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**A STUDY OF E-BUSINESS/E-MANUFACTURING
MODELS**

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A STUDY OF E-BUSINESS/E-MANUFACTURING MODELS

By

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Submitted to the University of Exeter as a dissertation towards the degree of

**MASTER OF SCIENCE BY ADVANCED STUDY IN ENGINEERING AND
MANAGEMENT**

September 2003

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I certify that all material in this dissertation which is not my own work has been identified and that no material is included for which a degree has previously been conferred on me.

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ABSTRACT

Traditional business methods are taking a drastic turn and changing to digitized businesses. Information and communication technology is being integrated into orthodox business practices and giving birth to e-business. E-business in turn, is looking up to e-business models for dynamic integration.

The e-business concept was first explored. It was broken down into its smaller entities to make for a clearer and better understanding. Components of an electronic business were identified, and e-commerce was understood to be a subset of e-business. It was established that for a business to be e-business enabled, it required information and communication technology (ICT) to be integrated into its brick and mortar business practice. This showed that the e-business concept was not replacing traditional business practices but improving on it. The e-manufacturing business practice was also researched. This practice was found to be in essence e-business, but in the manufacturing context. It showed that e-manufacturing made for a dynamic integration of the complex manufacturing business practice in real-time. It linked shop floors to top floors, as well as all the other areas of the whole manufacturing supply chain.

Adequate relevance was established for designing e-business and e-manufacturing models. This was achieved through rigorous literature review as well as a questionnaire survey. A hypothesis design and test based on the literature review was made to ascertain what models are utilized and in what context. Currently used models in different company sectors were discovered, and their subsequent benefits identified. Also reasons behind the adoption of the different models in the firms investigated were identified. Barriers associated with the e-business practice as well as the implementation of an e-business model were also identified.

A measurement system was utilized to ascertain if the investigated models met that stated in the literature (i.e. product innovation, infrastructure and the network of partners, customer relation, and finance). This was adopted from that presented in the literature review. Based on the study, a conclusion was drawn and recommendations suggested.

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CHAPTER ONE

INTRODUCTION

The method of doing business today is changing rapidly from the traditional marketplaces to electronic markets due to the growth of the digital environment. Although companies have been practicing a measure of e-business in their business methods in times past, it only involved basic electronic transactions such as the sending and retrieval of simple business documents through technologies like the fax machine.

The presence of better more sophisticated technologies provides an opportunity for more productive and flexible e-business practices. However, for an enhanced e-business practice and better utilization of these emerging digital technologies, the formulation and adaptation of e-business models is imperative. E-business models help sustain e-business activities, expanding markets, increasing transaction speed, boosting revenue and restructuring traditional processes; thereby enabling an organization to have competitive edge over others.

A distinct feature of e-business is the integration of business and information technology. Most research on e-business models revolves round their organizational and technological aspects. The organizational aspect investigates how innovative business practices affect the performance of a firm, while the technological aspects deals with the role of information technology in e-business. This study involves research into both aspects.

1.1 Aims and Objectives

The aim of this study is to:

- Define and identify currently used e-business models in general business practices.

- Investigate the implication and practice of e-business models in manufacturing industries
- Investigate the effectiveness of e-business models.
- Identify the risks and potential pressure points of utilizing these models.
- Investigate how beneficial e-business models are to business practices.

1.2 Research Method

- The methods of research employed in this study were:
- Extensive literature review of related work carried out on similar areas.
- Literature analysis leading to the identification of currently used models.
- Hypothesis design and test based on the literature review.
- Questionnaire survey
- Analyzing the obtained data to further identify and find out the subsequent benefits arising from the utilization of these models.

1.3 Dissertation Framework

Chapter 2 provides a generic background of the e-business practices as opposed to the traditional way of doing business. It explains the basic differences between e-business and e-commerce (which is commonly confused with each other), their competencies, and the technologies that drive them. The chapter discusses the components of an e-business and the relationship Business Intelligence, Customer Relationship Management, Supply Chain Management, and Enterprise Resource Planning has with e-business.

Chapter 3 discusses the e-manufacturing concept and how it evolved. Comparison was made between e-manufacturing and brick and mortar manufacturing. The benefits realized by integrating e-business practices into the manufacturing process were enumerated, and the Internet was identified to be one the major reasons for this change.

Chapter 4 Defines models, business models and e-business models. The relevance of designing e-business models was explored. Improved communication and the better understanding of how a company operates were, amongst others, identified to be one of the reasons for developing e-business models. The chapter also defines and explains the framework an effective e-business model should take and currently used e-business models identified.

Chapter 5 discusses the questionnaire survey and analysis. Based on the literature, questionnaires were designed to further investigate the usage and implementation of e-business models in companies. A measurement system by which the identified models could be assessed was employed, and this was based on the structure that a dynamic and profitable e-business and e-manufacturing model should have, namely, the product innovation, the infrastructure of a firms network and partners, the customer relationship and the financial aspect of the firm. Analysis of the received data was carried out and conclusion drawn.

Chapter 6 concludes the study as well as recommends certain areas to be improved on.

CHAPTER 2

E-BUSINESS

2.1 Introduction

The term e-business has most times been interchangeably used with e-commerce. E-business basically refers to transacting business via electronic media. It refers to “all electronically-mediated information exchanges, both within an organization and with external stakeholders supporting the range of business processes” (Chaffey, 2002).

E-business is also defined as employed “when a business has fully integrated information and communications technologies (ICTs) into its operations, potentially redesigning its business processes around ICT or completely reinventing its business models; and integrating all these activities with the internal processes of the business through ICT” (DTI, 2000).

2.2 Emergence of E-business

The beginnings of e-business was seen in the 1960s and 1970s when electronic funds transfer (EFT) was employed by finance companies in transferring funds between each other; and when electronic data interchange (EDI) was used for the sharing of information electronically between customers and suppliers in large companies. These exchanged information included invoices, purchase orders, quotes, etc, traditionally recorded on paper, but which through private telecommunications networks (VANs), was communicated electronically to different parts of the company.

However, EDI was very expensive to set up and maintained; thus, only well-established buoyant companies were able to afford it. Small and medium-sized companies (SMEs) who

could not afford this technology suffered. The emergence of the internet, therefore, not only enabled SMEs and many others use the above technology (EDI), but enabled them use it in better and more constructive ways.

E-business is comprised of “highly-developed technical skills, ranging from web-wizardry, graphic design ability and java programming to Internet standards”(Allen, 2001). Due to an increase of internet-enabled digital devices, such as wireless phones, digital TVs, email, etc, today’s businesses are undergoing constant change and innovations.

Anybody, be it a business, a consumer, or otherwise, with access to the Internet can enjoy the services it provides. However, only limited individuals or third parties are allowed to access sensitive company information, and applications utilized this way are called intranets and extranets.

2.3 Enabling Technologies for E-business

Technology is the heart of e-business and e-commerce. Without communication and networking technologies, e-business practice will be like a car devoid of an engine. To get a proper understanding about the e-business concept, it is necessary to have a detailed knowledge of the different technologies that enables the practice. Below are the key technologies driving an e-business:

- The Internet
- Intranets
- Extranets
- FAX
- E-mail
- Personal Computers

- Mobile Internet (WAP)
- EDI

2.3.1 The Internet

“The Internet refers to the physical network that links computers across the globe. It consists of the infrastructure of network servers and communication links between them that are used to hold and transport information between the client PCs and web servers” (Chaffey, 2002). These communication links are called Internet service providers (ISPs), which are further linked to larger ISPs connected to **backbones**. Backbones are “high-speed communications links used to enable Internet communications across a country and internationally” (Chaffey, 2002). The ability for the internet to function is due to the many established protocols developed by hardware and software manufacturers, “and is based on a set of open standards, or **protocols** of operation, that are not owned or controlled by any one company. These open standards ensure that business and individuals are not locked into one company’s hardware or software” (Rowley, 2002).

Although the Internet started amongst a select few (academic and research centers), its rapid growth now makes it accessible to the business environment and the general public as a whole. The internet is now a “gateway to myriad information-based online databases, commercial and government websites, software and document archives, in addition to electronic bulletin boards and newsgroups and e-mail. It offers access to both a rich seam of information and commercial transaction, and many websites combine information provision (sometimes in the form of marketing communication) with commerce” (Rowley, 2002). This explains why most companies today are keen on going on the Internet since it promotes their products and make them recognized throughout the globe.

However, the Internet is most times confused with the World Wide Web (WWW), and both are often thought to mean the same thing. But this is, in essence, not the case. Rowley (2002) defines the Internet as a worldwide network of interlinked computer networks, providing global connectivity via a mesh of networks based on the TCP/IP and Open Systems Interconnection (OSI) protocols. The World Wide Web on the other hand, is a method of linking (connecting) information stored on different computers. This method was called a ‘hypertext’ and developed by Tim Berners-Lee, a research scientist working at the European CERN physics lab in Switzerland.

File Transfer Protocol (FTP) and Hypertext Transfer Protocol, are some examples of Internet transfer protocols that enables the transfer of data/documents between networks. Tables 1 and 2 show these protocols (Internet and WWW), while figure 1 shows the Internet linkage.

Table 1: Internet Protocols

Protocol	Comment
TCP/IP	Transport Control Protocol/Internet Protocol – basic communication protocol.
E-mail	Electronic mail – supports the transfer of text between users
FTP	File transfer – allows computer files and software to be transferred across the Internet.
TELNET	Allows a computer to connect to another system as if it were a terminal in the first system. This supports the transfer of packets of data between computers and would allow, for example, remote checking of stock databases.
USENET	Supports online discussion in ‘newsgroups’ using electronic bulletin boards.
ARCHIE, VERONICA, WAS	Search protocols for FTP sites which support searching on the Internet. They have now largely been incorporated into or superceded by the Web.

Source: Rowley, J (2002) – Business Principles and Practice

Table 2: World Wide Web Protocols

Protocol	Comment
Web	World Wide Web (WWW) – set of standards that allow hyperlinks and graphics to move through the Internet.
HTTP	Hypertext Transport protocol – supports links between sites and retrieval.
HTML	Hypertext Mark-up Language – a text-based mark-up language, or set of codes, that define the design of a web page.
VRML	Virtual Reality Mark-up Language – allows 3D models to be displayed and rotated in a web page.
XML	Extended Mark-up Language – adds intelligence to web pages
CGI	Common Gateway Interface – interface that provides links to other programs for web servers, such as between a database and a web form when data entry to the database is through the form. A CGI script is used to transfer information from a computer on the Internet to the host computer.
URL	Uniform Resource Locator – address or code that can be used to locate a website.
Java	A programming language that permits complex applications, including graphics, to be developed so that they can be assessed using a web browser.

Source: Rowley, J (2002) – Business Principles and Practice

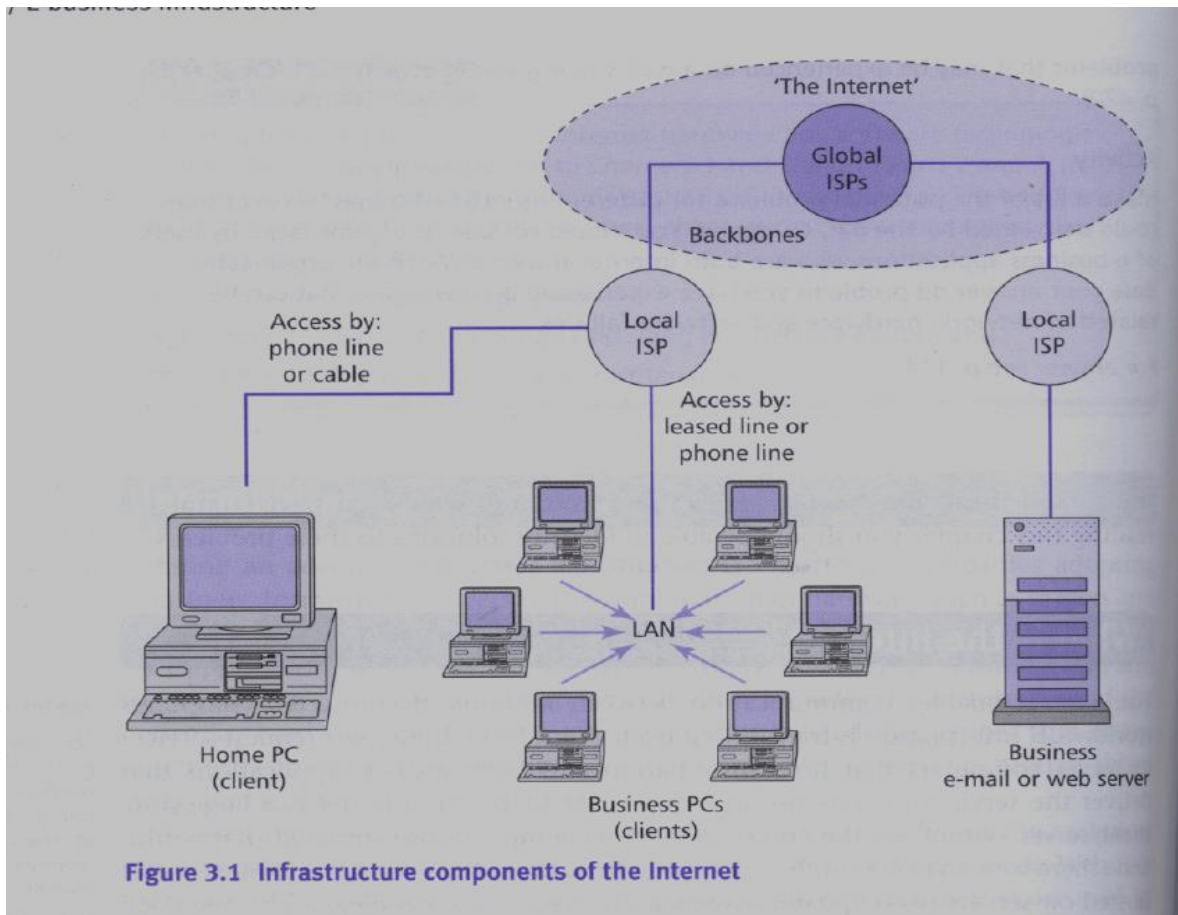


Fig. 1: Infrastructure components of the Internet

Source: *E-business and E-commerce management*, by Chaffey, D (2002)

LANs and WANs

Local Area Networks (LANs) and Wide Area Networks (WANs) are “digital computer networks that connects PCs to enable sharing of information between separate computers. LANs are limited to a geographical area such as an office, whereas WANs connect computers over a wider geographical area” (ED: Jackson et al, 2003).

When computers are connected in this form, their capacity increases as a result of data sharing, storage and printing.

2.3.2 Intranets

Intranets are used for the transfer of information electronically within an organization. “Intranets are ‘micro-Internets’ that enable companies to set up internal web sites and e-mail systems accessible only to people within the organization” (Haig, 2001). Intranets are designed to function as only a localized network. Outlined below are the essential components of an intranet by M. Haig in his book *the B2B e-commerce handbook: how to transform your business-to-business global marketing strategy*:

- *TCP/IP network.* Transmission control protocol (TCP) and Internet protocol (IP) enable computers linked to the intranet to connect and communicate with each other.
- *Web server.* This allows web documents to be placed on the intranet.
- *Browser/client software.* This enables members of the intranet to browse through and download intranet web documents.
- *E-mail server/software.* To send and receive internal e-mails via the intranet, it is essential to have an e-mail server as well as client e-mail software.
- *FTP.* File transfer protocol is the method normally used to send files back and forth via an intranet.
- *Chat systems.* Chat software systems facilitate real-time online communication between employees.
- *Usenet.* This helps to create newsgroup-style intranet forums.

2.3.3 Extranets

Extranets on the other hand in the business environment, involves disseminating valuable information within an organization and to a select few outside the company, but not to the general public. Also called an ‘external intranet’, “extranets enables third party access to internal applications or information. This is useful for organizations who need to share

internal systems and information with potential partners” (Haig, 2001); and requires an identification procedure (such as a password) to access it.

Like intranets, extranets also supports supply chain management since manufacturers can order resources from suppliers, which are in turn transformed into products and services.

Figure 2 shows the relationship between an intranet and extranet.

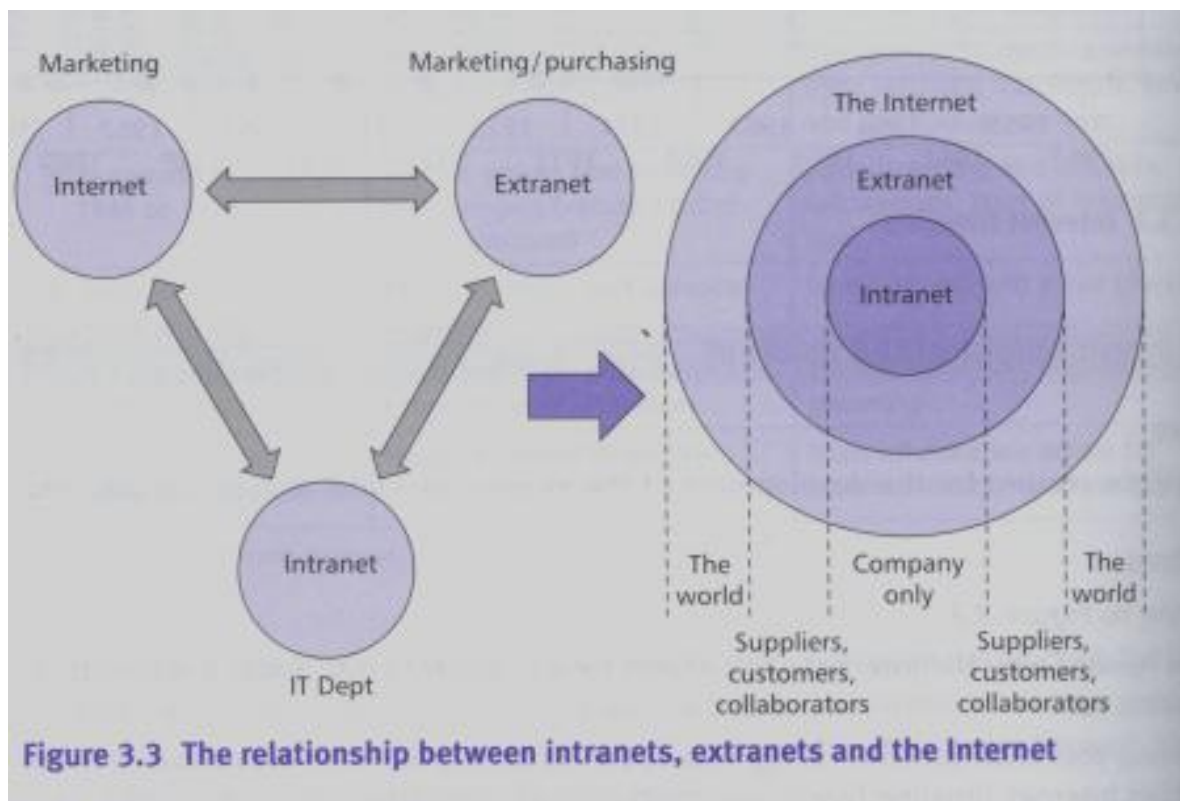


Fig. 2: The relationship between intranets, extranets and the Internet

Source: E-business and E-commerce management, by Chaffey, D (2002)

2.3.4 FAX

According to the Collins English Dictionary (2000), a fax (facsimile transmission) is an international system of transmitting a written, printed or pictorial document over the telephone system by scanning it photoelectrically and reproducing the image xerographically after transmission. The fax technology has been in use since the early 1970's, emanating from

the US amongst a select few, extending to Europe, before becoming more widely used due to a reduction in equipment price.

The FAX technology is far becoming outdated by newer technologies due to its limitations when compared to say, the e-mail technology, for the following reasons:

- It is handwritten or typed for text documents
- Drawn manually for diagrams (pictorial) documents.
- Involves the utilization of the telephone network
- Requires data re-entry
- It is slow (papers scanned as ‘dots’).

2.3.5 E-mail

E-mail is the electronically transferring of messages via a computer. It is the exchange of computer-stored messages by telecommunication. Email messages are usually encoded in **ASCII** text (which is the most common format for text files in computers and on the internet); however, non-text files could also be sent via an e-mail, such as graphic images and sound files, as attachments sent in binary streams (Fluke Networks, 2003).

When the Internet first came into existence, it was used first for the transfer of mails (messages), and was only available to a circumscribed community. Then gradually, it extended to yet another select few (the defense and academic sectors). Now with the growth of desktop computing in the mid ‘90’s, e-mailing now has the highest percentage of Internet traffic, “and can also be exchanged between **online service provider** users and in networks other than the Internet, both public and private” (Fluke Network, 2003).

The E-mail has a lot of advantages when compared to the fax technology such as its accuracy, data reliability, inexpensiveness and rapidity. But to exploit it, computer skills are required as well as the possession of 'terminals'.

2.3.6 Personal Computers (PCs)

Extensive access is gained to the Internet through the use of personal computers. PCs are now common household and office equipment, although "penetration does vary between different countries, regions and social and economic classes" (Rowley, 2002). Nevertheless, due to the rapid innovation of the PC technology, individual users and e-business organizations are confronted with the problem of deciding which versions of the many different software, hardware and browsers to use, in order to be at par with other users.

2.3.7 WAP

Wireless Access Protocol (WAP) servers enables the Internet to be accessed at all times irrespective of the individual's position or place, via a mobile phone, Personal Digital Assistants (PDAs), or portable computers.

However, WAP has its limitations, according to Rowley (2002), which are:

- ❖ Their CPUs have limited power
- ❖ Limited memory
- ❖ Limited power consumption constrained by battery life
- ❖ Small displays
- ❖ A variety of input devices, including phone pad, voice input and fold-up keyboards.

2.3.8 Electronic Data Interchange (EDI)

Electronic data Interchange has been used for several years for the exchange of business data. “An EDI message contains a string of data elements, each of which represents a singular fact, such as a price, product modular number, and so forth.” (EDI, 2001). This string of data elements is separated by delimiter and called a data segment. EDI can be defined as “the exchange of documents in a standardized electric form, between organizations, in an automated manner, directly from a computer application in one organization to an application in another” (Clark, 1998). Sokol (1989), & Pedersen (1995) defined Electronic data interchange as the interfirm computer-to-computer communication of trade documents in a standard format that permits the automatic handling of transactions. EDI is also employed for electronic funds transfer (EFT), electronic bulletin boards, and electronic mail (e-mail), and is a form of communication between remote corporate businesses that not only makes life easier for them, but also facilitates closer integration between organizations.

Before an organization is EDI-enabled, it needs to have a medium or avenue for electronic transmission. Value-added networks (VANs), served as this medium, which replaced the physical storage media like magnetic tapes and disks. Organizations also needed to have “structured, formatted messages based on agreed standards (such that messages can be translated, interpreted and checked for compliance with an explicit set of rules)” (Clark, 1998). Another essential element of EDI is achieved when EDI is integrated with Internet technologies.

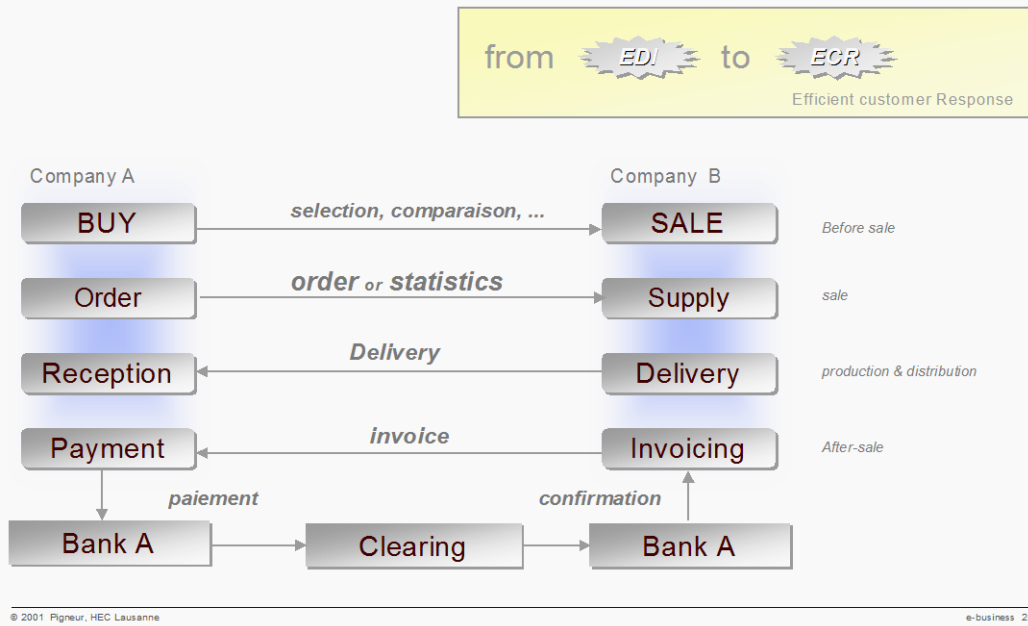


Fig 3: Electronic Data Interchange
 Source Pigneur (2001) in: *Ontology for e-business models*

2.4 E-business Components

Strauss and Frost (2001) proposed five major components of an e-business, namely:

1. E-commerce
2. Business intelligence
3. Customer relationship management
4. Supply chain management
5. Enterprise resource planning

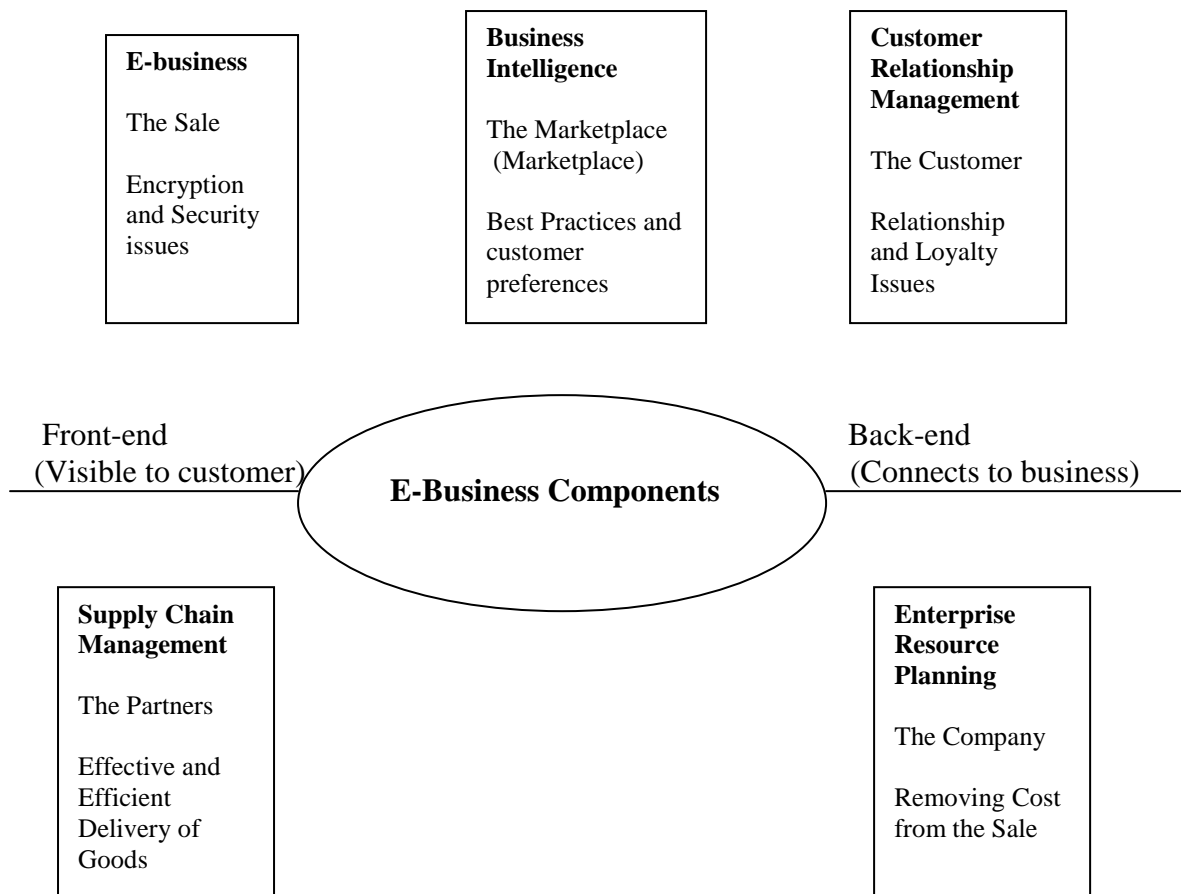


Fig. 4: E-business components

Source: E-business marketing, by Albert T, et al (2003)

2.4.1 E-commerce

E-commerce has and is still frequently confused with e-business. “E-commerce is the exchange of information across electronic networks, at any stage of the supply chain, whether within an organization, between businesses, between businesses and consumers, or between the public and private sectors, whether paid or unpaid” (UK Govt., PIU, 2001). However, e-commerce, according to Zeithaml et al (2000), is defined as the selling component of e-business.

Allen, (2000), differentiates between e-commerce and e-business by stating that E-commerce focuses on enabling the buying and selling process through the use of electronic services, primarily based on the internet but not excluding the use of other technologies where the focus is on the customer; E-business on the other hand, extends the use of electronic services to embrace all internal and external business relationships in an integrated real-time fashion, where the focus covers customers, suppliers, partners, government organizations and employees.

Thus it can be understood from the above definitions that e-commerce is a subset of e-business, constituting just one (although important), part of e-business. However e-business is comprised of a wider range of services such as maintenance, buying and selling, advertising, etc. Figure 5 shows how e-commerce and e-business are related to the business activities of an enterprise.

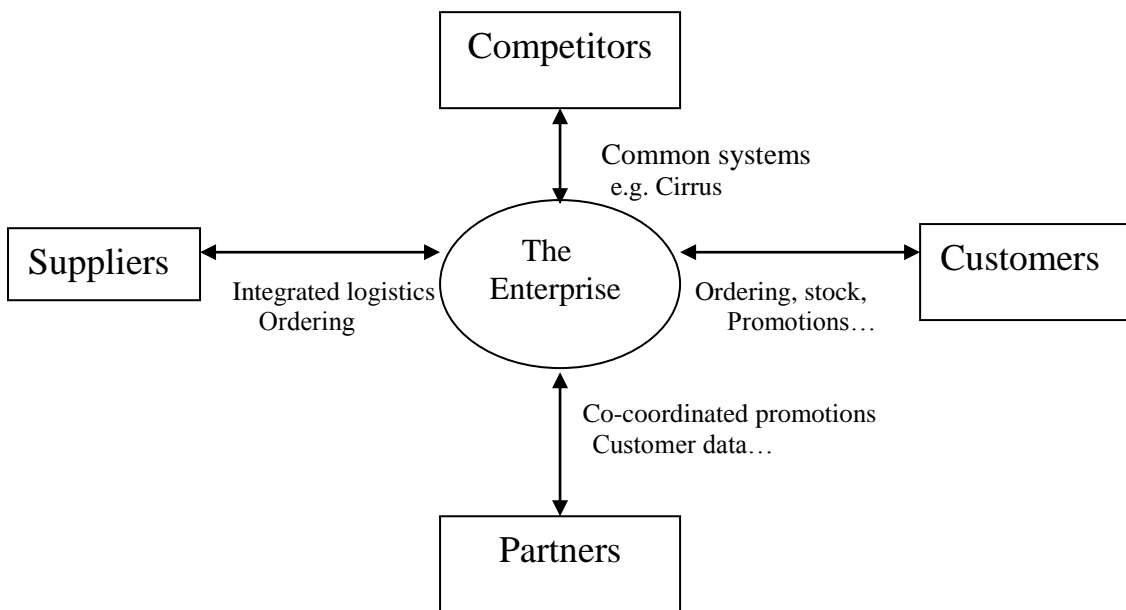


Fig. 5: Electronic Commerce

Source: The Burtler Group, Kennon, A (1997)

2.4.2 Business Intelligence

Business intelligence is the art of trying to understand one's target customers better by utilizing the company's business transactions and interactions to generate usable data about them. In order to attract and retain a company's best customers, a precise portrait of who they are – their wants, their needs, their buying patterns, business intelligence is imperative. BI is meant for analyzing and interpreting vast quantities of data-customer demographics, product-purchase histories, cross-sales, service calls, internet experiences and online transactions – turning information into insight and developing conclusive, fact-based strategies to gain that competitive edge (IBM –Business intelligence, 2003).

Business intelligence is comparable to “competitive benchmarking” (Albert et al, 2003), and the aim is to “copy or improve upon ‘best practices’” (Kotler, 2000). E-business intelligence

helps companies decide which markets to embark on, what particular products to promote and what target customers to pursue. It is “frequently used for concept testing, surveys, focus groups, and observational studies (observing online behaviors)” (Albert et al, 2003).

Organizations who require BI are those who have to deal with a lot of customers, huge amount of data and require rapid innovation to stand out in the competitive market.

IBM in Business Intelligence (2003), proposed five key elements for e-business organizations to adopt to ensure long-term success in managing customer relationships. These elements include:

- **Marketing analysis:** The ability to classify customers into different groups to be managed differently, either tactically or strategically.
- **Predictive marketing:** Using data mining capabilities to discover new customers for specific marketing programs and evaluate the responses to offers.
- **Campaign planning:** Cataloguing and organizing high-level campaign data so that multiple users can access what is happening across all campaigns.
- **Campaign management:** Target customer selection is made and contact lists is created-all based on the analytical work done and the intelligence generated in the preceding steps of the marketing process.
- **Campaign review:** Collecting, posting, summarizing, reporting, tracking and trending the results of each campaign and campaign segments.

2.4.3 Customer Relationship Management

CRM is a firm’s skill to develop, cement and maintain relationships with its business partners, customers, suppliers, etc in a ‘closed-loop’ customer interaction cycle. “It is a business strategy that integrates people, process and technology to maximize relationships

with its day-to-day customers, distribution channel members, internal customers and suppliers. CRM is a comprehensive approach that provides seamless coordination between sales, marketing, customer service, field support and other customer-facing functions” (DCI’s customer Relationship Management).

Benefits of a successful CRM are increased customer profitability, keeping customers for life and retaining customer loyalty.

2.4.4 Supply Chain Management

Supply chain management “is the strategic approach that unites all steps in the business cycle, from initial product design and the procurement of raw materials, through production, shipping, distribution, and warehousing until a finished product is delivered to a customer” (IBM – Supply chain management, 2003). Supply chain management employs e-business concepts and web technologies to “optimize business processes and business value in every corner of the extended enterprise” (IBM, 2003), regarding each individual or partner as valuable in the entire chain.

To achieve ultimate supply chain performance, collaboration and optimization, along with vigilance (keeping up with information up-dates) and speed (e.g. rapid planning and execution cycle, quick data access, etc), is imperative. The supply chain can be said to be comprised of three flows (SearchCIO.com, 2003), namely,

- Product flow (movement of goods from suppliers to customer)
- Information flow (transmitting orders and updating delivery status)
- Finances flow (credit terms, payment schedules and consignment and title ownership arrangements).

Some processes associated with supply chain management are procurement, logistics, and inventory management.

2.4.5 Enterprise Resource Planning

“ERP (Enterprise resource planning) is an industry term for the broad set of activities supported by multi-module application software that helps a manufacturer or other business manage the important parts of its business, including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, and tracking orders. ERP can also include application modules for the finance and human resources aspects of a business” (SearchSAP.com, 2003).

An ERP system normally utilizes a relational database for its analysis. “A relational database is a set of tables containing data fitted into predefined categories. Each table (which is sometimes called a *relation*) contains one or more data categories in columns. Each row contains a unique instance of data for the categories defined by the columns. For example, a typical business order entry database would include a table that described a customer with columns for name, address, phone number, and so forth. Another table would describe an order, product, customer, date, sales price, and so forth” (SearchSAP.com, 2003).

Thus to sustain its e-business strategy, an organization requires Enterprise Resource Planning, that links the entire enterprise, from the front office to the customers doorsteps.

2.5 E-business Transactions

The e-business practice is normally conducted between certain individuals or corporations. Knowing who these individuals are will provide a better understanding of the concept, and

since different people require different kinds of strategy and marketing techniques. Thus, between whom are these e-business transactions made? Classification of the e-business transactions falls generally in two broad areas, namely business-to-business, and business-to-consumer customers.

2.5.1 Business-to-Consumer

This type of transaction involves products/or services being sold directly to consumers via an electronic medium (internet). B2C arranges financing, sale and delivery of products directly to the customer (consumer). The consumer sometimes may also be entitled to receive after sale service from the business company. “Some B2C e-businesses provide high-value content to consumers for a subscription fee, while others supplement a traditional mail-order business with an online shopping site” (Napier et al, 2003). The ability for online businesses to understand customer behavior could make or mar their success. Knowing the kind of products and services that appeals to them, and the ones that are not good enough choices is very important. Although there has not been much research on online customer behavior, the increasing utilization of online environments by customers will hopefully ignite more research to be done.

Business-to-customer organizations apart from providing a round-the-clock customer global service endeavors to build long-term relationships with their customers. This is done because most B2C companies today know that it is the customers who are responsible for their profitability. Thus companies may go to great lengths in trying to gain a customer for life, even if it means by monetary investments, knowing that if a customers’ trust is gained, the return on investments could be realized many times over. This is in concurrence to a lot of

financial models, which attributes the actual value of a dot-com business involving customers as being equal to the long-term value of the current customer base.

“The internet has enhanced firms’ ability to build good customer relationships. One factor contributing to this enhanced ability is specialized software that allows sellers to track the decisions customers make as they navigate a website. Using the navigating data on buying preferences and customer profiles, management can make well-informed decisions on how best to serve its customers. This approach can also enhance inventory decisions, buying selections, and decisions in many other managerial areas. A good example of a dot-com firm who employs this is Amazon. Amazon’s selling approach involves the “tracking and analyzing customer data, providing individualized guided service to its customers” (Canzer, 2003). Figure 5 shows the relationship of a B2C model.

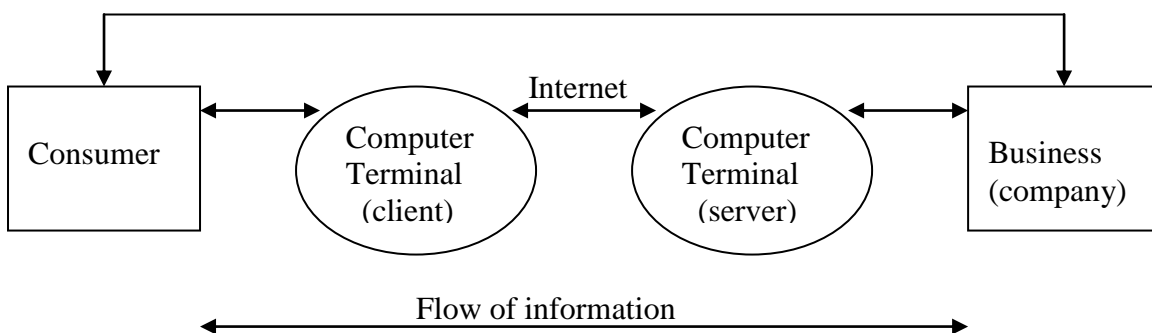


Fig. 6: Flow of tangibles between Business and Consumer (e.g. goods, documents)
Source: Center for virtual organization and commerce (CVOC) in: Supply chain management- Business-to-Consumer E-commerce

2.5.2 Business-to-Business

B2B e-business can be defined as the exchange of structured information about products and services between business partners through an electronic medium such as the Internet, or other private networks. (CVOC, 2003) defined B2B as an area of e-commerce that involves businesses conducted online, and the business networks and supply chains that make these transactions possible.

Although business-to-business activity has been around for a while, it has now taken a new framework due to the emergence of the Internet since it no longer depends on the “traditional one-to-one model for business transactions” (Haig, 2001). After examining firms with business-to-business model, (Canzer, 2003) proposed two clear types. The first type involves the facilitation of sales transactions between businesses, while the second has to with the relationship between companies and their suppliers. Suppliers now use the Internet to advertise and bid for the sale of their products and services. Companies on the other hand, utilize the web to search for suppliers, bid and buy their products and services.

This makes for a lot of advantages. For example “the online leader in the auto industry, Ford company, links 30,000 auto-parts suppliers and 6,900 dealers in its network, resulting in an estimated 8.9billion dollar savings each year from reduced transactions costs, materials, and inventory. This 8.9billion dollar savings represents about a quarter of the retail selling price for an average new car, providing Ford with a considerable competitive advantage in the marketplace through its ability to either reduce selling prices or earn higher profits” (Canzer, 2003). A range of emerging intermediaries, such as E-markets, Net Market Makers, Vortexes, etc, is now facilitating the B2B e-business.

2.6 Summary

The above chapter basically discusses the e-business concept. It defined e-business as the exchange of data, goods/services, etc via an electronic medium. It provided an insight into why e-business is normally confused with e-commerce, the reason for which one is a subset of the other. It explains how e-commerce is the selling component of e-business. Chapter two briefly gave a history of e-business and its structure. This framework comprised of customer relationship management, enterprise resource planning, amongst others. Drivers for e-business were also discussed, and these included the Internet, EDI, e-mail, etc. The different transactions enabled by e-business was not left out, the chapter discussed how business-to-business and business-to-customer business practice was part and parcel of this dynamic innovation.

CHAPTER 3

E-MANUFACTURING – The E-business of Manufacturing

3.1 Introduction

The more a country is industrialized, the better the economic health of the country as well as the standard of living of its people. Manufacturing can be said to be the backbone of any industrialized nation, comprising of 20 to 30 percent of the value of all goods and services produced (Kalpakjian, 1995). Thus, many countries today are striving to become industrialized nations.

A manufacturing organization has the obligation of not only creating value and understanding its customer's needs, but also to respond instantly to any changes demanded by its customers. To achieve this, the company needs to develop internal mechanisms, state-of-the-art technologies and concepts, especially in today's competitive market environment.

E-manufacturing is concerned with extending the manufacturing industry. It has changed the way companies purchase parts, raw materials, and handle their services. It has transformed the method product designers adopt when developing products, and interacting with real-time technologies to increase not only revenue, but to make for the overall productivity of the manufacturing industry.

3.2 What is Manufacturing

When raw materials are transformed from their original state/form into products that changes their physical or chemical characteristics, manufacturing can be said to have taken place. This

transformation involves a series of production methods and techniques, comprised of energy applications and organized activities.

In the conversion of raw materials into products, different kinds of flows are encountered, such as material flow and information flow.

3.2.1 Flow of materials

The conversion of raw materials into products in a manufacturing industry utilizes flow techniques. This involves the building of products from start (raw materials) to finish (consumers) on an integrated manufacturing line, where various stages are so sequenced such that the products ‘flow’ steadily down the production line. Figure 6 shows a detailed view of this flow.

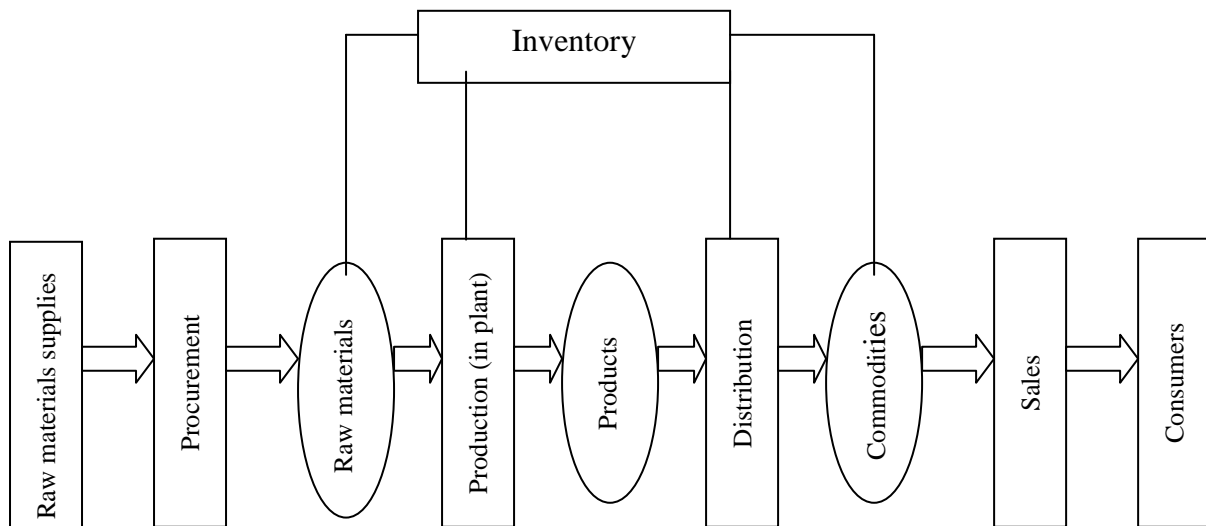


Fig. 7: Material Flow

Source: Zhang, D (2002) in: Manufacturing Systems

3.2.2 Flow of information

Any system with two or more material flow with sequence dependency needs real-time information to monitor and control these sequences. Maximum output in manufacturing is achieved if the quality and speed of the information flowing through the system is balanced and continuously flowing.

In manufacturing a product, the market needs has to be known first; this in turn reflects on the production processes of the given product. Figure 7 shows this information flow.

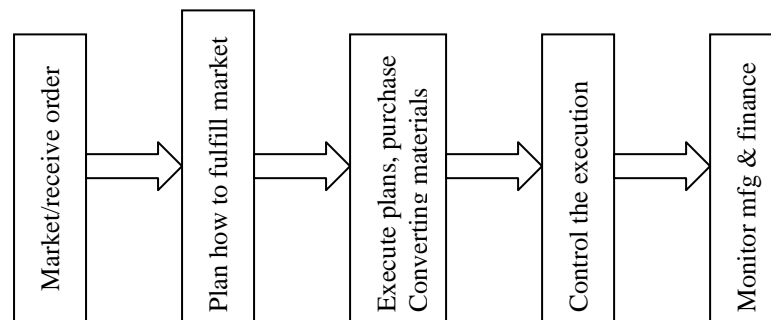


Fig. 8: Information flow

Source: Zhang, D (2002) in – Manufacturing Systems

3.3 ‘Brick and Mortar’ Manufacturing

Manufacturing industries had always endeavored to manufacture products at the right time, making sure the store room is well stocked with good quality products and ready to go at any point in time. The typical shop floor engineer was oblivious of demand fluctuations and customer demands because he builds for stock rather than to order. According to Rockwell Automation (2003), “Shop floor engineers were confined within the walls of the factory floor, focused on increasing production, improving product quality and raising productivity levels. Speed, efficiency, flexibility, cost savings, yield and productivity of the plant were of

utmost importance, but rarely was a view of these parameters taken beyond the plant walls into the broader supply chain”.

The technology employed to achieve this high productivity and quality levels on the factory floor contained detailed information about the production process, but this was not sufficiently consolidated and communicated to the rest of the manufacturing enterprise. Rather it was only utilized locally within the confines of the plant or factory, resulting in valuable information remaining trapped in the plant, stock rooms overflowing, and the increase of inefficiency as a result of this isolation between the shop floor, the top floor and the entire manufacturing supply chain. Figure 8 shows the make up of the different aspects involved in manufacturing.

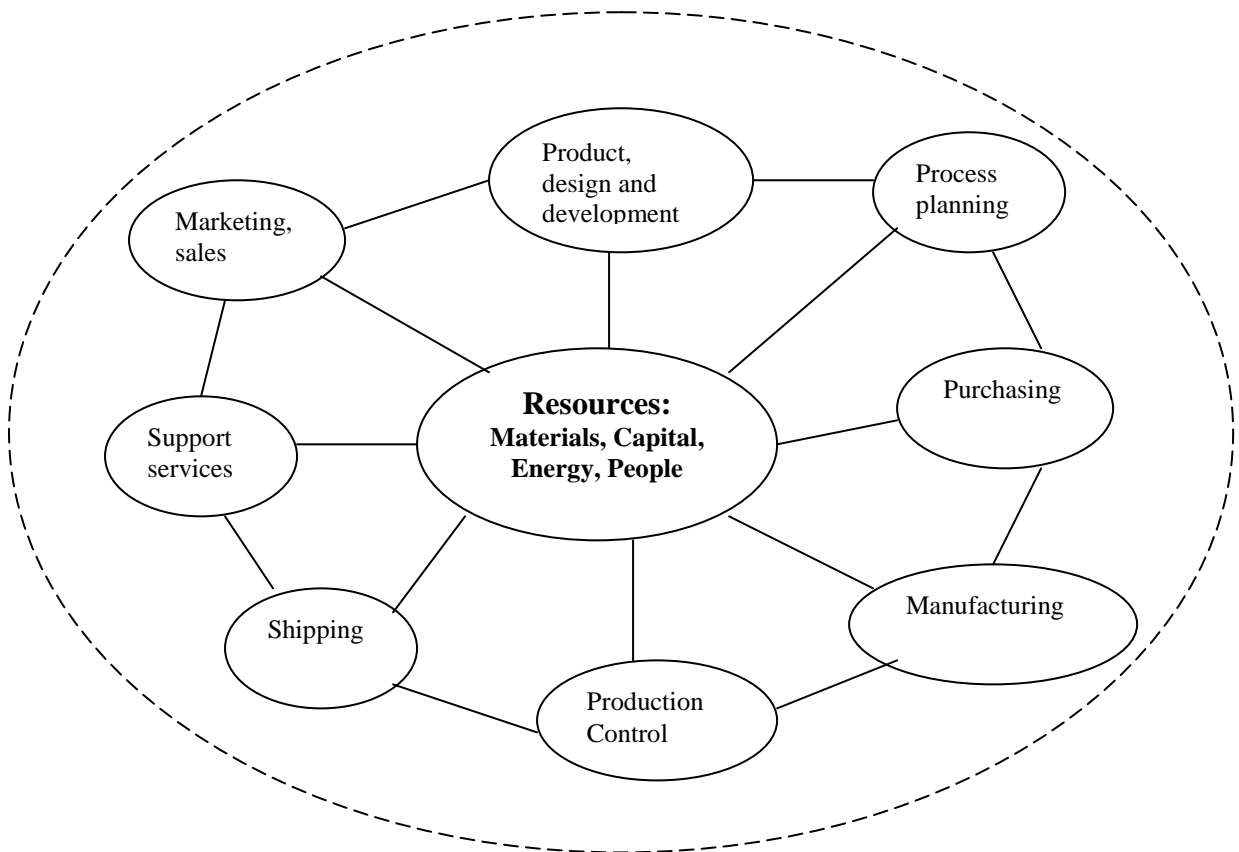


Fig. 9: Chart showing relationships among many activities in manufacturing, involving materials, processes, machinery and people.

Source: Kalpakjian S (1995) in-Manufacturing engineering and technology

3.4 Emergence of the Internet in Manufacturing

The emerging e-business technology and information-hungry economy are bringing rapid and fundamental changes to manufacturing today, bringing to life new market forces and new business technologies. The supply chain is being reconstructed by the help of the Internet and information technology due to the connection of many elements that did not meet prior to this time. This is as a result of “a significant increase in computational processing power and improvements in data collection, storage efficiencies, context-based information retrieval, data manipulation, ease of accessibility, connectivity, and data mining and analysis” Bloss et al (2001).

The Internet has revolutionized the way business is being done. Therefore to compete effectively in the market, manufacturers have to satisfy the customer in every aspect, from the shop floor to their doorsteps, unlike in times past when the customer was naïve and easily swayed by manufacturers. Thus because of the emergence of the internet, the customer has a wide range of selection at his finger tips, and if a manufacturer cannot meet up to a customers expectations, there are others who will.

3.5 E-Manufacturing Defined

E-manufacturing is “the application of open, flexible, reconfigurable communications and computing for the enhancement of existing manufacturing practices, and the creation of new business practices and models. It applies to web-based applications, emerging technologies, and new developments in enterprise resource planning (ERP) systems to manufacturing models, to convert mass production to more flexible, responsive and cost-effective methods. E-manufacturing integrates customers, e-commerce systems and suppliers into the manufacturing process to provide an internet-based strategic framework for the factory”

(CDAC Research, 2003). Also, e-manufacturing according to CAM-1 is a series of interrelated activities and operations involving design, material selection, planning, production, quality assurance, management and marketing of discrete consumer and durable goods. Therefore, e-manufacturing provides a complete overview of the entire manufacturing enterprise.

E-manufacturing is aimed at the integration of the entire manufacturing industry, from the drawing table through to distribution and marketing. Information and communication technology is now enabling the flow of the rich information contained in products and processes to permeate all sectors of the enterprise (customers and suppliers, inclusive), at the speed of light. “Design cycle times and intercompany costs of manufacturing complex products will implode. Information on design flaws will be instantly transmitted from repair shops to manufacturers and their supply chains” (NACFAM, 2001).

Nosbusch (Rockwell automation, 2003), outlined four distinct areas e-manufacturing has touched in the manufacturing industry, and these are:

- Rapid facilities deployment and reconfiguration.
- Build-to-order production, continually adjusted to optimize yield.
- Nonstop operation
- Seamless supply chain coupling

For manufacturers to meet these new manufacturing demands, he says, they must have four critical competencies:

- **Design.** Rapid new product introductions that take advantage of changing customer demand are a key to a company’s growth in the Internet-driven market. Manufacturers

must be able to quickly deploy and reconfigure manufacturing production capacity to translate that top-line growth into bottom-line results.

- **Operation.** As manufacturers, they must optimize process yield and consistency throughout the enterprise. Lean manufacturing initiatives help manufacturers reduce waste and improve cycle time, maximizing throughput.
- **Maintenance.** Manufacturers must efficiently manage all company assets—materials, equipment and employees—to ensure nonstop operations and optimum asset productivity utilization. Only with such a solid, efficient foundation such as reliability centered maintenance and demand chain management methodologies will companies be able to withstand the rigors of today’s fast-paced business environment.
- **Synchronization.** This competency is the tight coupling, both upstream and downstream, of manufacturing operations into the greater supply chain. For a plant to be firmly integrated into an e-commerce driven supply chain, the three prior competencies must first be solidly established.

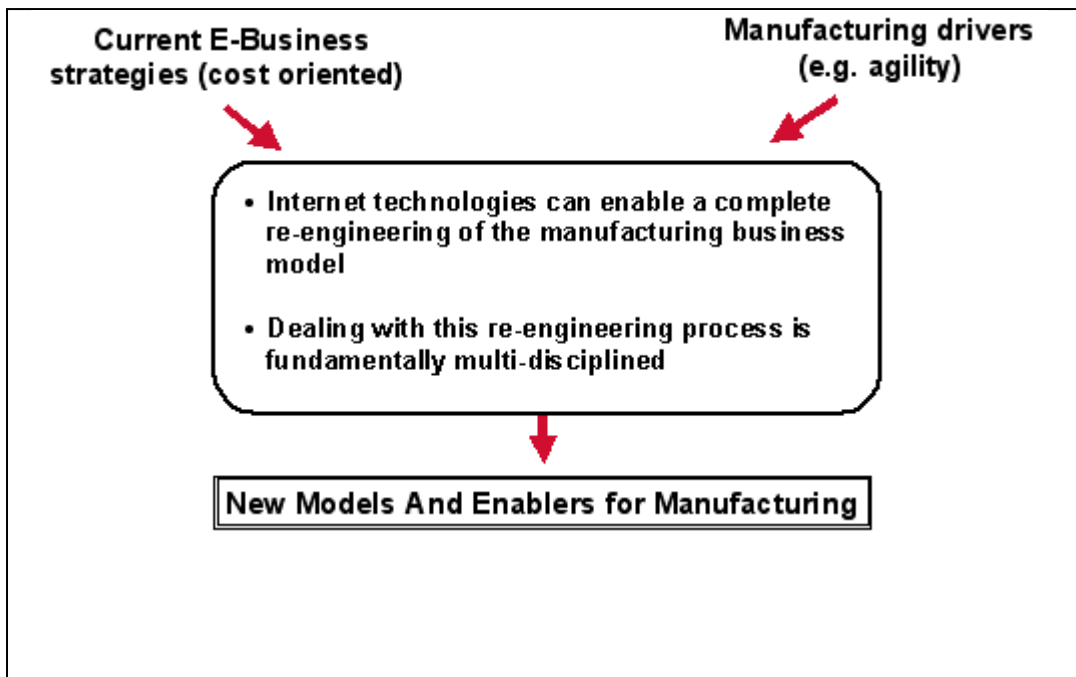


Fig. 10: Integrated view of e-manufacturing by CDAC Research

3.6 Summary

This chapter discusses the concept of manufacturing and its usefulness, how the traditional ways of manufacturing products was being overtaken by better, newer methods; which is due to a continuously developing digital environment. It draws attention to the reasons why the manufacturing industry needs to embark on integrating e-business in their business strategies, thereby requiring e-business models.

It explains how manufacturing is the center point of nations that have the economic advancement of their countries at heart. The brick and mortar method of manufacturing was discussed and its shortcomings outlined. These shortcomings included inadequate information flow, and the general alienation of parts of the industry from each other. The chapter enumerated the outcome of this non-integration, recommending e-manufacturing as a ready remedy for this. It explained the changes the Internet has made to manufacturing, and

this includes the total integration of manufacturing activities real-time such as communication, design, the production process and the entire supply chain.

CHAPTER 4

E-BUSINESS/E-MANUFACTURING MODELS

4.1 Introduction

The purpose of creating a model is to utilize it to understand a specific concept. Models are used to make complex situations simple, and “to make substantiated decisions based on well-understood and explicitly formulated essentials of the modeled situations” (Kilov, 2002). This explains why engineering and business artifacts do not collapse. Some examples of these artifacts are business markets, enterprises, bridges, buildings, etc. Models are used as frameworks for decision-making concerning, say, an organizational business process change, as well as the “possible usage (and non-usage) of computer-based information technology systems in order to improve some characteristics of that business” (Kilov, 2002).

4.2 Business Model Definition

There have been several attempts made by scholars to define business models. Different authors adopt different definitions for business models, and most times define a business model to suit their individual situations.

A business model according to Magretta (2002) is a story that explains how a business works; it is the business activities associated with making something (design, manufacturing, etc); and the business activities with selling something (distribution, delivery, transaction handling, etc). Afuah et al (2001) on the other hand, defined a business model as a method by which a firm builds and uses its resources. They based their definition on eight components which are interchangeably linked, these components include:

- Customer value - differentiation versus low cost

- Scope – products/services; customers/market
- Pricing/price – dynamic pricing
- Revenue sources – stock brokerage, advertising metrics
- Connected activities – value chain linkages
- Implementation – strategy, structure, systems, people, environment
- Capabilities – resources: tangible, intangible; human = competencies = ability/capacity to turn resources into customer value and profits.

Dubosson-Torbay et al (2001) defined a business model as the architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers in order to generate profitable and sustainable revenue streams. Timmers (1999) on the other hand, defines a business model as an architecture for product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors, and a description of the sources of revenue.

Below are some more definitions of business models put forward by the following authors:

1. *Tapscott (2000)*. A business model is about the invention of new value propositions that transfer the rules of competition, and mobilize people and resources to unprecedented levels of performance.
2. *Hawkins (2001)*. A description of the commercial relationship between a business enterprise and the products and/or services it provides in the market. More specifically, it is a way of structuring various costs and revenue streams such that a business becomes viable, usually in the sense of being able to sustain itself on the basis of the income it generates.

3. *Afuah and Tucci (2001)*. The main determining factor of a companies' performance, the method through which each company builds and uses its resources to offer its clients better value than that of the competitors, and to obtain long-term sustainability.
4. *Klueber (2000)*. Complements Afuah & Tucci's definition, defining business models as a logical arrangement of the creation of value in an organization as a business network, taking its partners, competitors and clients into consideration.

Therefore it can be deduced from the above definitions that every business has to contain or be made up of a model, without which a business cannot be said to exist. There has to be something (a kind of value), which a business in question is prepared to offer to a customer segment; there has to be a price set on this value in order for the business in question to recover the costs put into the effort of creating the said value (revenue); and finally, but not the least, the business in question has to have the required skills to produce this promised value. Thus, it can be said that every business is made up of products/services, skills, revenues, costs, etc as well as an invisible connection between all these elements to link them together.

4.3 E-Business Model Definition

Having discussed about what e-business is earlier on, the purpose of creating models, and the meaning of business models, it becomes clear that an e-business model is created in order for companies to carry out e-business practices in a style which results in an ultimate all-round benefit to everyone concerned. Therefore, an e-business model can be defined as a method of performing e-business through which a company can sustain itself and produce profitable revenue growth

However, it can be understood that the revenue generated by an organization doing e-business is directly proportional to the type of e-business model it employs, and the overall success of the organization relies solely on it. E-business models are designed to help e-businesses understand themselves better and know when to improve its standards by constant innovation, integrating these standards in all areas of the e-business. Thus a company manager can easily communicate its e-business ideas to others, be they business partners, customers, or employees, in a clear and uncomplicated way through the help of e-business models.

4.4 Importance of e-business modeling

Identifying and understanding the fundamental nature of e-business models is a way for business firms to be aware of, and adapt to, the vast opportunities available to them on the Internet. Having an e-business model creates an avenue for change, because it is easier for organizations to either modify or entirely change an existing model. Additionally, “e-business models can help managers simulate e-businesses and learn about them. This is a way of doing risk-free experiments and learning about possible consequences of decisions, without endangering an organization” (Sternman, 2000).

Osterwalder et al (2002) explained the reason for designing, using and understanding e-business models in the business environment, and these are outlined below:

- The purpose of an e-business model – helps identifying and *understanding* the relevant elements in a specific domain and the relationships between them (Ushold et al., 1995; Morecroft, 1994).
- The use of formalized e-business models helps managers easily *communicate and share* their understanding of an e-business among other stakeholders (Fensel, 2001).

- Mapping and using e-business models as a foundation for discussion facilitates *change*. Business model designers can easily modify certain elements of an existing e-business model (Petrovic et al., 2001).
- A formalized e-business model can help identifying the relevant *measures* to follow in an e-business, similarly to the Balanced Scorecard Approach (Norton et al., 1992).
- E-Business models can help managers *simulate* e-businesses *and learn* about them. This is a way of doing risk free experiments, without endangering an organization (Sterman, 2000).

4.5 E-BUSINESS MODEL STRUCTURE

Different authors and scholars classify/decompose e-business models in their own unique ways. But in this study, the classification employed by Osterwalder (2002) was used, since it gave a broader explanation of the topic in question.

An e-business model according to Osterwalder (2002), is based on four main pillars, namely,

1. The *products and services* a firm offers, representing a substantial value to the customer, and for which he is willing to pay.
2. The *infrastructure and the network of partners* that are necessary in order to create value and to maintain a good customer relationship.
3. The *relationship capital* the firm creates and maintains with the customer, in order to satisfy him and to generate sustainable revenues, and
4. The *financial aspects*, which are transversal and can be found throughout the three former components, such as cost and revenue structures.

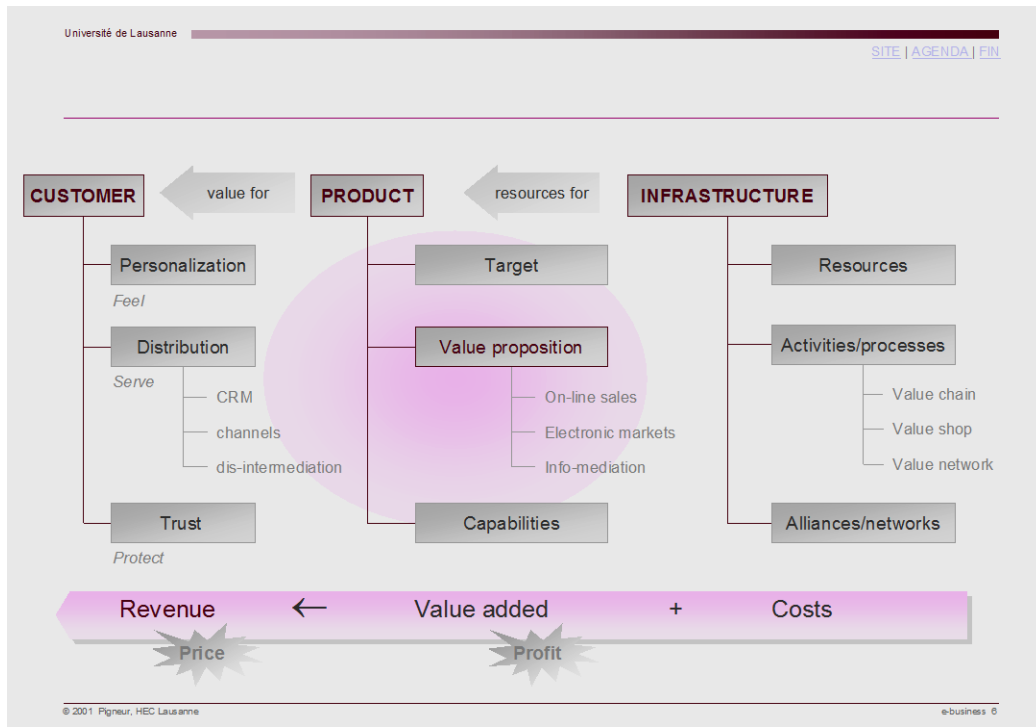


Fig 11: E-business model framework

Source Pigneur (2001) in: *Ontology for e-business models*

4.5.1 Product Innovation

This describes the **value** a company promises to offer to its consumers, the **precise** (targeted) **customers** in question, and the **skills** (capabilities) required to deliver this promised value.

Value Offer

This involves the definite products and services a firm offers to its target customers. Kamil et al (1997), describes value proposition as items of value, such as products and services as well as complementary value-added services, packaged and offered to fulfill customer needs. This value has a lot of benefits both to the firms and the targeted audience. Some of which are:

- a) *“Innovation through new, complementary or customized offerings.* ICT allows firms to include strong and new information components into their offerings or in some cases even completely digitize their products. Firms can propose value tailored to the

profile of every single customer. An example is the shoe company customatix, who allows their customers design their own personal footwear.

- b) *Providing a lower price than the competition.* Cost savings achieved through optimized infrastructure management or direct selling over the internet (Benjamin et al, 1995), can be passed on to customers in form of lower price tags, and
- c) *A premium customer service level and customer relationship excellence.* ICT allows firms to propose a whole new range of (often free) services that augment the value of the core offering. The company Live Manuals for example, lets firms that sell consumer electronics offer their clients interactive and multimedia product manuals. Other services that can be provided through ICT include product updates, training or support” (Osterwalder, 2002)

Target Customer

This refers to the customers a firm does business with, the geographical areas and the particular products and services it deals with. Outside this scope is a no-go area for the firm in question unless it decides otherwise.

“A firm can market either to businesses and /or individuals, commonly referred to as business-to-business (B2B) and business-to-consumer (B2C). What actually changes compared to classical marketing is the notion of distance and the notion of time. Through ICT firms expand their reach because geographical notions becomes less relevant and because websites are open 24/7. This is as much of an opportunity as well as threat because barriers to market entry are lower and the competition increases” (Porter, 2001).

Capabilities

“Capabilities can be understood as repeatable patterns of action in the use of assets to create, produce, and/or offer products and services to a market” (Wallin, 2000). Thus for a business to satisfy its target customers, it has to have the skills/be capable to offer the value it promises. Some examples of how a company demonstrates its capabilities are:

- a) A grocery shop that sells perishable goods and that promises an easy way to shop, especially to very busy working people, shows its capability by the rapid delivery of its products.
- b) A newspaper company shows its customers its degree of capability if its newspapers/magazines are constantly up to date, etc.

4.5.2 Infrastructure and Network of Partners

This framework describes what a firm’s value system looks like, which is imperative for the firm to deliver this promised value. How does the company organize its resources and know-how to achieve and deliver the value promised? This infrastructure comprises of “the *activity configuration* of the firm, in other words the activities to create and deliver value, and, the relationship between them; the in-house *resources and assets* and the firm’s *partner network*” (Osterwalder, 2002).

Activity configuration.

“The main purpose of a company is the creation of value that customers are willing to pay for. This value is the outcome of a configuration of inside and outside activities and processes. To define the value creation process in a business model, the *value chain framework* (Porter et al, 1985) and its extension, such as defined by Stabell and Fjeldstad (Stabell et al, 1998) is used. They extend the idea of the value chain with the *value shop* and

the *value network*. Former describes the value creation process of service providers, whereas latter describes brokering and intermediary activities. It is in this component of the e-business framework that we will find such activities as Supply Chain Management (SCM), Efficient Customer Response (ECR), or e-procurement” (Osterwalder, 2002).

Network of partners

A firm’s network of partners refers to the strong relationships it has with its business partners. This bonding between organizations comes in handy in certain periods such as when there is a drop in transaction costs. When this occurs, it becomes easier for companies to split up to form new partner networks, where concentration becomes more on their competencies allowing other activities concerning their firm to be handled by their partner networks.

Resources and assets

When there are no resources to play with, there cannot be a business. Resources can be said to be the lifeblood of any existing business. Thus, in order to generate value, a company requires resources. These could be in several forms – tangible (e.g. equipment, cash reserves, etc); intangible (e.g. brand, reputation, etc); and human (e.g. people).

4.5.3 Customer Relationship

This has to do with how much a company understands and knows its target customers. To achieve this, a firm has to have good information strategy. If there is no communication flow, firms will loose grip on their customers, which will not tell well for their business.

Good customer relationship also involves the trust and loyalty a firms customers has in them. E-business organizations should always bear in mind that “in a business world that is

increasingly virtual and has less face-to-face contact” (Osterwalder, 2002), keeping customers trust and loyalty is imperative if they want to be kept for life.

Information strategy.

“The objective of the information strategy is threefold. First, the defining of the strategy of gathering customer information and second the outlines of how to use this information in order to excel in customer relationship (e.g. through personalization and profiling). The third goal refers to the exploitation of customer information in order to discover new and profitable business opportunities and to ameliorate customer satisfaction. Data warehousing, data mining and business intelligence are important technologies that allow managers to gain insight on their customers buying behavior. These insights can be used to create what Hamel (Hamel, 2000) calls the positive feedback effect. A firm with a large base of users, and a way of rapidly extracting feedback and information from those users, may be able to improve its products and services faster than its competitors. In this virtuous circle products and innovation can be improved, which in return attracts new customers. Information strategy should contribute to a personalized relationship with the firm’s customer. Customer profiles allow rule-based one-to-one personalization or collaborative filtering, which give the customer the feeling of having been taken seriously as an individual” (Osterwalder, 2002)

Feel & Serve (distribution channels).

“This element refers to the way a firm "goes to market" and how it actually "reaches" its customers (Hamel, 2000). This means a company must define its channel strategy and outline through which channels - either indirect or direct channels, operated by the firm or provided by a third party (e.g. agent, intermediary) - it wants to deliver the companies value proposition. The purpose of a channel strategy is to make the right quantities of the right product or service available at the right place, at the right time to the right people. (Pitt,

1999). ICT, and particularly the Internet, has a great potential to complement rather than to cannibalize a business's channels (Porter, 2001). Direct selling over the Web could improve margins, whereas selling through new Internet mediation services (cybermediaries) (Sarkar et al., 1995) could mean new market opportunities. Of course the expansion of the range of channels also increases the potential of conflicts between channels (Anderson et al., 1998) and demands strong management. Because ICT can fundamentally change the way firms interact with customers, it is important to closely analyze and understand channel interaction." (Osterwalder, 2002)

Trust and loyalty.

"It is essential to establish trust between business partners when the business environment becomes increasingly virtual and the implicated parties do not necessarily know each other anymore before conducting business. With the emergence of the Internet in business and commerce important research has been conducted on what trust actually is in cyberspace. There exists a certain number of mechanisms to build trust in e-business environments, such as, for example, virtual communities (Hagel et al., 1997), performance history, mediation services or insurance in case of harm, third party verification and authorization, and, a clear and explicit privacy policy (Friedman, 2000; Dimitrakos, 2001).

Customer loyalty can be understood as the outcome of the customer's trust and satisfaction. To establish loyalty and relationship capital (Tapscott et al., 2000) the firm has to create positive relationship dynamics (Hamel, 2000), where emotional (such as e-branding), as well as transactional elements in the interaction between firm and client play an important role. Even though well known, it is often forgotten that in most cases it is much cheaper to incite existing customers to do repeat business than to acquire new customers. In the early days of

the Internet many e-businesses have concentrated on acquisition for growth and have neglected customer loyalty” (Osterwalder, 2002).

4.5.4 Financial Aspect

The financial aspect concerns the type of model that generates income for the firm, and a firm’s cost structure. All the other aforementioned pillars are dependent on this model and a company’s ability to remain in the competition also is influenced by this model. (Osterwalder, 2002).

Revenue model

This concerns the ability a company has to generate benefits or profit from those (its customers), it delivers its value to. Revenues derived this way are all different for each type of model (different pricing).“An online media company for example, could sell its content in several different ways. It could collect subscription fees from its private customers and demand fixed prices for content (articles, films, and sound) from its business customers. The media company may also live from advertising and sponsoring that it could sell or auction to business customers. Another revenue stream could be commission or transaction cuts from other businesses that conducts sales through the media company’s Website. The new pricing mechanisms enabled by ICT should be used in order to maximize revenues. Particularly the Internet has had an important impact on pricing and has created a whole new range of pricing mechanisms (Klein et al., 2000). It has become easier to compare prices, which will probably conduct firms to abandon fixed pricing. The German start-up Guentiger.de, for example, allows customers to compare prices of products in retail stores with the lowest prices in town by using a mobile phone” (Osterwalder, 2002).

Cost structure

“This element measures all the costs the firm incurs in order to create, market and deliver value to its customers. It sets a price tag on all the resources, assets, activities and partner network relationships and exchanges that cost the company money. As the firm focuses on its core competencies and activities and relies on partner networks for other non-core competencies and activities there is an important potential for cost savings in the value creation process. The right use of ICT in customer relationship also opens up new opportunities for delivering premium customer services and therefore additional value at reasonable costs” (Osterwalder, 2002).

Profit model

“This element is simply the outcome of the difference between revenue model and cost structure. Therefore it can be seen as the culminating point and as an expression of the entire e-business model ontology. Whereas Product Innovation and Customer Relationship shall maximize revenue, an effective Infrastructure Management shall minimize costs and therefore optimize the profit model” (Osterwalder, 2002).

4.6 CLASSIFICATION AND TYPES OF E-BUSINESS MODELS

There are a lot of ways scholars classify e-business models, but there is yet to exist a unique classification method. Most authors suggest a two-dimensional classification, such as Timmers (1998), who classifies an e-business model as made up of functional integration and degree of innovation; Tapscott et al (1999), classifies it as made up of economic control (which is both hierarchical and self-organizing), and value integration; while Pigneur (1999) classifies e-business models as comprised of the power of buyers and sellers.

Based on different classifications, different numbers and types of e-business models were proposed by different authors, such as Timmers (1999) who proposed eleven different e-business models; Tapscott et al (1999) five; while Rappa (1999), proposed 30 models. Table 3 shows some of these different classifications.

Table 3: Types of e-business Models

Authors	Bambury (1998)	Timmers (1999)	Eisenmann (2002)	Rappa (2000)
Models	Mail-order	E-shop	Online portals	Brokerage
	Advertising-based	E-procurement	Online retailers	Advertising
	Subscription	E-malls	Online content providers	Infomediary
	Free trial	E-auctions	Online market makers	Merchant
	Direct marketing	Virtual communities	Online brokers	Manufacture
	Real estate	Collaborative platforms	Networked utility providers	Affiliate
	Incentive scheme	Third party marketplaces	Application service providers	Community
	B2B	Value chain integrators	Internet access providers	Subscription
		Information brokerage		Utility
		Trust services		

4.7 Currently used e-business/e-manufacturing models

Based on this web of several classifications, this study uses a multicategory approach, classifying a range of e-business models from a combination of the models in table 3.

Therefore e-business models can be broadly classified into three types, namely,

1. Distributor
2. Producer

4.7.1 Distributor model

This type of model allows buyers and sellers to come together for the purpose of transacting business. It is comprised of two kinds, namely

- Focused distributors and
- Portals.

Focused Distributors

This type of model is further decomposed into four types, namely,

1. Retailers
2. Marketplaces
3. Aggregators and Informediaries
4. Exchanges

Retailers

This e-business model involves the sale of physical goods online. Inventory is controlled and a fixed price set on the products – very much like the physical everyday supermarket. “Because retailers assume control of physical goods, their ratio of tangible to intangible assets is much higher than for a firm that does not assume control of physical inventory” (Wojtkowski, 2003).

Revenue gotten here is mainly from products and service sales, while the cost model are procurement, advertising and marketing, inventory and customer service, research and development, and IT infrastructure. Examples are Walmart.com and landsEnd.com.

Marketplaces

This model sells information-based products and services and unlike the retailer model, does not move physical inventor. It involves companies employing the services of others, called

third parties, to carry out Internet marketing and transaction services on their behalf. These third parties are sometimes tasked with providing an aggregate of customers' demands on the company's' behalf.

E-markets offer a natural medium to implement the sophisticated pricing policies associated with revenue management. That is, via E-markets, suppliers (and buyers) can reach larger markets, dynamically change prices as the need and opportunity arise, and gain vital information about the other side of the marketplace. E-markets bring with them three critical factors that can help companies successfully implement sophisticated pricing policies and boost their profitability; (1) negligible transaction costs associated with price changes, (2) greater information about the marketplace and market participants, and (3) access to a wider range of buyers/sellers" (Elmaghraby, *Georgia Institute of Technology USA*). Business-to-business marketplaces are either 'vertical' or 'horizontal'. "Vertical B2B marketplaces aim to secure a large share of the transactions relating to a particular industry (e.g. automotive). Horizontal marketplaces on the other hand, aim to serve a wide variety of transactions in other to function as a one-stop shop for small businesses" (Haig, 2001). Additionally, Emarkets provide support to a cross section of enterprises/businesses "building capabilities to host critical supply chain applications" (CVOC, 2003). This enables organizations to integrate business activities such as production planning and marketing, planning procurement, etc. Emarkets therefore, make for an environment that is flexible, available, reliable and scalable.

"Often, therefore, the third-party marketplace is an additional, online channel to other existing channels, including physical outlets. They all have in common that they offer at least a user interface to the suppliers' product catalogues. Several of all the additional features

such as branding, payment, logistics, ordering and, ultimately, the full-scale implementation of secure transactions are added to third-party marketplaces” (Timmers, 1999).

Revenues are derived through taking commission on each sale made. Likely costs associated with this model are advertising and marketing, research and development, and IT infrastructure. Examples of e-marketplaces are E-loan and QuickenInsurance.

Aggregators and Informediaries

This model is tasked with the provision of information to the public about the products and services different firms have to sell. They create a forum where people can compare prices before making a purchase, after which their job expires. They do not complete final transactions. Benefits (revenue) derived are referral fees and advertising fees.

Aggregator e-business model is comprised of a special class called infomediaries. This aspect of the model unites individuals who buy and sell information. Informediaries could either be concerned with customers or other businesses. B2C informediaries often provide free information, while that of B2B charges subscription fees. Examples are AutoWeb.com and Insweb. Likely revenues are referral fees, advertising and marketing fees. Likely costs are advertising and marketing, R&D, and IT infrastructure.

Exchanges

Exchanges are models that involve the negotiating of the price of products by the buyers and sellers at the particular time of sale. Exchanges can also be referred to as **auctions**.

E-auction involves carrying out auctions electronically on the Internet. Peculiar to e-auction are electronic bidding mechanisms with the same properties as the traditional real life auction. An e-auction site might also involve an integration of different processes to make for easier transactions (bidding process) such as contracting, payments and delivery.

Internet auctions have become very popular over the years, owing to the fact that it is not as expensive as organizing real-life auctions and bidders do not have to travel long distances to get to the auction venue. “Online auction currently trade billions of dollars’ worth of goods per year, and are growing at a rate of more than 10% per month” (Lucking-Reiley, 1999).

Bidders who go online can do so not only at their convenience but also from anywhere around the globe (such as from homes, offices, etc), unlike the traditional auction where all bidders are required to bid simultaneously. Also, an auction on the web can last for as long as days or weeks, which is opposed to the traditional one where every bidder involved, are constrained to being present till the end of the bid.

The auction provider realizes his revenue by “selling the technological platform, in transaction fees and in advertising. Benefits for suppliers and buyers are increased efficiency and timesavings, no need for physical transport until the deal has been established, and global sourcing. Because of the lower cost, it becomes feasible to offer small quantities of low value, e.g. surplus goods for sale. Sources of income for suppliers are in reduced surplus stock, better utilization of production capacity, and lower sales of overheads. Sources of income for buyers are in reduced purchasing overhead cost and reduced cost of goods or services purchased” (Timmers, 1999). Fastparts (<http://www.fastparts.com>), Ebay, and FreeMarkets are examples.

Portals

This model creates/provides a gateway to a whole range of rich information on the Internet. Portals are horizontal, vertical or affinity.

Horizontal portals

This model acts as a “gateway access to the Internet’s vast store of content. It provides a broad range of tools for locating information, communicating with others and developing online communities of interest” (Wojtkowski, 2003). A virtual community springs from this e-business model.

A virtual community is a web (internet) environment that is formed by an organization that brings together a group of online users at a commonly used site for commercial purposes. The groups brought together vary widely and could range from customers or shareholders to people who share an interest like playing chess. What, may be asked is the importance of these kind of communities?

The aim of a virtual community is to “add value and facilitate an information exchange by bringing people and resources together onto a network” (Lovelock, 2000). Hagel et al (1997), also explains the necessity of these communities when he said that *the rise of virtual communities in online networks has set in motion an unprecedented shift from vendors of goods and services to the customers who buy them. Vendors who understand this transfer of power and choose to capitalize on it by organizing virtual communities will be richly rewarded with both peerless customer loyalty and impressive economic returns.*

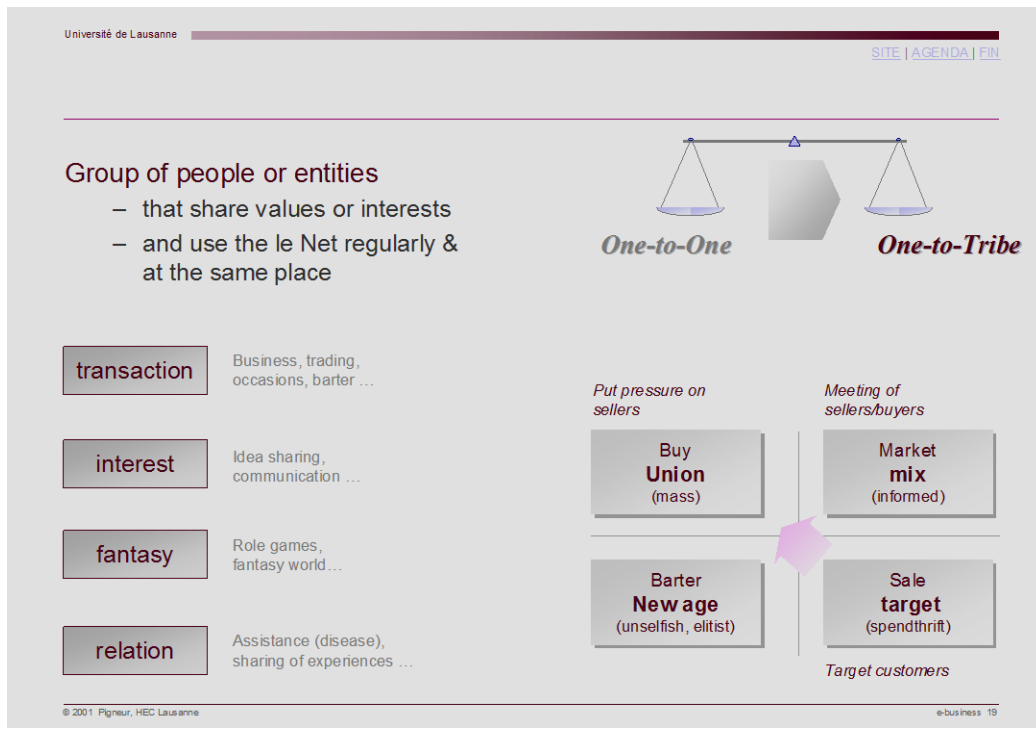


Fig 12: Virtual Community

Source Pigneur (2001) in: *Ontology for e-business models*

However, it is imperative to mention at this point that not all virtual communities are intended for profit purposes. Some are structured for educational and religious purposes, and are self-supporting, most times getting a maintenance contribution from donors. “Online communities, along with their advertising and shopping services unique to their focus, continue to flourish as a niche for small and special-interest groups. For example, Oxygen (www.oxygen.com), Oprah Winfrey (www.oprah.com), and iVillage (www.ivillage.com) have all developed large numbers of regular users by focusing mainly on topics that are of interest to women. Geocities (www.geocities.com), the build-your-own-web-site-for-free service provided by Yahoo! provides an environment for individuals who wish to explore their own creative skills by constructing a website” (Canzer, 2003). Other examples of virtual communities are Amazon.com, nanothinc.com (nanotechnology), and indconnect.com (in the steel industry).

Chaffey (2002) categorized virtual communities into communities of purpose, position and interest for the B2C market sector; and community of profession for the B2B market sector.

Purpose. This community is comprised of individuals who are aiming to achieve the same purpose. There are numerous examples of these kinds of communities, such as:

1. Autotrader (www.autotrader.co.uk), a site used for people with an interest in cars.
2. MySimon and Shopsmart hosts communities for those interested in price or product evaluation.
3. Egg Free Zone (www.eggfreezone.com) and Alexa (www.alexa.com) also have communities where companies exchange ideas about their products and services.

Position. This type of community caters for distinct groups of people similar circumstances, such as people with same kind of health disorder (e.g. cancer); people in same age groups (e.g. teenagers and 'over 50s'); and groups particularly designed for parents. Examples are Dobedo (www.dobedo.co.uk), Baby center (www.babycenter.com), and Parents Center (www.parentcenter.com).

Interest. People that the same interests or fervor in a particular area/topic such as sports and music belong to this category of community. Examples are interest in football (www.football365.com), and music (www.pepsi.com).

Profession. This virtual community is set up to attract people from different industries with particular specialties, such as the chemical and electronics industries. Vertical Net is an example. It has about 50 different virtual communities with different interests ranging from paints and coating to electronics.

How the growth of this type of model is dependent on how much awareness is created (advertised), which explains why incentives are extended to site users who introduce others to it. Other business services like e-malls, third-party marketplaces, etc, now employ virtual communities as an added service to enhance their attractiveness and opportunities.

Vertical portals

This e-business model provides a conducive environment to conduct business, shop, play and learn. E-shops and e-malls are types of vertical e-business models.

E-shops. This is an electronic market of a shop or company, that puts its goods on display in an Internet website. A customer who fancies any goods/service preorders the product, pays for it, and the company subsequently delivers the product directly to him via his/a suppliers warehouse. “Benefits sought for the company are increased demand, a low-cost route to global presence, and cost-reduction of promotion and sales. **Benefits** for the customer can be lower prices compared to the traditional offer, wider choice, better information, and convenience of selecting, buying and delivery, including 24-hour availability” (Timmers, 1998). **Cost models** are content/information assessment management, R&D, and IT infrastructure. Examples of e-shops are fleurop (<http://www.fleurop.com>), and travelocity (<http://www.travelocity.com>).

However, according to Indiainfoline.com in: the basics of e-commerce, “there are many things that need to occur in online shopping to generate higher revenues for the consumer. The consumer who has a general product need, but may be unsure about what features to look for, may need access to information from online consumers help – descriptions of product features, and detailed data about the product. The consumer would need another source of

information, such as news group postings and discussion forums for feedback from other consumers who have purchased the same product. This joining of advice and information would help generate revenues in online shopping”

E-malls are a conglomerate of e-shops where different e-shops share the same website and the same transaction processes. Large departmental stores comprised of a range of different stores within it are a real-life model of e-malls, and they all exist under a mutual umbrella (name). A good example is Electronic mail Bodensee (<http://www.emb.ch>), which gives entry to individual e-shops. E-malls becomes like an industry marketplace if they now specialize in a particular area of marketing. An example is Industry.Net (<http://www.industry.net/>).

“Benefits are sought in services (e.g. Barclays with BarclaySquare), or in advertising space and/or brand reinforcement or in collective benefits for the e-shops that are hosted such as increased traffic, with the expectation that visiting one shop on the e-mall will lead to visits to ‘neighboring’ shops. Benefits for the customer (real or hoped for), are the benefits for each individual e-shop, with the additional convenience of easy access to other e-shops, and ease of use through common user interface elements. When a brand name is used to host the e-mall, this is expected to enhance the trust and confidence of customers, and therefore increase readiness to buy. Benefits for the e-mall members (the e-shops) are lower cost and complexity of being on the web, with sophisticated hosting facilities such as electronic payments, and additional traffic generated from other e-shops on the mall, or from the attraction of the hosting brand. Revenues are from the membership fees (which can include a contribution to software/hardware and set-up costs as well as a service fee), advertising and possibly a fee on transactions (if the mall provider processes payments)”(Timmers, 1999).

Affinity portals

This model is similar to vertical portals in the sense that it also provides “deep content, commerce and community services, but targeted at a specific market” (Wojtkowski, 2003).

Examples theknot.com and wfn.com.

4.7.2 Producer E-business Model

Producers transform the work of inventors into useable products and services that satisfy a market need. “They may sell and maintain the product or may share that role with others in the value chain” (Wojtkowski, 2003). Producers are comprised of the following:

- Service Providers
- Manufacturer
- Advisors

Service providers

Internet service providers

Internet service providers (ISP) are “telecommunications companies which provide access to the Internet for home and business users. ISPs have two main functions; first they provide a link to a company or individual which enables them to access the World Wide Web and send Internet e-mail. Second, they can host websites or provide a link from a company’s web servers to enable other companies and consumers access to a company’s website” (Chaffey, 2002).

Examples of service providers are American express, eCoverage, and American Airlines.

Revenues realized are through commission, service or transaction fees; while cost model

includes advertising, marketing and sales, content or information assessment management, IT infrastructure and R&D.

Value chain service providers

“These specialize in a specific function for the value chain, such as electronic payments or logistics, with the intention of making that into their distinct competitive advantage. Banks, for example, have been positioning themselves in this way for a long time and may now find fresh opportunities using the open Internet network. New approaches are also emerging in production/stock management, where the specialized expertise needed to analyze and fine-tune production is offered by new intermediaries. A fee or percentage-based scheme is the basis of revenues.

Examples of value-chain service providers are FedEx (<http://www.fedex.com>), and UPS (<http://www.ups.com>), who provide web-based logistics support” (Timmers, 1999).

Manufacturer

Collaborative platforms

“These provide a set of tools and an information environment for collaboration between enterprises. This can focus on specific functions, such as collaborative design and engineering, or on project support to a virtual team, for example, a team of consultants. Business opportunities are in managing the platform (membership/usage fee) and in selling the specialist tools (e.g. for design, workflow, document management). Examples are in the products and projects spun off from the Global Engineering Network concept (Rethfeld, 1994), such as Deutsche Telekom/Globana’s Industrial Cooperation system (GEN/ICS)” (Timmers, 1999).

(Entellium, 2003) outlined the benefits of a more efficient information sharing process and better communication amongst team members and partners below as:

1. **Access to the most current information anytime from anywhere** means less time is spent managing information, and more time is spent acting on the information.
2. **By extending the level of interaction between staff, customers and partners**, a closer working relationship develops as people become more willing to share ideas and work together to resolve problems or issues.
3. **No more lost documents** or having to remember different versions or editions of documents – everything is current and on-line removing one more thing to remember and track from an already busy day.
4. **Reduce the processing and approval time for publishing key documents** or information. A faster time to approval of key documents like proposals, press releases, legal contracts, agreements document repository means valuable corporate information is protected from accidental loss, damage or unauthorized access or removal. Key company information stays within the company leading to better continuity and future knowledge sharing.
5. **A secure and centralized document repository** means valuable corporate information is protected from accidental loss, damage or unauthorized access or removal. Key company information stays within the company leading to better continuity and future knowledge sharing.

E-procurement

Most people often use the terms ‘procurement’ and ‘purchasing’ interchangeably, but Kalakota et al (2000) makes it clear that procurement has a broader meaning when they defined procurement as “all activities involved with obtaining items from a supplier, which includes

purchasing, but also inbound logistics such as transportation, goods-in and warehousing before the item is sold.

Therefore, e-procurement can be said to be “the electronic integration and management of all procurement activities including purchase request, authorization, ordering, delivery and payment between a purchaser and a supplier” (Chaffey, 2002). The ‘five rights’ of purchasing, as defined by Bailey et al (1994) are sourcing items:

- At the **right** price
- Delivered at the **right** time
- Are of the **right** quality
- And from the **right** source

The above ‘rights’ are basically what e-procurement seeks to improve. There are two broad types of e-procurement that concerns the manufacturing of products,

1. Production-related procurement and
2. Non-production related (operating) e-procurement.

These two types of procurement generally “supports the operations of the whole business and includes office supplies, furniture, information systems, MRO (maintenance, Repair and Operations) goods, and a range of services from catering, buying travel to professional services such as consulting and training”(Chaffey, 2002).

The benefits of e-procurement, as summarized by Turban et al (2000), are:

- Reduced purchasing cycle time and cost

- Enhanced budgetary control (achieved through rules to limit spending and improved reporting facilities)
- Elimination of administrative errors (correcting errors is traditionally a major part of a buyers workload)
- Increasing buyers' productivity (enabling them to concentrate on strategic purchasing issues)
- Lowering prices through product standardization and consolidation of buys
- Improving information management (better access to prices from alternative suppliers and summaries of spending)
- Improving the payment process (this does not occur currently since payment is not always integrated into e-procurement systems)

Offline Programming (CAD and Robotics)

This is the creation, “optimization and testing of machine programs without impacting manufacturing schedules or production, such as high-speed collision detection algorithm and advanced data exchange components (OpenCascade, 2003). Advantages derived are quicker adaptation rates in production and decreased risks of disinvestments

4.8 Summary

Chapter 4 discusses about the importance of modeling, and how it is utilized for simplifying complex situations, to make for better understanding and communication. Detailed definitions of what business models are were presented. It was deduced that a business model tells the history of a business, how the business functions, the values it has to offer, what

skills it possesses to create that value, what sector of persons are the recipients, and finally, but not the least, what the said business gets in return to compensate for all its efforts.

Based on this and what was previously discussed about e-business and e-manufacturing in chapters 2 and 3, an e-business/e-manufacturing model was defined. An e-business model was discussed to have all the properties of a business model but for the 'e' – electronic business. The chapter presented several advantages of e-business and e-manufacturing models, amongst which are to make for the better understanding of how an e-business functions, as well as to simulate a designed model.

The dynamic framework of an e-business model was also discussed. This was comprised of four main pillars, namely, firm's products and services, its infrastructure and network of partners, its customer relationship and its financial aspects. Finally currently used e-business models and e-manufacturing models were discussed. This was compiled from a cross section of e-business models presented and developed by different authors and scholars. These models included exchanges, collaborative platforms, e-shops, virtual communities, etc.

CHAPTER FIVE

QUESTIONNAIRE SURVEY

5.1 Introduction

A survey was carried out to investigate existing companies and organizations and the type of e-business models they utilized for their different e-business practices. The aim of the survey was to identify and evaluate key factors and indicators by which a company's e-business and e-manufacturing success can be assessed (Rockhart, 1979).

To evaluate the e-business models utilized by firms and determine their performance, it is appropriate to evaluate them based on the framework of an e-business model. This framework adopted from the literature review, are product innovation, infrastructure of its network and partners, customer relationship, and finance. Other key areas to investigate were what type of e-business strategy the companies in question had in place as well the degree of adoption of the e-business concept.

5.2 E-business Strategy

Johnson et al (1999) defined a business strategy as the direction and scope of an organization over the long term that achieves advantage for the organization through its configuration of resources within a changing environment to meet the needs of markets and to fulfill stakeholders' expectations.

E-business models are not designed for the mere fun of designing models. Amongst other reasons, to design and maintain a model is associated with costs and commitments, thus

before designing/implementing an e-business model, the company in question needs to ascertain what its goals or strategies are. Is the e-business strategy aimed at meeting customer values by achieving operational excellence, customer closeness or technical advantage? For a firm to achieve operational advantage, its e-business model has to revolve around e-procurement, supply chain integration, real-time employee communication, amongst others; if the goal of the business is for technical dominance, then e-business models designed should include CAD utilization, reduced market time and good supplier communication; and if the company goal is having good and close relationship with customers, constant customer survey, customer support and personalized marketing is required.

5.3 The Degree of E-business Development

The adoption of the e-business concept in firms, the reason behind the adoption, and if the e-business practice has in any way affected its development for the better was investigated. Questions were asked to try to find out whether the e-business practice was more beneficial than the brick and mortar way of conducting business for reasons such as the reduction of cost through better efficiency, forming partnerships in the supply chain, increasing revenue, acquiring, maintaining and developing customer status, etc.

5.4 Evaluating core processes

An integrated and global strategy is employed to get a balanced view of the e-business models used in different firms and to use the same measurement system for all the firms involved. The four pillars of an e-business model, adopted from the literature review are employed. An e-business model could be said to be dynamic and successful if it meets all the

requirements proposed. Thus questions asked in the questionnaire covered the following areas:

5.4.1 Product Innovation

The product innovation of an e-business firm measures a firm's value proposition, target customers, and the skills it possesses to deliver this promised value. Questions asked had the intent of trying to ascertain what particular value the company promises to offer. Is it in terms of customized offerings? Is this value offered to its customers in such form as to be value-specific? How also is the firm offering this value, is it in a digitized format or physically?

Value proposition. Questions 3, 7 and 21 aimed at identifying whom the target customers of the firm were. From the literature review, it was discovered that a business could have different markets for its products; it can market to other businesses as well as directly to individuals or end consumers (Porter, 2001).

Capabilities. The company's capabilities were also probed in questions 4 and 6. The aim was to find out if really it had the skills required to deliver the promised value, in this context, e-business enabling technologies. Without these capabilities, the business cannot be categorized as an e-business.

5.4.2 Infrastructure

This involves the overall activity that connects the entire value chain with the delivery of the promised value at the end. These activities could be the design, service, delivery, etc, and is referred to as the activity configuration of the firm.

Activity configuration. The activity configuration of an e-business enterprise involves the overall e-business/e-manufacturing model(s) developed to deliver the value promised. It

comprises of all the activities, both inside and outside the firm, which merges to produce this promised value. Porter et al (1998) referred to these activities as the value chain framework. Examples of this framework could be comprised of brokering, intermediary activities, as well as the part service providers' play.

In other words, what kinds of models (configuration) are put in place to deliver the value promised? These questions are probed in numbers 8-10, and 19 in the questionnaire.

5.4.3 Customer relationship

Questions were asked to find out what kind of relationship companies had with their customers. Respondents were asked what incentives were in place to augment the value of the basic value offered. Incentives could be in the form of product updates, digital product manuals and training.

Information strategy. The type of information strategy employed by these e-business firms was also asked (20, 23, 25 and 35). Were customer data collected and utilized (e.g. through personalization and profiling)? Were these data used to find out new ways to improve the business in order to make for a 100% customer satisfaction?

Trust and loyalty. Another important aspect of customer relationship management is trust and loyalty. A customer can only be loyal to a firm if it has every reason to trust it. Thus question 32 and 33 were designed to throw light on this. Are there any mechanisms put in place to encourage this trust? Dimitrakos (2001) gave examples of these mechanisms that could be third party verification and authorization, a privacy policy and insurance in case of harm.

Distribution channels. A dynamic and effective e-business model should have a good channel strategy. Channel strategy refers to the medium through which a firm markets its products. It

could be either directly or through indirect channels (third parties). Thus questions 20 and 21 aimed at determining this.

5.4.4 Finance

Finance is the core of any business. As seen from the literature review, all other areas of the e-business model framework depends on how buoyant the company's' finances are and how it intends to maintain that buoyancy. Thus questions 14-17 were designed to determine what benefits were derived from the value created. How does the firm in question realize profit for its effort? Is it from direct sales, advertising fees, subscription fee, etc? Questions 11, 12 and 13 provided the answers to that.

Additionally the cost model is also an important aspect of e-business models. This has to do with all the costs incurred in the process of creating, marketing and delivering a company's value to its customers. Questions 18, 28, and 29 covered that.

5.5 Design of Questionnaire

Oppenheim (2002) identified two distinct categories of surveys, namely:

1. Descriptive, enumerative census type
2. Analytic, relational type

The survey questions blends both styles in the sense that some questions were asked in a formal form, where respondents were asked to tick from a number of options; as well as an informal form, where open-ended questions were asked.

Some important areas considered in the course of designing the questionnaire were as highlighted by Bourque et al (1995):

- Asking questions with familiar words and phrases

- Using options sometimes to avoid ambiguous answers
- Using an economy of language when asking questions
- Asking specific questions
- Trying not to make presumptions

A pilot study was done to evaluate the questions designed in the questionnaire and to discover how the questionnaire could be improved on.

The final questionnaire consisted of 37 questions, which were believed to be sufficient to retrieve the essential information wanted, and also to avoid overloading the questionnaire. This information was intended to cover the entire aim of the study. The questions also provided a leeway to give respondents an opportunity to suggest/recommend subsequent solutions they felt could solve any associated problems. Those who did not employ e-business practices at all were omitted.

5.6 Results and Analysis

A total of 50 e-mail questionnaires were sent out to individuals from different geographical areas (the UK, Nigeria, and the US), and 31 responded, giving a response rate of 62%. From the responses, 29% were from the Oil and Petroleum industry; 9.7% from Packaging companies; 25.8% from computing (including software developers); 22.6% from Engineering and Design firms; and 12.9% from Materials.

Some of the respondents that had e-business and e-manufacturing models in place utilized a combination of various models. The models put forward were retailer, manufacturer, aggregator, auction, service providers, and horizontal and vertical portals e-business models. The retailer e-business model was observed to be the most utilized of them all. This is

presumed to be because lots of benefits stem from the utilization of this model. When products are sold online, they more or less are self-advertising, raising global awareness. Products are delivered quickly and directly to consumers, consumers can sit at home and shop at their leisure, and companies no longer have need for large storehouses.

However to get a detailed understanding of the models put forward, and to ascertain why a particular model is chosen, four companies were singled out and examined. This was in order to compare the benefits and reasons behind adopting a specific model for a specific business.

Company 1

Company 1 is a steel manufacturer. Their focus is to increase efficiencies and to improve customer relationship with their target customers. These target customers are other businesses (suppliers and distributors) who act as intermediaries. Thus, company 1 engages in a business-to-business e-business practice. Initially the above company concentrated on delivering its products to customers around its geographical region, and this was because it was cost effective for them at that time. However in order to increase its efficiency and have a global presence, they decided to adopt the Internet to sell its products. The retailer e-business model was chosen. Company 1 now sells its products online. Benefits derived are improved product sales (up to 20% increase), reduced delivery time (from 1 week to 48 hours), and good customer relationship. Additional benefit is that its customers can now order their products online creating an opportunity for customer tracking, hence improved customer relationship.

Company 2

This company is an engineering design firm. It designs a range of production products for the industry such as the health sector, electronics, etc. Due to the huge purchasing involved in its business, it decided to implement the e-procurement e-business model where it now orders its

items online via the Internet. Benefits derived from employing this model are reduced purchasing cycle time and cost, elimination of administrative error and inventory reduction.

Company 3

Company 3 is also a manufacturer. Their target customers further convert their products into end products, implying that they are ingredient manufacturers. The above company engages in a business-to-business e-business transaction, and its customers comprises of distributors, OEMs (original equipment manufacturers) etc. The company employs electronic data interchange for transaction between its customers, which, it says, is quite conducive for its business. However it decided to adopt an e-business model, namely a professional virtual community model. This was in order to communicate on a more regular basis with its stakeholders, keeping them up-to-date about its products, and the underlying opportunities offered, as well as receiving feedbacks from their target customers (customer tracking). Thus information gathered this way is utilized to modify aspects of the offered products making for continuous innovation.

Company 4

The above company is from the packaging industry. It designs and manufactures a range of different packages for different industries. Thus it is comprised of designers and manufacturers. To compete with its competitors, the above company adopted the advertising e-business model where its products were displayed online in an e-shop. Derived benefits were a global access to a highly targeted audience, and increase in its sales as a result of this publicity. Additional benefits were derived in its inventory reduction and operating costs increasing revenue by 30%.

Table 4 shows an outline of other models from the survey.

Table 4 E-business models

Sector	Models	Model characteristics	Benefits derived	Costs incurred
Oil/Petroleum	Retailer, Manufacturer.	Sells online, physical products, Fixed price on products, e-procurement	Product sales, Service fees, Rapid delivery to customers.	Procurement, advertising and marketing, IT infrastructure, R&D, inventory & customer service.
Materials	Retailer, Manufacturer, Vertical portals	Sells online physical products, E-shops, displays goods online, e-procurement	Product sales, Low-cost advertising, Increased demands, low-cost global presence, inventory reduction.	Content information assessment management, IT infrastructure, R&D.
Packaging	Retailer	Sells online, physical products.	Product sales, inventory reduction, global awareness	IT infrastructure, inventory & customer service.
Computing	Aggregators, auction, Service providers, Horizontal portals.	Sells online physical products and information, Provides tools for locating information elsewhere, develops online communities of interests.	Referral fees, Commission and service fees, product sales, advertising fees, access fees.	Content information assessment management, IT infrastructure, R&D.
Engr. Design	Manufacture (offline programming), Horizontal portals	Forms professional communities, simulation of design.	Service fees, speed of order execution, reduce inefficiency, increased production rates.	Content information assessment management, IT infrastructure, R&D.

Model Evaluation

Companies that employed a combination of models, such as online retailing and e-procurement, were observed to have a higher revenue rate when compared to those who used only one. To illustrate:

- Company A utilized the retailer e-business model alone, where it markets its products online to a cross section of customers. Its revenue model is a commerce-based one (i.e. product sales) alone.
- Company B on the other hand, combines its retail model with that of a vertical portal (e-shop). The benefits derived in this instance are both product sales as well as advertising its products on an online shop. This leads to acquisition of more customers and increase in demand.

Good customer relationship was observed to play a very crucial role in e-business model implementation. It was observed that e-business models that included product cataloguing (information on products, prices and availability) did better than those who did not.

Trust was another aspect that was of utmost importance. From the survey, it was observed that firms employed trust policies in many forms to retain customer trust in them. Some examples of the trust measures in place are product return policy, settlement policy and technical support for any product/service bought.

From the literature review, insecurity was one of the major reasons why individuals avoided engaging in e-business transactions (B2C mostly). Thus comparison was made between e-business firms who had security measures in place and those who did not. It was noticed that

the firms who used security measures such as customer password, e-mail address, and encryption had a higher percentage of customers than those who did not.

It was observed from the survey that businesses that used more than one e-business model incurred more costs than those with one. Also there are different costs for different models. For example a virtual community requires sophisticated web design and regular updates. These updates are required because there is a daily flow of new information that has to be taken into account. A retailer model on the other hand, does not require this; some might only need to pay their ISP and/or advertising fees alone. However, the benefits derived from having more models surpass the costs, it was observed. This is because, a firm who has a retailer model and a vertical model benefits from product sales as well as indirectly advertising its products.

5.7 Conclusion

The firms selected for the above study were selected with the knowledge that they were already e-business enabled. This was not a coincidence as the aim of the survey was to identify currently used e-business models. Investigating companies at random without this knowledge would have prolonged the study and made it more cumbersome.

The study showed that the company infrastructure of the respondents ranged from one type of e-business model to three. Companies who employed more than one e-business model in their business activities were observed to have more flexibility and sustainability. The customer relationship the above firms had with their customers was observed to satisfy the requirements of an e-business model framework, which ranged from price cuts to provision for training.

From the results, it was clear that companies went to great extents to build and retain customer trust and loyalty. This was showed in the different security measures put

forward, examples of which are firewall, customer passwords, etc. Distribution channels for all the above companies were 100% own sites and direct delivery. The revenue and profit models met the required standards based on the adopted framework for this study.

The models put forward by the firms investigated showed that the benefits derived from utilizing the above models were well worth it, stemming from increased revenue to 24hour customer service. The negative bit of the results, which were the cost models put forward, ran concurrently through all the sectors. These costs were observed to be quite tasking and they included software design costs, research and development, IT infrastructure amongst others.

5.8 Summary

This chapter discussed the questionnaire survey and analysis. A hypothesis design and test based on the literature review was carried out. A measurement system by which the investigated firms could be assessed was based on this review and this comprised of the structure that a dynamic and profitable e-business and e-manufacturing model should have, namely, the product innovation, the infrastructure of a firms network and partners, the customer relationship and the financial aspect of the firm. A 37-question questionnaire was designed and the results analyzed. It was observed that a lot of companies were at par with the e-business concept, having different e-business models designed and implemented. The benefits derived from this usage were also identified.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

This study has thrown light on electronic business and why it should be more adopted by businesses today. E-business was discovered to be an integration of information technology and the business concept, and is comprised of business intelligence, customer relationship management, supply chain management, enterprise resource planning and e-commerce (the selling component of e-business). E-manufacturing was discovered to be basically the practice of e-business in the manufacturing context, thus the term e-business covers it. Adopting e-business requires e-business models for the sustenance and growth of the e-business practice. Without e-business models, e-business will wither away even if there is a continual innovation and growth of the digital environment.

The study identified different types of e-business models, their benefits as well as their shortcomings. But the benefits derived justified the turn from orthodox business to e-business practice. Additionally, due to the constantly evolving digital environment, it is imperative that businesses utilize these emerging technologies to the best of their ability and also to remain at par with the information and communication technology. The effort put in by the digital environment, their consistent and brilliant innovations should not be left to waste but should be adequately harnessed by the society as a whole, which includes the world of business. Doing so will not only give more incentives to these innovators, but will turn the method of doing business completely around for the better.

Recommendations

It can be deduced from the study that there is still a lot on the part of model designers to do with respects to e-business models. The survey showed that most of the models presently employed were not designed in such a way as to meet the requirements of all customers involved. This was what attributed for the usage of more than one e-business model resulting in more costs on the part of the firms to maintain different e-business models for different customer sectors.

From the study, it was discovered that since software systems used by customers and businesses continue to vary due to the constant updates in computer software, it poses a problem for interoperability between systems. Thus software engineers are encouraged to improve on their present designs to make for better interoperability between systems.

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