B2B E-COMMERCE: VALUE CHAIN TRANSFORMATION, ENABLERS AND BARRIERS, TECHNOLOGY, PRIVACY AND SECURITY

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ABSTRACT

The Internet is changing the way we do business. Today's conventional wisdom says that in order to survive in the new economy era, companies must transform from and align their old business practices, processes and culture to suit the new business requirements.

This thesis examines the dynamics of channel shift from traditional supply chain to on-line e-commerce, in particular the enablers and barriers, as well as the value transformation due to the channel shift. The scope of this thesis is limited to B2B E-commerce. This paper took global perspectives to analyze value transformation, enablers and barriers, technology, privacy and security due to channel shift from traditional channel to e-commerce.

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MUHAMMAD FARID’S DEDICATION

To my parents, who always supported me in my pursuits, taught me timeless values, ethics, and to conceive and resolutely pursue my dreams, gave every thing to make sure I am successful, always kept my needs before their needs, sought my happiness and never asked any thing in return, installed hard work in me, nourished my ability to see when there was nothing to see, and, above all, always prayed for my successes.

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May Allah bless you all. Amen.
BAYU HANANTASENA’S DEDICATION

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To my parents, for their love, support and kindness prior and during my MIT year.

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Chapter 1

INTRODUCTION

We could not agree more with Porter, "In our quest to see how the Internet is different, we have failed to see how the Internet is the same. While a new means of conducting business has become available, the fundamentals of competition remain unchanged." The Internet is open, connected, global and mostly unregulated. On the Internet, data and information flow freely in small packets.

The very same features of the Internet "openness, connectivity and lack of regulation", make it blessing for some companies and a destructive force for other companies. Each manager is struggling to answer the basic questions "Does his / her business need to adopt to Internet or not? What are the main enablers and barriers for shifting from traditional channel to e-commerce? How does Internet create and transform value for the businesses? What are the privacy and security risks and how these can be solved?" By arguing that the key question is not whether to deploy Internet technology-companies have no choice if they want to stay competitive-but how to deploy it", Porter solved our first question. This thesis has covered, based on an intensive research, the abovementioned issues comprehensively with global perspective.

1. Objective:

The main objective of this thesis is to understand the enablers and barriers and the value chain transformation due to channel shift from traditional channels to on-line e-commerce.

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2 Porter, 2001, 64.
2. Scope:
The scope of this research paper is limited to B-2-B E-commerce. This paper took global perspectives to analyze value transformation, enablers and barriers, technology, privacy and security due to channel shift from traditional channel to on-line e-commerce.

3. Methodology:
We use extensive literature study for this thesis. Following resources were used to complete this thesis: books, magazines, articles and summaries, case studies, technical reports and research papers, MIT course work, industry research reports and our field experience.

4. Structure:
The thesis Structure is as follows:

1. Introduction
2. Enablers and Barriers
3. Technology
4. Regulation and Privacy
5. Security
6. E-marketplaces
7. Value Transformation
8. Conclusion
Chapter 2

ENABLERS AND BARRIERS

The Key Enablers: IT and the Internet:
From a high level perspective, the developments in information technology (IT) and the Internet are the main drivers of the network economy.

"The invention of the steam engine two centuries ago and the harnessing of electricity unshered in an industrial revolution that fundamentally altered the way we work, brought the world's people closer together in space and time, and brought us greater prosperity. Today, the invention of the integrated circuit and computer, and the harnessing of light for communications have made possible the creation of the global Internet and an electronic revolution that will once again transform our lives."3

Given the impacts that can be seen today, and the huge potential impacts of the powerful combination of IT and the Internet, we believe that this is just a beginning of the revolution. The combination of computing and communication power of IT and the Internet is the key enabler of electronic-commerce (e-commerce). E-business is changing the industrial age models of customer acquisition, procurement, pricing and customer satisfaction, as well as how we measure the performance of a corporation (business).

Companies must respond along many dimensions to numerous forces, including technology, investments and costs, organization and people, privacy and security,

1 White House, Text of the President's message to Internet users, The White House, Office of the Press Secretary, 1997.

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business ecosystems, competition, integration, regulations, and globalization forces. Integrating functions within a business, as well as integrating business partners in the supply and marketing channel is often fundamental to achieve higher levels of service at lower cost. It is essential to structure organizations, develop corporate cultures, and build information systems to maintain maximum flexibility in responding to new business demands that have not yet been envisioned or even contemplated due to channel shift.

The following sections are a comprehensive list of the enablers and barriers to the development of e-commerce:

1. Technology:
Fundamentally, an emerging technology will be accompanied by new opportunities. While the technology effect or impact on business strategy may be difficult to predict at the beginning, in the end, it can drive a new way of doing business or even create a new business. If history is a good reference, behind the industrial revolution and any business revolution there have always been underlying disruptive technologies that act as enablers, or even drivers, of the revolution itself. Some examples include the steam engine, electricity, etc. The technology then becomes the actual cause and driver in forming new business strategies that adapt to the new and emerging conditions. Therefore, the management of technology is a strategic business issue that requires consistent attention from the top management.

There are many other factors that affect the adoption of new technologies such as people, firm specific, financial, technology sophistication, regulation, the lack of use of the technology by business partners such as customers, suppliers and other organizations, the expense of installation and maintenance, availability of telecommunication infrastructures, perceived benefits, customer / supplier
dependency, external pressure to adopt, information intensity and software applications compatibility.

2. Investments and Costs:

2.1 Huge initial and continues financing requirements:

There are huge start up costs for an e-business, from initial investments, consulting, training, and technical support costs, which are very hard to absorb for a small and medium businesses ventures. Companies can spread these costs over a long period by providing some basic functions in the beginning of the launching of the e-business, and then developing a step-by-step implementation.

2.2 Financing:

For small and medium size corporations to get the financing is not an easy task. Therefore, the vendors or their big partners may offer the financing they need.

2.3 Financial - Return on Investment:

Return on investment and costs are an important consideration for small business owners.

Often small firms are more concerned with short or medium-term survival rather than with long-term viability. Before making a substantial outlay of capital resources, the owner / manager needs to be convinced of a short to medium-term return.

2.4 Lack of Proven Business Models:

Companies are struggling to create new business models to take full advantages of the Internet rather than emulating business models in physical space. Mistake can be costly.
2.5 Lack of time for Assessment:

Due to the perceived necessity to act quickly to take advantage of a window of opportunity, companies often feel they lack of the necessary time to get acquainted with the opportunities and challenges of the Internet and hence have no time to accurately assess potential benefits to the business.

2.6 Scalability:

"Will my company be successful in an e-environment" is a billion-dollar question. None can predict with absolute assurance whether their business will be a success or failure and this is the very reason that it is hard to design a system accurately that meets business peak-load needs. Adopting open system architecture may solve this problem, but in the end, scalability depends on the corporation’s ability to scale people, applications and implementation abilities. In the case of small corporations that cannot afford large investments and are not sure of their prospective for growth, out-sourcing the systems may offer an affordable alternative.

2.7 Fear of Failure:

E-commerce changes internal, as well as external cultures. To complete the launch and integrate value with change, companies need to prepare their processes for doing businesses. Businesses need to create and update their content often. In the end, most businesses are afraid of whether or not they will be able to make their investment back.

3. Organization and People:

3.1 Inter-enterprises Cooperation:

The industries in the private sector are preparing themselves to gain market share in the growing market of e-commerce. At the same time these industries realizes that in order to build their markets and not risk becoming isolated

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islands of technology, the players need to work together to solve common problems. Much of this work is done through member organizations and consortium projects to develop a common knowledge, standards and market trust. It should be noted that changes in the environment could also alter the internal organization dynamics.

3.2 Organizational Aspects:

3.2.1 Management Awareness and Support:

Business transformation requires unbreakable management attention. Success will be very dependent upon management leadership and support.

3.2.2 Corporate Culture:

As the Internet is gaining in importance as a channel for conducting business, the business and user communities all experience problems in establishing the Internet as a trusted and viable channel for domestic and international trade. In addition to the significant technological and infrastructure issues, as well as, external challenges in the regulatory environment, corporation must struggle to adapt their own culture to accept the internal changes that will be required to overcome these problems.

3.3 Skills Availability:

Management's must understand the benefits of availability of skilled labor force. The shortage of skilled personnel is a common issue, and even when available, the cost is usually quiet high. Furthermore, since technology and the business environment are constantly changing, the even skilled personnel must always be in a continuous learning mode.

3.4 Knowledge Transfer:

In a fast changing environment, knowledge transfer must be done faster and more effectively than before. Otherwise it will be worthless. In this mode,
people’s readiness to learn and the organization’s dynamics and structure in regards to personnel and career development will play a very crucial role.

3.5 Attitude Problems:

Transportation companies are focused on physical deliveries. The contents consist of bits and bytes. Employees may not consider digital contents as real shipments. Transportation companies can provide hybrid services by providing physical back up media deliveries and/or transmitting, constructing and physically delivering to points of consumption where digital channels are of low quality or unavailable. This leverages both digital and physical networks and allows multi-layered service in time and capability.

3.6 Firm Characteristics:

Certain characteristics of the firm play crucial roles in determining whether the firm’s e-commerce development will succeed, including organizational readiness, external pressures to adopt IT, and dependency on supplier.

3.6.1 Organizational readiness refers to the level of technology currently incorporated into the business processes of the firm. If there is little or out-dated technology in use, a firm is less likely to adopt new technologies.

3.6.2 External pressure to adopt IT can strongly influence a small business to adopt. If external pressure is lacking, the business owner may perceive the technology as a waste of resources.

3.6.3 Dependency on customers/suppliers is closely related to “external pressure to adopt”. When a major supplier or customer adopts IT, the small business owner is more likely to adopt.
3.7 Lack of competence:
Lack of competence is closely related to trust in e-commerce, because a lack of knowledge about the Internet and e-commerce can keep companies from developing an interest in the trading channels. Even if the interest is present, there may be a shortage of IT-personnel with adequate Internet knowledge. Lack of e-commerce competence among business leaders and IT-personnel are significant barriers to widespread adoption of e-commerce.

4. Process:
4.1 Process Transformation:
In the traditional supply chain, business processes are often business-specific, do not provide the visibility of movements of goods and information across the supply chain, and are very hard to integrate and interoperate across firms. The optimization of the process is also often firm specific and limited to only a part of supply chain.

The Internet enables customers to buy and compare competitive offerings and prices, review data, and order in the real time. Further, the Internet also enables customers to buy products anytime, anywhere cheaply and quickly. To support these buying patterns, the fulfillment processes must be structured differently than in the traditional supply chain.

4.2 Process (Transporter):
The most basic change that has occurred in the process is the flow of information and its speed. The processes and procedures have changed over time to attract the consumer to repeat the purchase and / or service.

For transporters the introduction and mediation of information-rich ordering and business support channels represent a major departure from existing
processes and procedures. This departure is not in terms of any fundamental change in content or support but rather in terms of the speed of change and the volatile nature of user behavior.

The transporter will play the role of intermediary between the businesses and customs / taxation authorities. This will require the transporter to implement additional processes and interface between its own internal applications and processes and those implemented by the businesses for e-commerce. Further, this will require transporter to automate most of its processes, application and interfaces.

To act as an intermediary, the transporter will need to satisfy different countries requirements and will pay duties, taxes and services and these expenses will be par to the transportation price / cost. In order to develop and maintain its role as intermediary and provide customer support for its customer and partner businesses, the transporter must be in a position that services are valued and priced realistically and that bills are paid in an effective and efficient manner by the businesses.

4.3 Service Quality:

E-commerce channels of trade are open and global. The Internet provides global access and has broadened the business prospective. This implies that the value / quality / price perception of the business at the time of each trade is critical to ensuring re-trading. The switching costs of a business (consumer) that is disappointed have dropped considerably, thus diminishing the brand loyalty characteristics of today’s trading environment. To ensure and achieve the constantly upward moving target of excellent service, businesses need to align all existing channels to allow a similar quality and service fulfillment for all their businesses / customers. This alignment is expensive and disruptive
but it is critical to the overall business success of the e-commerce initiative and the shift of customer interactions to the most cost-effective channels.

4.4 Lot Size:
Single lot shipments will increase. Consumers will demand short order-to-receipt cycle times that will put pressure on distribution systems.

4.5 Transportation Mode Shift:
The proliferation of e-commerce, especially direct selling over the Internet, also creates a new demand for small parcels transportation, replacing the less-than-truckload (LTL) shipments. Therefore, the package movements and volume levels will change dramatically.

4.6 Information Ownership:
In the traditional, as well as, the e-world, to conduct business activities, each business depends on information from and about other business. The majority of the required information for the transaction lies outside of the business. In the case of traditional business, it is hard to update the information and most of the time it is in multiple formats and is located in multiple locations, but in the e-environment, it can be updated from a central point in real time.

4.7 New Tools and Techniques:
Due to increase in supply chain length and complexity, new tools and techniques need to be planned and coordinated to establish relationships.

4.8 Seamless Partnership:
Achieving network optimization across a full logistics system requires each constituent in the supply chain to demonstrate best practices in its area of the linkage. To help in that endeavor, the channel partners have to work together
and share resources to find the means to develop a total system of interaction that is seamless, flawless, and electronically enabled. That requires beginning at the upstream side of the network and working across each link toward the downstream side, scrutinizing each logistics factor along the way.

4.9 Real-Time Connectivity among Partners:
Most of the legacy systems have point-to-point integration with many numbered interfaces. This point-to-point integration results in long fulfillment cycle time causing higher inventory levels. It also hinders efforts to partner with new trading partners and to adapt to new technologies and business opportunities. Under such circumstances, the adaptation of new business models is very time consuming and expensive.

4.10 Digital Contents-Challenges:
Digital contents are essentially transportation neutral. However, contents can be disassociated from the carrying media, such as paper or magnetic, and can be transported as bits and bytes from one business to another business. This will change the transport medium from a physical logistics system to a digital system or a hybrid digital system. The digital medium will be globally accessible, very cost effective and secure.

4.11 Redefinition of Role:
E-commerce is redefining the roles and responsibilities within the transportation and customer relationship. E-commerce possesses challenges for businesses that relate to channels of service access, business support, customer service, information flow and fulfillment monitoring. These challenges are the major source of e-commerce investment and management focus for both traditional and emerging e-commerce capable traders.
4.12 Increasing B2B Process Complexity because of B2C:

B2C business practices create additional complexity in B2B processes. For example, to gain consumer confidence, e-retailers provide "100 % Guaranteed Satisfaction" policy. To fulfill their commitment, B2C has to establish goods returning processes with their B2B partners. Such arrangements add complexity in the business process.

5. Privacy and Security:

5.1 Privacy:

Privacy is the ability to control access to information, that is, under certain agreed terms. It is crucial to protect the privacy of businesses in executing web-based transactions. Just like consumer's information, business's information might be bundled and sold to other marketers who may use the data to target businesses to sell their own product / services. Further, there is a greater opportunity to use businesses' information for price discrimination.

In both business-to-consumer and business-to-business commerce, trust and privacy are critical issues that must be dealt with electronically. Trust is a measure of confidence and TRUSTe, an independent, non-profit organization has taken the initiative of creating a standardized form of guarantee of privacy. TRUSTe focuses on a company's unaudited, voluntary commitment to meeting certain standards for e-commerce related privacy. TRUSTe has developed a third-party oversight "seal" program that alleviates users' concerns about online privacy, while meeting the specific business needs of each of their licensed web sites. A TRUSTe trustmark is awarded to sites that address to established privacy principles and agree to comply with ongoing TRUSTe oversight and resolution procedures, including audits by CPA firms. All web sites that display the trustmark must disclose their personal information collection and privacy practices-what personal information is
being gathered, how the information will be used, who the information will be shared with, choices available to the browser regarding how collected information is used, safeguards in place to protect information from loss, misuse, or alteration, and how a user can update or correct inaccuracies in information.

"Privacy principles embody fair information practices approved by the U.S. Department of Commerce, Federal Trade Commission, and prominent industry-represented organizations and associations. The principles include 1) the adoption and implementation of a privacy policy that takes into account consumer anxiety over sharing personal information online, 2) the notice and disclosure of information collection and use practices, 3) choices and consent giving users the opportunity to exercise control over their information, and 4) data security, quality and access measures to help protect the security and accuracy of personally identifiable information. To become a TRUSTe licensee, a candidate creates a privacy statement with the help of a TRUSTe online wizard, reassess, and signs a TRUSTe license agreement, and pays annual fees."

Privacy is a major concern of Internet users and can be divided into concerns about what personal information can be shared with whom, and whether messages can be exchanged without anyone else seeing them. The World Wide web Consortium’s Platform for Personal Privacy Project (P3P) is developing specific recommendations for practices that will let users define, control and share personal information with web sites. The P3P incorporates a number of industry proposals, including the Open Profiling Standards (OPS). Using software that adheres to the P3P recommendations, users will be able to create a personal profile, all or parts of which can be made accessible to a web site as the user directs.
In an open network such as the Internet, message privacy usually requires encryption and decryption. The most common approach is through public key infrastructure (PKI). Providing a trusted and private presence on the web is essential to any e-commerce initiative.

5.2 Security:

Openness and connectivity are the two basic elements of the Internet. Further, the Internet is unregulated. As Internet, data and information flow freely and no one watches over the flow of data and the safe delivery of the untampered information. Whenever a business transfers data on Internet, it has four main concerns; law, competition, crime and security breach. In the e-environment, all information travels through the Internet and it is very easy to gain access to confidential and sensitive data about products and procedures, financial information, pricing, contracts and business processing information. The new value chain is networked, transparent and brings an increased risk of damage for businesses, their partners and customers, and above all, their ability to do business.

"The main security threats are intrusion, infectious programs, surveillance, system penetration, denial of services, spoofing and legal liability. The most important e-business security issues include verifying the identity of the message originator to the message recipient, verifying data integrity, ensuring the confidentiality of business data, and detecting message duplication, impersonation, insertion, modification, and / or deletion"\(^5\). To curb the above-mentioned threats, authentication and authorization, message integrity (external security, embedded security, encryption, key management, digital

\(^4\)Except first paragraph, Section 5.1. Privacy is quoted from Fingar, Peter, Harsha Kumar, and Tarun Sharma, Enterprise E-Commerce, Meghan-Kiffer Press, Tampa, Florida, 2000, 243-244

signatures, and digital certificates) and network security (firewalls, virtual private networks) and web security (Secure Sockets Layer) related techniques and technologies are used.

6. Business Ecosystems:

6.1 Customer is empowered “Supply-Push to Demand-Pull:

The Internet has empowered the consumer with access to information and various options, thus shifting the power of selection of the goods and services to the consumer. This situation transforms the consumer from the weakest member to the most powerful member of the supply chain. Hence, the dynamics of supply chain has changed from supply-push to demand-pull.

6.2 E-Customer Characteristics:

The Internet enables e-customers to buy, compare competitive offerings and prices, review data, and order in the real time. Further, the Internet will enable the customers to buy products anytime, anywhere cheaply and quickly.

6.3 Business Definition Change:

The Internet embeds real time and transparency characteristics in the e-commerce. E-commerce is a merger of content and commerce.

6.4 Business Differentiators:

In the e-business era, the speed, accuracy, real time delivery of the product / services, and fulfillment of the order in a satisfactory manner are the basis for competition. The performance-measuring ruler will always slide upward.

E-business is changing the industrial age models of customer acquisition, procurement, pricing and customer satisfaction, as well as, how we measure the performance of a corporation (business).
6.5 Channel Shifts:
The Internet embeds real time and transparency characteristics in e-commerce that is itself a merger of content and commerce. In the future, the type of business will not matter too much. Supply chain channels will be changed. Suppliers will need to ship finished goods directly to direct and/or indirect customers. Just like Cisco today, partially fabricated or manufactured goods will be held and manufactured in transit and will be shipped directly to end customers.

6.6 Partnership:
E-commerce initiation causes immediate partners and partners from other channels to fear that they will lose business. This also creates fear in internal partners such as the sales force and marketing staff of losing business. In some instances, it does eliminate some channels from the value chain as described previously. E-business changes everything about the dynamics of a company and its power structure and creates a new channel for doing business. This allows companies to evaluate their value creation for their customers and causes disintermediation of their channels. E-commerce also forces companies to adopt hybrid business models of existing and digital channels.

6.7 Transformation from Supply Chain toward Collaborative Network:
The higher level of integration will create a collaborative commerce. In this concept, the dynamics of the supply chain or supply network will be transformed toward a collaborative network, which consists of integrated demand and supply chain. This shift has enormous potential to further streamline inter-company processes, eliminate redundancy and manual procedures, coordinate logistics, and create a high-velocity collaborative network.

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7. Competition in the Market Place:

7.1 Hyper-Competition:
Cost pressures are escalating as marginal protection and financial performance dominate management thinking. Customers are becoming more discriminating, demanding more service from suppliers establishing higher standards of performance, and creating preferred relationships with suppliers that can meet their higher expectations. Suppliers are striving to achieve differentiation through delivery techniques, information and communication capabilities, and policies and procedures that are often tailored to the unique needs of individual customers. Speed is now becoming a critical dimension of competition - speed in getting new products to market, speed in moving merchandise that is in great demand, speed in responding to customer emergencies and unique requests, and speed in making timely communications. These market demands - less cost, more services, more speed - directly impact the logistics function, for it is logistics that is directly challenged by, and responsible for, all these market place forces.

7.2 Competition and New Market Scope:
E-commerce technologies play a very important role in product searching, services and information, advertising, buying, selling and paying for products and/or services. E-commerce enables small and medium businesses to compete with large organizations, to operate on an international scale, provides a cost-effective way for them to market their business, launch new products, improve communications, gather information, and identify potential business partners.

8. Integration:
The requirements of E-commerce are both internal, such as planning, scheduling, forecasting, and sales, and external, such as distributors, customers, suppliers, and
competitors, integration. It is a vision that is full of back-end and legacy systems, data warehouses, inventory-tracking systems, web-servers, transportation, and customers relationship management systems. The following factors play critical roles in the seamless integration:

- Trust. If partners such as suppliers, distributors, manufacturers, and retailers do not trust each other, it will be a hard sell to establish collaboration among them.

- Middleware

- Customization

- Back office complexities

- Organizational, cultural and operational issues

- External culture

- Managing collaborated processes

- Fear of the visibility and losing the control of the process.

- Multiple databases

- Customer driven

- Channels for doing business.

- Outsourcing. To facilitate the integration and avoid huge investment, integration of inventory management, forecasting, scheduling, order and warehouse management, distribution and transportation can be outsourced.

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8.1 Legacy Systems:
Almost every old corporation has some kind of data and information that are saved and stored in legacy systems. The integration of the legacy systems with new and advanced systems is thus a major issue. Most businesses have very complicated back end and databases that need special skills and expertise to manage and operate. The Web lets companies hide their back-end systems. In e-business, companies have to integrate with their suppliers, customers, contractors, and even sometime with their competitors. This integration creates compatibility and computability problems among these systems requiring common business process definition, technology compatibility, and standardization.

9. Regulatory Issues:
In the beginning, the Internet was considered to be bounded by self-regulation and no regulation at all. The Internet is a global innovative force. Data and information cross multiple countries boundaries in microseconds. Just like a coin, the Internet also has two sides. On one side, the global nature of the Internet enhances trade and commerce, but on other side it simultaneously creates complicated regulatory issues such as jurisdiction, taxation, privacy, and crime prevention. To resolve these issues different countries, including the United States, France, South Korea and China, have passed regulations. Regardless of the impact of this regulatory change, new legislation and regulation represent a force and a business requirement that must be met.

10. Globalization:
The Internet and PC proliferation gives globalization a true meaning. With the Internet, even a small business can reach the entire networked world. As a consequence, the supply lines became longer and more complex, therefore, the

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risk and penalty for service break down and failure escalates dramatically. Globalization has its own unique issues such as cultural needs and norms, politics, skilled labor availability, business practices, regulations, financial systems and payment methods.

10.1 National Boundaries:

As a business goes global, the increasing complexity of the logistics is inevitable. While the Internet offers frictionless information flow, the physical goods movements and the entire logistics chain beyond the national boundaries does not necessarily follow seamlessly. The differences of process velocity in the different parts of the world present a big challenge to the transportation and logistics industry.

10.2 Infrastructure Availability:

The different velocity is a result of the differences in the infrastructure. The infrastructure consists of the Internet and telecommunications network, regulations, tax regimes, customs policies, security, transportation networks, and logistics networks.

11. Network Availability and Access:

One of the most important factors, as part of the technology, is network availability and access. The Network consists of the telecommunications network, from the last miles of access, backbones, switches, routers, multiplexers, as well as the Internet that include all of its parts. The two most important aspects of the network, in the last mile in particular, are bandwidth and mobility. Broader-bandwidth access will enable the user to obtain richer-multimedia content and applications, while mobility will enable the user to access the content and application from anywhere-anytime.
Enablers and Barriers Matrix:
Enablers and barriers exist whenever there is channel shift. The concerns and perceived barriers are not shared among all participants in e-commerce. These concerns vary among different communities. Further, the above-mentioned factors can be enablers under one set of conditions, but can become barriers under a different set of conditions. These enablers and barriers also change over time. In short, we can say that the dynamics of these enablers and barriers will naturally be high. Therefore, in determining the enablers and barriers, we have used a 2x2 matrix that represents our views in this matter (please refer to Figure 1.).

<table>
<thead>
<tr>
<th>ENABLER</th>
<th>BARRIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Enabling factor of the channel shifts. Provide or potentially have major impact to the channel shifts.</td>
</tr>
<tr>
<td>LOW</td>
<td>Enabling factor of the channel shifts. Provide or potentially have minor impact to the channel shifts.</td>
</tr>
</tbody>
</table>

Figure 2.1. The Enabler and Barrier Positioning Matrix: Definition

In horizontal axis, whether a factor is enabler or barrier relative to others is defined. In vertical axis, the enablers and barriers relative importance to others are defined.
Using this definition matrix, we are able to examine and define the above-mentioned factors not only as enablers and barriers, but also according to their relative importance to the channel shifts, as presented in the figure 2.

**ENABLER-BARRIER POSITIONING MATRIX**

<table>
<thead>
<tr>
<th>ENABLER</th>
<th>BARRIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology (SW, HW, Apps)</td>
<td>Lack of competence</td>
</tr>
<tr>
<td>Network access &amp; availability</td>
<td>Investment size</td>
</tr>
<tr>
<td>Bandwidth &amp; Mobility</td>
<td>Financing</td>
</tr>
<tr>
<td>Integration &amp; Scalability</td>
<td>Legacy systems</td>
</tr>
<tr>
<td>Inter enterprises/partnerships</td>
<td>Proven business model</td>
</tr>
<tr>
<td>Management attention</td>
<td>Existing corporate culture</td>
</tr>
<tr>
<td>Digital content</td>
<td>Lot size</td>
</tr>
<tr>
<td>Empowered and customer</td>
<td>Transportation mode shift</td>
</tr>
<tr>
<td>Competition &amp; new ecosystem</td>
<td>Trust, privacy &amp; security issues</td>
</tr>
<tr>
<td>Globalization</td>
<td></td>
</tr>
<tr>
<td>Regulation</td>
<td></td>
</tr>
<tr>
<td>Skill availability</td>
<td>Current attitude</td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td>Time to assess</td>
</tr>
<tr>
<td>Service quality and availability</td>
<td>Fear of failure</td>
</tr>
<tr>
<td>New tool and techniques</td>
<td>Information ownership</td>
</tr>
<tr>
<td>Process transformation</td>
<td>Process complexity</td>
</tr>
<tr>
<td>Redefinition of Role</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.2. The Enabler and Barrier Positioning Matrix
Chapter 3

TECHNOLOGY

Technology plays very important role in product searching, services and information, advertising, buying, selling and paying for products and/or services in e-commerce activities. As previously described, new technology is the actual driver in forming new business strategies that adapt to the new and emerging competitive environment Therefore, management of technology is a strategic business issue that requires consistent attention from the top management.

E-nabling technology is a system, consisting of many different technologies, which support e-commerce activities. In this chapter, the “e-nabling” technology of e-commerce will be described and analyzed. The coverage is the technology overview, compacted into telecommunication network and access, the Internet layer, application layer, and the technology adoption, including the enablers and barriers.

1. The E-nabling Technology:
Advances in technology are occurring at faster rates than ever before. Businesses are now experimenting with leading-edge technologies like remote telemetry, satellite tracking, e-marketplaces platform, etc. The use of technology is a significant business challenge, keeping pace with it and applying new technologies appropriately requires a combination of objectivity, prudence, vision, and a willingness to experiment. The e-nabling technology is a system that support the e-commerce activities, consists of multi-constituents, as follows (Figure 3.1):
1.1 Telecom Layer:
The telecom layer consists of two main elements: backbone and access. From backbone coverage perspective, there are two different types of network: local area network (LAN) and wide area network (WAN). The Ethernet technology dominates the LAN arena, from the ordinary Ethernet (10 Mbps), Fast Ethernet (100 Mbps), and now Gigabyte Ethernet (>1 Gbps). LAN protocols using either copper, fiber or radio (for wireless LAN) as its physical layer.

In the wide area network, ATM (asynchronous transfer mode) and Frame Relay backbones dominate. ATM and Frame Relay running on top of the physical network that ruled by the SDH (synchronous digital hierarchy) in Europe and the rest of the world, or SONET (synchronous optical network) in the U.S., for multiplexing. The physical layer can be in forms of optical network with fibers, or
radio frequency, either line of sight microwave radio or satellite networks. Using DWDM (dense wavelength division multiplexing) the bandwidth per fiber today is beyond 1 Tbps (10^{12} bits per second).

The network access can be in many different forms, from the plain old telephone service (POTS) that using twisted copper pairs to advanced xDSL (digital subscriber line: ADSL – asymmetrical DSL, HDSL - high speed symmetrical DSL, SDSL – symmetrical DSL, RADSL – Rate Adaptive DSL, and VDSL – very high speed DSL) technologies that using the existing copper, including cable modem technology.

It can be in the form of wireless technologies that use scarce radio frequency spectrums, either for fixed and mobile applications, with the main technologies such as GSM (global system for mobile communications – European system), U.S. TDMA (time division multiple access system – IS 136) or CDMA (code division multiple access – IS 95). The incoming third-generation mobile telecommunications systems (3G) based on wideband CDMA technology will provides even broader bandwidth and seamless roaming. For broadband fixed applications, there are two main technologies, LMDS (local multipoint distribution service) and MMDS (multipoint multichannel distribution system).

The access technology can also be in form of satellite technologies using LEO (low-earth orbital systems), MEO (medium-earth orbital systems) or GEO (geosynchronous orbital systems), of which, for business applications, VSAT (very small aperture technology) is the most popular systems for its flexibility.

Last but not least, access technology can be in the form of optical networks using fiber optics for the highest possible bandwidth in the access network environment (almost unlimited bandwidth).
We view that optical networking will be the core network technology in the future. The mobile access will be the main technology for personal communications in the future.

All in all, the main theme of the telecom network layer is mobility and bandwidth. In mobility terminologies, personal mobility, service mobility or terminal mobility, this means that the network should be able to be accessed anywhere, anytime. In bandwidth terminology, this means that the network should be able to provide the bandwidth necessary to support the higher-bandwidth-demanding multimedia and Internet applications. These two dimensional network domains is the main objective of the Telco (telecommunications network operators) around the world.

1.2 Internet Layer:
The Internet Protocol (IP) is running on top of these network protocols. The technology advancements will allow the Internet to run directly on top of the physical layer, especially optical networks, in the near future.

1.2.1 Internet Protocol (IP):
IP is a standard that is widely implemented in communication industry. IP can be adopted for any kind of computer and network infrastructure whether it is local or wide are network. Internet applications use TCP (Transmission Control Protocol) or UDP (User Datagram Protocol). The difference between these two is that UDP is for unreliable connectionless packet delivery, and TCP is for reliable connection-oriented byte stream delivery. UDP is used for simple services that need higher speed. TCP is used for more reliable services.

The Internet uses distributed intelligence to send a message. At Internet, a message is split into small packages and sends. Each small package is sent separately with its destination address. There are different technologies that are used to build these networks. Each network is different in its operation.
**IP Address:**

An IP address is a 32 bit number that is used to specify the network and host. This number does not need to be permanent. An example is when a dial-in-user uses Point-To-Point Protocol to connect with an Internet Service Provider. Each IP address relate to a specific host on a specific network.

Internet protocols are used in four layers.

- **Application Layer:** Application layer defines the application software, its processes and protocol it uses to convey its data to the communications protocol stack. The protocols that reside on this layer are Simple Mail Transfer Protocol (SMTP), Domain Name Server (DNS), File Transfer Protocol (FTP), Simple Network Management Protocol (SNMP), Hyper Text Transfer Protocol (HTTP) and Telnet.

- **Transport Layer:** Transport layer wraps up the application layer message in its own data that defines the sending application and the receiving application; these are known as the Source and Destination ports. This also adds data to specify the overall length of the message, and a number and a check sum to check the corruption of the data. TCP and UDP both reside at this layer.

- **Internet Layer:** This layer structures data into packets. These packets are called datagrams. This layer routes the datagrams from source to destination addresses, fragments and re-assembles the datagrams. The Internet layer wraps up the transport layer data in its own data, including the length of each datagram and the source and destination addresses that assist in the identification the sources of network and host and destination.
• **Network Access Layer:** Different hardware technologies are used to delivery and accept the delivery of data. Network Access Layer ensures the correct transmission of data to correct addresses of different hardware technology across datagrams through mapping the IP addresses. So for each hardware technology, there is a different Network Access Layer. The above-mentioned sequence is used to send data on the Internet. In case of receiving data, all above-mentioned process is reversed and it is called "encapsulation".

**Domain Name Service (DNS):**
This is a common naming and addressing scheme that allows the location of services, people and information source. There are some other protocols such as HTTP for hypertext, SMTP for mail, ARP for Address resolution, SNMP for management, TCP / UDP for packet delivery that are used in conjunction with IP to provide global access to internet and enhance its information transformation capabilities. DNS plays a critical role to find "routing" any host on the Internet. Routing is carried out through two main components: host (computer) and gateways (a network router).

**Markup Languages:**

Markup languages are human-readable and are made up of characters accessible from the normal computer keyboard.

• **Standard Generic Markup Language (SGML):** SGML is an international standardized language. Generally, this language is used as framework to define other markup languages. SGML encodes the structure of the document and not its rendition. SGML provides a language for defining tags, and includes the characteristics: whether it must have an obligatory matching end tag; whether it can appear anywhere or only nested within some other pair of tags. A set of tags
defined using SGML for a particular purpose is known as a DTD (document type definition). The markup languages widely used for internet-based multimedia are defined as SGML DTD.

- **Hypertext Markup Language (HTML):** HTML is the most widely used DTD for online multimedia systems. HTML is used to define the layout of a computer screen combining text and images while also combining the ability to address other forms of information through hypertext links. At the heart of HTML is the anchor. This is very simple construct within the HTML specification that identifies text, a single word or a string, as a hypertext link. Here is an example of anchor:

  Just an `<A HREF=\texttt{http://www.expl.com/expl.html}>`.

HTML is easy to read and write, since it consists of plain text delimited by tags. This language is growing very fast and has special characteristics such as text fields, buttons, check boxes and context-sensitive image definitions.

- **Extensible Markup Language (XML):** While SGML and HTML focus on how online information should be presented, XML defines what type of content is enclosed in a document. The World-Wide Web consortium (W3C) developed XML, a language that allow designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations. XML is a text-based format, similar to HTML in many respects, designed specifically to store and transmit data. An XML source is made up of XML elements, each of which consists of a start tag (`<title>`), an end tag (`</title>`), and content—the information between the two tags. An XML document holds text annotated by tags. Unlike

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HTML, XML allows an unlimited set of tags, each indicating not how something should look, but what something means. It is up to each document's author to determine what kind of data to use and which tag names fit best. HTML tags are for browsing; they are meant for interactions between humans and computers. This limits HTML applications, especially to manipulate data or for computer-to-computer interactions. The XML enables the standardization of data structures including complete blocks of data for a particular purpose known as documents. The standardization of data structure with Hyper Text Transport Protocol enables a standard interface. ⁶

Because of its capabilities, XML is quickly gaining acceptance for use in different applications across businesses. For instance, a B2B exchange for the construction industry could adopt an XML variation that fits common data categories for the industry. The common language makes it easier for companies to exchange meaningful data, including orders and requests for proposals, across the web. XML is a promising trend and more than half of the 200 IT departments in a recent Zone Research survey said they will deploy XML services this year ⁷. The survey participants most commonly cited the following reasons for deploying XML: 1) Shortens application development time, 2) Converts EDI to more manageable form, 3) Ties applications to those of customers and suppliers, and 4) Enables them to join an XML-based B2B exchange.

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⁷ Internet Week: "A Growing Role for XML", February 5, 2001

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1.2.2 The Future Internet:

Current version of IP technology, IPv4, has many weaknesses in terms of reliability and quality of service. Moreover, since it was designed in ‘60s with 32 bits addressing, a $4.3 \times 10^9$ unique address combinations, the extensive use of the Internet makes the unique address will soon be insufficient to support the demand, particularly with the vision that in the future every devices will have its own unique address. The following table provides a brief comparison between IP version 4 and its future replacement, IP version 6.

<table>
<thead>
<tr>
<th>Internet service</th>
<th>IPv4</th>
<th>IPv6</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real time internet services</td>
<td>Low</td>
<td>High</td>
<td>New ability to prioritize packets and routes should significantly help in offering real-time services</td>
</tr>
<tr>
<td>Address portability</td>
<td>None</td>
<td>High</td>
<td>Ipv6 will enable users to continue to use same internet address even if they change service providers</td>
</tr>
<tr>
<td>Reliability of service</td>
<td>Best</td>
<td>High</td>
<td>Any cast routing and packet prioritization should allow ISP to offer near guaranteed quality of service</td>
</tr>
<tr>
<td>Mobile computing</td>
<td>Low</td>
<td>High</td>
<td>User authentication, security features, and remote access services should support the growing mobile computing industry</td>
</tr>
<tr>
<td>Unique address</td>
<td>$4.3\times10^9$</td>
<td>$340\times10^{36}$</td>
<td>128-bit address system under Ipv6 increases unique address</td>
</tr>
</tbody>
</table>

| Device control        | Low    | High   | Larger number of unique address, real time services, and packet prioritization should support centralized device control |

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*This table refers to Morgan Stanley Dean Witter Internet Research, [http://www.msdw.com](http://www.msdw.com).*
1.2.3 Peer to Peer Technology:

In addition to this, an emerging-disruptive Internet technology, called peer-to-peer technology (P2P), come in to place and get very extensive attentions, especially in the case of Napster. In essence, P2P drives the Internet going 'back to the future'. Peer-to-Peer (P2P) refers to a decentralized network-computing model (DNCM), of which nodes in the Internet space can be tightly linked and able to communicate directly between the peers. In P2P environment, the information and content is highly distributed, therefore, eliminates the needs of web servers that adopt a client-server model.

This disruptive technology is in its development stage and has yet to reach its' full potential. Nevertheless, we believe that once proliferates, the P2P technology will have disruptive impacts to the Internet community in terms of traffic flows, infrastructure, business models, and user interactions.

1.3 Application Layer:

1.3.1 E-Business Platforms:

Today, vis-à-vis the competition pressures, more companies integrate their applications to streamline operations in order to stay competitive in the e-commerce arena. Of many different applications that laid the e-business platforms foundation are:

- Customer Relationships Management (e.g. Siebel Systems). CRM integrates sales, service and marketing functions, toward integrated customer centric applications.

- Enterprise Resource Planning (e.g. SAP). ERP integrates the enterprise functions, such as planning, purchasing and material management, inventory management, finished product distribution, finance and accounting.
• Supply Chain Management (e.g. I2 Technologies). SCM integrates the supply-chain applications, such as market demand, real-time scheduling, as well as resource and capacity planning.

• Selling Chain Management (e.g. Trilogy) integrates selling-chain applications such as product development and customization, pricing and contract management, quote and proposal management, promotion management, and commission management.

• Operating Resource Management (e.g. Ariba), also known as procurement management, integrates the procurement applications, such as service procurement, MRO (maintenance, repairs and operations) procurement, office supplies procurement, business travel procurement, as well as IT and networking procurement.

• Business Analytics, Knowledge Management, and Decision Support Applications (e.g. SAP) provide the necessary knowledge of a company from the stream of information from its operations, as well as from its large-scale databases.

• Enterprise Application Integration (e.g. Cross Worlds). EAI integrates the abovementioned applications, especially in the multi-vendor environment.

The generic e-business application architecture is shown in Figure 3.2 below.
1.3.2 Best of Breeds versus Fully Integrated Solutions:
In e-business platform implementation, companies have two options: whether to use the fully integrated solutions (e.g. Oracle) or the best of breeds' assembly solutions (e.g. IBM). While the multi-vendor solutions give companies the option to have the best in class of each functional module, the integration process can be costly and time consuming. The fully integrated solution will provide a quick solution with seamless integration between functionalities.

1.3.3 B2B Platforms:
New software applications are being developed and marketed, allow companies to link to multiple B2B exchanges, creating a larger market for their goods and

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services. One example is i2 Technologies, which is marketing a product suite, called TradeMatrix, which is designed to sit between markets. It serves as a gateway for a seller or buyer to interact with multiple markets. Other players such as Ariba, IBM, Oracle, also came into play in this prospective market.

1.4 Information Technology and Access Devices:
In addition to abovementioned technologies, there are many different technologies that also support the e-commerce activities, such as PCs (personal computer), PDAs (personal digital assistance, such as Palm Pilot), wireless devices, storage systems, operating systems, web browsers, software applications, etc.

2. Technology Adoption:
There are many factors that affect the adoption of new technologies, i.e. people, firm specific, financial, technology sophistication, regulation, the lack of use of the technology by business partners such as customers, suppliers and other organizations, the expense of installation and maintenance, availability of telecommunication infrastructures, perceived benefits, customer/supplier dependency, external pressure to adopt, information intensity and software applications compatibility. While the factors’ effects are idiosyncratic for each organization, there is a common understanding about the technology diffusion, that is, technology follows a certain cycle from its inception until its obsolescence.

The following sections provide a discussion about technology cycle, technology adoption and a comprehensive list of the enablers and barriers to the technology adoption:
2.1 Technology Cycle:

Tushman and Rosenkopf\textsuperscript{10} argue that technological evolution is driven by a combination of technical, economic, social, political, and organization processes. Their findings suggest that the interaction of technical options with organization and interorganization dynamics that shapes the actual path of technological progress.

Further, they describe that the technology process follow certain cyclical model, as follows: (1) Technological discontinuities, indicated by either competence destroying or competence enhancing discontinuities; (2) Era of Ferment – Community-Driven Technologies, characterized by competition between old and new technological regimes, and competition within new technical regimes; (3) Dominant Designs – Community-Driven Technological Selection, characterized by the emergence of the dominant design, of which a single designs emerge to dominate rival designs. These designs remain dominant until the next technological discontinuity; (4) Era of Incremental Change – Technology-Driven Communities, characterized by incremental, order creating, technical change. The cycle then goes back to the technological discontinuities era.

In the same context, Utterback\textsuperscript{11} argues that technological innovation processes is driven by a dynamics relationship among product innovation, the marketplace, and the firms that emerge and compete on the basis of particular innovations. He describes that the dynamics of innovation starts from (1) The Fluid Phase, indicated by high rate of product innovation activities; followed by (2) Transitional Phase, where the dominant design emerge and the activities are dominated by process innovation, and in the end; (3) The Specific Phase. This


model covers dynamics of innovation in terms of product, process, organization, market and competition.

The Internet is no exception to this phenomenon. The differing factor is that the pace of technological change in the Internet technology and applications is faster, much faster, than the majority of others. We found that the Internet mode is fast-mode-continuous-discontinuity technological innovations.

2.2 Technology Adoption Cycle:
Following the technology cycle, the technology adoption cycle can also categorized into similar fashion. Rogers\textsuperscript{12} classifies five adopter categories and demonstrate that the distributions closely approach normality. The adopter categorization is based on innovativeness, and divided into:

(1) Innovators (2.5\% of population), consists of people that are obsessed with innovation, able to cope with high degree of uncertainty, have control to substantial financial resources and the ability to understand and apply complex technical knowledge;

(2) Early adopters (13.5\%), consists of people who are visionaries, who want to use the discontinuity of any innovation to make a break with the past and start an entirely new future. They want to be the first to exploit the new capability, in order to achieve a dramatic and insurmountable competitive advantage over the old order. Visionaries have an extraordinary influence on high technology because they are the first constituency who can and will bring huge resources for the process;

(3) Early majority (34\%), Consists of pragmatists that: believe in evolution and not revolution, they are interested in making their companies’

systems work effectively, therefore they are technologically neutral and will wait to adopt innovations only after a proven track record of useful productivity improvement, including strong references from people they trust;

(4) Late majority (34%), consist of conservatives that price-sensitive, highly skeptical, and very demanding. Conservatives nonetheless represent a largely untapped opportunity for technology, holding out the promise of a horde of new customers who can be brought into the market if handled with care. The key to winning their business and profiting is to simplify and commoditize systems to the point where they just work;

(5) Laggards (16%), consists of traditionalist, the last in the system to adopt an innovation.

Each segment plays a different role in the development of a technology, with the innovators and early adopters driving the technology. The early and late majority sit on the sidelines, waiting until a dominant design or standard established. The laggards tend to prolong a technology’s life, and sometimes proved to be a highly profitable opportunity. Overall, these later customers dominate the technology adoption market, and therefore should be taken into consideration. These customers demand convenience, ease of use, reliability, and are price sensitive.

Furthermore, Moore\(^{13}\) found a deep and dividing chasm that separates the early adopters from the early majority, especially in the high-tech marketing model. This gap symbolizes the dissociation between the two groups—that is, the difficulty any group will have in accepting a new product if it is presented in the same way as it was to the group to its immediate left. This phenomenon is disastrous for the

\(^{13}\) Moore, Geoffrey A., Crossing the Chasm, Harper Collins, NY, 1999
high-tech companies if it is left unrecognized. Please refer to Figure 3.2 for the adopter categorization and the chasm.

![Diagram showing the adopter categorization and the chasm](image)

Figure 3.3. The Adopter Categorization and the Chasm

Nevertheless, this segmentation of the customer base seems oversimplified. The world markets consists of billions of people, with a wide variety of interests, skills, socioeconomic and educational levels, and concerns, the lifestyle, and a host of other variables. The needs vary, the threshold being low for some, high for others. Any individual plays multiple roles in society: parent or child, students or worker, employee or manager, serious adult or playful youth. Even though the segmentation is oversimplified, it captures well the changes in attitudes about a technology as it matures and becomes integrated with a society’s culture.
3. Enablers to B2B Channel Shift:

3.1 Level of Information Intensity:
The level of information intensity may influence the owner to adopt or not adopt a technology. Large amounts of data and many transactions are likely to push an owner into adopting technologies that can help to streamline operations and offer process efficiencies within the organization.

3.2 Peer Pressures in Industry Sector:
Industry sector has been shown to influence technology adoption. If the competitors, the trading partners and a whole industry are adopting a technology, a company is likely to adopt as well.

3.3 Network Management Competence:
In the case of E-commerce implementation, staff have to manage more networks such as customers’, suppliers’ and their own networks. In day-to-day e-business running, it is very hard to predict peak-load that is contrary to the traditional business networks. Practically, staff does not know what to expect every day. Businesses can get heavy traffic one day and no traffic at all the next day. It is very hard to optimize the network resources utilization.

3.4 Reliability and Availability:
E-business is global and is fully exposed. For a business to be successful, it systems must be reliable and should be available 7 x 24 x 365 without breakdown. These systems shall be constantly monitored. Preventive maintenance is needed to detect and fix systems’ failures before any failures happen.

3.5 Decreasing Transaction Costs:
The cost of accessing the Internet is often a fraction of the cost of sending the information via telephone, fax, or mail. These costs savings using the Internet are even greater when considering costs of international telephone and mail costs. As
a result, conducting business over international borders and far distances is becoming an increasingly viable option. The lost cost of Internet communication, however, is only half of the equation. The rise of B2B exchanges enables fragmented buyer and sellers from all over the world to find each other without incurring the search costs, travel expenses or high commissions to intermediaries that are typical with traditional international commerce. This decreasing transaction costs will drive the technology adoption.

3.6 Increasing Intra-Enterprise Digitization:
In the e-economy, the ability to streamline the structure, influence, and control of the flow of information is critical and cost-effective compared to moving and manufacturing physical products. The development and evolution of enterprise wide applications and technologies such as ERP and data mining are the enabling factors to establish digitally networked global organization. Further, these technological capabilities are enabling the corporation to formulate e-Business architectures such as vision, strategy, cross-functional processes, integrated applications, and IT infrastructure. As a result, the digitized infrastructure can be leveraged in communicating with outside networks.

3.7 Ability to Leverage Legacy Systems:
Prior to the Internet age, companies invested heavily in mainframe applications to support their businesses. However, these technologies were not inherently compatible with information applications built with emerging technologies, including Internet-based applications. Due to changing businesses’ needs, and short life of new and emerging technologies, companies need to update and implement new information systems after using them for two to five years that made it possible to transit to the Internet easily. Y2K problems and issues also acted as a facilitating agent for new technology transit. Besides the phase-out of the mainframe-based applications, this incompatibility is becoming less of an issue
over time due to the rise of middleware software applications that support application integration.

3.8 Proliferation of Applications Supporting the Networked Organization:
Enterprise applications such as ERM, CRM, SCM, ORM, EAI, etc, have emerged as companies have digitized and networked their organizations to maintain competitive advantage. These applications are the key to unlocking information powers by making it available to any user, anytime, and anywhere.

3.9 Strategic Outsourcing Options:
Due to the high costs of IT implementations and labor required to maintain business applications, businesses are sometimes slow to adopt and use technologies to build their business. With Internet technologies, however, companies have emerged with a focus on providing technology services to businesses. These companies typically fall into two categories: Hosting and Application Service Providers (ASPs). Hosting companies take advantage of scale economies in web site maintenance and security expertise to provide corporate customers with a low-cost means of maintaining their information systems. Application Service Providers also take advantage of scale economies to develop and rent business applications, such as procurement and billing, on a subscription basis.

This method of software development allows companies to avoid the large up-front costs associated with information technology development. Morgan Stanley Dean Witter estimates that large corporations can save up to 90% of their IT costs in the first year by outsourcing. However, the cost savings is a particularly important trend when considering small businesses, which often do not have the cash flow or capital leverage to build information systems on their own.
To understand the impact of outsourced technology solutions as a key enabler to B2B e-commerce, consider Kelly’s new law of the value of the Internet network combined with the dollar value of Small Business transaction—50% of the U.S. GDP is from Small and Medium Size Businesses (MSDW 3 pg. 10). If Small Businesses take advantage of the new IT outsourcing options available to them, they will aggregately add tremendous value to the B2B network of businesses, which will in turn greatly increase the value proposition to Small Businesses of joining the network.

To get a sense of the growth of the ASP and Hosting markets, consider the following: 1) AMR Research predicts the ASP market will reach $4.7 billion by 2004, with a compound annual growth rate of 153 percent\(^{14}\), and 2) Salomon Smith Barney predicts the Hosting market will grow at 64% a year and exceed $10 Billion by 2003\(^{15}\). Nevertheless, we do not believe that these estimates will be true because actual market might be double than these estimates and different financial and research institutions’ predictions widely differ from each other. The purpose to give this example is to show that there will be tremendous growth in this area.

### 3.10 Increasing Inter-Enterprise Integration:

*Standards and Common Application Platforms:*

The emergence of standards, such as common and industry-specific Extensible Markup Language (XML) variations, and the implementation of compatible application platforms across enterprises allow real-time inventory inputs to net markets and make net markets an increasingly more viable means of conducting business. Now that companies are more digitized internally and inter-organizational compatibility is enabled by common standards and platforms, they

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are moving away from company-specific IT information systems implementations to open and data-rich links with supply partners and B2B exchanges built on the Internet network.

_Proliferation of Applications Supporting Inter-Enterprise Communication:_
Focused on meeting business demand and enabled by Internet technologies such as the common TCP/IP standard, software companies are dedicated to developing applications that support inter-enterprise applications.

_Transition from EDI to Open Networks:_
Enterprise Resources Planning applications are EDI compliant and XML capable, allowing manufacturers committed to expensive EDI networks to connect with those suppliers who find EDI cost-prohibitive.

_The emergence of Supply Chain Planning (SCP) Systems:_
SCP systems have emerged as a complement to ERP systems to provide intelligent decision-support capabilities. An SCP system is designed to overlay existing systems and pull data from every step of the supply chain, providing a clear, global picture of where the enterprise is heading. Creating a plan from an SCP system allows companies to quickly assess the impact of their actions across the entire supply chain, including customer demand.

_The emergence of B2B Exchange Linking Software:_
New software applications are being developed and marketed currently that allows companies to link to multiple B2B exchanges, creating a larger market for goods and services.
3.11 Technology Convergence:

Infrastructure Convergence:

One key aspect of technology convergence that impacts B2B e-commerce is the infrastructure shift from separate data and voice networks into a unified Internet Protocol (IP)-based network that is capable of transmitting information of any kind quickly and cheaply. The importance of this trend to B2B e-commerce—both the low cost and ease of working on a common protocol—is that companies are better able to link business processes, like customer care and supply chain management, with other applications—both internal to the company and external to suppliers and business partners.

Network Anywhere Technology Convergence:

A second aspect of technology convergence is that in addition to computers, almost anything that contains a silicon chip is capable of being connected to the Internet and of sending and receiving information. The information transmitted over the network may be as simple as stating whether that particular item is on or off, empty or full; or it may be more sophisticated information such as where it is currently located (i.e. GPS). The relevance of this trend is that the additional data produced by network-enabling devices that previously required monitoring supports better process linking with business partners and customers. For instance, the manufacturer, suppliers, and shippers can track the entire manufacturing process from raw material delivery through to delivery of the product to the customer—including inventory levels, production schedules, and delivery dates. The resulting efficiency results and cost savings should increase the trend toward greater B2B e-commerce.

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4. Barriers to the B2B Channel Shift:

The most important factors inhibiting the adoption of the technologies are the lack of standards, as well as adoption of the technology by business partners such as customers, suppliers and other organizations, the expense of installation and maintenance, technology sophistication, and the availability of telecommunications infrastructures.

4.1 Lack of Standards:

XML:

Despite the promise of XML and other common standard platforms detailed in the prior sections, barriers to deployment still remain. The following barriers were most commonly cited by the Zone Research survey participants: (1) Security still lacking (56%); (2) Standards not yet mature (49%); (3) Tool not yet mature (44%); (4) Management doesn’t understand XML and other platforms to understand value (40%); and (5) Complexity of projects (34%).

Wireless Applications:

Even if a 3G wireless technology was adopted, the U.S. is not projected to implement 3G wireless infrastructure before 2003. Moreover, there are problems with global frequency spectrum allocations for wireless technologies that may prevent a truly global, single standard system.

Complexity Barriers:

The complexity of implementing and managing global e-business operations should not be underestimated. Companies must be able to successfully balance the needs of the regional activities as well as coordinate and integrate worldwide operations. As an example, consider Dow-Corning’s recent rollout of their Enterprise Resource Planning (ERP) system, which includes about 1400 concurrent users and 8000 regular users in 84 sites across 17 countries. In addition to the complexity of building out the infrastructure, Dow must be able to
handle the currency, language, tax, and statutory requirements of many different countries.

4.2 Network Constraints:

*Infrastructure Availability:*

Internet services availability (ASP), bandwidth availability, network reliability and security are key barriers for the growth of Internet. In the most part of the world, bandwidth availability of 7x24x365 will remains an issue for foreseeable future.

*Infrastructure Investment Requirements:*

There is huge start up and infrastructure costs, in million dollars, for e-business that is very hard to absorb for the majority of businesses. Companies can spread this cost over a long period by providing some basic functions in the beginning of the launching of e-business. ASP model might provide the solution to this problem.

*Costs of integrating legacy systems not built for integration:*

Legacy systems require huge investment for integration with new infrastructure systems and network, as well as to preserve the integrity of the legacy data. In e-business, companies have to integrate with their suppliers, customers, contractors, and even sometime with their competitors. This integration creates compatibility and computability problems among these systems requiring common business process definition, technology compatibility, and standardization.
Chapter 4

REGULATION AND PRIVACY

1. Regulation:

In the beginning, the Internet was thought to be bounded by self-regulation and no regulation at all. The Internet is a innovative global force. Data and information cross multiple countries’ boundaries in microseconds. Just like a coin, the Internet also has two sides. On one hand, the global nature of the Internet has enhanced trade and commerce, and, on the other hand, it has simultaneously created complicated regulatory issues such as jurisdiction, taxation, and crime prevention. To resolve these issues, different countries, including the United States, France, South Korea and China have passed regulations. Here are further details about critical regulatory issues such as jurisdiction, taxation, privacy and technological solutions related to these issues:

1.1 Jurisdiction:

Among many other problems, the Internet has created a serious issue of jurisdiction, or “legal governance”, in the case of disputes, which country law will be applicable. A recent case against “Yahoo” in the French courts brought this issue into the spotlight. The French court ordered “Yahoo” to ban the access of Nazi memorabilia in France. These Nazi memorabilia are posted on US based sites, however, and under US rights of free speech, it is legal to post such information. The jurisdiction issue will be further complicated by alliance of different countries such as European Union (EU). The EU gives rights to sue to its consumers in their country of origin even though a product or services
provided on the Internet originating in another country not part of the EU may have actually caused the harm. The enforcement of these rights will be extremely difficult without international governing body. The establishment of any such international body will itself prove extremely difficult, if not impossible. Keeping in view the above-mentioned case, enforcing the French court ruling will be against the US constitution because under the US constitution, freedom of speech is basic right.

The implementation of jurisdiction will also be impeded by the inherent nature of the data flow on the Internet. Data is transported in small packets and each packet adopts a different route to reach the destination. If data that is carrying different parts of the same information passed through different countries boundaries, which country should have jurisdiction on the subject matter? There are multiple possibilities: country of origin, country of destination, and or the middle countries.

What will happen if a crime is committed on Internet or during the transform of the information through different routes at Internet? Different crimes carry different punishments in different countries. Which country laws will be upheld? The implementation of laws could create political crises.

All of the above-mentioned matters are further complicated by peer-to-peer and proxy servers. Peer-to-peer technology allows the spread and distribution of content to the whole web and destroys the ownership claim of the content. Further, proxy technology enables each computer to act as a server that makes it more difficult to pin point the origin of information.

In conclusion, the Internet does away with the geographical boundaries and also does away with boundary-based laws that create competition among jurisdictions and their implementation processes.
1.2 Taxation:

Websites can be hosted in any country. Data transformation is instant; it does not matter where the sender and receiver are. Businesses can generate an order in one country and receive merchandise in another country. Orders can be posted from different countries and merchandise can be sent to one country or multiple countries. Likewise, an order can be posted from one country and merchandise can be shipped to multiple countries. The question arises, then, of which country will collect the taxes? This creates special problems for the enforcement of trade sanction enforcement.

2. Privacy:

The privacy issue refers to ensuring that private information about customers, employees, and business partners is kept private. This is a very important issue because the establishment of trust, as a basis of business relationships, is largely dependent upon this trust. People are very sensitive about privacy matters, and violations of privacy have already become a topic in high politics. The US privacy laws stand as only one example of many. The FTC has recently recommended government-driven privacy regulations after its careful study found that the operators of many commercial web sites are not doing enough to protect privacy. The study was triggered by a recent FTC report that found that 92% of web users expressed concerns about having their personal information misused by web site operators.

Managing privacy issues is a matter of administrative, as well as, technical practices. If customer including the business partners - experience is the main objective, privacy will be the top on the list of design main considerations.
There is huge difference in the definition of “privacy” among different countries. Most of the countries in the world do not even agree on the basics of privacy. As an example, the EU has a very well defined and comprehensive legislative body to regulate the privacy while the US emphasizes self-regulation and regional or local laws. To safe-guard the privacy and safety, almost every corporation has some sort of organization set up to provide security, often including a security officer. Due to growing concern of privacy, in the future there is a higher possibility for a much stronger executive role, such as Chief Privacy Officer. At the present there are more than 100 corporations that have a “Chief Privacy Officer“ position. A Chief Privacy Officer has to be a diplomat, facilitator, and negotiator who can play their role effectively keeping everyone happy, including customers, employees, business partners, and even the press. This position will demand multiple and unique skill, such as a background in IT, law and technology. The privacy compliance is a combination of organization policies and procedures and the availability of the proper technology.

2.1 Privacy and Regulation:

Privacy is a social norm. To take part in the modern social circle and to do business, people have to provide data. The main questions will be “How much data? Who owns the data? How could this data be protected? How could we curtail the abuse of the given information?” In his book, The Unwanted Gaze: the Destruction of Privacy in America (Random House, 2000), Jeffrey Rosen suggests that if people passively accept new data-gathering technologies, privacy will erode. “The future of privacy will be determined not by the inherent nature of the Internet, but by social choices about how much privacy we as a society think it is reasonable to demand,” he writes. In the future, consumers, as well as, businesses will require the disclosure of information utilization by those companies to which they are providing information.

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There massive amounts of data about consumers and businesses. Businesses have the ability to differentiate their customers in real time and could segregate their customers into groups, based on “which customers to embrace and which customers to reject”. This will create real and troubling problems. This data collection may defy the enforcement of federal discriminating laws.

2.2 Privacy Enforcement in the Future:

The future privacy enforcement will consist of self-regulation, standards for information practices, third party enforcement, criminal and civil accountabilities to punish companies’ abuse and technology. Consumers will be able to use third party applications to hide their real identities. The level of government legislation will depend on how successful the industry is at regulating itself. The fundamental fact is that “businesses have to disclose what is being done with the consumers information”. Businesses can decide to provide the information about the usage of consumers’ information to their consumers by regulating themselves or may be ready to get a very heavy hand from “over-regulation”. The choices will be very clear.

At present, US Congress is considering the Internet Growth and Development Act (H. R. 1686), Online Privacy Protection Act (S.R. 809), Electronic Rights for the 21st Century (S.R. 854), Secure Online communications Enforcement Act of 2000 (S.R. 2063), Internet Integrity and Critical Infrastructure Protection Act of 2000 (S.R. 2448), Consumer Privacy Protection Act of 2000 (S.R. 2606), and Consumer Internet Privacy Enhancement Act (S.R. 2928) are under consideration for enactment as the new laws. This new legislation focuses on bandwidth, privacy disclosures and allows consumers to access their personal data, standards for law enforcement access and decryption assistance and stored information), restriction for the disclosure of personal information without the consent of the consumer, computer crime and fraudulent access to personal information, US
Federal Trade Commission enforcement authority and the creation of private right of action, requirements for opt-in for the collection and disclosure of personal information, and requirements for the providing clear and conspicuous disclosure of information practice.\(^{17}\)

3. Possible Solutions:

Some of the above issues can be brought under control, at least partially. There are filtering software products that can be used at a country gateway to block the entry of illegal content in the country. Countries could establish intra-net firewall across the whole country. To curb the crimes such as hacking, fraud and white-collar crime, different countries can arrange bilateral or multilateral treaties. IP addresses tracking can assist to track the user location. At present, in the case of same user, for each use, the IP address is changed. In the future, however, a permanent and unique IP address could be assigned to a user to track their location. Further, content imaging technologies such as those developed by Akamai, can assist in locating a user’s whereabouts at the time they were using the website to personalize the site for the user. This technology can help to implement taxation and foreign trade laws, and even to track criminals. Governments can also establish a permanent user certification system to ensure the recognition of the user and the enforcement of the different laws and regulations. Further, governments can mandate licensing for the website owner and hold them responsible for any misdeeds of their users. These website owners could be held responsible for forbidden content postings and charged to have their web sites monitored. This methodology will be hard to implement in some countries such as USA because they might be seen as a violation of basic citizen rights.

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To resolve jurisdiction issues and tax collection, different countries can form an international forum and / or establish a uniform international standard such as International Intellectual Property Organization. To ensure privacy across borders, different countries can agree upon minimum general guidelines. An example will be the International Civil Aviation). Every country has its own civil aviation authority such as the Federal Aviation Authority (FAA) in the US. But most of the countries comply with the International Civil Aviation rules and regulations in international air boundaries. Countries can enforce such generally agreed-upon principles through Safe Harbor Laws and Regulations. To minimize the load over member countries' judicial systems and substantially reduce the cost and time for resolution of conflict and contractual disputes, alternative dispute resolution methodologies should be used. Above all, to tackle the above-mentioned issues, technology and human forces must be used together.

All in all, Privacy is an especially critical issue for small businesses or sole businesses ownership. The authors believe that Internet Integrity and Critical Infrastructure Protection Act of 2000 will be extended to protect sole business owner’s privacy.

The future privacy enforcement will consist of self-regulation, standards for information practices, third party enforcement, criminal and civil accountabilities to punish companies’ abuse and technology. Consumers will be able to use third party applications to hide their real identities. The level of government legislation will depend on how successful the industry is at regulating itself. The fundamental fact is that “businesses have to disclose what is being done with the consumers information”. Businesses can decide to provide the information about the usage of consumers’ information to their consumers by regulating themselves or may be ready to get a very heavy hand from “over-regulation”.

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Chapter 5

SECURITY

The supply chain is an integral part of any business. Supply chain management forces businesses to streamline the ways they manufacture, distribute, and sell products and ultimately improves the way they conduct business. These businesses, with their partners shared market segment, collaboratively plan, implement, and manage the flow of goods, services, and information along the value system in a way that increases customer-perceived value and optimizes the efficiency of the chain. For these businesses, value-chain integration means their business systems can no longer be confined to internal processes, programs, and data repositories, rather they interoperate with other such systems that support links in the supply chain.

In the case of most companies, before establishing a fully integrated supply chain that is an integral part of B2B, these companies had a paper based traditional supply system. In contrast to the disparity of a traditional system, the new supply system is fully integrated. The main functions of this new system are customer service, demand forecasting, distribution, communication, inventory control, material handling, order processing, parts and service support, plant and warehouse site selection, procurement, packaging, return goods handling, salvage and scrap disposal, traffic and transportation, warehousing and storage.

This fully integrated supply chain adds values for customers, reduces lead time and inventory, increases capital and human capital utilization, increases customer service satisfaction, laterally eliminates material related quality problem (JIT & JIT II), provides the right information at the right time and at the right price to

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suppliers and distributors. In spite of these benefits, integrated and Internet based supply chain creates serious security threats. The following paragraphs will discuss the effects of the Internet on security, the characteristics of the security system, sources of e-commerce security systems, e-commerce related security risks, and enabling technologies and techniques that B2B initiatives use to curb these security risks.

1. The Importance of Trust:

In the future, it will be the value chain constellation, a group of interrelated firms dedicated to focused industries and markets, that finds the best way to combine the supply chain improvements gained by the linked constituents, into a system that most effectively meets the needs of the future consumers. Poirier argues that the new supply chain game is becoming a competition between effective supply networks rather than individual corporations, and that in turn, success belongs to the best value chain constellations, not individual corporations. Finally, Poirier argues that only when new levels of trust and cooperation are created in an interactive corporate environment can such a constellation be established and flourish. In short, trust is one of the most crucial components of B2B.

Trust cannot be established in vacuum. Many factors are required to establish trust in B2B transactions, however, without security and privacy guarantees, it is very difficult to establish trust. Various techniques and technologies have been developed to provide an acceptable level of security and privacy. In the following sections, we will discuss the issues and various technologies that relate to security and privacy.

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2. The Effects of The Internet on Security:

The Internet is a public medium without the strict government and private regulation that traditional forms of communication, such as telephone systems and delivery services provide. Further, the Internet is global and open. These characteristics of the Internet have enhanced the risk. Automation (computational power), location, and propagation are the primary sources for risk enhancement and are described in detail as follows.\textsuperscript{19}

2.1 Automation (Computational Power):

Most of the defensive systems are based on a combination of codes. To break these codes, an intruder must go through tedious work of unlocking these codes. The computer computational power, complicated algorithms and network connection has made this task very easy, quick and less costly.

2.2 Location:

Traditional security systems usually take advantage of the fact that the attacker has to be in close proximity of the target for extended periods of time, allowing for possible detection. The Internet allows an intruder to take action from remote and safe locations, never exposing himself or herself to potential physical (or electronic) detection, or at least offering easy escape if detection occurs. Furthermore, distance may also complicate investigation and prosecution of criminals even if they are identified or detected, based on legal and jurisdiction issues.

2.3 Propagation:

In the e-world, a single person can develop a program and / or algorithm to break a security system and transfer and transport their work all over the world to break and / or destroy security systems anywhere in the world. The propagation and implementation of this program all over the world does not require any special or specific knowledge. In most of the case, this propagation and implementation just needs one click. A popular example is the spread of “LOVE” virus globally. In addition, because these programs can easily be shared or copied, others can quickly utilize a successful method without even fully understanding the underlying technology or code.

3. Characteristics of E-Commerce Security System:

The fundamental network security issues of e-commerce are directly related to contract formation and enforcement. Authentication, authorization, communication integrity, confidentiality, and non-repudiation are the basic elements of the e-commerce security and are applicable to transactions and firm’s systems equally.

3.1 Authentication:

Authentication identifies the party that has sent or received a message, and/or determining that the message received is accurate. Authentication assigns a value to each electronic node in a transaction. To gain access to data in a document, the receiver must verify the authentication code. Businesses use authentication to:

- Verify the identity of a message sender to the intended recipient, avoiding spoofing or impersonation;

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- Verify the integrity of a message by detecting changes including transmission errors introduced between sender and receiver, and;

- Protect a unique message identifier used to detect attempts to insert, delete, or duplicate messages.

3.2 Authorization:

Authorization or access control is concerned with giving the right people the right access to the right resources and restricting others' access to those same resources. These tasks can be coordinated by the transaction workflow and authorization modules.

3.3 Communication Integrity:

Communication integrity guarantees that a message has not been modified while in transit. On the Internet, information and data travel over various networks and routers in small packets making it susceptible to capture and modification while en route to its destination. All parties in a transaction must be assured that the contents of the transaction have not been modified (either intentionally or accidentally) prior to, during, or after the transmission. This is commonly known as communication integrity and is often accomplished through hashing algorithms and digitally signed digest codes.

3.4 Confidentiality:

Confidentiality assures that unauthorized persons cannot access the data. The key point behind ensuring the confidentiality of information on the network is to deny information to anyone who is not specifically authorized to see it or use it. Confidentiality therefore equates closely to privacy.
The responsible parties must be sure that the contents\textsuperscript{21} of the message or transaction are known only to the sender and receiver and any other related individuals. Since breaches of privacy can occur both during the transmission and after it has been received, the sender must be assured that the contents also remain private. While perhaps the most obvious aspect of security, this may be the most difficult to implement.

The issue of consumer privacy is especially important for businesses operating consumer-oriented web sites to conduct electronic commerce transactions. The usage of cookies to gather consumer information is one example of the controversial and still evolving nature of privacy in these situations. As electronic commerce continues to develop, protecting the rights of the individual will certainly be a central topic to be addressed. At the current time, in terms of business-to-business applications, the most crucial aspect of personal privacy is ensuring that personal information and data are not used in unwarranted ways.

3.5 Non-repudiation:

Non-repudiation consists of cryptographic receipts that are created so an author of a message can prove having sent it and cannot falsely deny having sent a message. These tasks fall well within the premises of contract formation and enforcement. In traditional business transactions, this often involves the use of signatures or seals. Similar techniques must be used in electronic commerce to avoid potential disputes between parties. The ability of a transaction to withstand later audit is crucial for the confirmation of security.

\textsuperscript{21} "Contents" is used in the broadest sense here, to refer to whatever information in whatever format is being transferred during the process of the business communication or transaction.
The above-mentioned desirable characteristics can be grouped as web client, data transport, web server, and operating system level or at the combination of these, at multiple levels.

4. Commerce Security Threats and Risks:

Internet attacks are easy to accomplish, hard to trace, and bring only a low risk to the attacker. The threats to the E-Commerce security can be classified as internal and external.

4.1 Internal Threats:

Data crime and damage can come from inside. Insiders generally have a greater opportunity, greater understanding of what's valuable, and very often a greater motivation for hurting the company in the first place. One of the easiest ways to breach security on a corporate network is to call up an employee pretending to be technical support and ask them for a password. Unauthorized access, network sniffing, loss of service, and viruses are common internal security threats that FI faces. The internal threats can be posed by malicious intention and / or carelessness.

4.2 External Threats:

The main external threats are as follows:

4.2.1 Vandalism and Sabotage:

Web defacing is the over-writing or rewriting someone's web page illegally. Other main forms of sabotage include hacking and IP (Internet Protocol) spoofing. In general hackers include industrial spies, disgruntled employees, unpaid suppliers, environmental extremists, terrorists, professional criminals, teenagers with too much time on their hands, and other social malcontents and deviants.
In case of IP Spoofing (masquerading), attackers run a software tool that creates Internet messages that appear to come not from the intruder's actual location, but from a computer trusted by the victim. IP refers to the unique address of a computer. When two computers trust each other, they allow access to sensitive information that is not generally available to other computer systems. The attacker takes advantage of this trust by masquerading as a trusted computer to gain access to sensitive areas or take control of the victim computer by running "privileged" programs.

4.2.2 Breach of Confidentially:
On the Internet, messages are transmitted through a number of middlemen, routers-and mail servers, before reaching their final destinations. During data/information transfer, these data can be modified, copied or deleted through illegal means.

4.2.3 Violation Data Integrity:
Data can be altered during transmission. This presents a serious threat because data integrity determines the data validity.

4.2.4 Denial of service- SYN Attack:
This is one of the major threats that companies could face. A SYN attack is an attack against a computer that provides service to customers over the Internet. In this attack, the enemy runs a program from a remote location (anywhere in the world) that jams the service on the victim computer. This is known as a denial-of-service attack because the effect of the attack is to prevent the service-providing computer from providing the service. The attack might prevent one site from being able to exchange data with other sites or prevent the site from using the Internet at all. This type of attack is very difficult to prevent because it exploits a design flaw in the basic technology used for Internet communication today.
4.2.5 Viruses:
Viruses are also an Internet threat. E-mail sent with attachments can contain "Trojan horses" such as the "FORMS" virus that affects Microsoft Word and Excel documents. The virus is transmitted within the attachment using the macro features. It hides until the document is opened. It then replicates itself to infect other files or causes damage by destroying files with particular file name extensions. Another form of an Internet virus infects target machines when file transfers take place. The infected file is placed on an unknowing machine. Another host that desires the file, which has become infected, requests the file to be copied to it. Once the copy is complete the receiving host has been compromised and can infect other files that it stores and uses within its local area network community.

4.3 Internal vs. External Security Breaches:
According to a 1999 IDC study, about 90% of IT security breaches are internal and more than 45% are carried out by disgruntled employees. These findings contradict the popular belief that hacker attack or eavesdropping by criminals is the main security risk. Opportunities for security breaches grow with the size and complexity of sites. Security management can tie up a considerable amount of human resources, especially in heterogeneous environments with different security systems in place. Daum and Scheller (2000) said that one-stop multi-platform security systems could improve this situation²².

Having mentioned this, however, we still believe that human factor is the most important factors of security issues of the e-business. Careful treatment of employees determines the successful implementation of security systems.

5. Enabling Technologies and techniques for E-Commerce Security:

Security system must identify vulnerabilities and threats, anticipate potential attacks, assess whether they are likely to succeed or not, assess what the potential damage might be from successful attacks, and then implement countermeasures against those defined attacks which are deemed to be significant enough to counter. The following are tools, both hardware- and software-based, which can help to mitigate the above-mentioned threats or possibly eliminate them.

5.1 Public Key Infrastructures (PKI)-Network Security:

PKI are used to obtain digital certificates for information transformation. PKI is a data encryption system between server and client. Such certificates can ensure the confidentiality and integrity of data through encryption, control access through private keys, authenticate documents via digital signatures, and enforce nonrepudiation of business transactions. PKI software uses a string of numbers or keys to encrypt documents to protect them from unauthorized access, and then decrypts them for authorized users.

The PKI uses a hybrid key pair, one public (asymmetric) key and one private key (symmetric). The public key is made available to a user that would probably transmit the data to the main party. The participants in the user list would use the public key to encrypt data that needs to be transmitted to the main party. This data would be decrypted by the main party using its own private key, thus providing confidential exchange of information.23

23 Jilovec, Nahid, 2000, 124.
5.2 Secure Socket Layer (SSL):

SSL is a data encryption and server identification system between web server and client. Most E-Commerce sites use SSL for transferring customers' personal data. SSL provides remarkable security and is widely used by e-commerce sites to transfer customers' personal data.

5.3 Secure Electronic Transaction (SET) Protocol:

The Secure Electronic Transaction (SET) protocol is used to secure the transactions. SET is the first end-to-end solution. SET makes use of Netscape's Secure Sockets Layer (SSL), Microsoft's Secure Transaction Technology (STT), and Terisa System's Secure Hypertext Transfer Protocol and uses aspects of a public key infrastructure. The SET specification is designed to enable payment security for all involved, authenticate cardholders and merchants, provide confidentiality of payment data, and define protocols for potential electronic security service providers.

5.4 Combination of Firewall and Domain Type and Enforcement:

Firewalls, and domain and type enforcement (DTE) security mechanism are used to impose restrictions on clients and the types of applications and services that can be accessed over the network.

5.5 Scanners:

Scanners are tools that allow the user to scan its computing systems that are interconnected via the Internet for known security holes. The scanner actually looks at software version levels, tests known weaknesses or bugs in the operation of the operating system, detects instances of network sniffing, looks for possible past unauthorized access, and creates a report which will inform the systems.
administrators of what was found. They cannot, however, stop all of them. They show weaknesses; they do not fix them.

5.6 Encryption:

Although authentication ensures the integrity of the data, encryption provides data confidentiality. Encryption ensures that if hackers do gain access to data, they find it unintelligible. However, encryption does not detect accidental or deliberate alteration of messages between sender and receiver. Encryption without authentication will not detect any error during data transmission and decrypted message may not be processable.

Data encryption uses a key value to translate data to something else that does not reveal the contents of the original data. This can be achieved either by using symmetric (private) or asymmetric (public) keys. With symmetric keys, the same key both encrypts and decrypts the data. With asymmetric keys, you cannot decrypt the data using the same key that was used to encrypt the data. Asymmetric keys are used for a higher degree of protection and encryption.24

5.6.1 Software Encryption:

As mentioned above, software encryption is used to make data unreadable during transfer. The encryption software on the host system creates a public key and a private key. Anyone wanting to communicate with the host simply encrypts the data using the public key. The data received by the host is then decrypted using the private key. Communications are not readable by anyone but the receiving host with the private key. Encryption is a frequently used mechanism for guaranteeing confidentiality, since only those recipients who have access to the decrypting key are able to decode the messages.

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24 Jilovec, Nahid, 2000, 123.
5.6.2 Hardware Encryption:

Hardware encryption engine enhances encryption software performance by increasing the encryption speed and by providing higher security.

5.7 Firewalls:

Firewalls protect against unauthorized access, loss of service, sniffing, and viruses. Firewalls protect Internet access from unknown IP addresses. Firewalls are basically servers and routers that are embedded in an internal network to "ward off" unwanted users. Firewalls allow open access to the network internally, but externally, they grant access based on a valid user ID, password, IP address, or domain name. Firewall technology is sophisticated, effective, and widely available. But firewalls do not address other security issues, such as user authentication or message integrity. They simply monitor network traffic. Although firewalls are effective at keeping unauthorized users out, they are ineffective at preventing viruses from entering the network.\(^{25}\)

There are two basic types of firewall available today: packet filters and application gateways. Packet filtering firewalls make decisions based on information contained within each network "packet." If the packet meets the security policy set forth by the business then it will be sent on to its destination. Application gateway, also known as proxy gateway, control connections rather than individual packets. At the point where a connection is requested, the proxy for the given protocol will check the firewall's security policy and decide whether the connection will be allowed to take place. If the connection is permitted the application gateway or proxy server acts as an intermediary for all transactions taking place. It protects direct connection to a business' computer systems.

\(^{25}\) Jlovec, Nahid, 2000, 127.
Connections by the outside world can only be accomplished through the application gateway or proxy server.

5.8 Digital Signature:

A digital signature is simply data that is attached to the e-business message or transaction. The encoded message is used to confirm where the message originated and that its contents have not been altered. This serves in place of a traditional hand written signature for web transactions.

Digital signatures are created and verified by cryptography, a mathematical calculation that transforms messages into something that appears unintelligible. Digital signatures use an algorithm with two related keys, one for creating a digital signature or transforming data into a seemingly unintelligible form, and another key for verifying a digital signature or returning the message to its original form. The complementary keys of digital signatures are called private keys, known only to the signer and used to create the digital signature, and public keys, known and used by a receiving party to verify the digital signature.

5.9 Digital Certificates:

To verify a digital signature, the verifier must have access to the signer’s public key and assurance that it corresponds to the signer’s private key. However, a public and private key pair has no intrinsic association with a particular person; it is simply a pair of numbers. The trading parties must be convinced that digital signatures can be associated with specific persons or parties. With e-business, there is a greater possibility that the trading partner is an unknown entity to the seller, increasing the risk of an order not being real or not being paid. This makes authentication and non-repudiation an absolute necessity. Digital certificates are issued to resolve this identity issue.
A digital certificate is a certificate that is signed digitally by a certification authority. The certification authority is a neutral party that provides independent confirmation of the attributes of the user’s digital signature. To associate a key pair with a prospective signer, a certification authority issues a certificate and confirms that the prospective signer identified in the certificate holds the corresponding private key. The prospective signer is referred to as the subscriber. A certificate’s function is to bind a key pair to a specific subscriber. A recipient of a certificate can use the public key in the certificate to verify that the digital signature was created with the corresponding private key. If certification is successful, you can be assured that the particular subscriber named in the certificate holds the corresponding private key by which the digital signature was created. Digital certificates can provide much greater trust between trading partners, especially if the trading partner is a new customer. In addition, they satisfy a legal requirement to authenticate and enforce an electronic transaction.\(^{26}\)

5.10 Virtual Private Networks:

Virtual Private Network's provide a way for individuals in remote locations to log onto a network under a specific type of secure connection to ensure privacy during the transaction session.

5.11 Intelligent Software Agents:

These are programs that autonomously and automatically perform intelligent searches, answer questions, tell you when an event occurs, individualize news delivery, tutor and, to track the attackers.

5.12 Trapping Software:

Traps to detect unauthorized access.

\(^{26}\) Jilovec, Nahid, 2000, 125.
5.13 Hybrid network and host-based solution:

Use hybrid system to curb the potential problems such as known holes in operating systems as well as the internal corporate security threats are covered by the intrusion tools.

5.14 Smart Card:

Smart card is used to lock and unlock the system.

5.15 Locking Client System Boot:

To prevent unauthorized system access, we can lock client system boot.

5.16 Client Hard Disk Drive Certification (CHHDC):

CHHDC is used to prevent unauthorized data access to hard disk drive.

5.17 Password:

Passwords are used to lock and unlock the system.

5.18 Fingerprint Identification:

These are used to lock and unlock system based on fingerprint identification.

5.19 Physical Access Lock:

To prevent physical hardware theft, physical locks are used.

5.20 Virus Detection Software:

This software is installed on networked connected systems, clients and servers to automatically scan the virus.
5.21 Intrusion Detection Software:

Often, the key to responding to an attack is detecting that the attack is actually occurring. Intrusion Detection software is designed to serve this purpose, alerting the system administrator when unauthorized users log on to the system.

5.22 Lead Box:

Lead box /sand box allows you to peek inside a mystery message that is attached with e-mails without exposing the vitals of the system. The sandbox could be set to reject anything without a digital signature, protecting against spoofed sender names.

5.23 Hardware Lead Security:

Computers should be built with an auxiliary processor whose sole job should be to execute functions received from outside and automatically kill the incoming attachments if there is any security risks involve.

6. Management Techniques:

Education of employees about security risks and threats, and the establishment of information security policy are crucial to implementing any security measures. Here are some critical management techniques:

6.1 People and Policy:

Companies should increase the employees’ awareness and competences through training and education on security system and related matters, as well as, the establishment of information security policy that are crucial in implementing any security measures.
6.2 House Keeping:

It is useful to map the network and know every entry way and every point at which system has trust with another, and to know what the vulnerabilities are and how those might impact the business.

6.3 Update The Network:

A firm must properly train employees for security related matters, and address Security Across the entire network—whether big or small. Firms must keep up-to-date on operating system patches and "hot fixes."

6.4 Network Audit:

The company should perform security and a disaster recovery and business continuance audit on mission-critical systems and networks regularly.

6.5 Filtering and Testing:

It is necessary to examine filter points, such as firewalls and routers, to determine whether they are securely configured based on what is known about distributed denial of service attacks.

6.6 Back Up and Space Diversity:

All mission-critical data and information should be properly backed up. Perhaps even in different location. Should any physical destruction occurs in one place, the critical data could be kept safe in another location.

Even after considering all the above-mentioned technologies and techniques, there is no absolute security from above mentioned risks and it is impossible to guarantee total security. Time provides the only trustworthy evidence that a firm’s security measures are truly protecting the firm from all the different possible Internet related risks.

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Schneier describes that implementing security requires protection, detection, and reaction. The technologies described above are primarily concerned with protection and detection. But since no security measures are completely safe, reaction to security breaks is often the most important element for the firm to limit the lasting effects of an attack. Once an incident has occurred, the firm must react swiftly and appropriately to the situation in order to contain the damage and prepare the firm to move forward as soon as possible. Schneier outlines several ways that a firm can prepare themselves for this part of the security process. He suggests the compartmentalization of systems to limit widespread damage. Also, a firm should create multiple levels of security so that any individual only has as much privilege as they need to do their jobs, which limits the amount of damage that these individuals’ accounts can do if they are compromised. He also points to the securing the weakest link of the system, as that is the true measure of how secure the system is. Defense in depth adds to the tasks that any prospective attacker must face, adding to the security of the organization. Finally, Schneier points out that it is crucial to “fail securely” – referring to the fact that systems often are designed to default to less secure settings after failure, setting up the system for further attack, and to create simplicity whenever possible, because the simpler things are, the less can go wrong.

In short, it is essential that the firm recognize the limitations of any security measure and prepares response mechanisms and procedures to deal with breaches.

Back to history, the business world has been dealing with the security issue since it’s beginning. Obviously, the Internet is bringing different, and perhaps, larger security issues. The best explanation of people willingness to use the risky medium is that what matters is the value and cost trade-off. Daum and Scheeler
explain this situation in *Success with Electronic Business: Design, Architecture and Technology of Electronic Business Systems*. Further, they argue that the value and cost depend on the regional, national, cultural and social context of the prospective user\(^7\). Therefore, our view is that the business world will continue to use the Internet, with an acceptable level of risk, since the benefits (value) of using the Internet far exceeds its costs.

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\(^7\) Daum, Berthold & Markus Scheller, 2000, 5-7.
Chapter 6

B2B E-MARKETPLACES

B2B e-marketplaces can be defined as on-line marketplaces where businesses can do on-line transactions. B2B e-marketplaces consist of a combination of a sell-side and a buy-side. As is true of conventional markets, several sellers conduct transactions with several buyers.

![Diagram of E-Marketplace]

Figure 6.1. E-Marketplace

1. Horizontal vs. Vertical E-marketplaces:
Horizontal marketplaces handle cross-industry, indirect goods. Indirect goods are defined as the items that are essential to running a business, but which are not necessarily part of a company's products. For example, a construction company needs computers for administration and office furniture for its employees, but it does not manufacture these goods. Other industries also need the same goods, so

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horizontal marketplace is the most appropriate format for the buying and selling of these goods. Grainger.com, a distributor of maintenance, repair, and operating (MRO) supplies, is a good example of a horizontal marketplace that deals with office equipment for a wide variety of industries.

Vertical marketplaces deal primarily with industry-specific, direct goods. As an example, consider the commerce in a chemical marketplace that offers the basic elements needed to manufacture paints. Since a vertical marketplace deals with industry-specific goods, only companies in that particular industry are connected to these marketplaces. Aetra Energy is an example of the vertical marketplace in the energy industry.

2. Transaction Mechanisms:
The following sections present the main types of transaction mechanisms to exchange goods and services:

2.1 Aggregators:
An aggregator brings a large number of buyers and sellers of similar products such as chemicals, under one roof and reduces transaction costs by allowing for “one-stop shopping”. This model increases buying or selling power. An example is fobchemical.com, which enables its customers to form buying groups for similar chemicals that allow them to aggregate their buying power. Another example is PlasticNet.com. PlasticsNet.com allows plastics processors to issue a single order for hundreds of plastics, which PlasticsNet sources from a diverse set of suppliers. An important characteristic of the aggregation mechanism is that adding another buyer to the hub only benefits sellers and does not benefit other buyers. The aggregation mechanism is static in the nature, because prices are pre-negotiated. The aggregation works best in the following situations:
• The cost of processing a purchase order is high relative to the cost of items procured.

• Products are specialized and not commodity-like

• The number of Stock Keeping Units is extremely large.

• Buyers are not sophisticated enough to understand dynamic pricing mechanisms.

• The suppliers are highly fragmented.

• Small volume buyers.

• Most purchasing is done on the basis of pre-negotiated contracts.

• A meta catalog of products carried by a large number of suppliers can be created.

Aggregators can be neutral or biased. Neutral aggregators do not favor buyers over sellers or vice versa. To work properly, neutral aggregators need bilateral participation, from buyers and suppliers. In this sense, the neutral aggregators are true market makers. Neutral aggregators benefit buyers and sellers by aggregating supply and demand. Because they are neutral, they are ideal when there is systemic purchasing and bilateral fragmentation. Neutral aggregators add value when markets are fragmented for both the buyer and seller sides.

A biased aggregator either works for sellers or buyers and helps them to negotiate better terms or streamline the buying / selling process. When favoring sellers, the biased aggregator acts as a forward aggregator or forward auctioneer. An example of a forward aggregator is eChemicals. When favoring buyers, the biased
aggregator acts as reverse aggregators or reverse auctioneers. An example of a reverse aggregator is FOB.com. The reverse aggregator assists small and medium size buyers to negotiate price reduction and reduce procurement transaction costs by outsourcing the procurement function. These aggregators primarily benefit buyers or sellers by aggregating demand or supply.

2.2 Reverse Auctions:
Reverse Auctions applies when many sellers deal with a single buyer. The transaction process includes requests for proposals (RFPs) or requests for quotations (RFQs). These are usually used for complex services with detailed specifications, such as construction orders. The entire process for requests is conducted online.

2.3 Auctions:
Auctions are a third type of market and apply to unique goods or goods that come into the market at irregular intervals. It is difficult to determine the price for such goods in advance. For example, if a company wants to sell a used, specialized machine in a marketplace, it would hold an auction. The product is non-standard, and the price cannot be determined easily. Sometimes a buyer holds a reverse auction, at which suppliers try to underbid each other to offer the goods. If no other criterion plays a role, the supplier with the lowest price makes the sale.

2.4 Consortia:
E-marketplaces can function as a supply-chain hub for members, focus on transaction efficiency and cost reduction, and support a multitude of services and applications pertinent to related industries such as logistics, credit, product development, packaging, and equipment acquisition. Some common characteristics of consortia operated e-marketplaces are as follows:
• Contact Business. (Cost Focus via e-enabling supply)

• Shared, but proprietary, one-to-one.

• Producer backed liquidity.

• Multi-entity ownership.

This model might raise regulatory issues in the areas of price fixing and monopolistic practices.

2.5 E-Distributor:
This model is centered on providing a catalog of standard products and a basket of value-added, buyer-centric services. This also creates value for the seller who cannot otherwise provide serve cost efficiently to fragmented groups of smaller customers.

Many of the e-commerce providers blend a variety of each of these business models to differentiate themselves and deliver a complete package of services to both sides of the transaction.28

2.6 Exchanges:
Exchanges provide forward auctions (many buyers, one seller) and reverse auctions (many sellers, one buyer), as well as a platform for completing transactions on a bid-ask-basis. Exchanges provide a dynamic trading platform for fungible commodity and intermediate chemicals and in effect act as a spot market for buyers and sellers. Examples of exchanges are CheMatch.com and ChemConnect.com. Some common characteristics are as follows:

• Price focus: sales/purchase price.

• Many-to-Many capability.

• Many-to-One-to-Many.

• Vertical reach, open.

• Liquidity challenged.

• Transaction Costs-usually free.

• Intrinsic liquidity such as guaranteed "two-way" markets and standardized contracts.

Exchanges provide a centralized, real time mechanism for negotiating different variables such as price and delivery, and improve the ease and efficiency of the entire transaction. Exchanges are usually used to sell excess, obsolete, or slow-moving inventory, as well as time sensitive, limited, or scarce products. Presently, exchanges are used for standardized products with high price volatility. Stock exchanges are the most familiar example. Stocks are standardized titles for capital and usually experience significant fluctuations in price. Another example is electricity exchanges. Electricity is an easily standardized product: depending upon the demand, its price moves up and down.

3. E-Marketplaces Requirements:

E-Marketplaces are suitable for certain types of products, services, or markets. The following are the unique requirements of e-marketplaces:
3.1 Product and Services Qualities:

The products or services must have the following qualities:

- Well defined, clearly specified or widely understood
- Relatively standardized i.e. commodities or near commodities
- Perishable such as food.
- Time-sensitive such as airline seats.
- Depreciating value such as computer components.
- Scarce such as limited resources. An example will be art auctions.

3.2 Unsuitable Products for Marketplaces:

Products with following characteristics are not suitable for e-marketplaces:

- Specialized products that require relationship-specific investments between buyers and suppliers in order to bring the product to market successfully. A complex electronic component that is specifically designed in conjunction with a key supplier to meet strict performance and quality requirements is one example.
- Small markets without sufficient breadth and volume of market demand.
- Markets where the price of a commodity is well understood.
- Monopoly situations where buyers negotiate directly with the supplier.
3.3 An E-Marketplace will have one of the Enabling Factors:

- Uncertainty about the price exists due to imperfect information about the marketplace. This imperfect information may be due to the newness of the product, unclear levels of supply and/or demand, or a fragmented market.

- Sufficient competition exists among bidders.

- A buyer or seller exists with sufficient market clout to make and stimulate competition.

- Geographical or physical constraints between buyers and suppliers create a high cost to participate in, or expand, markets through traditional means.

- Value chains exist in which middlemen create pricing or information inefficiencies.

- A significant variance exists between supply and demand, perhaps because of long production lead times after an order is made or large fluctuation in demand.

3.4 Characteristics of Potential E-Marketplace:

It follows from the preceding section, then, that E-marketplaces are most likely to form in markets that are characterized by one or more of the following:

- Fragmented buyers and suppliers.

- Large trading volumes.

- Goods or services with well understood valuation standards.
• High search and transaction costs associated with traditional trading mechanisms.

• Multiple stages of negotiation.

• Markets that require frequent spot purchases.

4. The Benefits:
The benefits of an e-marketplace for both buyers and sellers can be considerable, depending upon the transaction mechanisms and services offered by the marketplace and the industry it serves.

4.1 Buyers’ Benefits:
Buyers, can enjoy significant reductions in the costs of order processing with integrated processes due to fewer errors and less manual reworks. E-marketplaces provide greater transparency for both the purchasing process and product availability compared to traditional channels. Transparency means that decisions can be made more securely and with a better consideration for the ultimate target. Finally, transparency also means that purchasing power increases because of the aggregation of all purchases through the marketplace. That is, the decision power shifts from the sellers to the buyers.

4.2 Sellers’ Benefits:
Sellers also enjoy several benefits. Process integration, for example, also lowers costs for sellers. Furthermore, the increased reach and larger customer base for a marketplace lowers the acquisition costs for new customers. Statistical reports on marketplace activities lead to better information on buyers and enable a faster response to changes in the market. Finally, the marketplaces create a platform for collaboration between buyers and sellers.

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4.3 The Benefits vs. Risks Based on Market Centricity:

Based on who has more power (the lesser the number, the higher the power), marketplaces can be seller-centric or buyer-centric. There are advantages, disadvantages and risks associated with these kinds, as follows\textsuperscript{29}:

\textsuperscript{29} Abstracted from "The Value Proposition of Business-to-Business Dynamics Commerce", Andersen Consulting.
4.3.1 Seller-Centric Marketplaces:

**Benefits to Seller (Company):**
- Enhanced revenues
- Lowered costs and improved efficiency
- Access to a larger and more diverse group of buyers
- Real-time access to market demand information
- Stronger relationship with trading partners
- New channel to dispose of aged, unused, or idle assets

**Benefits to Buyers (Trade Partner):**
- Opportunity to lower price
- Lowered cost and improved efficiency
- Access to a larger and more diverse group of suppliers
- Better information about the market conditions
- Ability to participate in multiple auctions concurrently
- Means to smooth out supply and demand

**Risks to Seller (Company):**
- Yield control over pricing to market mechanisms
- Exposure to new competition
- More complex logistics

**Risks to Buyer (Trade Partner):**
- Pay more than market value
- Credibility of product and / or supplier
- Access to customer service
4.3.2 Buyer-Centric Marketplaces:

**Benefits to Buyer:**

- Opportunity to create or increase competition for buying dollars
- Better information about the marketplace
- Enhance the Request for Quotations process and compress cycle time
- New supply management capability

**Benefits to Seller:**

- Access to new customers
- New and timely information on state of the market
- Automated Request for Quotations process
- New demand management capability

**Risks to Buyer:**

- In the event that sufficient competition does not materialize, the price could be higher than the buyer expected
- Risks of taking on new suppliers
- Potential effects on decision-making and relationships

**Risks to Seller:**

- In the event that sufficient competition exists to ignite a bidding frenzy, the price may fall below that desired by the vendor.
- Risks of taking on new buyers.
- Potential effects on decision-making and relationship.
5. Revenue Models for E-marketplaces:
Revenue from the E-marketplace is generated from commercial activities, content provisions, and supplementary services. Revenue that results from commercial activities usually consists mainly of transaction fees. For example, the operator of the marketplace usually charges a fee, based upon a percentage of the price, for goods traded on a marketplace. Many marketplaces also demand a participation fee from all sellers. Revenue that results from the provision of content include fees for market reports or special advertising rights. E-marketplace operators also usually charge fees for the supplementary services.

6. Success Factors for e-Marketplaces:
In order to succeed, an independent marketplace must offer advantages to both buyers and sellers: it should not favor one side over the other. The operator's neutrality is a precondition in attracting both sides to an e-marketplace. An e-marketplace must also be able to pull in a sufficient number of participants. If too few buyers or sellers participate, the e-marketplace becomes uninteresting. One way to ensure a critical mass of participants is to attract the most important representative companies in an industry, which then creates the market volume critical to success.

To attract large companies to a marketplace while sustaining neutrality, the e-marketplace’s operator can allow important participants to share in the capitalization of the e-marketplace. Another emerging trend is industry-owned e-marketplaces that owned and / or supported by the traditional industry players, such as GM, Ford, DuPont, etc.
7. The Outlook for B2B Marketplaces:

7.1 Mega-Exchanges:

Wise and Morrison examine the future of B2B, and they argue that there is an emerging B2B business model, which is called mega-exchanges\(^{30}\). These mega-exchanges are a result of the consolidation of B2B exchanges. They argue that today's B2B exchanges are not sufficient in liquidity and will move away from being for-profit entities to become collective industry efforts run for the benefit of all. Therefore, they conclude that the future of B2B exchanges will resemble today's financial markets.

7.2 Collaborative Commerce:

With the argument that e-commerce will always move toward greater efficiency and transparency, the analyst at Morgan Stanley Dean Witter (MSDW) argue that the B2B will move toward a collaborative commerce, of which the buyer and seller can tighten their link in reaching higher efficiencies\(^{31}\). Similar to Wise and Morrison, they also support a theory that in doing so, B2B exchanges will follow the model of the financial markets that are already networked and integrated around the globe.

7.3 Future Capabilities:

Marketplaces will offer complex transaction formats such as\(^{32}\):

- Multi-attribute auctions formats with complicated criteria such as price, quantity, time, reliability, quality, value added services, conditions of

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\(^{32}\) Abstracted from "The Value Proposition of Business-to-Business Dynamics Commerce", Andersen Consulting.

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goods, supplier performance history, and delivery time.

- Complex, multi-line Request For Quotations and bid schedules.

- Continuous-matching formats where automated agents, comparable to current computerized stock-trading systems, perform the matching in real time.

- Format that allows a higher level of negotiation between buyers and sellers.

- The marketplaces will face major problem of attracting, retaining a critical mass of buyers and sellers. In future, marketplaces have to create value through content, commerce, services and/or a combination of all.

8. Potential Impacts to Logistics Supply Chain:
The development of B2B e-marketplaces will have a huge impact on B2B supply chains, by addressing inefficiency in flows of information, goods, payments, and other services between businesses. We predict that the impacts will be larger for perishables and time-sensitive goods, such as logistics services.

Moreover, the integration pressure is driving the B2C companies to integrate their supply chains, as well as their demand chains. Since the B2B dynamics are not only influenced by the interactions between business entities but also are also affected by the dynamics of B2C and C2B, it is vital to understand the behavior of the customer’s customer, as well as, the supplier’s supplier in different industries that require transportation and logistics services.

Traditionally, the end customer had limited information and choice of any given product or service. Consequently, the end customer’s influence on the supply
chain was minimal. With the advent of e-commerce, the end customer has gained access to more information and larger selection, thus becoming a powerful member of the supply chain. E-commerce has led changes in business dynamics, which have brought about a shift in both B2B and B2C supply chains. We will discuss the value shift in the next chapter.
Chapter 7

VALUE CHAIN TRANSFORMATION

In this chapter, we will analyze the value chain transformation, the underlying factors that drive the value transformation, and where the value will be in the future. Before we move on, we will revisit some of the important definitions that will be useful to gain a common understanding in the discussion.

1. Definitions Revisited.\textsuperscript{33}

Value Chain:

The value chain is defined as the result of transforming a full supply chain system, through the application of activity-based costing techniques, into a process map that includes all significant costs at each step in the process, so the total costs of delivering the final product or service to satisfied customer can be determined.

Value chains design, produce and deliver products or services to meet a specific set of customer needs. As the spinners of wealth in any economy, value chains first identify and define needs, then design and build solutions. Through a sequence of steps, value chains transform raw materials-atoms in the physical world and bits in the electronic world into finished goods and services. They deliver the goods to points of distribution or directly to end-customers and often provide documentation, service, and support. Value is added each step of the way, from the extraction of raw materials through to customer fulfillment.

\textsuperscript{33} Most of the definitions are adopted from Poirier, Charles C., Michael J. Bauer, E-Supply Chain: Using the Internet to Revolutionize your Business, Berret-Koehler Publisher, Inc. San Francisco, 2000.
Value Network:
A Value network is a consortium of companies linked together to build a superior supply chain network with a focus on specific markets, customers, products, and end customers. The purpose of the constellation is to use collective assets and resources to build a seamless network of supply that will distinguish the network from any competing group.

Supply Chain:
The supply chain is defined as the core business processes, including the inter- and intra-company processes, which allow a company to create and deliver a product or service from concept through development and manufacture or conversion into a market for consumption.

Supply Chain Management:
Supply chain management is defined as the methods, systems, and leadership that continuously improve an organization integrated processes for product and service design, purchasing, inventory management, manufacturing or production, order management, logistics, distribution, and costumer satisfaction. Implementing supply chain management principles involves such techniques as working with suppliers to optimize the cost of supply, introducing flexible manufacturing strategies and systems, and using process redesign to streamline systems throughout the full supply chain network.

Supply Chain Network:
A supply chain network is the linkage of business firms into a concerted effort to apply mutual resources for achieving mutual benefits across the full supply chain system, from primary raw materials through consumption and recycling. Firms might be part of several such networks. Supply-demand linkage is the connection of a demand chain (forecasted buying patterns modified by the flow of incoming orders) with a supply chain (flow of products and services in response to actual

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orders), whereby replenishment is in response to actual pull-through consumption.

Supply Chain Optimization:
Supply chain optimization is the development of the lowest-cost and most effective system of supply chain interactions, trough sharing of best practices between constituents, resulting in virtually no waste across the network and above-industry level of customer satisfaction.

Logistics:
Logistics is the processes involved in transferring goods through the manufacture, storage, and transportation to business customers and end customers. The logistic channel is the network of intermediaries engaged in the transfer, storage, handling, and communications that contribute to the efficient flow of goods to customers.

2. Networked Economy:
The paradigm shift in the economy toward a networked economy, which relies heavily on the information flows over the seamless network, powered by the Internet, will prevail. In the networked economy, as can be seen in the financial industry, the value of information almost equals to the value of goods, services, or even funds. Information of the goods and funds movement becomes highly valuable attribute in today’s logistics and transportation industry.

2.1 Constant Disequilibrium:
The networked economy seeks sustainable disequilibrium. It is just like creating destruction force and genesis altogether. The unstained vitality of a complex network requires that the net keep provoking itself out of balance. If the system settles into harmony and equilibrium, it will eventually stagnate and die.
Innovation is a disruption; constant innovation is perpetual disruption. This seems to be the goal of a well-made network; to sustain a perpetual disequilibrium. Networks are turbulent and uncertain. The networked economy's task is to destroy-company by company, industry by industry and create and transform these companies and industries into more agile, and tightly integrated and linked organizations.

2.2 Inefficiencies:
In network economy, the definition of being productive is different than in the industrial era. In this economy, the task for each worker is not “how to do this job right” but “what is the right job to do?”. In network economy, doing exactly the next thing is far more “productive” than doing the same thing better. In the network economy, productivity is not our bottleneck. Our ability to solve our social and economic problems will be limited primarily by our lack of imagination in seizing opportunities, rather than trying to optimize solutions. In the words of Peter Drucker, “Don’t solve problems, seek opportunities”. When you are solving problems, you are investing in your weaknesses; when you are seeking opportunities, you are banking on the network. The positive news about the network economy is that it plays right into human strengths. Repetition, sequels, copies, and automation all tend toward the free, while the innovative, original, and imaginative all soar in value.\(^\text{34}\)

2.3 Inverse Pricing:
In the industrial age, slight improvements in quality resulted in slight increases in price. In the information age, this equation is flipped. In the information age, all items that can be copied, both tangible and intangible, adhere to the law of inverted pricing and become cheaper as they improve. While it is true that

\(^{34}\) Abstracted from Kelly, Kevin, “New Rules for the New Economy”, Wired 5.09, September 1997
automobiles will never be free, the cost per mile will dip toward free. It is the
function per dollar that continues to drop. For the consumer it is heaven. For
those hoping to make money, this will be cruel world. Prices will eventually settle
down near zero, but quality is completely open-ended at the top. In the network
economy, for businesses to get back their investments, they need to invent items
faster than they become commodities. This is easier to do in a network-based
economy because the criss-crossing of ideas, the hyperlinking of relationships, the
agility of alliances, and the nimble quickness of creating new nodes all support the
constant generation of new goods and services where none were before. In the
network economy, the best is anticipated to be cheap.

2.4 Network Value Law:
Furthermore, new network value law highlights the importance of the Internet as
the key enabler to the evolution of B2B e-commerce and exchanges. Kevin Kelly
proposes a new measure of the value of the network, that is, the value of an
Internet network increases much faster than Metcalfe’s formula, $N^*(N-1)$, which
is based on the telephone or fax network with person-to-person connections. He
argues that on the Internet network groups of people make simultaneous
connections with a resulting value of the network of $N^n$ (N to the power of N)$^{35}$.

2.5 Exponentially Increasing Value:
According to this, since the sum of a network increases as the square of the
number of members, as the number of nodes in a network increases
arithmetically, the value of the network increases exponentially. Adding a few
more members can dramatically increase the value for all members. The
archetypical illustration of a success explosion in a network economy is the
Internet itself.

$^{35}$ Kelly, Kevin, “New Rules for the New Economy”, Wired 5.09, September 1997

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2.6 Increasing Returns on Investment:
In the networked economy, increasing returns are created and shared by the entire network. Many agents, users, and competitors together create the network's value. Although the gains of increasing returns may be reaped unequally by one organization over another, the value of the gains resides in the greater of relationships. In the network economy, there is no future for hermetically sealed closed systems. The more dimensions accessible to member input and creation, the more increasing returns can animate the network, the more the system will feed on itself and prosper.

2.7 Return on Investment Metrics:
In the e-environment, we will need to find new methods, tools and techniques to measure true return on our investments. Traditional financial models will not be sufficient to measure and capture e-created value. Further, in the e-environment, value will be created and realized through direct, as well as, indirect components of the networked value chain.

2.8 Lily Blossom: the Tipping Point:
Every industry, business and network has a tipping point, after which success feeds upon itself. However, the low fixed costs, insignificant marginal costs, and rapid distribution that we find in the network economy depress tipping points below the levels of industrial times; it is as if the new bugs are more contagious-and more potent. Smaller initial pools can lead to runaway dominance.

Lower tipping points, in turn, mean that the threshold of significance—the period before the tipping point during which a movement, growth, or innovation must be taken seriously—is also dramatically lower than it was during the industrial age. Detecting events while they are beneath this threshold is essential. In the past, an innovation's momentum indicated significance. Now, in the network environment, significance precedes momentum.
Biologists tell a parable of the lily leaf, which doubles in size every day. The day before it completely covers the pond, the water is only half covered, and the day before that, only a quarter covered, and the day before that, only a measly eighth. So, while the lily grows imperceptibly all summer long, only in the last week of the cycle would most bystanders notice its “sudden” appearance. But by then, it is far past the tipping point. The networked economy is a lily pond. In the network economy, significance precedes momentum.

The network economy is not the end of history, as we understand that the only constant in this world is change. Given the rate of change, this economic arrangement may not endure more than a generation or two. Once networks have saturated every space in our lives, an entirely new set of rules will take hold.

In short, the Internet proliferation has a huge impact on the B2B supply chains, by addressing inefficiency in flows of information, goods, payments, and other services between businesses. We predict that the impacts will be bigger for perishables and time-sensitive goods, such as logistics services.

2.9 E-customer Characteristics:
E-business is changing the industrial age models of customer acquisition, procurement, pricing and customer satisfaction, as well as, how we measure the performance of a corporation (business). The Internet enables customers to buy products anytime, anywhere cheaply and quickly and also enables the customers to compare competitive offerings and prices, review data, and order in the real time. The Internet embeds real time and transparency characteristics in the e-commerce that is itself a merger of content and commerce. 36


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Traditionally, the end customer had limited information and choice of any given product or service. Consequently, the end customer’s influence on the supply chain was minimal. With the advent of e-commerce, the end customer has gained access to more information and larger selection, thus becoming a powerful member of the supply chain. E-commerce has led changes in business dynamics, which have brought about a shift in both B2B and B2C supply chains.

Further, E-commerce is having an enormous impact on the logistics function in most companies as the distance between suppliers, manufactures, distributors, and consumers continues to shrink. It is causing organizations to reduce their market assumptions, value propositions, and value delivery systems. It is causing organizations to redefine their markets assumptions, value propositions, and value delivery systems. It is also forcing firms to take on new value chain roles and responsibilities.37

As for the logistics function, Brynjofsson, and Kahin argue that market demands - less cost, more services, more speed - directly impact the logistics function, for it is logistics that is directly challenged by, and responsible for, all these market place forces.38 Because of the Internet, cost pressures are escalating as marginal protection and financial performance dominate management thinking. Customers are becoming more discriminating, demanding more service from suppliers establishing higher standards of performance, and creating preferred relationships with suppliers that can meet their higher expectations. Suppliers are striving to achieve differentiation through delivery techniques, information and communication capabilities, and policies and procedures that are often tailored to

the unique needs of individual customers. Speed is now becoming a critical
dimension of competition - speed in getting new products to market, speed in
moving merchandise that is in great demand, speed in responding to customer
emergencies and unique requests, and speed in making timely communications.

3. Value Chain Transformation:
The following paragraphs capture the value transformation in more detail.

3.1 Value Chain Framework:
The value chain framework, developed by Michael Porter\(^3\) is a useful device to
visually represent the components of value associated with activities used to
produce a good or service and the relative importance of each. Understanding the
value chain will help a company in developing its business strategy, especially for
the major sources allocation strategy, in search of the best value proposition to its
customer. In addition to this, value chain framework can be used to examine the
boundaries of organization.

Furthermore, Porters suggest that to understand value chains, we should view
them as a series of linked value-creating activities\(^4\). Linkages refer to the flow of
goods and information between activities both inside and outside firm. Performance of value chain depends on each value activity effects on other value
activities.

3.2 Traditional Supply Chain:
The traditional-basic supply chain and logistic network is product driven. The
supply chain manufactures products and pushes them trough distribution

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\(^3\) For more detail on value chain framework, please refer to: Porter, Michael E., Competitive Advantage, New York, 1985.

channels in the hope that someone will buy them. It is tactical, and its primary mission is cost efficiency with acceptable service. It is designed to meet the customer demand with a fixed product line, relatively undifferentiated, one-size-fits-all types of products. The relationship between entities is conventional supplier-purchasing agent relationships. The material flows slowly and sequentially down the supply chain. Information moves hardly back up the chain. The mismatch between supply and demand is common in the traditional supply chain, and creates what is known as the Bullwhip Effect, of which a small volatility at one end of the supply chain can trigger a tidal wave at the other. This phenomenon leads us to the first law of supply chain dynamics: business cycle volatility is amplified as one goes up the chain, from the customer end to the technology suppliers.\(^{41}\) This problem is known for a longtime, and the industry have been using several techniques, such as Just in Time (JIT) concept, to overcome this issue.

3.3 Supply Chain Transformation:
In Clockspeed, Fine argues that the phenomenon of the supply chain dynamics not only creates the supply chain volatility amplification, but also what he calls clockspeed amplification. In the nutshell, clockspeed defines the lifecycle or evolution rate of an industry that is determined by its product clockspeed, process clockspeed, and organization clockspeed. The clockspeed increases, sometimes dramatically, as we move closer to the final customer, and what oscillates are the product, process, and supply life cycles\(^{42}\).

The message from the increase in volatility and clockspeed in today's hyper-competitive business ecosystem is that the each tier adds amplification, and more tiers mean more amplification-in both volatility and clockspeed. Therefore, in


\(^{42}\) Fine, 1998, 97-99

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order to survive and thrive the competitions, a new design of the supply chain is required. In short, the old, traditional supply chain is no longer viable to maintain competitive edge. The industrial-age companies that are not transforming themselves to the new competitive environment and remain using the old-style supply chain will be diminishing. A new breed of competitors, with a deep understanding about the new environment dynamics, will help the old-style companies to reach their extinction.

3.4 Channel Shift:
The Internet embeds real time and transparency characteristics in e-commerce. In the future, the type of business will not matter too much. Supply chain channels will be changed. Suppliers will need to ship finished goods directly to direct and/or indirect customers. The main driver of this change is that the Internet has empowered the consumer with access to information and various options, thus shifting the power of selection of the goods and services to the consumer. This situation transforms the consumer from the weakest member to the most powerful member of the supply chain. Hence, the dynamics of supply chain has changed from supply-push to the demand-pull.

This channel shift, driven by the Internet, appears along two dimensions: medium and direction.

3.4.1 Medium: From Traditional Channel to Web Channel:
The medium shifts can be divided into two categories:

- As for business-to-consumer (B2C), from the traditional retail outlets such as shopping mall, supercenters, factory outlet mall, mail order catalog shopping into web channel enabled by the Internet.
• As for business-to-business (B2B), from the traditional electronic-data-interchange (EDI) platform or similar toward B2B channel via the Internet.

3.4.2 Direction: Reversing the Value Chain:
The Internet proliferation turns the supply chain (push-based) into a demand chain (pull-based). The customer, the former weakest node in the traditional supply chain, now assumes the control of the supply chain. The whole business model is now reversing, so that the chain is driven by demand. Cisco and Dell are the examples of this model. Their fast response to actual demand requires a new hyper-efficient and effective supply chain (demand chain) network, as we mentioned previously.

3.5 Elimination of Chain Components and Emergence of New Intermediaries:
Another effect of the channel shift is the elimination of chain components and the emergence of new intermediaries. This effect is a result of disaggregation and reaggregation of the chain by the Internet.

The Internet embeds real time and transparency characteristics in the e-commerce that is itself a merger of content and commerce. In future, the type of business will not matter too much. Supply chain channels will be changed. Suppliers will need to ship finished goods directly to direct and / or indirect customers. Just like Cisco, partially fabricated or manufactured goods will be held and manufactured in transit and will be shipped directly to end customers. This will eliminate the necessity for Cisco to have warehouses, internal material handling equipments and staff, reduce shipping time and eliminate inefficiencies and useless repetitions from the supply chain. E-commerce supply chain will be integrated and will require seamless partnership among each part of the supply chain. Further, it will free capital for other core businesses and processes and will enhance return on
investment and will create extra options for the utilization of this saved capital. At the other end, new intermediaries and service providers will evolve.

In order to have a better understanding about the value chain transformation, before we move onto value network, in the following sections we will review the paradigm shift affected by the Internet on companies.

4. Paradigm Shift:
As we mentioned previously, the Internet is the fundamental driver of the current transformation. As a conduit for information, networks can be in any forms. As a result of its very successful worldwide proliferation, the Internet has become the only ubiquitous network available today that is capable to carry any kinds of traffic: voice, data and video. The Internet tsunami is inevitable, and its impact is irresistible. In the following, we will discuss the paradigm shift that is caused by the Internet and its underlying factors.

4.1 Business Paradigm Shift:
In Digital Capital, Tapscott, Ticoll and Lowy, reveal their findings about how the Internet will revolutionize businesses and companies. In their studies of the effects of the Internet on companies, they found that the Internet has displaced the primary unit of business, the corporation, and the primary business activity, production, of the industrial age. In the information age, the primary business unit is what they call the business web or b-web, in which groups of firms come together over the Internet; and the primary business activity is the fulfillment, in which firms seek not merely to provide their customer with products but to build enduring relationships with them.

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4 In this discussion, we mainly using an approach that offered by Don Tapscott, David Ticoll and Alex Lowy in: Tapscott, Don, David Ticoll and Alex Lowy, Digital Capital: Harnessing the Power of Business Webs, Harvard Business School Press, MA, 2000

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4.1.1 Coase's Law:

To have a better understanding about the paradigm shift, a look back to the nature of firm is necessary. In their work, Tapscott, et al. refers to what they call the Coase's Law.

In 1937 paper, not long after his visit to Ford and General Motors, Nobel laureate Ronald Coase concluded that firms were a lot like centrally planned economics with voluntary associations. Further, he asked question such as: why would people choose to gather in such vast entities, and why would capitalists choose to organize that way. Coase argued that friction in the marketplace, or what he calls the cost of the price mechanism – the transaction costs, is the underlying factor. Coase identified that the transaction costs consist of:

- Search costs. The costs of finding the needs that consumes time, resources, and out-of-pocket costs; including the costs of determining suppliers.

- Contracting costs. The costs of contracting a sizeable work, including lawyer's fees and time spent in negotiations.

- Coordination costs. The costs of coordinating resources and processes. This cost decreased dramatically by advancements in telecommunications and information technology.

Fundamentally, the Coase's law says that a firm will tend to expand until the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction on the open market. Accordingly, Coase's Law provided the explanation of the establishment of the Industrial age giants such as

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Ford and General Motors. At that time, the search costs, contracting costs, and coordinating costs was the argument of bringing activities inside the organization, since it was more costly for a company to do otherwise. Since then, the Coase’s Law served as the basis for the theory of the firm.

4.1.2 The Internet Impact on Coase’s Law:
The next question is on how the Internet affected Coase’s Law. From their research, Tapscott, et al concluded that the Coase’s Law remains valid. A firm should still expand until the cost of organizing a transaction internally exceeds the cost of organizing it externally. Nonetheless, the companies’ business practices are changing, since the Internet is driving down the transaction costs. Today, the outsourcing game is common practice. Companies are forming alliances, integrating processes, spawning virtual corporations and creating a new kind of value network in which companies get together in order to be able to compete with the other groups.

Take Ford for example. During the industrial age, when transaction costs were relatively high, Ford built almost everything on its own, from tires to engines. Today, the situation has changed. That is, Ford would not build anything on its own, unless it is cheaper and more valuable to do so. Instead, it will outsource the manufacturing jobs to its suppliers and partners. In doing so, Ford built a vast B2B network that integrates the whole process.

4.2 New Business Ecosystem:
The dynamics of the changes in business environment is described by James Moore’s business ecosystem. According to Moore, “The business ecosystem is an economic community supported by a foundation of interacting organization and individuals—the organisms of the business world.” Further, this ecosystem

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includes customers, suppliers, lead producers, competitors, and other stakeholders, that co-evolve their capabilities and roles, and tend to align themselves with the direction set by one or more central companies.

In the same context, Poirier argues that future success no longer belongs to a single firm, no matter how massive or on what scale of global operations it functions. In fact, the future belongs to the networks of supply, of which those large firms are just one constituent. E-supply chain will be the approach that binds the constituents together and connects the value chain constellation to the designated end consumers.

4.2.1 Devolution:
The ultra-connected nature of the network economy behaves like an ecological system. The fate of individual organizations is not dependent entirely on their own merits, but also on the fate of their neighbors, their allies, their competitors, and of course, on that of the immediate environment.

The rich interactive, and highly elastic nature of network economy resembles a biome seething with action. Some biomes in nature are shy of opportunities for life and other biomes are chock full of opportunities and those possibilities are in constant flux, appearing and retreating in biological time. Just like biome, new niches pop up constantly and go away as fast. Competitors sprout beneath you and then gobble your spot up. One day you are king of the mountain and the next day there is no mountain at all.

All organizations, profit and nonprofit, face two problems as they attempt to find their peak of optimal fit. Both are amplified by a network economy in which turbulence is the norm. First, unlike the industrial arc’s relatively simple

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environment, where it was fairly clear what an optimal product looked like and where on the slow-moving horizon a company place itself, it is increasingly difficult in the network economy to discern what hills are highest and what summits are false. Big and small companies alike can relate to this problem. An organization can cheer itself silly on its way to becoming the world’s expert on a dead-end technology. In biology’s it gets stuck on a local peak. The harsh news is that getting stuck is a certainty in the new economy. Sooner, rather than later, a product will be eclipsed at its prime. While one product is at its peak, another will move the mountain by changing the rules. There is only one way out. The business must devolve. In order to go from one high peak to another, it must go downhill first and cross a valley before climbing uphill again. It must reverse itself and become less adapted, less fit and less optimal.

This brings us to the second problem. Businesses find devoiling unthinkable and impossible. There is simply no room in the enterprise for the concept of letting go-let alone the skill to let go-of something that is working and trudge downhill towards chaos. And it will be chaotic and dangerous down below. The definition of lower adaptivity is that your are closer to extinction. Finding the next peak is suddenly the nest life-or-death assignment. But there is no alternative to leaving behind perfectly good products, expensively developed technology, and wonderful brands and heading down to trouble in order to ascend again in hope. In the future, this forced march will become routine.

4.2.2 Business Differentiators:

In the e-business era, the speed, accuracy, real time delivery of the product / services, and fulfillment of the order in a satisfactory manner are the basis for competition. The performance-measuring ruler will always slide upward.
E-business is changing the industrial age models of customer acquisition, procurement, pricing and customer satisfaction, as well as, how we measure the performance of a corporation (business).

In addition, in our research we found that the phenomenon, where the Internet displaces the nature of independent firms toward interdependent firms that highly integrated, is a common theme in the recent business and strategy studies. Unanimously, from different perspectives, the stress on the creation of value networks is shared among researchers and business writers. We also examined this phenomenon in the previous chapter, The B2B E-Marketplaces. We hereby, concluded that in order to survive, not to mention to thrive, the current competition, company must transform and adapt to the new environment, where the old paradigm, old business model are no longer viable, that is, to evolve toward value network constellation.

5. From Value Chain to Value Network:
5.1 Value Puzzle:
Where exactly does the value lie? How should firms position themselves to create capture value in today’s networked economy? The following paragraphs will attempt to address these questions. Sawhney and Parikh argue that in a networked world, where everyone and everything is connected, economic value behaves very differently than it does in the traditional, bounded world. Their argument is based on intelligence migration theory, according to which both the location and the mobility of network intelligence have changed dramatically.

- **Network Intelligence Location:** With regards to location, back-end intelligence becomes embedded in a shared infrastructure at the

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network's core, while front-end intelligence fragments into many different forms at the network's periphery, where the users are.

- **Network Intelligence Mobility**: For mobility perspective, large units of intelligence that were once disconnected become small units of free-floating-high-mobility intelligence that coalesce into temporary bundles whenever and wherever necessary to solve problem.

With this proposition, they describe the value trends in the network age, as follows:

- **Value at the Ends**: Most economic value will be created at the ends of networks. At the core – the most distant from users – generic, scale intensive function will consolidate. At the periphery – the end closest to users – highly customized connection with customers will be made. This trend pertains not only to technological networks like the internet but to networks of companies engaged in share tasks and even to the human networks exist within companies.

- **Value in Common Infrastructure**: Elements of infrastructure that were once distributed among different machines, organizational units, and companies will be brought together and operated as utilities. Shared infrastructure will take the form not only of basic computing and data-storage functions but also of common business functions, such as order processing, warehousing, and distribution, and even manufacturing and customer service.

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• **Value in modularity:** Devices, software, organizational capabilities, and business processes will increasingly be restructured as well defined, self-contained modules that can be quickly and seamlessly connected with other modules. Value will lie in creating modules that can be plugged into as many different value chains as possible. Companies and individuals will want to distribute their capabilities as broadly as possible rather than protect them as proprietary assets.

• **Value in orchestration:** As modularization takes hold, the ability to coordinate among the modules will become the most valuable business skill. Much of the competition in the business world will center on gaining and maintaining the orchestration role for a value chain or an industry.

Their proposition contain a very important message, that is, the value in the networked economy lies in the network itself. Therefore, the company should review its position and strategy to create and capture value in the network age.

**5.2 New Business Model:**
While value networks might be established in many ways, Tapscott, et al. propose an approach to differentiate between the basic types of value networks’ business model (business-web) along control dimension and value integration dimension⁵⁰.

• **Economic control:** Control is about economics. Some business models are hierarchical; they have a leader who controls the content of the value proposition, the pricing, and the flow of transactions. For example, Amazon.com function hierarchically, taking responsibility for product selection, pricing and customer satisfaction. Other business models are self-organize; the market and its dynamics define the value and price of

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goods and services. For example, e-marketplaces function like stock exchange, where trading participants can obtain market value of a commodity that is set by the market dynamics.

- **Value Integration**: Value defined as the benefit that a user gains from a good or service. Some business model focus on high value integration; facilitating the production of specific products or service offerings by integrating value contributions from multiple sources. For instance, IBM that achieves high value integration by taking contributions from many suppliers and turning them into a computer. On the other hand, some are focus on low value integration (selection); that is, providing a basket of choices rather than a single integrated solution. For example, Ingram Micro, a leading wholesaler of computer hardware and software, does not alter the product offering. It focuses on distributing high tech product, not making them.

Along these dimensions, the value networks’ business model can be defined as follows\(^5^1\):

- **Agora**: This refers to an open marketplace, like the agora of ancient Greece. An Agora facilitates exchange between buyers and sellers, who jointly discovers a price through on-the-spot negotiations. Example: E-Bay auction market.

- **Aggregation**: This refers to one company that positioning itself as a value-adding intermediary between producers and consumers. An Aggregation offers a variety of products and services, with zero to limited value integration. Amazon.com represents the company in this category.

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\(^{51}\) Tapscott, et al, 30-36.
• **Value Chain:** In a Value Chain, the context provider structures and directs a b-web network to produce a highly integrated value proposition. Cisco System is the best example of this category.

• **Alliance:** In an Alliance, the network strives for high value integration without hierarchical control. Its participants design goods or services, create knowledge, or simply produce dynamic, shared experience. The driver behind this is network effects, of which network externalities\(^{52}\) and positive feedback play a key role.

• **Distributive Network:** Distributive Network acts as the infrastructure for the other business model. It is a network for moving goods and service among the participants of the b-web. In addition to the roads, postal services, telephone companies, and electrical power grids of the industrial economy, Distributive Networks include data network operators, the new logistics companies and banks.

Companies compete to be the conductor of a value orchestration—because it is the place where the most value is. Cisco and Dell are good example of this.

**5.3 Value Aggregation:**

In network economy, to get value you have to be the part of the most efficient and profitable network. In today’s economy, “inside” now is whether you are on the network or off. Individual allegiance is going away from organization and toward networks and network platforms.

A network is like a country. In both, the surest route to raising one’s own prosperity is raising the system’s prosperity. The one clear effect of the industrial

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\(^{52}\) This is also known as Metcalfe’s law: the value of the network increase as the square of the number of users.
age is that the prosperity individuals achieve is more closely related to their nation’s prosperity than to their own efforts. The net is a like a country, but with three important differences:

- No geographical or temporal boundaries exist. Relations flow 24 by 7 by 365.

- Relations in the network economy are more tightly coupled, more intense, more persistent, and more intimate in many ways than those in country.

- Multiple overlapping networks exist, with multiple overlapping allegiances.

In every network, rule is same. To maximize prosperity, feed the web first.

5.4 Value Drivers:

From practical perspectives, according to Earle and Keen, there are six main imperatives for future value and profit in the network age:

- **Relationships**: Only the long-lasting relationships could maximize the value for company. Internet reduces the customers’ switching cost and add more choices for them. Therefore, companies should be able to create personalization and customization, provide innovative pricing, and therefore could establish a dynamic relationship that could bring repeat business. Focus on the essence of customer value. In the end, it is customer that driving the business direction.

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• **Logistics:** Payoff from logistics is very high. It is about minimize the costs and maximize profits, by establishing better inventory management, streamlining, integrating supply chain and logistics.

• **Channels:** It is about providing choices to customer to maintain relationships. Be it person-to-person, customer-to-call-center, or web channel, company need to harmonize the channels on behalf of the customers.

• **Brand Power:** Brand equity becomes more relevant in today’s marketplaces. The Internet is redefining the brand idea. Recognized brand delivers trust and preference.\(^{54}\)

• **Intermediaries:** The Internet is not eliminating intermediaries, it creates new breeds of intermediaries. For instance, Yahoo as a portal and trusted third party advisers.

• **Financial Dynamics:** It is about realizing the opportunity into cash flow, slashing working capital, generating high sales on low invested capital. It is about establishing appropriate capital structure for sustainable growth in a company.

### 5.5 The Emerging Value Network:

From the information we gathered during our research, as mentioned previously, perhaps it is safe to say that the company boundary, as we know it, is blurring. Take Cisco System for example.\(^{55}\) Cisco is the worldwide leader in networking

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\(^{54}\) Brand equity is real and sometime has very significant proportion in percentage of market capitalization of a company. For example, in July 2000 Microsoft had brand value of $70.2 billions (56.7% of market capitalization) – Financial Times, July 17, 2000. For more information please refer to [www.interbrand.com](http://www.interbrand.com).

products that powering the Internet. When an order came to Cisco's website (80% of orders are configured and submitted via Cisco's website), the order then automatically transmitted to its suppliers or scheduled in the Cisco production system. Depending on its complexity and specification, the order then goes to the Cisco's contract manufacturer that build and ship about 60% (40 to 45% of sales) of units direct to customers. The contract manufacturer will build, assembly, test the order by itself using Cisco's set of standard procedures, and finally send the order directly to the customer. Alternatively, it goes to Cisco production line that configures only highly complex orders.

In this example, we observed that Cisco rely on the intelligent it put on the network it operates to do the complex processes of orchestrating the value network. From this short illustration, we can observe the shift toward what we called Value Network. Understand its limitation to cope with the demand explosion on its product, Cisco decided to establish a highly integrated value network, and become one of the first of its kind that obtain a huge success in value orchestrating.

In addition, we also observed that there is orientation shift from production to fulfillment. In Cisco case, the company is committed to fulfill the customer need, not necessarily produce by itself. In doing this, Cisco moves beyond the outsourcing. Using the power of the Internet, Cisco collaborates with its partners, from manufactures to sales channels worldwide, in delivering value to its customer. The illustration is given in the Figure 7.1. below.
5.6 E-Business Platform:

In order to be able to ensure a competitive edge sustainability on the new battleground between integrated enterprises, the value networks establish an extended value chain and interactive relationships with its value chain partners. To accomplish this objective, the parties involved should implement compatible e-business platforms that able to be seamlessly integrated. The generic, integrated e-business application architecture is discussed in the Technology Chapter. Furthermore, as we discussed in the Enablers and Barriers Chapter, the

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56 Adapted from, Value Nets: Breaking the Supply Chain to Unlock the Hidden Profits, John Wiley & Sons, Inc., 2000, p. 3-4, 209.
implementation of e-business platform is not solely applications and technology changes, but more deeply, it is about transformations in management policies, business processes and arrangements (including financial arrangements), performance metrics, organizational structures and culture of the partners.

6. The Logistics Role in the Value Chain:
By definition, logistics is the processes involved in transferring goods through manufacture, storage, and transportation to business customers and end customers. In day-to-day operations, companies use the logistic channel, the network of intermediaries engaged in the transfer, storage, handling, and communications that contribute to the efficient flow of goods to customers. The logistics role in the value chain is listed below:

6.1 Increase Profitability:
Companies aware that the payoff from highly efficient logistics system will be very high, since the savings go straight to the bottom line. In addition to this, with regard to the transaction costs, many companies also understand that outsourcing is the best option. This awareness led to establishment of the third-party logistic provider (3PL), that is, a firm that supplies logistics services (particularly transportation and warehousing) to other companies. The logistics impact in increasing the profitability is dependence upon the success of channel optimization.

6.2 Channel Optimization:
Achieving network optimization across a full logistics system requires each constituent in the supply chain to demonstrate best practices in its area of linkage. To help in that endeavor, the channel partners have to work together and share resources to find the means to develop a total system of interaction that is seamless, flawless, and electronically enabled. That requires beginning at the

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upstream side of the network and working across each link toward the downstream side, scrutinizing each logistics factor along the way.

One very important factor that affects the optimization is the e-marketplaces for logistics and transportation industry. The e-marketplace offers shippers, carriers, and logistics providers the ability to buy and sell transportation through the exchange, plan their cargo requirements, and execute the delivery of shipments. The e-marketplace serves as a one-stop logistics provider, and provide following benefits to logistics providers: improved information flows that optimize the channel utilization, so the transportation’s company can offer their unused capacity to maximize their capital, equipment and process; better customer service because of real-time visibility of shipment events; reduction in payment cycle time because of an electronic funds transfer capability; and in the end, decreased the overall costs at minimum.

6.3 Information Business:
Knowledge about a cargo’s origin, whereabouts, destination, estimated time of arrival, price and cost of shipment is as important as its safe delivery. Further most of transportation carriers have state of art communication and information systems. They can use their system extra capacity or off peak capacity to generate extra revenue by providing extra services such as marketing suppliers products, hosting their servers, and managing and maintaining information flow for suppliers. In future, these services may be extended for financial purpose. Above all services are additional to the core transportation business "moving and delivering packages and parcels". It does not matter what happens to value chain, there will still be need for transportation service core business.

6.4 Increase Total Visibility and Traceability:
The logistics value network is fully connected, integrated, and transparent and has capabilities for complete visibility and traceability. Each component such as rail

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car, truck, airplane, and shipment in transit can be pinpointed in real time and anywhere in the world. It enhances delivery time and services, order fulfillment rate, lower incidental insurance cost, and equipment and transportation utilization, and reduce safety stock and inventory level. Moreover, the network also enables end user and partners to get updates about goods and of transportation equipment in transit, get maintenance services in real time, informed about possible delay and schedule changes, and manage transportation fleet effectively. Last but not least, it allows users to monitor the readiness of partially finished goods and finished goods and enables customers to divert shipments based on markets needs and arrange for returns and damage goods.

6.5 Become the Service Interface:

Internet enables single interface service. Logistics and transportation companies are in excellent position to take advantage of their fully integrated information network. They can provide service in all parts of the transaction between customers and suppliers. For instance, a customer placed an order on line. This customer order is simultaneously transmitted to the transportation carriers. Accordingly, the carriers prepare all the necessary documentation for the transaction such as labels for the delivery, picks the orders, and at the same time, inventory is automatically dedicated from the supplier stock.

This single interface end-to-end service is beneficial for both supplier and customer. This service eliminates repetitive tasks and takes “commerce interruptus” 57 out of the system and as a result customer gets superior service with less cost. This also reduces lead-time for service and lower level task from supplier dock. Most importantly, the supplier saves million of dollars in capital investment.

6.6 Center of Value Network:
E-commerce initiation causes immediate partners and partners from other channels to fear that they will lose business. This also creates fear in internal partners such as the sales force and marketing staff of losing business. In some instances, it does eliminate some channels from the value chain as described previously. E-business changes everything about the dynamics of a company and its power structure and creates a new channel for doing business. This allows companies to evaluate their value creation for their customers and causes disintermediation of their channels. E-commerce also forces companies to adopt hybrid business models of existing and digital channels.

As a transporter of information and goods, logistics and transportation companies will be benefited by this situation. Having a deep knowledge about each partner, customer, and channel dynamics, the situation provides opportunity for the logistics and transportation companies to be the value orchestrator of value networks.

7. Logistics Trends toward the Future:
Based on our understanding the changes in the business environment of the logistics and transportation industry, we foresee two main trends that move to different directions:

- **Commoditization:** As for commoditization trend, the true transportation commodity exchanges are established, as derivative of the e-marketplace development. The logistics industry, consists of asset-based, network operating companies, will emulate the type of commodity exchanges that similar to the electricity and natural gas industry. However, before this trend proliferates, the regulatory issues concerning this type of commodity should be resolved.
• **Customization:** As for customization trend, a logistics and transportation company will become a strategic partner, as a result of the value chain integration. In this role, the company will need a set of capabilities that different from the current ones, such as: business process review and re-design, technology and process integration, process transformation and strategy consulting, as well as financing expertise and capability. Customization plays an important role.

In our view, both trends will emerge and proliferate. It should be noted that a company is possible to thrive on both trends. Nonetheless, it is the company level of readiness to surf the trends that will determine its level of success.

8. **Summary and Conclusion:**

• Channel shift from traditional channels to cyber channel will lead to a larger number of packages, in terms of its destinations (selling channels from e-tailers toward end customers) or origin (return channels from the end customer to e-tailers). Smaller size of packages (from bulk TL or LTL to the physical stores become small parcel from e-tailers) resulting larger number of packages to be sent.

• Consequently, traffic becomes harder and harder to predict. Unless the logistics and transportation company has a solid back-end process and agile front-end interface, supported by the fully integrated e-business application that can propagate the information end-to-end in the chain, the delivery companies will not be able to handle the parcel traffic efficiently with existing infrastructure. Reversing flow from supply push to demand-pull drives the companies to have different business processes.
• As value network emerges, strategic logistics outsourcing becomes the norm. However, the delivery companies will be less visible. Because of the rapidly changing environment, they should have very agile interface and solid back-end supports to be able to handle the complex integration in a most efficient and effective way.

• The complex structure of alliances and partnerships in the very competitive environment creates a unique situation when enemies can be allies in different scenes. This complex relationships should be managed very carefully.

• In the networked economy, the value is in the network. This means that if a company would like to capture the most value, they should become the conductor of a value orchestration. In networked economy, the web has to be fed first to maximize prosperity. The logistics and transportation companies will play a key role in the value orchestration.

• Two “C” trends will emerge: commoditization and customization of the logistics and transportation industry.
CONCLUSION

- Technology, investment size, organization and people, privacy and security, change in business ecosystems, competition, integration, regulations, and globalization are among the main categories of the enablers and the barriers for dynamic channel shift. Each of these enablers and barriers category is composed of different enablers and barriers.

- These enablers and barriers of the dynamic channel shift are dynamic in nature, change overtime, offer different opportunities and threats, and have different impacts at different companies and industries.

- Furthermore, these enablers and barriers are interchangeable and under different set of conditions, enablers can transform into barriers, and barriers can transform into enablers.

- These enablers and barriers are the driving force for the value chain transformation. These enablers and barriers transform value chain to value network that is integrated, optimized and customized.

- The Internet and IT proliferation enables the customers to access, process, store and use the information and shift power from other components of the value chain to the end customer, and transfer value chain from a push chain to a pull chain.
• For success, companies should consider the dynamics of the system as a whole and understand that each of these enablers and barriers is an integrated element of this very complex system.
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