.

The difference between buyer hosted catalogs (GM) vs. supplier hosted catalogs (Office Depot): When purchasing organizations want to maintain control of the catalog content, the purchasing organization can develop a web catalog and ask suppliers to update product and pricing availability. When purchasing organizations do not want to maintain tight control over content, they can use a supplier-hosted catalog (e.g. Office Depot). While supplier hosted catalogs can provide purchasing organizations convenience, and reduce processing costs – it also allows the supplier to differentiate product and service offerings.

In this context, it is worth noting that GM has recently announced that it plans to combine its online purchasing efforts with those of Ford and DiamlerChyrsler. It is not clear whether this initiative supercedes or complements GM's earlier E-business efforts[16].

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[14] Kyung Kim "GM Conducts web auctions on GM trade exchange site", Dow Jones Newswires, December 17, 1999.

[15] Gross, Neil "Leapfrogging a few links" Business Week, June 28, 1998.

[16] Simison, Robert "Big three automakers plan to merge online purchasing.' Wall Street Journal, February 25, 2000

5: Protocols such as XML are allowing businesses to exchange documents such as purchase orders and invoices over the Internet– leading to reduction in purchasing lead times.

RosettaNet, an Internet standard development consortium, has developed open standards XML templates (known as Partner Interface Processes or PIP) for managing the procurement processes. Some of these PIP's involve (a) request for pricing information (b) request for inventory levels and (c) order status. Solectron, a contract manufacturer and Marshall Industries, a distributor (recently acquired by Avnet) both have different enterprise systems. Yet, these systems are able to use PIP's to exchange information over Internet is a seamless and secure manner. For Marshall, this pilot has demonstrated a significant reduction in purchasing lead times[17].

6: Businesses are using web-based catalogs from third party vendors to improve existing purchasing practices. Improvements include greater harmonization of purchases across business units, and price consolidation.

Aspect Development, a third party catalog vendor, has developed a mega-catalog of 10 million items, with 15 million design notes that are routinely updated. The catalog covers offerings from 900 suppliers from US, Japan and Europe. 3COM is using Aspect's mega-catalog to consolidate harmonize products and pricing decisions across business units. The improvement in purchasing process resulted in savings of over $10 million[18]. While Aspect can be considered a third party middleware applications provider – it has also offered companies guaranteed savings for using its products. It would, therefore, make sense to consider Aspect as a third party service provider. Ariba is another player that is developing online trading communities for maintenance, repair and operating (MRO) products. MRO products like office supplies, spare parts etc. are necessary for business operations, but are not inputs into the production process. Typically, a US corporation spends anywhere from 30-50% of its annual revenues on MRO purchases. Any reduction in MRP expenses can directly impact corporate profitability in a positive manner[19].

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[17] Blanchard, Dave "Seeds of a solution" Supply chain technology news, Sept/Oct 99

[18] Hardy, Quentin "Chain gang" Forbes, October 4, 1999

[19] Glynn, C J "Business – to –Business Electronic Commerce. Delivering bottom line results." Supply Chain Management Review Global Supplement, Fall 99

7: Extranets[20] and Web-based quoting tools help streamline and automate material acquisition process, and help businesses achieve significant reduction in sourcing cycle times.

Lexmark is using a web-based quoting system to reduce its sourcing cycle time. It has reduced Request For Quote (RFQ) cycle time from 5 days to 2 days[21]. Consider a product like laser photocopier – it requires hundreds of small parts. These parts can sometimes constitute as much as 80% of the products' total cost The way Lexmark handled the RFQ process was

Day 1: Purchasing coordinator distributes bill of materials to Lexmark's buyers (email)
Day 2: Buyers distribute RFQ to suppliers (email)
Day 3: Suppliers review RFQ and respond (email)
Day 4: Suppliers review RFQ and respond (email)
Day 5: Buyers receive bids, input information into purchasing system, clean up bids, analyze bids and determine responses which are not complete

Lexmark's extranet and web-based quoting tool from Digital Buyer – together provide the buying department the ubiquity to reach suppliers, and the computing infrastructure to analyze the bids. As a result, a layer of communication between purchasing department and buyers, and buyers and suppliers is removed.

The new process is as follows:
Day 1: Purchasing coordinator distributes RFQ's to Lexmark's buyers and suppliers through Lexmark's extranet site
Day 2: Suppliers respond and, concurrently buyers perform their analysis (using digital buyer tool)
Day 3: Suppliers respond and, concurrently buyers perform their analysis (using digital buyer tool)Roberts also adds that a study conducted by Hau Lee of Stanford University for Solectron found that extranet combined with web-based quoting analysis tool reduced the RFQ cycle from 10 days to a range of 4 hours to 2 days. Both Lexmark and Solectron believe that the reduction in RFQ cycle will give them the ability to introduce new products to the market at a faster pace – a definite strategic advantage in the Electronics industry.

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[20] An extranet is a private network that uses the Internet protocols and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. (from www.ask.com)

[21] Roberts, Bill "Supply Chain, Simplified via the web", InternetWorld, October 15, 1999

8: By substituting paper and EDI purchase orders with web-transmitted requests, businesses are finding major improvements in order fulfillment operations.

Example: Herman Miller is a $2 Billion furniture manufacturer in Holland, MI. By replacing paper and EDI purchase orders with online ordering system, Herman Miller noticed a dramatic improvement in order fulfillment process. The orders generated from web are easily transmitted to Herman Miller's suppliers. This has resulted in reduction in furniture components from two-weeks to 3 days. Most importantly, Herman Miller has statistics that suggest that customers are now getting the right order, and 99.7% of the time orders are being delivered as promised[22].

As illustrated in the example above, Internet can improve the fulfillment process. But can it lower fulfillment costs? E-commerce environment typically is a one-to-one shipping environment. If the back –end processes such as pick, pack, ship, track, delivery notification and exception processes are not well integrated - the fulfillment costs can actually rise. Only when order management activities, back-end processes and tracking data from shipping companies are merged over Internet – can the customers and company employees gain full visibility into the fulfillment processes. According to The Forrester Report - with increased visibility, business can reduce redundant activities and make better shipping decisions[23]. This can lead to lower fulfillment costs.

9: By publishing large bulky content (especially those that require regular updating) on the Internet, businesses are reducing the costs of customer communication.

Merck is reducing communication costs by moving content that is typically bulky (e.g. pharmacological information), needs to be regularly updated (e.g. regulatory information), needs to be current (e.g. pharmacy locations), and needs to be circulated to medical supply chain partners (e.g. sales information) to its corporate Internet site.

Though no figures were available, Merck claims to have obtained benefits in terms of cost reduction and improved customer relationships. To illustrate the potential benefits, one can look at Kinko's – a business printing and communication services company. Typically, Kinko's spends $500,000 a year on paper, printing and postage expenses to communicate operational and procedural information to its employees. By investing $1 million on an internal communication web-site, Kinko's was able to accomplish the same objective, without

[22] Shachtman, Noah "E-Business demands a new outlook on ROI" Information Week, October 18, 1999, www. Informationweek.com

[23] "Mastering commerce logistics" The Forrester Report, August 1999

[24] Piturro, Marlene "Get into e-commerce without betting the store" Journal of Accountancy, 187(5); 56-63.1999 May.

[25] Piturro, Marlene "Get into e-commerce without betting the store" Journal of Accountancy, 187(5); 56-63.1999 May.

the \$500,000 in annual expenses. Thus, the ROI on this project was 50%[24].

For Merck, the indirect benefits can be lower call center volume, and building customer relationship by allowing them to easily search and access information[25]. The typical issues with publishing on the Internet involve content management and copyright infringement. Fortunately, there is evidence that new tools are being developed to address these problems.

10:   Internet is enabling businesses to improve ROI by leveraging   existing investments in information technology (especially ERP)
Discussion: When Toro decide to implement SAP, it did not do a hard ROI calculation. It has spent over \$25 million on SAP over four years. Toro is now getting some benefits. The superior information provided by SAP has helped Toro move from a traditional model (delivering product to a few key distributors) to new model (delivering products on JIT basis directly to big retailers like Sears). This has resulted in inventory savings of about \$10million. By extending its ERP application to the Internet, Toro plans to increase its ROI by improving its relationships with its down-stream partners. Toro plans to obtain significant strategic benefits by extending its ERP application (SAP) to the Internet[26]. For a start, it does not have to invest in a dedicated network. Instead, Toro can now share securely, and conveniently provide inventory information with its supply chain partners on a 24*7[27] basis. The partners can also see, in a real time basis, information on product availability and product commitments.

11: By enabling customers to order online and use online catalogs, businesses are able to leverage sales personnel for other higher value-added activities.
Marshall Industries is recognized pioneer in the use of Internet for business applications. Marshall's customers do not have to contact sales person for service. They can go the Marshall's website to search and order for products, and track the status of the orders. Based on order status, the customers have the choice of using expedited shipping options. These above functionality's are now considered essential for any business-to-business e-commerce site. Customer are now getting the level of service that they would typically get from a Marshall's sales agent. Marshall can now allocated sales resources for other business development activities[28].

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[26] Stein, Tom "Making ERP add up" Information Week, May 24, 1999

[27] 24 hours a day, 7 days a week

[28] Ghose, Shikhar "Making Business sense of the Internet", Harvard Business Review, March-April 1998

12: The ability to keep a website open all the time is enabling businesses to extend operations and provide customer service on a 24*7 basis, all throughout the year.

Wal-Mart, a brick-and-mortar retailer, has gone online with walmart.com. The online operation complements the traditional retail operations in two ways. One, the online operations allows Wal-Mart to sell products on a 24*7 basis year round – with absolutely no service disruption. Second, for customers the service is consistent and convenient. They can mail back products, or return products to any Wal-Mart retail store[29].

13: Businesses are developing new web-based applications to create a self-service environment for their customers.

Initially companies began to publish product information on the Internet (also known as "brochureware"). With businesses increasingly customer service on the web, customers are getting to see and experience the capabilities of Internet medium. OfficeDepot.com website has many self-service features. Every time a customer logs in to the website - Internet applications generate a shopping list based on previous purchases, downloadable business forms, financial applications and spreadsheets. The website also provides real-time status of inventories at Office Depot's warehouses or stores throughout United States[30].

14: By allowing customers to configure products online, businesses may be able to reduce product returns.

Dell undertook a study that suggests that web can reduce returns. When Dell decided to sell its PC's online, the managers at Dell believed that the returns would be higher. The reasoning was simple – customers would not make good choices because they would not have the benefit of sales representative guiding them over telephone. However, when Dell decided to go online and allow its customer to configure PC's, the managers found that the returns was 2.1% as compared to 2.65% for orders taken over fax and phone. The possible reason attributed for the benefit is that customers can configure PC's in their leisure time – and take breaks and complete process at times convenient to them. They can also cancel orders online and reduce returns[31].

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[29] Karpinski, Richard "Is your business ready?" InternetWeek, December 20, 1999

[30] Violino, Bob "Office Depot builds a winning strategy on the web" InformationWeek, December 13, 1999

[31] Caldwell, Bruce "The Web can reduce returns" InformationWeek, April 1999

15: By developing an e-commerce website as a forum for information exchange, businesses are proving customers with complementary services.

The web can be considered a standard and universal interface, and allows the facilitation of interactive communication and community development. Amazon.com allows customers to post their reviews and comments on the books on the books they have read. This allows the visitors to consider views of their peers before making the final decision. Some of the potential benefits of this feature can be increased customer loyalty and reduced returns[32].

16: Businesses are using the convenience and ubiquity of the Internet to inform customers about exceptions on a real time basis.

Third party service providers play an important role in almost every supply chain. The ubiquity of Internet is essential for timely dissemination of service statistics. Penske logistics is major third party logistics services provider. It transports and warehouses inventories for JIT manufacturers like GM and Toyota. These clients depend on Penske for timely service. If Penske is not able to make deliveries, it needs to inform material and plant manager about exceptions on a proactive basis. Penske has installed hand-held computers to track truck movements and is building extranet sites to inform customers about service delays. Penske is thus able to publish exception reports quickly, and has seen major improvements in customer service[33]. With proactive information, managers can make optimal decisions. The indirect benefit can be in lower inventory carrying costs.

17: New 2-way interactive communication technologies are enabling businesses to develop one-to-one customer service channel over the Internet.

Marshall industries is not only using the Internet for procurement purposes (Benefit 5), but is also using Internet to build very intimate and responsive customer service environment[34]. One of the tools that it has incorporated is the 2-way interactive chat sessions on the website – where customers can engage in discussions with sales agents. The availability of 2-way interactive tools removes any hesitancy that customers may have about doing business on the web. For Marshall, the technology was the easy part. The tougher part was to resolve the differences between the compensation for traditional sales– and compensation for Internet sales. Marshall has implemented a reward system that ties sales efforts to corporate profitability.

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[32] Ghose, Shikhar "Making Business sense of the Internet", Harvard Business Review, March-April 1998

[33] Davis, Beth and Jennifer Meteyaschuk "Rapid Response" InformationWeek, January 12, 1999

[34] Wilder, Clinton et al "Giving users the E-business" InformationWeek, December 20 1997

Cisco also has implemented IP voice over Internet. If customers are not able to find information, or need additional assistance – they simply have to click a button and speak to a customer service agent. Before Cisco moved to web, it rated its customer service as 3.4 on an internally developed scale of 5. Now, with web-site and Internet telephony – it rates the service at 4.17[35]. Organizations like Cisco have developed internal metrics to capture business benefits of Internet. The use of web based applications like telephony provides Cisco with a powerful one-to-one marketing and customer service channel. The challenge, however, is to ensure that these applications have "zero latency" (i.e. No down time – any breakdown can mean negative customer experience) and are scalable to meet increasing demand. Though these projects show initial promise, the costs of upgrading and maintaining services needs to be factored in the business case.

18: With the deployment of self-service tools and interactive communication tools, business can learn customer buying behavior and preferences.
According to Hamel and Sampler, "The web lends itself to immediate customer feedback and rapid adjustment. Learning cycles are much shorter on-line than off-line. Companies that are quick to try, quick to learn, and quick to adapt will stay ahead. Companies that have taken months to assess what they've learned, whose internal processes don't run on Internet time, will be left behind"[36]. By observing customer interaction on its website, Staples can collect valuable information on customer buying behavior and learn their preferences[37]. Hamel and Sampler suggest learning curve benefits for Staples "Zipping through the learning cycle creates positive feedback effects: The faster a company learns and adapts; the more customers it wins; the more customers it wins, the faster it can learn and adapt".

19: Businesses are leveraging information and analyzing customer's buying patterns over the Internet to provide customized product offerings.
As mentioned earlier, Staples can learn about customer behavior by observing customer interaction over the web. Much of this learning can be utilized for providing customers with "customized" product offerings – and Internet can be used to provide a personalized interface to present a value proposition directly tailored to an individual customer. The anticipated benefits are increased customer retention and sales[38].

20: Businesses are developing the Internet channels to provide wider (and sometimes different) range of products than in their traditional retail stores. Internet is enabling

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[35] Waltner, Charles "Web commerce means E-service" InformationWeek, July 12 1999

[36] Hamel, Gary and Jeff Sampler "The E-corporation", Fortune www.fortune.com accessed on December 23 1999

[37] Ghose, Shikhar "Making Business sense of the Internet", Harvard Business Review, March-April 1998

[38] Ghose, Shikhar "Making Business sense of the Internet", Harvard Business Review, March-April 1998

businesses to develop new distribution and retail channel.

Example(s): Sears is losing the market share to category killers like Home Depot, specialty discounters like Old Navy, and discounters like Walmart. In response, Sears is launching an Internet division — Sears.com. Sears had decided to focus its online channel on home products such as appliances and machine tools[39]. — businesses that have been stable for many years. Sears does not intend to sell clothes online, because its apparel business has been through many seasonal gyrations.

21: By incorporating database driven language translation tools over the Internet, businesses are able to reach customers around the world with greater effectiveness.

The web can be accessed globally. However, to reach a specific country market, the website must at least have multi-lingual capabilities. GE Information systems was looking for ways to develop localized version of its website to meet the needs of the European market. Tools such as Global Sight Ambassador from Global Sight Inc. help GE reduce content translation time and reach customers globally with greater effectiveness[40].

Kodak has 16 different language versions of its website kodak.com. It uses WorldPoint's Passport software to translate the 30,000 to 40,000 pages of content on the site. Web tools from software vendors like WorldPoint and Global Sight are essential for companies who wish to derive benefits from globalization of supply chains[41]. DaimlerChrysler use such tools to reach smaller trading partners in Europe, and Chipshot.com for reaching customers in Japan.

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[39] Brown, Eryn "Big Business Meets the e-World", Fortune Nov 8, 1999

[40] Engler, Natalie "Global E-commerce", InformationWeek, October 4

[41] Engler, Natalie "Global E-commerce", InformationWeek, October 4

22: By moving existing customers away from proprietary systems to Internet, established businesses are finding an increase in sales revenues.

Within a month after Merisel went online, the 40% of customer switched from proprietary ordering systems to the web. Merisel is considering moving all of its customer entry order processing to the web and abandoning its proprietary ordering systems altogether[42].

W.W Grainger finds that corporate buyers who move from traditional ordering systems to Internet actually like the experience. They are staying at the site longer and buying more. Statistics collected by Grainger suggest that a typical customer which moved from proprietary ordering systems to the web this was ordering 32% more than the year before[43].

23: Distributors are giving resellers and retailers access to their systems over the Internet. As resellers interact with the distributors systems – the distributor learns about retailers preferences and supply chain capabilities.

Ingram Micro has opened its systems to distributors and retailers. It allows them to access to information over Internet. With product order and status information readily available over the Internet, the resellers are more interested to learn about product compatibility and configuration issues. By allowing its customers to access its systems over the Internet, Ingram learns about resellers operations and supply chain capabilities. Ingram intends to use this information for building business partneships.[44].

24: Internet is enabling supply chain partners to share planning schedules with suppliers on a real time basis, therefore reducing product development cycle times.

Adaptec shares data with its contract manufacturer, Taiwan Semiconductor Manufacturing Corporation (TSMC) over Internet This arrangement reduced product development cycle time to 55 days and reduced WIP inventory by half (from $18 million to $9 million)[45]. Though Adaptec and TSMC use different ERP systems, they are able to communicate share planning schedules over Internet by using software from Extricity.

The reason for the long product development cycle was the lack of integration between different systems within Adaptec, as well as between Adaptec and TSMC. When Adaptec received an order, the (Adaptec's) buyer would re-enter into the manufacturing system, pull out paper drawings, fax them to Taiwan, and then submit a purchase order to TSMC. Now,

[42] Periera, Pedro "Internet services ready for lift-off" Computer Reseller News, March 3 1997

[43] Wilder, Clinton and Gregory Dalton "E-Commerce Dividends", InformationWeek, May 3 1999

[44] Pereira, Pedro "Internet services ready for liftoff" Computer Reseller News, March 3, 1997

[45] Getting slack out of cycle time, Fortune, November 1999

with the Internet based solution – orders move to TSMC with the product drawings. The confirmations are received quickly – and the product development cycle times and WIP inventory have reduced considerably.

Hau Lee in his article gives an interesting survey result. Companies engaged in higher levels of sharing had higher than average profits (Stanford/Anderson Consulting survey)[46].

25: The Internet is enabling supply chain partners to connect and create a collaborative work environment. This results in reduced product development times and improvement in research and development (R&D) and innovation.
Ford is deploying engineering applications such as CAD, CAM and CAE over Internet. Ford can now design cars collaboratively with its partners. The geographically separated workers can inexpensively and securely connect and work on CAD applications. Ford has able to leverage Internet to reduce product development cycle times and improving its research and development efforts[47]. The real time sharing of data allows Ford and its suppliers to reduce product development times. Team working in US, Japan and Sweden can design products in parallel rather than in sequence. Ford is using Internet enabled engineering applications to 34 vehicle development efforts and wants to expand this to 60 by the end of the year.

Bechtel's customers want to access engineering applications online during the project lifecycle. Bechtel has been able to reduce project review cycles and has been able to leverage expertise of its employees all over the world[48]. Internet is, therefore, emerging as a major medium for knowledge-management and product innovation.

26: Internet is enabling supply chain partners to make joint decisions on plant capacity allocations.
Adaptec and TSMC are using Internet to make joint decisions on semiconductor fabrication capacity[49]. This suggests that collaboration may make for better integration between the two companies, also increasing commitment to their mutual success.

27: Internet is enabling customers and supply chain partners obtain visibility into inventory levels and movements.

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[46] Lee, Hau and Seunjin Whang "Supply Chain Integration in the age of e-business." Supply Chain Management Review Global Supplement, Fall 1999

[47] Sweeney, Terry "R & D – Net Helps Ford, Bechtel to innovate" InternetWeek, October 25, 1999

[48] Sweeney, Terry "R & D – Net Helps Ford, Bechtel to innovate" InternetWeek, October 25, 1999

[49] 'Getting slack out of cycle time', Fortune, November 1999

Cisco is allowing its customers to connect to its inventory systems over Internet. Once the customers have made the necessary investments, they are unlikely to switch away from Cisco. Thus, Cisco has the benefit of being a dominant player in the new Internet channel for networking products[50].

Ingram Micro is also letting its resellers connect to its inventory systems over the Internet. This allows Ingram to strengthen its partnerships with resellers[51].

28: The Internet is enabling businesses to collaborate with supply chain partners, using industry-wide collaborative, planning, forecasting and replenishment standards.
Heineken is widely credited to have pioneered the first use of Internet for collaborative, planning and replenishment standards. Beer is manufactured in Europe and shipped to 450 distributors in United States. The beer is delivered on a replenishment basis based on forecast jointly determined by Heineken and its distributors. Heineken posts long term forecasts for each of the distributors and the distributors log in to the company website through secure Internet connections, and review, revise and approve forecasts[52].

Both big and small distributors can participate in the CPFR process over Internet. The paper does not mention whether Heineken shares the forecasts with its suppliers. The beer industry is known to be vertically integrated – one can therefore speculate that CPFR on the supply side way not be make economic sense. Internet enabled CPFR has reduced order fulfillment lead times from 12 weeks to 6 weeks.

29: The Internet is enabling businesses to use real time information sharing among partners for monitoring events in the supply chain (and make proactive decisions).
Carpetland is implementing business alerts systems. This system monitors any abnormal fluctuation in the inventory levels through Internet to decision-makers within the company. The company envisions sharing this information with its supply chain partners[53]. With the growth of electronic commerce, the demands for Internet driven monitoring and alert applications is likely to increase manifold.

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[50] Ghose, Shikhar "Making Business sense of the Internet", Harvard Business Review, March-April 1998

[51] Pereira, Pedro "Internet services ready for liftoff" Computer Reseller News, March 3, 1997

[52] Hewson, John and White, Andrew "Collaborative value chain management over the Internet." Council of Logistics Management Annual conference papers, 1998

[53] "How fast can you respond? The return on investment from enterprise wide alerts", White Paper, Categoric Corporation, www.categoric.com.

30: The Internet is enabling businesses to sell directly to end-customers.

Cisco was conducting over 40% of sales by March of 1998. Its goal is to do most of its annual sales of $5 billion over Internet. Cisco has found that its customer find Internet channel to be more convenient than traditional channels[54].

Dell supports its Build-to-order direct sales model through its website Dell.com[55]. Dell has also developed intranet sites for its largest customers. The intranet allows Dells customers to purchase securely over Internet.

31: The Internet is enabling businesses to enhance their role (or even take a new role) in the value chain.

Ingram Micro is the largest distributor of computer products in the world. Ingram was earlier focussed on bulk distribution. With the advent of Internet Ingram has developed logistics capabilities to receive and fulfill smaller orders. It can now act as an Internet channel for many manufacturing concerns – especially those who don't have good logistics capabilities[56].

32: Internet is enabling business to experiment with new business models.

WebVan is an online grocer. The retailer takes the order over the Internet and fulfills the order from its warehouses (located in inexpensive areas of a town or locality) and a network of vans[57]. WebVan.com is one of many Internet enabled business models that wish to exploit the distribution inefficiencies in a typical grocery retail chain[58].

33: Internet is enabling businesses to re-design supply chain to reduce inventory-carrying costs.

GM has launched many internal initiatives to redesign the supply chain and reduce inventory-carrying costs. Currently, GM carries about 70 days of inventory in its retail channel. GM is considering changing its current built to stock business process to a more Build to Order (BTO) model – where it receives orders over Internet, and delivers the car to the customer in 10 days[59].

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[54] Ghose, Shikhar "Making Business sense of the Internet", Harvard Business Review, March-April 1998

[55] Ghose, Shikhar "Making Business sense of the Internet", Harvard Business Review, March-April 1998

[56] Gurley, William J "The evolving world of e-tailing", Fortune, September 6, 1999. From www.fortune.com

[57] Anders, George "A carrier delivering goods takes on hills, alleys, toddlers" Wall Street Journal, December 15, 1999

[58] Blackmon, Douglas A. "New e-businesses deliver products. But can they deliver profits as well?"

[59] Kolbasuk McGee, Marianne and Clinton Wilder " GM's goal: Net Gains" InformationWeek, January 3, 2000

Internet does present the potential to redesign the supply chain. GM's initiative anticipates a considerable reduction in inventory carrying costs. GM however has to undertake major organizational and process changes in order to obtain this Internet-enabled benefit.

34: Internet is enabling businesses to build extended enterprises[60].

Ingram Micro and Solectron are working together to build extended enterprise. So, when Ingram gets order over Internet, the backend configuration systems determine if the order can be fulfilled. If it cannot, the order is routed over Internet to Solectron (a contract manufacturer) for fulfillment. Additional parts (if needed) also are forwarded to Solectron. Solectron then assembles the order and ships it to Ingram's customer[61].

35: Internet has spawned new online markets, agents (or online brokers) and information intermediaries.

Internet has spawned many new agents and intermediaries. These Internet entities are experimenting with variety of business models. The models depend on the ubiquity and reach of the Internet. Examples are:

a. Yahoo.com – which is an Internet portal (www.yahoo.com). The benefit for the online community is easy access to vast amounts of information – usually catalogues and easily navigable, and searchable.

b. Shopper.com – which is comparison-shopping site (www.shop.com). These sites present product comparisons based on a number of attributes – and assist buyers in online shopping.

c. E-Bay – which is an auction site (www.e-bay.com). A auction site where buyers and sellers meet. The site is meant for consumers who wish to reach other consumers. Also, known as a C2C site.

d. Trading Hub.com – which is a B2B auction site for buying and selling excess inventory

e. Priceline.com - which is a demand concentrator, which obtains orders from consumers and negotiates price with the seller. The buyers hope to gain better prices.

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[60] TM Chrysler corporation

[61] Andrews, Whit "How to build a global virtual factory?" Supply Chain Technology News, September/October 1999

2.3 E-business project areas

An attempt was made to organize the 35 distinct E-business benefits into meaningful project "areas" or categories. The guiding principle in defining a particular "project area" was straightforward – the benefits derived from one project area should be qualitatively different from benefits derived from another area. After considering many potential classification schemes, the following set of eight "project areas" is proposed:

1. B2B – Auctions: A company decides to participate in online auctions. An online auction is

   an Internet website where buyers and sellers congregate. The buyers participate in a

   bidding process. The website may be hosted by a neutral party, by buyers or by sellers. A

   manufacturer can use B2B online exchanges for getting rid of excess inventory, or for

   procuring raw materials for production.

2. B2B – Procurement process improvement: Projects where businesses decide to use the

   Internet and web-based tools to streamline purchasing processes.

3. B2B – Internet-Enabled Collaborative Planning Forecasting and Replenishment: Projects

   where businesses use the Internet to support both intra-enterprise and inter-enterprise

   planning and forecasting activities.

4. Internet-associated Organizational Improvement: Projects where businesses develop

   internal metrics and tools to evaluate organizational and process improvements from the

   application of the Internet technologies.

5. <u>Internet-enabled Inter-enterprise cooperation:</u> Projects where businesses leverage the Internet to foster cooperation in product development and manufacturing activities.

6. <u>B2B- Internet Channel:</u> Projects where businesses use the Internet to develop a sales and customer service channel targeted towards business[62]customers.

7. <u>B2C- Internet channel:</u> Projects where businesses use the Internet to develop a sales and customer service channel targeted towards consumers.

8. <u>B2B – Internet-enabled Supply Chain Orchestration:</u> Projects where businesses are using Internet to coordinate sophisticated supply chain processes (e.g. Build-to-order systems (BTO) which require considerable "orchestration" of procurement, manufacturing and delivery operations. Also, end-to-end visibility projects that rely on the Internet's real-time communication capabilities for pro-active monitoring of events[63] in the supply chain).

In Table 2.1 below, 35 business benefits are distributed under different E-business project areas. This table will be used later in chapter 5 for purposes of hypothesis testing.

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[62] as opposed to consumers

[63] E.g. of events: a transportation provider, facing a highway roadblock, proactively communicates a delay in delivery of shipment to a customer

Table 2.1 Organization of business benefits by E-business project areas

E-business project area	E-Business Benefits
1. B2B – Auctions	(4) GM and its suppliers: GM is using online exchanges to reduce procurement costs.
2. B2B – Procurement process improvement (online catalogue, RFQ process)	(5) Solectron (Contract manufacturer) and Marshall Industries: Both use XML protocol, MI has seen a reduction in purchasing lead times (6) 3COM's suppliers and 3COM: 3com is using web catalog from 3rd party vendor, helps in consolidating purchases, and negotiate better prices (4) GM: GM is using online catalogs to establishing new sourcing relationships (7) Lexmark's suppliers and Lexmark: Lexmark is using web based quoting tool to streamline material acquisition process and reduce sourcing lead times.
3. B2B – Internet Enabled Collaborative Planning Forecasting and Replenishment	(28)Heineken- By using Internet enabled CPFR, Heineken has seen a dramatic reduction in order fulfillment lead times.
4. Internet associated Organizational Improvement	(11) Marshall Industries (MI) and its customers: MI allows its customers to search and order through catalog, sales personnel can focus on higher value added activities. Marshall has developed a sales compensation system (based on corporate profitability) to promote online sales. (17)Cisco and Marshall Industries: - Cisco has developed internal metrics to measure the business benefits of the Internet. Cisco is using these metrics to evaluate new two-way interactive communication technologies. This technology can help Cisco expand one-to-one customer service channel over the Internet.
5. Internet-enabled Inter-enterprise cooperation	(24) Adaptec and its supplier Taiwan Semiconductor Corporation: Adaptec is sharing planning schedules with TSMC on a real time basis. (25)Ford/Bechtel: Both use Web based tools for collaborative product development. (26) Adaptec and its supplier Taiwan Semiconductor Corporation: -Adaptec and TSMC are using Internet to make joint capacity planning decisions.
6. B2B- Internet Channel (customer support, order fulfillment)	(3) Office Depot: By linking billing with web based order entry processes, Office Depot is reducing its customers order processing costs. (1)Office Depot: Ubiquity of the Internet is enabling Office Depot gain new customers. (11) Marshall Industries.and its customers: MI allows its customers to search and order through catalog, sales personnel can focus on higher value added activities. (8) Herman Miller (furniture manufacturer) and its customers: - By substituting paper and EDI orders with web transmitted orders, Herman Miller has seen a major reduction in order processing cycle time (13) Office Depot: Office Depot is using web applications to provide its customers with self-service environment.
7. B2C- Internet channel (customer support, order fulfillment)	(30) Dell: Dell is using Internet to sell directly to customers (15) Amazon.com: Amazon.com provides its online customers a forum of information exchange. (19) Staples: Staples is using intelligence on consumer's Internet buying patterns to provide personalized product offerings. (15) Amazon.com: Amazon.com-provides its online customers a forum of information exchange. (32) WebVan: WebVan is experimenting with a new Internet based business model - it is online grocer. (9) Merck and its customers: By publishing bulky pharmacological content on the company website, Merck is reducing the cost of customer communication. (12) Walmart.com -The ability to keep a website open 24*7 basis throughout the year allows Walmart to extend its operations and improve customer service. (20) Walmart.com - Walmart.com is developing an Internet channel to provide wider range of products than in their traditional retail stores.
8. B2B – Internet-enabled Supply Chain Orchestration(BTO)	(14) Dell and its customers: - by allowing customers to configure products online, Dell was able to reduce returns (33) GM: GM is attempting to use Internet to re-design supply chain to reduce inventory-carrying cost. The goal of this endeavor is to introduce a Build-to-order system similar to Dell.

In the Table 2.1 above, the catalogue of E-business benefits (discussed in section 2.2) are sorted by different E-business project areas. The "E-business benefits column" provides a brief description of the business benefit. The number of E-business benefit is also given in parenthesis for easy reference.

Summary

An extensive review of the available secondary sources yielded 35 distinct, Internet-enabled business benefits. These are categorized into eight project areas. The cross tabulation has shown that the benefits are unevenly distributed across the eight E-business project areas. Of the 35 benefits, the largest set of 9 benefits belong to the "B2C – Internet Channel" E-business project area.

CHAPTER 3: IMPACT OF E-BUSINESS BENEFITS ON SUPPLY CHAIN

3.1 The Inference process

In this chapter, an attempt is made to understand the potential impacts of the Internet on a typical supply chain. There are two broad approaches to obtaining possible explanations – one approach is to conduct a major cross industry research study and, the other approach is to infer a possible explanation using secondary data. One limitation of the "inference process" is that it is not perfect, nor definitive. The insights the process offers, however, may be useful to a researcher. With some effort, the process helps the researcher gain a different understanding of a complicated research problem such as the one addressed here.

Described below, is a two step process to infer the impact of E-business benefits on supply chain

(1) Map the thirty-five E-business benefits from the "E-business benefits table" (Table 2.1) along a typical supply chain (see the "supply chain maps" below). In Map I, benefits appearing in the "supplier-manufacturer" domain are shown. Map II presents benefits in the "manufacturer-distributor" domain. Maps III displays benefits in the "distributor-retailer –customer"[64] domain.

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[64] see definition of Supply Chain in Chapter 1

Supply Chain Maps: The upper and lower maps (Map I and II) show the distribution of benefits in "supplier –manufacturer " and "manufacturer – distributor" domains of the supply chain respectively.

Supplier	Manufacturer
(24) Adaptec and its supplier Taiwan Semiconductor Corporation - Adaptec is sharing planning schedules with TSMC on a real time basis	
(26) Adaptec and its supplier Taiwan Semiconductor Corporation -Adaptec and TSMC are using internet to make joint capacity planning decisions	
(6) 3COM's suppliers and 3COM - 3com is using web catalog from 3rd party vendor, helps in consolidating purchases, negotiate better prices	
(7) Lexmark's suppliers and Lexmark - Lexmark is using web based quoting tool to streamline material acquisition process and reduce sourcing lead times	
(4) GM and its suppliers - GM is establishing new sourcing relationships through (a) use of online catalogs (b) online bidding/quoting systems and (c) online auctions	

(35). New Agents, Auction sites, Portals, Infomediaries, Online Retailers

Map I: In the map above, the benefit 24 involves two players – Adaptec (manufacturer) and Taiwan Semiconductor corporation (supplier). These two entities are leveraging Internet for exchanging product development plans, and reducing product development cycle times. The benefit is observed in the supplier-manufacturer domain of the supply chain.

Manufacturer	Distributor
(28)Heineken- By using internet enabled CPFR, Heineken has seen a dramatic reduction in order fulfillment lead times.	
(29)Carpetland- Carpetland uses internet based alerts system to monitor events in the supply chain.	
(27)Cisco and Marshall Industries - Cisco allows its customers (like Marshall) to obtain inventory levels and movements over internet	
(5) Solectron (Contract manufacturer) and Marshall Ind. - both use XML protocol, MI has seen a reduction in purchasing lead times	
(27)Cisco and Marshall Industries - Cisco is using new two-way interactive communication technologies to develop one-to-one customer service channel over the internet.	
(28)Heineken- By using internet enabled CPFR, Heineken has seen a dramatic reduction in order fulfillment lead times.	
(29)Carpetland- Carpetland uses internet based alerts system to monitor events in the supply chain.	

(35) New Agents, Auction sites, Portals, Infomediaries, Online Retailers

Map II: In the map above, the benefit 27 involves two players – Cisco (manufacturer) and Marshall Industries (customer). Cisco is allowing customers like Marshall to access inventory information over the Internet. Cisco believes that once customers begin to use inventory information for product promotion –they will find it difficult to switch from Cisco.

Supply Chain Maps: Both upper and lower maps (Map III and IV) show the distribution of benefits in the "distributor – retailer – manufacturer" domain of the supply chain respectively.

Distributor	Retailer	Consumer
(23) Ingram Micro and its customers -capture information about its customers and learn about their preferences		
(31) Ingram Micro : Internet is allowing companies like Ingram to enhance their role in the value chain. E.g., Ingram and CompUSA undertaking assembly and manufacturing operations		
(22) Merisel and its customers - by moving customers away from proprietary systems to internet, Merisel has seen an increase in sales		
	(32) WebVan - Is experimenting with a new internet based business model - it is online grocer.	
	(12) Walmart.com -The ability to keep a website open 24*7 basis throughout the year allows Wal-Mart to extend its operations and improve customer service.	
	(20) Walmart.com - Walmart.com is develop an internet channel to provide wider range of products than in their traditional retail stores.	
	(18) Staples - Staples is deploying self service tools and interactive communication tools to develop intelligence on consumer's buying pattern over the internet to provide customized product offerings.	
	(19) Staples - Staples is using intelligence on consumer's internet buying patterns to provide personalized product offerings.	
	(1) Office Depot - Ubiquity of internet is enabling Office Depot gain new customers.	
	(2) Office Depot - By allowing customers to input orders at its website, Office Depot is reducing its order processing costs.	
	(15) Amazon.com -provides its online customers a forum of information exchange.	
	(13) Office Depot - Office Depot is using web applications to provide its customers with self-service environment.-	
	(12) Walmart.com -The ability to keep a website open 24*7 basis throughout the year allows Wal-Mart to extend its operations and improve customer service.	
	(20) Walmart.com - Walmart.com is develop an internet channel to provide wider range of products than in their traditional retail stores.	
	(32) WebVan - Is experimenting with a new internet based business model - it is online grocer.	
	(15) Amazon.com -provides its online customers a forum of information exchange.	
	(3) Office Depot - Office Depot is using web applications to provide its customers with self-service environment.-	
(9) Merck and its customers - By publishing bulky pharmacological content on the company website, Merck is reducing the cost of customer communication		
	(3) Office Depot and MCI -By linking billing with web based order entry processes, Office Depot is reducing its customers order processing costs.	

Map III: In the map above, the benefit 3 involves two players – OfficeDepot and MCI. By integrating web based ordering system with billing systems, Office Depot is reducing MCI's order processing costs.

2) Inspect the benefits in the "supply chain maps", both individually and as a group. Ponder on the question — In what way can the individual benefit, or group of benefits change the "structure"[65] or "operation"[66] of a typical supply chain? Collate the answers and draw observations. The observations are given in section 3.2 below.

3.2 Observations from the "supply chain maps"

Business benefits are observed throughout the supply chain. In the "supplier – manufacturer" space, six benefits are observed (Map 1). Whereas in the "manufacturer – distributor" space has seven benefits (Map II), the "distributor-retailer-consumer" space has nineteen benefits (Map III). The spread of benefits across these interfaces suggests that business may be able to leverage the Internet to obtain benefits throughout the supply chain.

3.2.1 Observations on structural impact of the Internet on supply chain

In analyzing the benefits in the "supply chain maps", it appears that there are several structural impacts on the supply chain. These structural impacts are:

1. <u>Direct channel:</u> When a manufacturer decides to sell products directly to the consumers -- by passing the distribution channel, the direct Internet channel threatens to disintermediate distributors and retailers. Hence, direct channel changes the structure of the supply chain. Businesses like GM have expressed a desire to establish a direct channel to sell cars to

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[65] Structure of Supply chain - What type of business entities does one notice in the supply chain? How is the supply chain organized?

[66] Operation of Supply chain - How does the supply chain work? What types of transactions, relationships and processes are seen in the supply chain?

consumers. This move will not only threaten dealerships, but also change the structure of the automotive supply chain.

2. <u>New agents:</u> The Internet has spawned many new economic agents or entities. An online retailer is a new economic agent that relies on the ubiquity of the Internet to reach customers around the world. Online retailers like Amazon.com threaten to change the structure of the book supply chain. With increasing numbers of consumers shopping online, traditional booksellers are likely to go out of business.

3. <u>New marketplaces:</u> Online Exchanges are a special class of new economic agents. These exchanges function as markets – bringing buyers and sellers together over the Internet. Manufacturers do not necessarily have to push inventory up the supply chain, they can rely on exchanges like Tradinghubs.com to find a right buyer. Thus, the emergence of this new economic entity changes the structure of a typical supply chain.

3.2.2 Observations on the Operational Impacts of the Internet on the supply chain

Analysis of benefits in the "supply chain maps" also suggests that there are several operational impacts on the supply chain. These operational impacts are discussed below

a. <u>Scope of supply chain operations change:</u> The Internet is changing the scope of supply chain operations. Businesses are now undertaking different logistics activities. For example, the scope of outbound logistics operation of a manufacturer that has decided to open a new direct channel for selling products changes. The manufacturer now has to undertake a different set of activities (i.e. small order fulfillment).

b. Scale of supply chain operations are enhanced: The Internet enhances the scale of supply chain operations. The availability of real-time information allows business to increase the scale of existing business operations. For example, Heineken is using Internet to conduct collaborative, planning and forecasting with its existing distributor. The availability of real-time planning and forecasting data has allowed Hieneken to reduce order fulfillment cycle times. Heineken has reported an increase in percentage of orders delivered on time.

c. Speed of supply chain operations increase: The Internet increases the speed of supply chain operations. Businesses are now able to monitor, and quickly respond to different events in the supply chain. For example, Penske logistics, a third party logistics provider, uses the ubiquity and reach of the Internet to quickly inform its customers (usually material managers in plants) about exception notifications on a proactive basis. The indirect impact of the Internet may be an increase in order fulfillment cycle times, which speeds up supply chain operations.

Summary

The purpose of mapping E-business benefits along a typical supply chain was to obtain some measure of understanding of the Internet phenomena and its potential impacts on the supply chain. Furthermore, analysis of these observed benefits indicate that Internet is inducing structural and operational changes in a typical supply chain. The structural impacts result from (a) the growth of a direct channel (b) the presence of new economic agents (c) and new marketplaces. The operational impacts appear to be that (a) the scope of supply chain

operations change (b) the scale of supply chain operations are enhanced and (c) speed of supply chain operations increase.

These observations suggest that the managers may benefit from understanding the supply chain impacts of their E-business decisions. Decisions relating to the selection and prioritization of investments among eight E-business projects may affect a business' ability to change the structure and operation of its supply chain, a business' ability to reconstruct supply chain for competitive advantage. The next chapter suggests some "perspectives" that may be useful to a management team in choosing E-business projects.

CHAPTER 4: PERSPECTIVES ON E-BUSINESS STRATEGY

4.1 E-business perspectives

This chapter discusses different perspectives[67] that represent different ways to characterize a business. These may provide insight to managers faced with choosing E-business projects. The perspectives that will be discussed below are (1) Value Perspective (2) Asset Ownership Perspective and (3) Product Portfolio Perspective. Other ways to consider characterizing are (4) Customer Needs Perspective (5) Functional Perspective (6) Business Process Perspective (7) Change Management Perspective (8) Cultural Perspective (9) Industry Perspective and finally (10) Information Technology Perspective.

1. <u>Value Perspective:</u> The value perspective[68] characterizes companies according to customer value offered to customer. Using this perspective, companies can be characterized as "customer intimate", "product innovative" or "operationally excellent." As an example, Procter and Gamble is an "customer intimate" company. It is excellent at assessing customers needs and developing products that create customer value. Cisco is a "product innovative". It has extensive capabilities on product innovation. Customers choose Cisco for its ability to push performance boundaries. FedEx is an "operationally driven" company. It has excellent internal processes. Customers depend on companies like FedEx

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[67] The word perspective may not be the ideal – one can substitute perspective with variable, factor, determinants, or parameter

for consistent and reliable service. According to value perspective, a "customer intimate" company would put greater emphasis on B2C – Internet channel because these project allow the company to develop customer relationship. A "product innovative" company would emphasize B2B – Procurement projects on a priority basis because these projects allow the company to build supplier supplier relationships – an important factor for sustaining innovation. Finally, A "operationally excellent" company would expend resources on Internet-associated organizational improvement to further improve its internal opportunities.

2. Asset Ownership: The asset ownership perspective characterizes companies according to ownership of supply chain assets. Based on asset ownership, one can classify companies broadly as brick and mortar companies and .com companies. Brick and mortar companies have extensive investments on infrastructure – like plants, warehouses, distribution centers. A .com company invests in one major asset – the brand name that brings customer to its website. Typical challenges facing a brick and mortar company are (i) finite resources (ii) competition from .com companies (iii) downward pressure on prices induced by comparison-shopping information websites (iv) possible channel conflicts between traditional channel and the Internet channel and (v) meeting shareholder and wall street expectations. The challenges facing a .com company are (i) customer acquisition and retention (ii) response from brick and mortar (e.g. brick and mortar companies opening their B2C Internet channels) and (iii) honeymoon with Wall Street may end. Asset ownership

[68] Treacy, Michael and Fred Wiersema "How market leaders keep their edge?" Fortune, February 6 1995

perspective suggests that brick companies will consider short-term projects with demonstrable business savings (e.g. B2B procurement) to meet shareholder and Wall Street expectations. The .com companies will mostly focus on B2C initiatives because their business models depend on customer acquisition and retention.

3. <u>Product Portfolio Perspective:</u> Product portfolio perspective characterizes companies according to nature of their product portfolio. Using this perspective, one can classify companies based on whether their projects composed mostly of early, mature, or late products. The business objective of company whose products are in early stage is to ensure product availability. A Company with many mature products would like to retain customers. For late stage companies, the challenge is to find customers. Product portfolio perspective suggests that companies with product portfolio (a) comprising mostly of early stage products will prefer B2B sales – Internet channel because they wish to reach early adapters, typically business customers (b) comprising mostly mature products will prefer B2C sales – Internet channel band because they want to retain existing customers and (c) comprising mostly late stage products will opt for B2B –Auctions to find customers.

Some other perspectives worth mentioning are

Perspectives	Explanation
4. Customer Needs Perspective	Based on Maslow's model of needs, one can classify customer needs as – basic, security, social, esteem and self-actualizing. A company with customers whose "needs" are mostly security related may benefit from B2C – Internet channel. The company may provide information such as order tracking and status information.

5. Functional Perspective	Various functional areas within the department have different E-business priorities. A company with an influential marketing department may prefer B2B – sales or B2C sales projects, whereas a company with influential manufacturing department may emphasize B2B –Procurement.
6. Process Perspective	A company undertaking an internal process improvement program may decide on projects in the Internet-associated organizational area. A customer relationship management process improvement initiative may emphasize B2C – sales projects.
7. Change Management Perspective	Projects such as "end-to-end visibility" can lead to a major paradigm shift within a company. Hence, certain types of E-business projects can support corporate change management initiatives.
8. Cultural Perspective	A company that has a progressive technological culture may be willing to experiment with E-business initiatives than a company that isn't.
9. Industry Perspective	The organization, structure and pace of operations of a high technology company is very different from that of a low technology company. A high technology company may choose projects in the "Internet – enabled inter-enterprise cooperation" because it has the technological backbone and business processes to work with real-time information. The same cannot be said about firms in low technology industry. This discussion suggests that the industry to which a company belongs to may indicate E-business opportunities.
10. Information Technology Perspective	Existing investments in information technology can often constrain E-business opportunities. A company whose customers tend to use EDI may find it difficult to migrate them to an web- based ordering system.

In the next chapter, the Industry perspective (Perspective 9) is investigated in detail[69]. Here, the industries are classified into high, medium, and low clockspeed based on "clockspeed" framework developed by Charles Fine. The chapter presents a hypothesis that suggests correlation between industry clockspeed and E-business opportunities. Observations from secondary data[70] appear to support the hypothesis.

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[69] Due to paucity of time, only one of the ten perspectives was explored. Business researchers are invited to explore other nine "perspectives".

[70] Catalogue of E-business benefits

CHAPTER 5: INDUSTRY CLOCKSPEED AND E-BUSINESS OPPORTUNITIES

5.1 Industry Clockspeed Framework

The differences among industries can be explained through various classification or grouping schemes (e.g. capital intensity, concentration ratio etc). A relatively new approach for industry grouping developed by Charles Fine of MIT is the industry clockspeed[71]framework. Clockspeed measures the rate of industry evolution. Fine suggests that the framework "explicitly recognizes the dynamic nature of industry and technology, providing the potential to refine industry-level and inter-industry level Schumpeterian dynamics".

According to Fine, the three essential parameters of industry clockspeed are

(1) Product technology clockspeed – or frequency of changes in a given model or dominant design. He provides example of Honda, which introduces new model every four years.

(2) Process clockspeed – or the rate of introduction of new process paradigm or technology (e.g. leans production, build-to-order, mass customization).

(3) Organizational clockspeed – or the rate of change in organizational restructuring (e.g. propensity for organizational restructuring).

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[71] Fine, Charles "Clockspeed: Winning industry control in the age of temporary knowledge." Perseus Books, 1998

Based on Fine's clockspeed framework - semiconductor, automobile and paper industries are considered members of high, medium and low clockspeed industry[72]groups respectively. In Table 5.1[73] below, the product, organizational and process clockspeed of semiconductor industry is shown to be higher than that of automobile and paper industries.

Table 5.1 Grouping of industries by clockspeed

Industry group	Product Clockspeed estimate	Organization Clockspeed estimate	Process Technology clockspeed
High clockspeed - Semiconductors Other examples: -Personal Computers - Toys and Games	1-2 years	2-3 years	3-10 years
(Medium clockspeed) - Automotive Other examples: - Beer Brewing - Pharmaceuticals	4-6 years	4-6 years	10-15 years
(Low clockspeed) - Paper - Other examples: - Steel	10-20 years	10-20 years	20-40 years

[72] See Fine, Charles "Clockspeed: Winning industry control in the age of temporary knowledge." Perseus Books, 1998 p. 3

[73] see Table A.1 Measuring Clockspeed- Sample Industries, p. 239 from Fine, Charles, "Clockspeed: Winning industry control in the age of temporary knowledge." Perseus Books, 1998

The graphic[74] below metaphorically highlights the differences in product, process and organizational clockspeeds across high, medium and low clockspeed industries. If high clockspeed industries are considered "fruitflies" (because of their very short life cycle)"[75], then medium clockspeed industries can be thought of as "elephants" and slow clockpeed industries as "turtles". The differences in the pace of product, process and organizational clockspeeds can be explained by the differences in the relative speeds of a sprinter, a marathon runner and a walker.

Industry Clockspeed	Product Clockspeed	Process Clockspeed	Organization Clockspeed
High			
Medium			
Slow			

5.2 Industry clockspeed and E-Business opportunities: An Hypothesis

The following hypothesis was developed using the clockspeed framework:

When comparing one clockspeed industry to another, the differences in product development lifecycles should indicate differences in business needs and requirements, and therefore lead to different E-business opportunities (as explained below).

(i)   The high clockspeed industries, by definition, have fast product development cycle times. The primary basis of competition in these industries is to develop new products quickly and bring them to market. These firms appear to use the Internet to share information with suppliers possibly to maintain or increase prod development cycle times. Given the increasing pressure to reduce the cycle time of product development, relationships with suppliers may not be arm's length nor long term based. Therefore, an important focus of most E-business activities may be on improving procurement and product design – and lesser focus on auctions and Internet based supply chain integration projects (e.g. CPFR).

(ii)   The medium clockspeed industries do not necessarily have to use the Internet to speed up product clockspeeds – since the basis of competition in these industries does not always depend on bringing products quickly to market. These businesses have the opportunity to leverage the Internet to speed up (either one or some combinations of) product, process and organizational clockspeeds. They can choose to undertake a variety of projects, and maintain a wide portfolio of E-business projects. The projects can vary from auctions to Internet-driven Build-to-Order (BTO) initiatives.

(iii)   The low clockspeed industries have considerably slow product life cycles. The products in these industries are usually commodities and standard products– and the Internet-enabled improvements in product cycle times may not have high impact (e.g. paper, books, office supplies). These industries may attract new entrants who wish to capitalize on slow process and organizational clockspeeds of incumbent firms. Entrants may focus on efficient models for delivering commodity products to the customer (e.g. auctions). The incumbents, on the other hand, may use the Internet to improve existing customer relationships through B2B and B2C sales initiatives.

The hypothesis suggests the following E-business opportunities for businesses in high, medium and low clockspeed industry groups (Table 5.2 below).

Table 5.2 Hypothesis: Industry clockspeed and E-business opportunities

E-business project category	High Clockspeed Industries	Medium Clockspeed Industries	Low Clockspeed Industries
1. B2B – Auctions	✗	✔	✔
2. B2B – Procurement process improvement (online catalogue, RFQ process)	✔	✔	✗
3. B2B – Internet Enabled Collaborative Planning Forecasting and Replenishment	✗	✔	✗
4. Internet associated Organizational Improvement	✔	✔	✗
5. Internet-enabled Inter-enterprise cooperation	✗	✔	✗
6. B2B- Internet Channel (customer support, order fulfillment)	✔	✔	✔
7. B2C- Internet channel (customer support, order fulfillment)	✔	✔	✔
8. B2B – Internet-enabled Supply Chain Orchestration(BTO)	✔	✔	✗

✗ Low emphasis ✔ Medium or High emphasis[76]

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[76] as measured by the incidence of (a random sample of) E-business benefits across different eight project areas.

If the hypothesis is found valid, then managers can benefit from applying industry clockspeed framework for determining their E-business opportunities.

5.3 Sorting of benefits by clockspeed

The benefits organized in Table 2.1 ("Organization of business benefits by E-business project areas") were sorted by industry clockspeeds[77] (e.g. high, medium and low respectively) in Table 5.3 ("Sorting of business benefits by E-business project areas and Industry clockspeed").

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[77] For example, benefit 24 is an example of Cisco E-business initiative. Since Cisco belong to the network products industry – a high clockspeed industry, the benefit is put in the "high clockspeed" industry category.

Table 5.3 Sorting of business benefits by E-business project areas and Industry clockspeed

P	High Clockspeed Industries	Medium Clockspeed Industries	Low Clockspeed Industries
1	(4) GM and its suppliers: GM is using online auctions for procurement (participating)	(4) GM and its suppliers: - GM is using online auctions for procurement. (hosting)	(4) GM and its suppliers: GM is using online auctions for procurement (participating)
2 .	(5) Solectron (Contract manufacturer) and Marshall Ind.: both use XML protocol, MI has seen a reduction in purchasing lead times (6) 3COM's suppliers and 3COM: 3com is using web catalog from 3rd party vendor, helps in consolidating purchases, negotiate better prices (7) Lexmark's suppliers and Lexmark: Lexmark is using web based quoting tool to streamline material acquisition process and reduce sourcing lead times	(4) GM and its suppliers GM is establishing new sourcing relationships through the use of online catalogs and online bidding/quoting systems	
3 .		(28)Heineken- By using the Internet enabled CPFR, Heineken has seen a dramatic reduction in order fulfillment lead times. (10)Toro: - Toro is using Internet to improve the ROI on existing investments (e.g. ERP).	
4 .	(11) Marshall Industries and its customers: MI allows its customers to search and order through catalog, sales personnel can focus on higher value added activities (17)Cisco and Marshall Industries: Cisco is using new two-way interactive communication technologies to develop one-to-one customer service channel over the Internet.	(25)Ford/Bethel: Both use Web based tools for collaborative product development	
5 .	(24) Adaptec and its supplier Taiwan Semiconductor Corporation: Adaptec is sharing planning schedules with TSMC on a real time basis (26) Adaptec and its supplier Taiwan Semiconductor Corporation: Adaptec and TSMC are using the Internet to make joint capacity planning decisions	(25)Ford/Bethel: Both use Web based tools for collaborative product development.	
6	(11) Marshall Industries and its customers: - MI allows its customers to search and order through catalog, sales personnel can focus on higher value added activities	(8) Herman Miller (furniture manufacturer) and its customers: By substituting paper and EDI orders with web transmitted orders, Herman Miller has seen a major reduction in order processing cycle time	(3) Office Depot By linking billing with web based order entry processes, Office Depot is reducing its customers order processing costs. (1)Office Depot – The ubiquity of the Internet is enabling Office Depot gain new customers. (13) Office Depot - Office Depot is using web applications to provide its customers with self-service environment.
7	(30) Dell Online: Dell is- is using Internet to sell directly to customers	(9) Merck and its customers: By publishing bulky pharmacological content on the company website, Merck is reducing the cost of customer communication.	(15) Amazon.com-provides its online customers a forum of information exchange. (19) Staples - Staples is using intelligence on consumer's Internet buying patterns to provide personalized product offerings. (12) Walmart.com -The ability to keep a website open 24*7 basis throughout the year allows Walmart to extend its operations and improve customer service.
8	(14) Dell and its customers - by allowing customers to configure products online, Dell was able to reduce returns	(33) GM; GM is attempting to use Internet to re-design supply chain to reduce inventory-carrying cost. The goal of this endeavor is to introduce a Build-to-order system similar to Dell.	

The first column is the E-business project area. **Key**: 1. B2B - Auctions 2. B2B - Procurement process improvement (online catalogue, RFQ process) 3. B2B - Internet Enabled Collaborative Planning Forecasting and Replenishment 4. Internet associated Organizational Improvement 5. Internet-enabled Inter-enterprise cooperation 6. B2B- Internet Channel (customer support, order fulfillment) 7. B2C- Internet channel (customer support, order fulfillment) 8. B2B - Internet-enabled Supply Chain Orchestration (BTO). E-business benefits (discussed in section 2.2) are sorted by different E-business project areas and Industry clockspeed groups. The number of E-business benefit is also given in parenthesis for easy reference.

From this simple organization, a few observations emerge that may be useful.

1. <u>Project area 3 has only one example. This example belongs to a medium clockpeed industry.</u>

Project area 3 is "B2B – Internet enabled Collaborative, Planning, Forecasting and Replenishment." It is interesting to note that there are only a few examples that have been published. In Table 5.3, the example observed in this project area is Heineken, which has implemented an Internet–enabled CPFR project. One can speculate about the reasons underlying this observation. Perhaps, businesses that undertake such complicated projects have industry influence, and commitment to implement long term projects. One is more likely to see such a business in high and medium clockspeed industry than in a low clockspeed industry (where firms typically deal in commodity-like products). However, when compared to high clockspeed industries, the medium clockspeed industries have slower process and organizational clockpeeds[78]. The businesses in the medium clockspeed industry have relatively higher organizational and process stability. This stability may make their organizations more capable of undertaking medium and long-term supply chain integration protects like Internet-enabled CPFR.

2. <u>Project area 4 has two examples, both of which belong to high clockspeed industries</u>

Project 4 is the "Internet associated organizational improvement category." There are three examples in this project area, two of which belong to high clockspeed industries. Again, one can speculate about the reasons why these examples come from high clockspeed industries. Since the competition in high clockspeed industries is mostly product based, initial focus of E-business projects in high clockspeed industries is possibly geared towards speeding up product development cycle times. As these businesses make gains in product clockspeeds, the lags between product development and organizational change are likely to become apparent. Evidence suggests that early adapters in high clockspeed industries are addressing this issue.

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[78] See Table 5.1 Grouping of industries by clockspeed"

They are developing new organizational forms and relationships to leverage the potential of the Internet. For example, Cisco is developing internal metrics to better capture Internet enabled – business benefits for strategic planning purposes.

3. Project areas 7 and 8 are the most popular project areas, with many examples – and most of them belong to low clockspeed industries

Project area 7 and 8 are "B2B – Internet channel" and "B2C" – Internet channel". Businesses in low clockspeed industries are witnessing an interesting business dynamic. Low clockspeed industries tend to attract new entrants who find the Internet an efficient model for delivering standard products to consumers. For example, Amazon.com was among the first online retailers to find the ubiquity of Internet an important asset in building relationships with consumers. The incumbents in low clockspeed industries - who tend to have slow process and organizational clockspeeds, find Internet to be a "disruptive" technology[79]. However, the incumbents stand to benefit by supporting existing customer relationships (both business and consumer). It is, therefore, not surprising to see the businesses in low clockspeed industries undertaking a variety of projects in both "B2B and B2C- Internet channel" project areas. Therefore, one can suggest that "B2B, and B2C – Internet channel" projects will be an important part of E-business initiatives in low clockspeed industries.

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[79] As the Economist submits "(Internet) overturns traditional business model, which makes it hard for a traditional firm, with its own cultural inertia, to embrace." See "E- Commerce survey", The Economist, February 26, 2000

4. Medium clockspeed industry group has examples in every project area.

As can be seen from Table 5.3, the medium clockspeed industry column has examples in every E-business project. The businesses in medium clockpeed industries may leverage the Internet for speeding up product clockspeeds[80]. Alternatively, they can rely on the relative stability of process and organizational clockspeeds for implementing longer-term projects. Businesses in medium clockspeed industries, therefore, can undertake projects in a number of E-business project areas. This presents an interesting challenge: What criteria or approach should firms use to select and prioritize among E-business projects? A simple approach would be to follow the lead of high clockspeed industries. There are well-publicized examples of high clockpeed firms, such as Cisco and Dell, who have successfully leveraged the Internet to streamline procurement and BTO processes and reduced product development cycletimes. For an auto manufacturer like GM, the temptation to implement a BTO system similar to Dell and drastically reduce inventory pipeline of 70 days appears to be an irresistible proposition. Industry clockspeed perspective, however, suggests that automotive manufacturers may not find it easy to achieve the same degree of success as Cisco and Dell. The relatively slow process and organizational clockpeed of medium clockspeed industries, in comparison to high clockspeed industries, may be a constraint. For example, automotive manufactures have invested, over many years, financial and organizational resources on developing supplier arrangements such as Just-in-time

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[80] as explained earlier - The medium clockspeed industries do not necessarily have to use the Internet to speed up product clockspeeds — since the basis of competition in these industries does not always depend on bringing products quickly to market. So, these businesses have the opportunity to leverage the Internet to speed up (either one or some combinations of) product, process and organizational clockspeeds

(JIT) and Vendor management inventory (VMI). The modifications to arrangements to meet the needs of a BTO process are not readily apparent, and need to be determined. Perhaps, a better approach to E-business strategy can be ascertained from the value discipline perspective[81]. Instead of asking the question "How can my firm implement a BTO system like Dell?" the managers should ask, "How can the Internet help my firm support its business strategy?" A "product innovative" firm may well decide to use the Internet to implement a BTO system, a "customer intimate" firm may choose to emphasize B2C initiatives, and "operationally excellent" companies may choose to undertake medium term Internet-enabled CPFR initiatives.

5.5 Conclusion

The above observations suggest that Industry perspective may possibly be a useful criteria for guiding a firm in choosing E-business opportunities in high, medium and low clockspeed industries.

For businesses in high clockspeed industries: The competition in a high clockspeed industry is typically based on bringing new products quickly to the marketplace. Therefore, the likely emphasis of E-business projects may be on speeding up product development cycle times. The businesses may find that the gains in product development times lead to increasing lags between product clockspeed on one hand, and process and organizational clockspeed on the other. To reduce

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[81] See Chapter 4

this disconnection, the businesses in high clockspeed industry need to consider projects in the "Internet – associated organizational improvement" area.

For businesses in medium Clockspeed industries: The medium clockspeed industries do not necessarily have to use the Internet to speed up product clockspeeds – since the basis of competition in these industries does not always depend on bringing products quickly to market. Businesses in medium clockspeed industries have the option to leverage the Internet for speeding up (either one – or combinations of) product, process and organizational clockspeeds. The businesses in medium clockspeed businesses can undertake projects in all the eight E-business project categories (Observation 4). However, projects such as "Internet –enabled Collaborative, Planning, Forecasting and Replenishment are more likely to be seen in medium clockspeed industries (Observation 1).

For firms in low clockspeed industries: The incumbents in low clockspeed industries have long process and organizational clockspeeds. This suggests that businesses in low clockspeed industries may find it difficult to respond against new entrants who are adept at using the Internet to provide standard products to customers. The incumbents can benefit by supporting existing customer relationships through "B2B, and B2C Internet channel" projects (Observation 3).

The usefulness of Industry clockspeed perspective suggests that hypothesis development and investigation of other perspectives mentioned in Chapter 4 may be considered for further academic research. This topic is discussed in the next chapter.

CHAPTER 6: SUGGESTIONS FOR FURTHER RESEARCH

6.1 Foundation for building an E-business decision model

The usefulness of industry clockspeed perspective is a modest contribution towards building an E-business decision model. . In Chapter 4, a few business "perspectives" – and tentative hypothesis concerning the "perspective" and E-business opportunities were discussed. To build an E-business decision model - these perspectives should be investigated. Once such a body of research is available, then the model building activities can be persued in two different ways.

System Dynamics Approach

In this approach, the cause and effect (or feedback) relationships between the different perspectives would be explored. For example, how does the decision making dynamic of a firm (in a high clockspeed industry) that is decentralized, entrepreneurial, and product innovative firm differ from a firm in low clockspeed industry with just the opposite profile (centralized, bureaucratic, operationally excellent)? What impact does this dynamic have on the selection of E-business projects? The two variables that a systems dynamics model might consider are – clockspeed (the rate at which industry evolves) and cultural attitude (the rate at which firms evolve).

Econometric Approach

This requires the development of econometric models that correlation between a particular "perspective" or a set of "perspectives" with different E-business project areas. A business can use such models to develop a ranking basing decision support model. The decision model can be refined further based on field-testing.

Summary

E-business projects can be divided broadly into eight different areas. Managers can benefit from a decision model that can help them select, and prioritize E-business projects. Such a model entails considering a variety of "perspectives" (e.g. value, product life cycle, cultural, process etc.). This thesis suggests that there may be some positive correlation between industry type (i.e. clockspeed) and prospective E-business opportunities, although there is no statistical evidence on-hand to prove that presently. Further research on other perspectives will help in the development of systems dynamics and econometric models. The management team can make use of these models, and take a more structured approach to E-business strategy.

E-business benefits summary: The description of benefit, the company that realized the benefit, the industry which the example company belongs to.

	Benefit	Company	Industry
1	The ubiquity of the Internet is enabling businesses, especially those that are predominantly brick and mortar operations, to gain newer customers.	Office Depot and its new customers	Office Products Retailing
2	Internet is enabling businesses to reduce order-processing costs by allowing customers to input the orders.	Office Depot	Office Products Retailing
3	By linking billing with web base order entry processes, businesses are using Internet to Reduce their customers' order processing costs	Office Depot and MCI	Office Products Retailing
4	Internet is enabling businesses to establish new sourcing relationships through (a) use of online catalogs (b) online bidding/quoting systems and (c) online auctions.	GM and its suppliers	Office Products
5	Protocols such as xml are allowing businesses to exchange documents such as purchase orders and invoices over Internet– leading to reduction in purchasing lead times.	Solectron and Marshall Industries	Contract Manufacturer Electronics
6	Businesses are using web-based catalogs from third party vendors to improve existing purchasing practices. These include greater harmonization of purchases across business units, and price consolidation.	3COM	Computer Hardware
7	Extranets and Web-based quoting tools help streamline and automate material acquisition process, and help businesses achieve significant reduction in sourcing cycle times.	Lexmark	Computer Hardware
8	By substituting paper and EDI purchase orders with web-transmitted requests, businesses are finding major improvements in order fulfillment operations.	Herman Miller	Office Furniture

	Table 2.1 cont'd		
	Benefit	Company	Industry
9	By publishing large bulky content (especially those that require regular updating) on the Internet, businesses are reducing the costs of customer communication.	Merck	Pharmaceuticals
10	Internet is enabling businesses to improve roi by leveraging existing investments in information technology (especially erp)	Toro	Garden and Agricultural tools
11	By providing customers to order online and search through catalogs, businesses are able to leverage sales personnel for other higher value-added activities.	Marshall Industries and its customers	Computer Hardware
12	The ability to keep a website open all the time is enabling businesses to extend operations and provide customer service on a 24*7 basis, all throughout the year.	Wal-mart.com	Retailing
13	Businesses are developing new web-based applications to create a self-service environment for their customers.	Office Depot	Office Products Retailing
14	By allowing customers to configure products online, business are able to reduce returns.	Dell	Computer Hardware
15	By developing e-commerce website as a forum for information exchange, businesses are providing customers with complementary services.	Amazon.com	On-line book retailer
16	Businesses are using the convenience and the ubiquity of the Internet to inform the customers about exceptions on a real time basis.	Penske Logistics	Third-party Logistics Services Provider
17	New 2-way interactive communication technologies are enabling businesses to develop one-to-one customer service channel over Internet.	(i) Cisco and (ii) Marshal Industries	Computer Hardware
			Cont'd

	Table 2.1 cont'd		
	Benefit	Company	Industry
18	With the deployment of self-service tools and interactive communication tools, business can learn customer buying behavior and preferences.	Staples	Office Products Retailing
19	Businesses are leveraging information and analysis regarding customer's buying patterns over Internet to provide customized product offerings.	Staples	Office Products Retailing
20	Businesses are developing Internet channels to provide wider (and sometimes different) range of products than in their traditional retail stores.	Sears.com	Retailing
21	By incorporating database driven language translation tools over Internet, businesses are able to reach customers around the world with greater effectiveness.	(I) GE and (ii) Kodak	(I) Conglomerate and(ii) Photography
22	By moving existing customers away from proprietary systems to Internet, established businesses are finding an increase in sales revenues.	(I) Merisel and (ii) W.W Grainger	(I) Computer hardware distribution and (ii) Industrial distribution
23	Internet is enabling businesses to capture information about supply chain partners, and learn about their preferences.	Ingram Micro	Computer Products
24	Internet is enabling supply chain partners sharing planning schedules with suppliers on a real time basis.	Adaptec and Taiwan Semiconductor Manufacturing Corporation (TSMC)	Electronics
25	Internet is enabling supply chain partners to connect and create a collaborative work environment. This results in reduced product development times and improvement in r & D and innovation.	(I) Ford and (ii) Bechtel	(I) Automotive and (ii) Engineering Services
			Cont'd

Table 2.1 cont'd

	Benefit	Company	Industry
26	Internet is enabling supply chain partners to make joint decisions on plant capacity allocations.	Adaptec and Taiwan Semiconductor Manufacturing Corporation (TSMC)	
27	Internet is enabling customers and supply chain partners obtain visibility into inventory levels and movements	(I) Cisco and (ii) Marshall Industries	Networking Hardware
28	Internet is enabling businesses to collaborate with supply chain partners, using industry-wide collaborative planning and forecasting standards.	Heineken	Alcoholic Beverages
29	Internet is enabling businesses to use real time information sharing among partners for monitoring events in the supply chain (and make proactive decisions).	Carpetland	Carpets
30	Internet is enabling businesses to sell directly to end-customers	(I) Cisco and (ii) Dell	Networking and computer hardware
31	Internet is enabling businesses to enhance their role (or even take a new role) in the value chain.	Ingram Micro	Computer distribution and retail
32	Internet is enabling business to experiment with new business models.	WebVan	Grocery
33	Internet is enabling businesses to re-design supply chain to reduce inventory carrying costs.	GM	Automotive
34	Internet is enabling businesses to build extended enterprises.	Ingram Micro and Solectron	Computer parts distribution
35	Internet has spawned many online markets, agents (or online brokers) and information intermediaries.		
	Portals	Yahoo	
	Comparison	Shopper.com	
	Demand Aggregators	E-Bay	
	Auction for excess inventory	Trading Hub	
	Demand Aggregators	Priceline.com	

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