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THE APPLICATION OF ADVANCED INFORMATION AND COMMUNICATIONS TECHNOLOGIES IN THE TRANSPORT SECTOR IN THE ESCWA REGION

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Preface

The present study constitutes an output of the work programme of the ESCWA secretariat for the biennium 2000-2001. The study focuses on the application of advanced information and communications technologies in the transport sector in the ESCWA region.

The study was carried out under the general direction of the Chief of the ESCWA Sectoral Issues and Policy Division, and under the direct supervision of the Chief of the ESCWA Transport Section. The main contributors to the study were two ESCWA staff members in the Transport Section.

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ABBREVIATIONS

ACIS	Advanced Cargo Information System
ADSL	Asymmetric Digital Subscriber Line
ASCYUDA	Automated System for Customs Data
ATM	automatic teller machine
BOT	build, operate, transfer
B2B	business-to-business
B2C	business-to-consumer
B2G	business-to-government
CICOS	Computer Integrated Conventional Operations System
CIMOS	Computer Integrated Marine Operation System
CITOS	Computer Integrated Operations System
C.O.D.	collect on delivery
CPFR	collaborative planning, forecasting and replenishment
CRM	customer relations management
CRS	computer reservation system
C2B	consumer-to-business
C2C	consumer-to-consumer
C2G	consumer-to-government
ebXML	electronic business extensible mark-up language
EDGE	Enhanced Data for Global Evolution
EDI	electronic data interchange
ERP	enterprise resource planning
EU	European Union
FDI	foreign direct investment
FEDI	financial electronic data interchange
FLAG	Fibreoptic Link Around the Globe
FOG	Fibre Optics Gulf
FS	flexible specialization
FSML	Financial Services Markup Language
FSTC	Financial Services Technology Consortium
GDP	gross domestic product
GEIS	General Electric Information Services
GII	Global Information Infrastructure
GIS	Geographic Information System
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
G2B	government-to-business
G2C	government-to-consumer
HTML	hypertext mark-up language
HTTP	hypertext transfer protocol
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	information and communications technologies
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
ISP	Internet service provider
IT	information technology
ITU	International Telecommunication Union
JIT	just-in-time
Kbps	kilobytes per second
km	kilometers
KACST	King Abdul Aziz City for Science and Technology
LE	Egyptian pound

LL	Lebanese pound
MAINS	Maritime Information System
MB	megabytes
Mbps	megabytes per second
MRP	material requirements planning
OECD	Organisation for Economic Cooperation and Development
PKI	public key infrastructure
PSA	Port of Singapore Authority
QR	Qatar riyals
RO	rials Omani
SCM	supply chain management system
STC	Saudi Arabian Telecommunication Company
STE	Syrian Telecommunications Establishment
SCM	supply chain management system
TEU	twenty-foot equivalent unit
TT	tracing and tracking
UMTS	Universal Mobile Telecommunications System
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNCITRAL	United Nations Commission on International Trade Law
UNCTAD	United Nations Conference on Trade and Development
UN/EDIFACT	Electronic Data Interchange for Administration, Commerce and Transport
UPS	United Parcel Service
URL	universal resource locator
VAN	Value Added Network
VAT	value added tax
VPN	virtual private network
VTP	Value Transfer Protocol
WAP	wireless application protocol
WCO	World Customs Organization
WIPO	World Intellectual Property Organization
XML	extensible mark-up language

INTRODUCTION

Globalization can be characterized as the trend towards a borderless world. There is still a long way to go before that goal is reached, but production, consumption and ownership are becoming increasingly internationalized as international trade and foreign direct investment (FDI) are growing faster than world gross domestic product (GDP).[1]

As a result of globalization, flowers are now imported to Europe from Kenya or India, and vegetables from Zimbabwe to the United Kingdom. Car parts for a particular model may be manufactured in some 20 different countries and delivered just-in-time (JIT) for assembly in yet another country.

Globalization is driven, in part, by falling transportation cost and faster deliveries; falling trade barriers with lower tariffs and fewer non-tariff trade impediments; and falling communication costs and expanding telecommunication networks.

Globalization is not new. A significant wave of globalization occurred from the mid-nineteenth century up to the time of the First World War. During that period, the steamship and the railroad drove down the costs of transportation, the invention of the telegraph allowed faster communications around the world, and England, the foremost industrialized country at the time, adopted free trade policies.

The trend towards globalization was stopped and reversed for political reasons in the period between the First and Second World Wars. However, from the mid-twentieth century up to the present day, the trend has again been towards globalization and an ever more integrated world.

The driving forces behind the current wave of globalization are still to be found in lower cost transportation, more efficient communications and a continued reduction of tariff and non-tariff barriers to trade. Air transport for high-value goods and the use of containers as the preferred means of sea and land transport have revolutionized international trade in manufactured goods.

The modern container was first introduced in 1956 on the east coast of North America. In 1965, the International Organization for Standardization (ISO) published the international standards for freight containers that gave industry the confidence to commit the enormous investment in ships and terminals necessary for the technology to take off. In 1999, ports around the world handled some 185 million TEU (twenty –foot equivalent units), an increase of 9 per cent over the previous year.[2]

Several countries in the ESCWA region have not only adopted the container for their own import and export trade but have also successfully taken additional advantage of this shipping technique by developing transshipment hubs serving the region and the trade between Europe, Asia and Africa. In 1999, the port of Dubai in the United Arab Emirates, with 2.8 million TEU, was the 12th busiest container port in the world, and the ports of Jeddah (Saudi Arabia), Khor Fakkan (United Arab Emirates), Salalah (Oman), Fujairah (United Arab Emirates) and Alexandria (Egypt) all handled more than 500,000 TEU each.

This new revolution in international trade and transport is also driven by information and communications technologies (ICT), in particular the Internet and the World Wide Web. The Internet is a global communications infrastructure that makes it possible to exchange and share all kinds of information, as long as it can be digitized, at high speed and low cost. The Web is a global repository of information. The Internet became available to the general public in the first half of the 1990s, and in 2001 it was estimated that there were already some 429 million users.

The Internet is being used to develop new ways of selling and buying goods and services. However, the delivery of the goods still depends on efficient and low-cost transportation, unless the product is in digital

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[1] UNCTAD, *World Investment Report 1999: Foreign Direct Investment and the Challenge of Development* (New York and Geneva, United Nations, 1999).

[2] *Containerisation International Yearbook 2001* (London, Leigh Smith, 2001).

form. At the same time, transportation and logistics services have become increasingly dependent on information technology to optimize operations, track shipments and automate the document flow that is necessary for goods to cross borders. Internet technologies and international transportation are therefore closely interrelated and interdependent.

The Internet revolution has brought new opportunities and challenges to the transportation industry and to ESCWA member countries. The present study reviews the current status of ICT and e-business in transportation in general and in the ESCWA region in particular, and provides recommendations to Governments for action.

Chapter I of this study provides definitions of the terminology and concepts used in ICT, and explains the developments in computers, software, standards and institutions that led first to the establishment of the Internet and then to its explosive growth. The chapter also briefly reviews the future prospects for ICT and e-business.

A review of various applications of e-business in general and in the transport industry in particular is given in chapter II. The chapter also reviews current and evolving standards for e-business and reviews ICT applications for optimizing transport operations and for tracking goods.

The current status of e-business and the use of the Internet in the transport sector in the ESCWA member countries are reviewed in chapter III, together with a survey of the telecommunications infrastructure in the region.

Chapter IV reviews issues related to ICT and e-business that require government attention and action, in particular issues related to taxation, intellectual property rights, consumer protection, electronic payment systems and security.

Chapter V presents a summary of the previous chapters and a series of recommendations for government action to promote the use of ICT and e-business in the ESCWA region.

I. CONCEPTS AND RELATIONSHIPS OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND E-BUSINESS

A. DEFINITIONS

Information technology (IT), information and communications technologies (ICT), e-commerce, e-business, the Internet, the Web, wireless application protocol (WAP), portals, electronic data interchange (EDI) and electronic business extensible mark-up language (ebXML) are abbreviations and concepts that one frequently encounters in any discussion of modern business practices. The following will provide brief definitions of these and some other useful terms.

Information Technology, or IT, covers all aspects of managing and processing information. IT includes both computer hardware and software and, often, networking and telecommunications as well.

ICT, or information and communications technologies, is frequently used synonymously with information technology, although ICT is sometimes employed to emphasize specifically the convergence of computer and communications technologies.

The Internet, or the Net, is a global network that connects more than 100 million computers around the world and allows them to communicate and share services.

The Internet offers a wide range of applications such as electronic mail, electronic funds transfer, file transfer, remote computer access, bulletin boards, newsgroups, games, and in particular the World Wide Web, or simply the Web. The Web is a collection of computer-based information in hypertext format. This information, residing on millions of computers, is organized in pages or documents, each with their own address or identifier. Users can move from one document to another, or from one web page to another, through links, which can be icons, pictures, underlined texts or buttons. A link contains the address of a referenced document and clicking on it with a "mouse" causes the referenced document (or picture, piece of music, or clip of video) to be downloaded and displayed on the host computer. The special software that is used to display Web documents on a computer is referred to as a browser.

A web page is often a multimedia document containing a mixture of text, graphics, photos, video and sound. The World Wide Web is based on three concepts: HTTP (hypertext transfer protocol), which enables Web servers and Web clients to communicate; URL (universal resource locator), which gives the address of an Internet resource or link; and HTML (Hypertext Mark-up Language) documents.

HTML is the computer language used to tell a Web browser how to display the information on a computer screen. The Web contains more than a billion electronic pages and grows by approximately a million new pages a day.[3]

A web portal is a web site or service that offers a broad array of resources and services, such as e-mail, discussion forums, search engines, and on-line shopping malls.

Users of the Internet are often categorized as consumers, businesses or governments, and their relations are expressed in a kind of shorthand as "B2B" for business-to-business, "B2C" for business-to-consumers and "G2C" for government-to-consumers.

A common way to connect to the Internet is to connect a computer via a modem to an Internet service provider (ISP) through a telephone line. This is referred to as a "dial-up" connection, as the computer connects to the ISP server (a specialized computer) by dialling a number, usually a local number, just like any other telephone number. This allows transmission speeds of up to 55.6 kilobytes per second (Kbps). It is also possible to connect to the Internet through a so-called "broadband" connection that allows transmission speeds of up to several megabytes per second (Mbps). The ISP server is in turn connected to the Internet.

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[3] "Hypersearching the Web," *Scientific American,* June 1999 (http://www.sciam.com/1999/0699issue/0699raghavan.html).

Mobile Internet access is still in its infancy but may develop into a less expensive means of accessing the Internet and the Web. The international standard that is expected to be dominant for mobile access is the WAP, or wireless application protocol.

Electronic business, or e-business, encompasses everything related to doing business using the Internet, or any other electronic network. E-business includes promotion; advertising; hiring; customer, employee and investor relations; communication; collaboration; research; and any other business activity that can be conducted with the assistance of electronic tools using networks. E-government is also any interaction between Governments and their constituents conducted on the Internet.

Electronic commerce, or e-commerce, is an older term that is often used synonymously with e-business. However, it is sometimes used with the narrow definition of "buying and selling goods and services over the Internet."[4]

Electronic data interchange, or EDI, is a technique for sending data electronically between computers in such a way that computers can interpret and act on the data without human intervention. This is accomplished by tagging, coding and structuring the data in a manner agreed between the sender and the receiver. An international standard for EDI, UN/EDIFACT (EDI for Administration, Commerce and Transport) has been developed under the auspices of the United Nations. This standard includes a universal data dictionary, and commonly agreed data structures, data tags and codes to be used for electronic data interchange in international trade and transport as well as numerous other applications.

The standard that is used to describe and present documents and information on the Internet is Hypertext Mark-up Language. HTML has rules for describing how to present information, but not the content or significance of the information. HTML is therefore not suitable for electronic data interchange. In order to correct this, an extension of HTML, "extensible mark-up language" (XML) has been developed.

XML has provisions for tagging individual data elements and can thus describe commercial documents, or for that matter any document that requires part or all of the content to be computer-readable. This feature is extremely useful for interactive web sites that require frequent updates of particular data. It also makes XML suitable for electronic data interchange. Standard EDI scenarios and applications are being developed under the auspices of the United Nations Centre for Trade Facilitation and Electronic Business[5] (UN/CEFACT), which also maintains and publishes the UN/EDIFACT standard. This initiative is referred to as "ebXML" for electronic business XML.

Additional definitions and concepts related to computer and communications technologies can be found on the Internet.[6]

B. A SHORT HISTORY OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND ELECTRONIC BUSINESS

The current interest in electronic business comes from the spectacular growth in the Internet since 1993, the year the first graphical user interface, or Web browser, became available. The Internet, like the telephone, is an open communication facility with global reach. However, as millions of computers are connected to the Internet, it is not only a means of communication but also a vast and growing repository of information. The Internet therefore facilitates the organization, delivery and acquisition of products, services, information and entertainment and has created a multitude of new opportunities for Governments, businesses, educational institutions and others, including individuals, to interact with each other.

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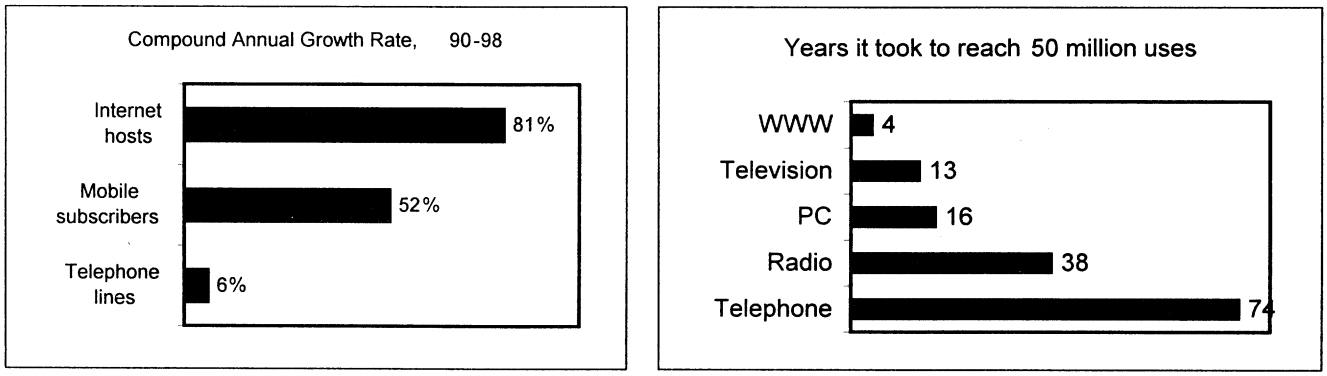
[4] http://whatis.techtarget.com/WhatIs_Definition_Page/O,4152,212029,00.html.

[5] http://www.unece.org/cefact/index1.htm.

[6] http://www.webopedia.com/Top_category.html.

A striking measure of the growth of the Internet is the fact that it took only four years for the World Wide Web to reach 50 million users, whereas it took the radio 38 years and the telephone 74 years to reach a similar number of users. This, and the annual compound growth of telephone lines, mobile subscribers and Internet hosts are illustrated in figure I from the International Telecommunication Union (ITU).[7]

Figure I. Growth of the Internet and other communications media



Note: The growth rates shown are annualized rates.
Source: ITU World Telecommunication Indicator Database, Network Wizards, Compaq, RIPE.

There were 214 countries connected to the Internet in the year 2000, with less than half a dozen not yet linked. According to the ITU, some 80 million new people began using the Internet in the year 2000, bringing the total number of users to an estimated 315 million. This means that around 5 per cent of the world were online in 2000, and that the growth of new users is continuing at a rapid pace.[8] The number of Internet users is difficult to measure, but the polling company ACNielsen, following a survey in 27 countries in the first quarter of 2001, estimates that as many as 429 million people worldwide have Internet access.[9]

This situation is due to many converging developments over the last 50 years in the fields of computers, software, telecommunications, standards and institutions. Below is a brief review of such developments.

1. *Computers*

The first commercially available, general purpose, digital computer was produced in the early 1950s. Following the invention of the transistor in 1948 and the initial use of integrated circuits in 1958, the miniaturization and capacity of computers have advanced to an amazing degree. Since 1971—when Intel, the world's foremost producer of computer chips, first located all components of a computer on a single chip—the number of transistors on a microprocessor has roughly doubled every 18-24 months, without increasing the cost. The 1999 Intel Pentium III processor, for example, has 9.5 million transistors on a single chip, more than 4,000 times the number of transistors on the original 1971 Intel 4004 processor. Computing has thus steadily increased in power and decreased in cost. The price of a megabyte of semiconductor memory also declined, from about US$ 550,000 25 years ago, to just US$ 0.75 or less in the second quarter of 2001,[10] and there is as yet no end in sight with regard to this trend.

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[7] See International Telecommunication Union, *Challenges to the Network: Internet for Development, Executive Summary*, October 1999.

[8] ITU Telecommunication Indicators Update, January-February-March 2001. (http://www.itu.int/ti/update/Update_1_01_E.pdf).

[9] http://www.eratings.com/

[10] *Scientific American*, October 1997, http://www.sciam.com/specialissues/1097solidstate/1097hutch.html#link2 and <www.apple.com>

In the 1960s and 1970s, mainframe computers dominated the computing world. These were powerful machines that shared time with many terminals for many applications. The terminals were referred to as "dumb" as they depended on the central computer for their processing capabilities. A major step forward in the popularization and general use of computers was taken in 1981 when IBM introduced its personal computer. As personal computers became more powerful and widespread in the workplace, schools and in homes, technologies were developed that allowed them to be linked together, or networked, to share information and services. The personal computer in the beginning of the new millennium is considerably more powerful than the mainframe computers of the 1970s and can be bought at a fraction of the cost.

The ITU estimates that in the year 2000 there were some 442 million computers in the world or 77 computers per 1,000 inhabitants. This is equivalent to one computer for every two fixed telephone lines.[11]

2. *Software*

It is software that contains the instructions to make computers do things. In the early days computers used numbers as input for technical and scientific applications. However, computers and software have developed since then, and as long as the data are in digital form, computers can now deal with input as diverse as texts using many types of alphabets and special characters; audiovisual data including sounds, music, videos and pictures; and physical data such as light, sound, temperature and pressure, in addition to the original numerical data.

Software can be categorized into system software and application software. System software includes programming languages, which are the tools for writing computer instructions, and operating systems, which are groups of system programs that tell the computer how to interpret commands, process the inputs and outputs and manage data.

Application software is used to perform specific jobs or specialized functions for the users, such as managing payroll and accounting, writing reports, preparing presentations or engineering drawings. Programming languages mentioned above are used for writing applications as well. There are thousands of applications for all kinds of jobs, but the most popular ones are word-processing, spreadsheet, database management and entertainment.

In terms of business applications, it is common to make a distinction between two types: enterprise resource planning (ERP) and customer relations management (CRM). ERP integrates many facets of a business, including planning, scheduling, manufacturing, accounting and human resource management. ERP is roughly equivalent to what is referred to as "back office" operations. CRM is similar to traditional "front office" operations and includes all aspects of the interactions a company has with its customers, whether sales or service-related. With the growth of e-business, more and more aspects of CRM are being managed on the Internet.

3. *Standards*

Computers and telecommunications are highly complex technologies, and without far-reaching international agreements on how to make the individual pieces of the big puzzle fit together, the Internet would not work. International standards are voluntary agreements developed by industry, consumer and government representatives participating together in international and national bodies such as the ISO, the ITU and the International Electrotechnical Commission (IEC).

The set of standards, or protocols, that defines the Internet comes under the Open Systems Interconnection model developed jointly by the ISO and the ITU. This model defines in seven layers the different aspects of the network and the network services from the physical wiring to data packaging, routing, presentation and the ultimate applications, such as e-mail, file transfer or the World Wide Web.[12]

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[11] http://www.itu.int/ti/industryoverview/at_glance/Internet00.pdf.

[12] http://www.itp-journals.com/nasample/t04124.pdf.

Several important standards for electronic data interchange and electronic business are being developed under the auspices of the United Nations.[13]

Governments may choose to make standards compulsory within their jurisdictions. However, in doing so, they should take care not to make the adherence to a particular standard a barrier to innovation.

Well-designed standards are, as far as possible, transparent to users so that the technology they support becomes intuitive and easy to use. Telephones and fax machines are examples of intuitive but complex technologies that rely on international standards for their functioning.

4. *Institutions*

The success of ICT and e-business does not depend on technology alone. Appropriate institutional structures are also essential for this technology to flourish and for countries, governments, businesses and individuals to be able to benefit from it. Infrastructure must be built and regulatory bodies established to ensure high quality service at affordable prices. Electronic services must be developed and made available to users.

National and international legal frameworks must be updated and adapted to the new ways of communicating and storing of information, to paperless transactions and to electronic evidence. Unfamiliar security issues and threats must be addressed. New and difficult taxation issues have arisen, with goods and services being traded in digital form. Manpower must be trained to develop and make use of ICT and ordinary citizens must learn how best to benefit from the new opportunities presented by e-business, e-government and other e-activities.

Many of these issues are within the realm of government and require much attention and concerted effort for good and appropriate solutions to be found.

With regard to the international transportation of goods, institutional issues related to the facilitation of border-crossing procedures and modern customs reform are of particular interest. The complex set of procedural requirements that many countries impose on imported and exported goods increases the cost to consumers and discourages foreign investors.

Modern customs authorities often employ EDI, computer-assisted risk assessment and audit methods to improve the efficiency of their law enforcement tasks. By better focusing their resources on high risk importers and exporters, modern customs authorities achieve higher success rate in intercepting illegal activities and making possible quicker release times for legitimate traders, thus ensuring shorter delays at border crossings or in ports.

ICT, and in particular EDI, play a key role in modern customs administration, in that transport documents can be received electronically before the goods arrive. If the transport documents are in EDI format, the data can be entered automatically into the customs database. Goods that come from high-risk areas in the world or that are imported by unknown or suspicious consignees are flagged by the computer for more detailed inspection. The remaining goods, often 95 per cent or more of the total traffic flow, are released immediately upon arrival at the border crossing or port with no delay.

This is but one example of how proper institutional set-ups, combined with streamlined procedures and the application of ICT, can significantly reduce barriers to international trade and transport.

C. CURRENT AND FUTURE STATUS OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND ELECTRONIC BUSINESS

Although the term is relatively new, aspects of e-business have been around for more than 20 years. EDI and electronic funds transfer were introduced in the late 1970s. Automatic teller machines (ATMs),

[13] http://www.unece.org/cefact/.

telephone banking and the acceptance and growth of credit cards in the 1980s are also examples of early e-business.

With the take-off of the Internet in 1993 and onwards, the concept of e-business expanded from primarily EDI and transactions-processing to include communications through e-mails, promotion, marketing, stakeholder relationships, research, and any business-related activity that could take place on the Internet or over private networks. It also grew from being mostly an issue of business-to-business (B2B) to include business-to-customers (B2C), as the Internet provided a new boost to the traditional mail order business, as well as government-to-citizens (G2C), as Governments started using the Internet to provide information and services more efficiently to citizens. Many other new relationships still remain to be developed.

The non-monetary aspect of e-business is difficult to measure. The importance of e-business is therefore often stated in terms of B2B and B2C transactions, which involve sales of products or services. In early 2001, the Internet research company Forrester estimated that global e-commerce would reach US$ 6.8 trillion by 2004, or 8.6 per cent of world sales of goods and services.[14] This estimate, which is a considerable increase over the 2000 figure of US$ 657 billion, represents an annual compound growth of about 80 per cent.[15]

Many Internet companies have gone bankrupt, and the stock value of many telecommunication manufacturing companies dropped by as much as 90 per cent or more in 2000-2001 as the result of a sharp and unforeseen drop in demand by telecommunication service providers. This, however, is likely to be only a temporary setback.

The impact of e-business in the ESCWA region will increase at an accelerated pace, like e-business in the rest of the world, as the telecommunication infrastructure is improved. The Internet user base is growing rapidly, and most Governments in the ESCWA region are committed to making the Internet a critical element of their development strategies.

[14] http://www.forrester.com/ER/Press/Release/0,1769,281,00.html.

[15] http://www.forrester.com/ER/Press/ForrFind/0,1768,0,00.html.

II. INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND ELECTRONIC BUSINESS IN TRANSPORT

Information and communications technologies are increasingly being used in all forms of transportation transactions. At the same time, transport is becoming a critical element in the growth of electronic commerce for physically transportable goods.

Therefore, e-commerce and transport are the cornerstones of new supply chain management and just-in-time (JIT) strategies, integrating production, distribution and retail through ICT.

Two examples illustrate the mutual relation between transportation and ICT. The United States-based retail chain Wal-Mart is a good example of how JIT delivery is used. At Wal-Mart, an EDI network links retail stores, redistribution centres, suppliers and manufacturers with transportation industries. All information (sales history, number of items in transit) is digitized and maintained in a common database, to which floor retail staff have access through a bar code scanner and display read-out. The floor-level staff responsible for a given section, such as household wares, place the order. The order is then transmitted through the common network directly to suppliers, redistribution centres and transport firms. The supplier who receives the order ships the goods to the redistribution centre, where it is transferred from the supplier-delivery loading dock to the retail-store shipment dock, and with minimal (24-48 hours) trans-shipment time to the retail store. The result: 97 per cent of Wal-Mart's goods never pass through a warehouse, and Wal-Mart can pay suppliers directly through customer sales.[16]

In manufacturing, the integration of ICT and transport has also become common, linking intermediate and primary commodity producers in the production chain. Car manufacturing plants, for example, are linked to part suppliers by ICT networks. Each time a new car rolls off the assembly line, it is automatically registered by the parts supplier through a common EDI or Web-based system, which then manufactures and ships the parts "just in time" to meet the demand from the plant. Again, warehousing is eliminated, reduced or transferred from the manufacturer to the supplier. Account settlements, transfer of designs and drawings, e-mail and other business transactions between the automakers and their supply are now done through an integrated ICT network.[17]

As illustrated in the above two examples, there is a two-way relationship between growth in e-commerce and growth in transportation.

A. OVERVIEW OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND ELECTRONIC BUSINESS

The open structure of the Internet and the low cost of using it make possible the interconnection of new and existing information and communication technologies, and offers transport businesses and/or consumer partners a new and powerful information system and a new form of communication. This makes it possible for buyers and sellers to come together in more efficient ways and creates new digital marketplaces and opportunities for the reorganization of economic processes. It is also changing the way products are customized, distributed, exchanged, paid for, and how businesses and consumers search for and consume products and service.

In the coming years, exploiting the full potential of these developments could have a profound impact on the transport sector in the ESCWA region, as well as macroeconomic performance in general.

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[16] Don Tapscott, *The Digital Economy: Promise and Peril in the Age of Networked Intelligence* (McGraw-Hill, 1997).

[17] Transport Canada, "Transportation and Information Technology," 1998 (http://www.tc.gc.ca/pol/en/ANRE1998/TC98C11E.HTM).

For the transport sector, productivity and economic growth could increase, at least for some time, as a result of more efficient management of supply and distribution, lower transaction costs, reduced barriers to market entry and improved access to information.

Many extravagant and unjustified claims have been, and are still being, made in e-commerce and ICT. However, there are many facts with regard to the effects of the Internet on commercial activities that are widely acknowledged, such as the following:[18]

(a) E-commerce shifts power from sellers to buyers by reducing the cost of switching suppliers (the next seller is at your fingertips only one click away) as the Internet can distribute price and product information more openly on a global scale.

(b) E-commerce reduces transaction costs. The typical example is that of banking transactions, in which an operation, such as paying an invoice, is much cheaper for the bank when the customer uses the Internet for making the payment rather than paying by telephone, ATM or in person at a counter in the bank. This is mainly due to lower transaction costs.

(c) E-commerce increases the automation, speed and range of markets. New businesses, such as "informediaries" in the middle between businesses and customers/partners, are uniquely placed to exploit these attributes by collecting information, adding value to it and distributing it to those who will find it most useful. Informediaries can vastly improve the efficiency of even low-tech vertical markets, such as road haulage.[19] In transport, new third party intermediaries are rapidly automating pricing, monitoring of compliance, booking, and track/tracing as self-service portals become more and more integrated into customers' web sites. Key examples from transportation include the United States-based iLinkGlobal.com, 3Plex.com and Freightdesk.com.

(d) E-Commerce improves market transparency by, in many cases, establishing 24 x 7 x 365 opening hours, offering rich and accessible information any time, any place.

(e) E-Commerce improves comparability and customization, as buyers can more easily compare all options and select information tailored for sub-markets and customers.

(f) E-Commerce offers dynamic pricing, as the real-time capacity and demand create flexible pricing options both for buyer and sellers.

(g) E-Commerce makes collaboration between business partners, suppliers and customers easier as new demand forecasting and work flow management tools have become available.

This shift of power, noted in point (a) above, should manifest itself in a number of ways, including lower prices, finer (albeit more frequent) price modifications, and a narrower dispersion of prices for identical products or services. Lower transaction costs (see point [b] above) and improved transparency (point [d] above) should also lead to business partners and/or customers becoming more sensitive to fluctuations such as price changes. So far, however, the available empirical evidence is mixed. Some of the first studies in this field from the late 1990s found that prices for goods sold through the Internet were on average higher than equivalent goods sold through traditional retailers.[20]

However, more recent studies have found prices for books and compact discs (CDs) to be on average about 10 per cent lower on the Internet compared with traditional retailers (in the United States). However,

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[18] "The net imperative", *The Economist*, 26 June 1999.

[19] Only a couple of years ago, enthusiasts were predicting that there would be widespread "disintermediation" when e-commerce took hold, using examples such as Dell Computer, which has cut out the middlemen and become a direct seller on the Internet. However, recent examples signal that intermediaries will prosper if they add value and that the Web offers many new ways of doing so.

[20] Data Investment Consult-Lebanon, The Center for Emerging Markets Studies, The *White Book on Middle East e-Commerce and e-Finance* (ECO/WKP[2001]02), February 2001.

these studies also found that price dispersion was not lower online, but that prices tended to change more frequently, reflecting lower menu cost (the costs a retailer incurs when changing a posted price) in electronic markets.

These market signals provide some justification for the prediction that B2C e-commerce raises competitive pressures and improves economic efficiency. Part of the reason may be that certain reductions in costs are offset by higher overheads elsewhere. For example, distribution switches from high-density channels (from warehouses to downtown shopping centres) to lower density routes (factories to residential areas). Another explanation may be that e-commerce businesses may have a better understanding of the preferences of their customers and business partners, which makes more direct marketing and mass customization of products possible and could also lead to more finely differentiated and sophisticated price setting for products.

Goods and services offer the greatest possibilities for e-commerce to reduce prices, because they can be digitized. This makes possible substantial economies in production and delivery costs, and for B2B, where opportunities exist for efficiency gains via lower procurement and inventory costs, and better supply chain management. Many businesses claim that establishing their supply chain management on the Internet has led to major cost savings, as illustrated in table 1 below.

TABLE 1. POTENTIAL COST SAVINGS FROM BUSINESS-TO-BUSINESS ELECTRONIC COMMERCE IN UNITED STATES INDUSTRIES
(*Percentage*)

Industry	Cost savings[a/]
Chemicals	10
Coal	2
Communications	5-15
Computing	11-20
Electronic components	29-39
Forest products	15-25
Freight transport	15-20
Media and advertising	10-15
Oil and gas	5-15
Paper	10
Steel	11

Source: Goldman Sachs Annual Report, 2000.

a/ Percentage of total input costs.

The study cited as the source to table 1 predicts an economy-wide price reduction of almost 4 per cent, although such an estimate must be viewed with caution, as it depends on numerous assumptions and is inherently uncertain. However, even if the impact on prices is still small and uncertain, e-commerce could considerably enhance the economies of the transport sectors thanks to time saved, greater convenience, and access to a wider selection of goods and services that are more finely tuned to meeting the needs of customers and business partners.

None the less, to exploit fully the opportunities of e-commerce in the transport sector in the ESCWA region, much remains to be done to ensure business, customer and consumer trust, improve access to the Internet infrastructure and services, and create a stable, predictable regulatory environment.

This chapter assesses the potential outcomes and economic effects of e-commerce for the transport sector, the forces underlying its expansion, and the possible implications for structural change. However, given the recent advent of the Internet and the fact that only scattered empirical information is available, it must be stressed that the policy and business imperatives of e-commerce for the ESCWA region at this stage are, in many respects, still tentative and can only be speculated about, at least in the short term.

For purposes of clarity regarding the presentation of the advantages and options related to e-commerce, this chapter has been structured around several e-business issues, including the following: (a) an overview of electronic business infrastructure and activities; and (b) e-business applications in supply chain management, logistics, and transport, with particular emphasis on tracking and tracing, scheduling, shipment monitoring, bookings and price quotations.

B. ELECTRONIC BUSINESS INFRASTRUCTURE

In any review of e-business infrastructure, some definitions are necessary. In a loose sense, e-commerce can be defined as doing business over the Internet, selling goods and services that are delivered off-line, as well as products that can be digitized and delivered online, such as information, music, videos and software. Business transactions can be between business partners (B2B), or between businesses and consumers (B2C). The Internet is also being used by businesses to manage after-sales service, investor relations, public relations, stakeholder relations, education and financial/administrative transactions, as well as to develop direct consumer marketing. However, the Internet also encompasses a wider spectrum of potential commercial activities and information exchanges. For instance, it offers firms, consumers and public authorities an electronic infrastructure, which enables the creation of virtual auction markets for goods and services, information platforms, and service portals that previously did not exist.

An example of a successful new marketplace is eBay.com. This company was among the first to provide an electronic marketplace on the Web, where consumers can trade a wide variety of goods and services with each other (consumer to consumer, C2C) and, at least in principle, with businesses (consumer to business, C2B). Both the revenues and net profit of eBay have increased despite actual pressure on e-business companies in general. The gross margins of eBay for 2001 were more than 80 per cent over the figure for the year 2000, and revenues nearly doubled compared with the previous year, despite the NASDAQ stumble.

In essence, eBay may not be more than some software running unattended on a Web server. All the work is done by the customers: buyers and sellers. Sellers pay the company for the privilege of setting up their own auctions, buyers use eBay's software to place bids. When the auction is over, the seller and the winning bidder negotiate payment and shipping between them; eBay never touches the goods. For this matchmaking service, for which its marginal costs are almost non-existent, eBay takes between 7 and 18 per cent of the sale price. Comparing that with, for instance, Sotheby's, a traditional auctioneer, the business advantage of eBay becomes evident. Sotheby's is dependent on a large number of staff and auction rooms, and handles only a limited number of auctions. In contrast, eBay has almost unlimited capacity, which confers a powerful advantage of scale. With regard to future growth of eBay, one publication noted that:

> "in the last quarter of 2000, even eBay's operating margins, despite rapid international expansion and heavy investment in technology and marketing, were 20%, bringing in profits of USD 25 million in the quarter. Over time, analysts expect eBay's operating margins to average around 35% on revenue growth of 40- 50% a year. Quite a cash cow."[21]

In the B2C segment, the leading example is Amazon.com, which to some degree has outshone many other e-business options in areas that are more established, but less prominent, than Amazon's key markets of books, music and video retail. However, the main advantage of B2C e-business makes Amazon stand out in comparison with its bricks-and-mortar competitors. Thanks to its centralized warehouses and virtual shelves, Amazon needs to have only a few units of each product in stock, rather than having to keep a few of each product at every store. Moreover, because Amazon's packing and handling costs tend to be about the same regardless of the nature of the product, the company can hope to make more money by moving to higher-value products. Margins in the consumer electronics business, for instance, are notoriously low because of inventory and depreciation costs. Amazon, with a fast-moving centralized inventory and relatively fixed handling costs, can make such a business far more attractive. In spite of this, the future success of Amazon is not certain. It is widely known that Amazon has so far raised US$ 2 billion and lost

[21] "Is there life in e-commerce?", *The Economist*, 3 February 2001.

about the same, a situation which, from a financial point of view, makes the future existence of the company questionable.[22] There are other reasons to question Amazon's future success. As is the case in most transport, logistics and distribution businesses, the supply chain efficiency on which Amazon's business model depends is held hostage to the pace at which its partners, from suppliers to transportation companies, upgrade their systems to complement the Amazon system. This problem, which has been frustrating for Amazon in the United States of America, is far more serious in its international markets. Similar problems may be encountered in the ESCWA region by any business trying to copy or to build on the experience of Amazon.

It is not only B2B and B2C that are taking advantage of the Internet. In some countries, including Australia, European Union members and the United States, Governments are beginning to reorganize the management of public procurement—equivalent to some 10 per cent of GDP—so that it can be done over the Internet, opening the prospect of a sizeable B2G (business-to-government) electronic market. For example, the European Commission has decided that 25 per cent of all public procurement in Europe will be executed and handled electronically by the year 2003, and more than 100 electronic public procurement pilot projects have been started all over Europe. Evaluation of the results indicate that Governments can expect between 5 and 25 per cent savings, depending on the nature of the procurement (goods, works, services or utilities). Short-term expectations for public procurement rationalization potential is highest for goods, in particular low-value goods, and to a lesser extent for works and services (in that order).[23]

Governments and the private sector are actively involved in developing and testing these new electronic public procurement marketplaces all over Europe, including Germany (Avacom.com, Medienpol.com), the United Kingdom (ELPRO, TenderTrust, Delta Suite), France (Marché Online, Doubletrade, Saomap), Denmark (Ethics) and Austria (Er@t).[24]

Governments are also using the Internet technology for the transmission and receipt of information (G2B, G2C), to improve the convenience and lower the cost of transactions such as VAT payments (B2G) and tax compliance (C2G). The spectrum of electronic transactions facilitated by the Internet is summarized in table 2.

TABLE 2. EXAMPLES OF ELECTRONIC BUSINESS INFRASTRUCTURE

	Consumer	Business	Government
Consumer	Consumer auctions www.Yahoo.com C2C	Business bidding www.eBay.com C2B	Tax compliance www.ccra-adrc.gc.ca/eservices/ C2G
Business	Retailing www.amazon.com B2C	Subcontracting www.covisint.com a/ B2B	VAT payment www.ccra-adrc.gc.ca/eservices/ B2G
Government	Tax return www.toldskat.dk G2C	Public procurement www.doubletrade.com G2B	Tax cooperation www.ciat.org b/ G2G

Note: B2B = business-to-business; B2C = business-to-consumer; B2G = business-to-government; C2B = consumer-to-business; C2C = consumer-to-consumer; C2G = consumer-to-government; G2B = government-to-business; G2C = government-to-consumer; G2G = government-to-government; and VAT = value added tax.

a/ Covisint.com is a jointly sponsored web portal where leading automakers (including Ford, General Motors and Chrysler) buy goods and services.

b/ CIAT is the Inter-American Center of Tax Administrations.

[22] Ibid.

[23] European Commission, *Analysis of Electronic Public Procurement Pilot Projects*, European Commission, DG Internal Market, 2000.

[24] Ibid.

This chapter, however, focuses on two parts of e-commerce: B2B and B2C, which is also the domain in which the most development and progress has taken place to date.

C. ELECTRONIC BUSINESS BY ACTIVITY

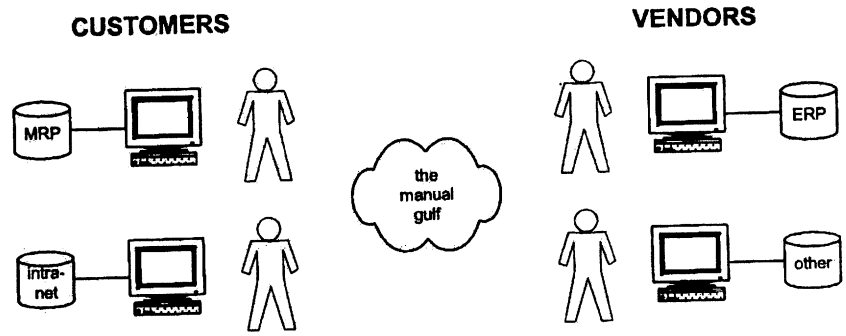
The typology described above (B2B, B2C and B2G) is useful in identifying the trends that nurture the growth of e-commerce, and in predicting where, in the ESCWA region, enterprises, customers and Governments might "fit in" in the matrix in the future. In other words, it is just a map, and it gives no indication on where to go, which strategy to adopt, or which technological applications to employ. However, if the ESCWA region wants to integrate with the world of e-business, the enterprises, public institutions and consumers in the region will need more than a map. Winning strategies will require a sense of direction, and a clear vision of which steps must be taken, and in what sequence. This means that, beyond a mere (descriptive) typology, successful e-commerce strategies will require further operational definitions.

In this chapter, operational definitions are understood as definitions likely to serve as a practical basis for action, in particular by offering the ESCWA member countries, and especially the transport enterprises in these countries, ways to design and implement appropriate strategies to succeed in the world of global e-commerce. Most of the definitions used so far in surveys and analyses of e-business have remained purely descriptive. In the subsections below, three different electronic business strategies are presented.

1. *The starting point*

The objective of e-commerce is to eliminate the manual trading processes by allowing internal applications (ERP) of different companies to exchange information and trade products or services directly. In traditional commerce and transportation, both customers and businesses may be automated internally, but their systems usually do not have the ability to communicate with each other. Therefore, trading partners must bridge the gap between each system by manual processes such as mail, e-mail, fax, meetings and phone calls. The objective of e-commerce is to minimize the manual gap. Figure II illustrates the starting point.

Figure II. E-commerce: the starting point



Notes: MRP = material requirements planning; ERP = enterprise resource planning.

However, in the transport sector, electronic commerce is not a new concept, and "bridging the manual gap" between companies and customers was actually initiated many years ago. A number of (mainly large) transport companies have been using EDI with their major trading partners, over the last two decades. Despite its relative success among many large transport companies, EDI has proved too complicated and expensive for many small and medium-size transport companies (in its original form) and as a result, EDI has not been widely adopted. "Only" 300,000 companies worldwide have adopted EDI because of its complexity and expense (in comparison with the millions of companies that have established an Internet presence). As a result, EDI was never adopted widely enough to transform the way business is conducted electronically. In fact, most large retailers have a maximum of 20 per cent of their suppliers using EDI. The basic premise of EDI, however, is right on track. EDI eliminates manual processes by allowing the internal applications of different companies to exchange information directly.

Today business can be conducted—also electronically—in new ways that are more affordable than EDI. The Internet and XML have lowered the entry barriers to e-commerce, in both cost and complexity, not by replacing EDI, but rather by extending or building on top of the vision of EDI. Compared with EDI, XML has the advantage, in that it is becoming the language (syntax) of the Web, as XML now "takes over" from HTML (and EDI) in many B2B Web solutions. Thus, XML is rapidly becoming the new lingua franca of B2B transactions. Still a number of obstacles must be passed before XML can fulfil its early promise, most notably: the language's vocabulary (binding international agreements are missing on which "tags" will be allowed), the language's structure (how tagged elements may nest within one another) and how tags should be processed.[25]

Currently, three different approaches, which to some extent all benefit from XML, can be labelled as distinctive e-commerce strategies. In different ways, all three approaches illustrate direct applicable and operational technological strategies for transport companies to enter the electronic business market, but the objectives, efficiency and functionality of the three approaches vary. The three approaches are: (a) Web storefronts; (b) e-commerce portals; and (c) B2B e-commerce.

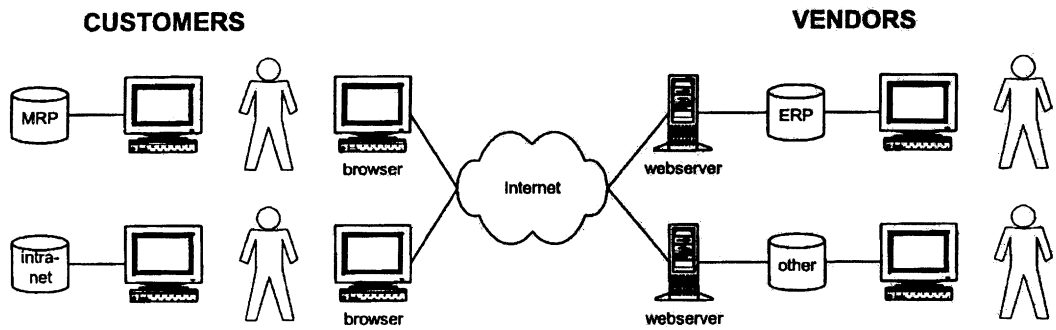
Each of these approaches will be reviewed according to its ability to implement the overall e-commerce objectives of transport companies (saving time and money), as well as its prospects for minimizing the manual gap between transport companies and customers noted above.

2. *Web storefronts*

Many software companies are advertising Web storefronts as e-commerce solutions. However, Web storefronts (only) provide a Web interface to a vendor's catalogue of products or services. The Web storefront integrates the placing of an order over the Web, with an internal processing system, such as enterprise resource planning (ERP) systems, to fill the order.

This may be an acceptable solution for B2C commerce. However, Web storefronts are inadequate for "true" large-scale B2B e-commerce in the transport sector. Customers presented with the Web storefront solution would have to visit hundreds of suppliers' web sites to fill orders. Potential customers would be obliged to conduct manual searches and manual order entry through a web form. Once an order is placed, the customer would have to update manually their internal ordering systems, or ERP. For large-scale transport, logistics and distribution companies—or manufacturing enterprises—with hundreds of suppliers, this would be an intolerable way to conduct business. The e-commerce strategy of Web storefronts is illustrated in figure III.

Figure III. E-commerce Web storefronts



Notes: MRP = material requirements planning; ERP = enterprise resource planning.

[25] Jon Bosak and Tim Bray, "XML and the second-generation Web", *Scientific American*, May 1999.

3. *E-commerce portals*

In some sectors, companies have proposed e-commerce portals to automate both vendors and customer buying and selling of goods and services. Utilizing e-commerce portals, customers can browse numerous vendor service and/or product catalogues and place orders while only visiting one web site, the portal web site. Vendors go to the same portal web site to view and fill customer orders.

Today groups of large companies in nearly every industry are combining forces to buy goods and services through jointly sponsored and developed e-commerce web portals. They include retail (World Wide Retail Exchange), metals (MetalSpectrum), plastics (Elemica), chemicals (Envera), forest products (ForestExpress), and many others.

The advantages of portals compared with Web storefronts are evident. If, for example, an automotive manufacturer desires to purchase 1,000 pieces of hydro-formed steel tubing with a specific weight and diameter, it is not feasible to turn to 10, 50 or 100 general product catalogues and order the materials by part number, as the quality, condition, and price may vary from supplier to supplier. However, if the purchase could be established through a direct materials exchange (such as Plasticnet, eSteel, PaperExchange or, most likely, the Covisint.com collaboration between leading automakers, such as Ford, General Motors or Chrysler), the buyer would have the opportunity of requesting bids (reverse action) for the materials and obtaining a lower competitive price without compromising the integrity of the purchase. These options are actually available in maritime shipping. For example, some independent sites let shippers find ocean carriers' excess capacity: shippers post loads and carriers bid prices down to win the loads, on so-called reverse action sites such as GoCargo.com (while maritime carriers can find shippers' cargo on sites such as CargoExchange.com).

E-Commerce portals do not eliminate the need for human interaction to occur in advance to ensure that the manufacturers will deliver quality goods or services. However, once this information is established, transport companies can incorporate new businesses into the trading partner community of the portals exchange system and allow them to compete for business based upon price and performance. For the buyer, this results in the exchange's producing lower costs of procurement. For the seller, it provides increased sales opportunities with relatively low overhead.[26]

Although these portals eliminate some of the problems of Web storefronts, there are still major technical shortcomings to this approach, as noted below:

(a) Both customers and vendors must, in less advanced conditions, manually update their internal systems after placing and retrieving orders from the portal.

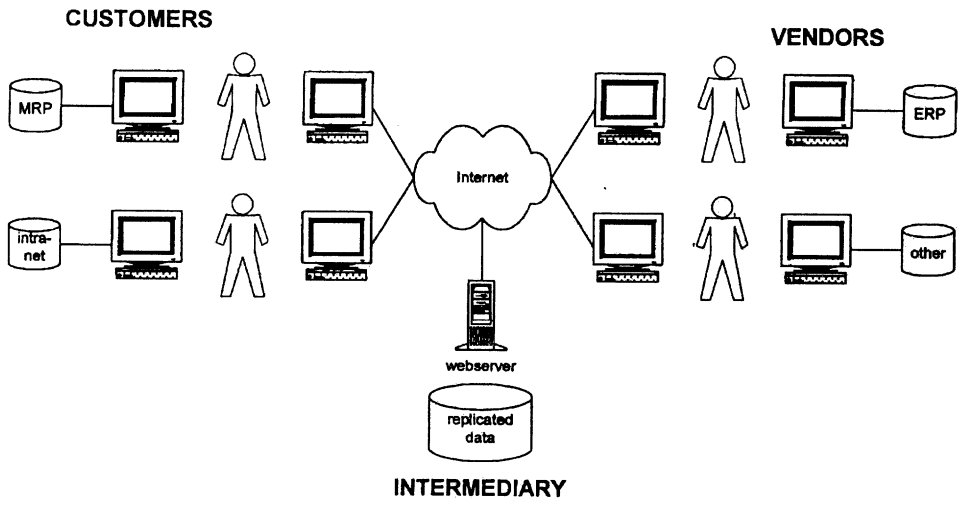
(b) A company's critical information business resides outside of its internal firewalls while its data are being updated and maintained by a third party on the portal web site.

(c) Portals charge companies for service catalogue updates and ensuing transactions, and companies are thus charged to access their own information.

While this approach may be suitable, for a time for some transport companies, it will not prove acceptable as a long-term solution, especially not for large transport and logistic companies. Typically, large companies want and need to have their vital information residing within their own walls. The e-commerce portals are illustrated in figure IV.

[26] J.P. Morgenthal, *Implementing Direct Materials B2B Exchanges*, White Paper (xml solutions, 2000).

Figure IV. E-commerce portals



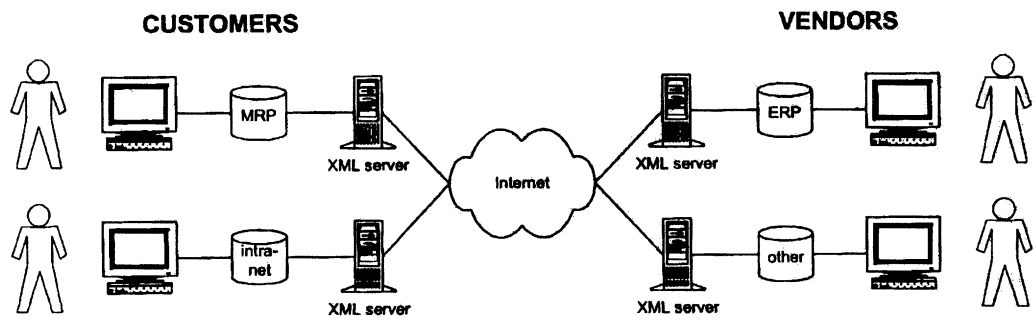
Notes : MRP = material requirements planning ; ERP = enterprise resource planning.

4. *Multipoint business-to-business electronic commerce*

What here are called multipoint B2B e-commerce solutions feature end-to-end, B2B e-commerce systems. This architecture system offers transport companies the opportunity to move from the traditional single point-to-point trading partner relationship (typically in EDI solutions) to multipoint trading partner relationships. The multipoint relationship is one trading partner communicating in a broadcast exchange simultaneously with multiple partners.

In the transport sector, an online offer of, for example, road transport services, developed by Internet-based transport and logistics service providers, now enables a shipper to enter an order into its enterprise resource planning system. The order automatically goes through the transport service provider's transportation management system, and is then received by the carrier. The system can determine and approve the price, acknowledge the order, send messages for collecting the shipment, notify the carrier and consignees, accept and pay the carrier's charges—all automatically. By accessing a single web site, the shipper can obtain a customized view of all shipments in transit, identify shipment status, read exceptions reports, arrange for pick-ups and update its purchasing department, on the basis of true landed cost of freight movements around the world.[27] The system architecture of multipoint B2B e-commerce is illustrated in figure V.

Figure V. Business-to-business electronic commerce



Notes: MRP = material requirements planning ; ERP = enterprise resource planning.

[27] UNCTAD, "Electronic commerce and international transport services: report by the UNCTAD secretariat" (TD/B/COM.3/EM.12/2) (Geneva, 31 July 2001).

By offering a much more descriptive messaging format, XML should be more reusable than EDI and easier to translate into other document layouts, making it possible to do business simultaneously with multiple trading partners.

Once companies move from single point-to-point trading exchange relationships to a broadcast exchange, opportunities arise to create a more competitive environment and thus lower the costs for procuring direct materials or services.

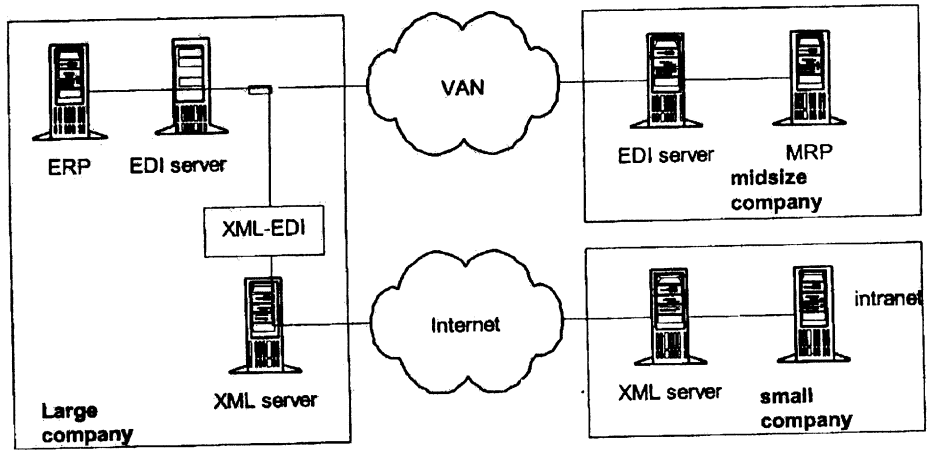
For companies already using EDI, this system architecture can extend EDI to XML so that (also small) transport companies can access the information through a simple browser. Companies not using EDI can directly employ XML. Reaping the obvious benefits of EDI, XML also allows the internal applications of different companies to share information directly on the Web. The advantage that XML holds over EDI is that XML is both machine- and human-readable, while EDI is only machine-readable. Though both languages "tag" the data with codes, it still remains to be seen if XML will be easier to read, as there obviously are language difficulties in international trade.

Actually, XML and EDI may not be that fundamentally different, as first thought, as they both tag data. However, the creators of EDI were mainly concerned about the size of their messages, as bandwidth for EDI networks is very expensive, even today. EDI typically uses VAN, charging US$ 1 to US$ 20 US per message, while XML can use existing Internet connections at low costs. EDI messages therefore tend to become very compressed and use codes to represent complex values.

In this multipoint B2B e-commerce system architecture, both large and small transport companies can benefit from automation. Large companies already using EDI can extend their existing electronic trading community beyond just those companies who can afford EDI. They can use their current EDI investment as financial leverage by installing an EDI-XML translator on their web server. By adding this technology, companies can send XML documents such as purchase orders to their smaller trading partners (for example, truckers) and retrieve invoices over the Web.

Small transport companies can also benefit from the above move. A small company's trade volume can typically handle the processing and accounting of paper forms. Additional manpower is necessary to handle the computers, programs and networks necessary for electronic forms. By extending EDI to XML, these small suppliers can access this information through a simple browser, allowing them to continue to print orders and manually process them. With the hoped-for ease of implementation and low cost of entry for XML, small suppliers will be able to leverage this new technology and download the XML data directly to their internal business systems. This is illustrated in figure VI.

Figure VI. Increased interaction between small, medium, and large companies due to XML



Notes: XML = extensible mark-up language; MRP = material requirements planning; ERP = enterprise resource planning; EDI = electronic data interchange.

This multipoint B2B e-commerce system architecture does not prevent companies from exploiting the advantages of the above-mentioned freight exchange and material exchange portals. Actually, many shippers seem to prefer just a single interface to conduct business with multiple carriers, and several carriers are now responding positively to this trend in new ways, which still allows for "multipoint competition." For example, FedEx's new Ship Manager Software[28] saves shippers time by letting them book on other parcel carriers as well as FedEx. Given a choice of several separate online systems or one "open" system, the preferred choice of shippers seems obvious. In addition, FedEx may soon broaden its Ship Manager to include other modes of transport. Motor carriers (Transplace) and railroads (SteelRoads and Arzoon) in the United States are also developing multi-carrier work flow management sites for shippers, while ocean carrier Maersk Sealand is currently exploring this approach.[29]

D. ELECTRONIC BUSINESS AND SUPPLY CHANGE MANAGEMENT

Many major transport service providers now make agreements with information technology companies that supply them with information systems for their operations. The information systems are typically one of (or a combination of) the Internet concepts that support operations including: ordering, booking, billing, charging tariffs, customs clearance, insurance claims, tracing/tracking and payment (see section E below).

In assessing the impact of e-commerce on transport services, it should be borne in mind that the transport industry has for decades been undergoing organizational and technological changes independent of any influence from electronic commerce, in particular the Internet, which is quite a recent phenomenon. Developments in industrial production systems including JIT (just-in-time), FS (flexible specialization), outsourcing, and SCMs (supply chain management systems), in addition to the globalization of economic activities, have had profound effects on the transportation business. Thus e-commerce tends more to reinforce and accelerate developments that had already started in the transport industry some time ago.

On the demand side of freight transport, in many sectors such as automobiles, electronics, petrochemical products and pharmaceuticals, a small number of very large or multinational enterprises now dominate world trade and investments. These firms are often characterized by substantial intra-firm trade, and their competitiveness depends on state-of-the-art logistics systems, both for internal coordination and for external linkages with suppliers and customers. Given the enormous importance of logistics chain optimization for global competitiveness, large companies and multinational enterprises are systematically engaged in e-business process re-engineering of their goods and information flows. Here, e-commerce systems are used as a catalyst for the development of new ideas and the implementation of new opportunities. The large companies and multinationals such as General Motors, Volkswagen, Volvo, Phillips, Dow Chemicals, and Johnson and Johnson are currently instrumental in the development of e-commerce and the establishment of new targets for e-commerce and supply chain management on the world market. This implies that transport operators, including those in the ESCWA region, must adjust to and satisfy "global benchmarks" for e-commerce: costs, quality, delivery characteristics and flexibility. Many transport operators are thus confronted with new quality requirements and technological competencies imposed by large multinational clients.

On the supply side, there is no doubt that e-commerce will call for fundamental changes in various ways. Providers of transport and related logistics services will have to adapt their infrastructure, marketing, management and customer service to fulfil the requirements imposed by the above demand side development. The challenges facing the supply side of the transport sector are illustrated in figure VII. The figure indicates how the key elements and the relationships of all transport modes (rail, sea, road and air), logistics operations (from consigner to consignee), and the related supply chain management issues (of goods, information, data and procedures), which can be supported and streamlined by the implementation and use of electronic commerce systems, are interconnected in the transport sector.

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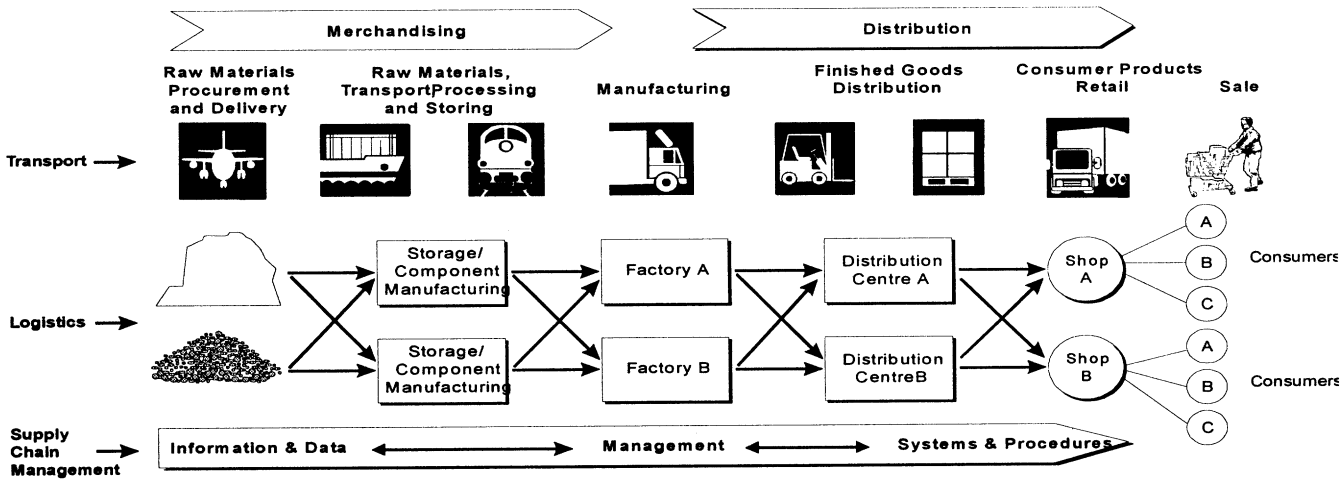
[28] FedEx US. http://www.fedex.com/us/ebusiness/eshipping/ship.html.

[29] *Containerisation International*, November 2000.

Figure VII. Electronic e-commerce in transport and logistics



As illustrated in the above figure, e-commerce offers many ways to improve the supply chain as well as the management and distribution of freight in the transport sector imposed both by the supply and demand sides of the transport business.

Studies have found that time delays caused solely by information requirements, including documentation, inspection/clearance and transaction completion, usually account for as much as 35-46 per cent of the door-to-door time in international trade flows.[30]

Such waste of money and time is unacceptable to the suppliers of transport services, and can be largely prevented by the effective use of e-commerce and related Internet technology. However, many obstacles still remain to be overcome. There still seems to be some reluctance to innovation, especially from the supply side. Netherlands e-business news provider ECP.NL (Electronic Commerce Platform Nederland)[31] reported in August 2001 that many suppliers were reluctant to adopt e-business solutions, and were instead adopting a "wait and see" attitude. Many suppliers even felt threatened by the concentration of purchasing power in the new "collaborative buying" initiatives on portals and freight exchanges. For example, the automotive e-marketplace Covisint.com suffers from reluctance among suppliers to participate in their initiative. Apparently, these suppliers fear that Covisint will merely be used as an instrument to squeeze prices, instead of to realize efficiency gains due to supply chain integration. Obviously, suppliers feel threatened and want to defend their own interests. They will have to reconsider their position in the supply chain and the value they add to it. Suppliers should be aware that, without their involvement, e-business is not viable, as there is a mutual dependency. Without supplier participation, the success of an e-procurement project is limited to (sub)optimization of the internal procurement request.

It is important for suppliers to realize that, both for suppliers and buyers, e-business can result in attractive efficiency gains within the supply chain. Integration of and communication between processes on both sides (supply and demand) are crucial to a well-managed supply chain. The e-business system in use can provide the key to tailoring these mutual integration efforts. However, as noted above, the degree of integration can vary from mere catalogues, via vendor-managed inventory, to collaborative planning

[30] Ernst G. Frankel (Massachusetts Institute of Technology), "Profitability through connectivity: the e-port terminal operations in the Internet age; information and transaction management as a key to profitability for shipping and ports," submitted at the TOC 2001 meeting with the theme "Managing Growth with Intelligence: the Quest for Profitable Capacity," 2001.

[31] http://www.ecp.nl/ENGLISH/home.html.

forecasting and replenishment (CPFR), joint product development, and joint project management. As the level of integration increases, suppliers increasingly become partners of their customers. This demands a certain degree of automation of suppliers, who have to be able to let buyers tap into their technical, logistical, and management information systems as if they were a single integrated system.

E. Overview of information and communications technologies in transport

This section is an overview of the general use of ICT in the four main transport sector modes: maritime, rail, road, and air transport. Section F below focuses more specifically on how the Internet and Web technologies allow for new ways of doing e-business within the transport sector.

1. *ICT in road transport*

JIT delivery may result in changes in the average load weight and number of trips a transportation mode must provide. JIT may, for example, increase the number of trips. It may also be more conducive to truck transport, as freight trucks have lower capacity per unit, come in varying sizes, and have more dispatch flexibility than rail and marine transport. Consequently, the impact of JIT may be to increase the demand for freight trucking relative to other freight modes, subsequently increasing the need and demand for ICT in all trucking and courier-service related processes.

ICT in trucking includes a broad range of diverse technologies applied to transportation with the prime objective of saving time, money and, to some degree, lives (safety-related technologies[32]). The range of technologies involved in road transportation to save time and money includes microelectronics, communications, and computer informatics, and cuts across disciplines such as transport engineering, telecommunications, computer science, financing, electronic commerce and vehicle manufacturing. The advancement of ICT has, in some parts of the world, enabled the merging of the driver, vehicle and roadway, through technological means, into a single integrated system to enhance the timing, efficiency and effectiveness of passenger and freight transportation operations, and to promote economic activities.[33]

Currently, trucking and courier companies in many parts of the world use ICT in one or more of the following ways:[34]

(a) To maximize planning efficiency (scheduling, routing, navigation and freight exchanges) and administrative functions (payroll and price calculations) through the use of optimization software;

(b) To track vehicles and cargo in real time monitoring systems through electronic communication between equipment, infrastructure and central logistics coordination centres (vehicle identification, tracing and tracking systems), in combination with two-way communication between centres and drivers (real time traffic information and route guidance);

(c) To transmit automatically transport-related documents such as manifests, bills of lading and invoices, while also automating financial transactions through electronic data interchange or Web-based systems.

These ways of using ICT apply not only to road transport companies, but also to companies operative in other transport modes, such as maritime and air and, in part, rail transportation.

However, some notable differences in the use of ICT can be recognized in the other transport modes, mainly owing to differences in transport infrastructure, ownership structure, transport frequency and safety. These differences in the use of ICT are summarized below.

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[32] The subject of transport safety technologies will not be addressed in the present study, but information on the subject can be found at: www.tc.gc.ca.

[33] See *Study on ITS Applications within the Canadian Trucking Industry*, prepared for Transport Canada Surface Transportation Policy by Sabounghi & Associates and Delcan Corporation, November 1999.

[34] Transport Canada, *Transportation in Canada – 1998 Annual Report* (http://www.tc.gc.ca/pol/en/ANRE1998/TC98C11E.HTM) (hereinafter referred to as "*Transportation in Canada. – 1998 Annual Report*").

2. *ICT in maritime transport*

Use of ICT in marine-freight transport can be divided into two main areas: ICT used by shipping companies, and ICT used in marine infrastructure, such as ports or canals.

Shipping companies use real-time ICT for automatic ship-tracking systems that rely on satellite technology for Global Positioning Systems (GPS) combined with electronic digital charts, as well as two-way digital communication from ship to shore. These systems make it possible to track ships, containers and equipment in real time, both from shore and from sea, and to calculate optimal routing and scheduling. International shipments involve complex process steps, and many of the maritime carriers (and intermediate information service providers) have started to help shippers, intermodal partners and third parties to execute the shipment work flow more efficiently on the Internet, including tasks such as: scheduling, multimodal coordination, price quotation, shipment costing, booking, tracking and tracing, insurance/taxes/duties, payment and document management.[35]

Marine infrastructure's main use of real-time ICT and electronic data-processing systems is for tracking and optimizing the movements of ships and cargo, especially within a port or canal. It also uses this technology to optimize loading and unloading by allocating berths and cranes; storage (particularly in container yards); and cargo pick-up and delivery by other freight modes, (rail or truck) at a port's gates.

In ports, particular emphasis is placed on container management and tracking, which can be supported by GPS or bar code registration. However, an interesting problem related to real-time container tracking is the requirement for all transport companies to install standard identifiers, such as bar codes or transponders,[36] on containers. Another interesting problem is the need to locate interior containers in densely packed container storage yards, with spread spectrum technology being explored to solve it (as bar codes have never been very successful with containers). Today, two overall approaches to ICT in ports are common:[37]

(a) Transport operating systems are implemented in ports, where computer systems handle data management, yard, vessel and train planning, control of equipment in the terminal and communications;

(b) Port community systems, which often include routing of EDI and, increasingly, Web-based messages between: carriers, shippers and brokers, marine infrastructure (ports) and other freight modes, such as rail, allowing for sharing of container details and location, as well as vessel arrival and departure times.

The typical information flow in a port community is illustrated in figure VIII. This diagram, based on the Port of Rotterdam Information Network, illustrates the various players and data flows that typically occur. The two essential actors are the freight forwarder and the shipping agent, as both must coordinate information flows from various sources. The use of ICT, notably EDI and/or Internet-based communication, reduces both the amount of time for information exchange and errors occurring from multiple transcriptions of data, while data entry routines ensure that the information is both complete and logical.

The United Nations, through UNCTAD, is also working to promote the widespread use of ICT in the maritime sector and thereby speed up the flow of goods. A first step was the launching of the Automated System for Customs Data (ASYCUDA), which speeds up the customs clearance process through computerization and simplification of procedures. The second step was the Advanced Cargo Information System (ACIS), which improves transport efficiency by tracking equipment and cargo along the transport modes and at interfaces, providing information in advance of cargo arrival. This latter programme has allowed management to reduce significantly the transit time of goods, make better use of transport

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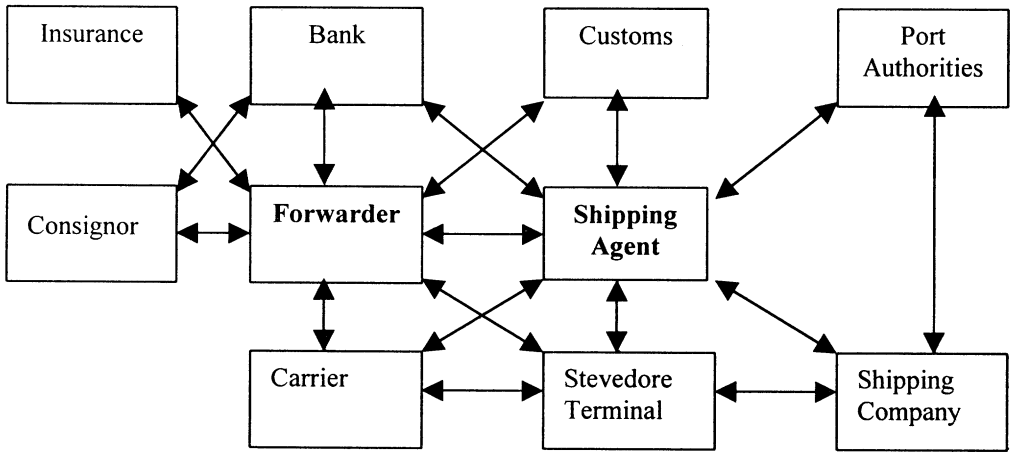
[35] Dean Wise and James Brennan, "E-commerce - taking stock," *Containerisation International*, November 2000.

[36] A transponder is a wireless communications, monitoring, or control device that picks up and responds to an incoming signal. The term is a contraction of the words transmitter and responder.

[37] Karl Jeffery, "Recent developments in information technology for container terminals: a Cargo Systems report," London, January 1999.

equipment and improve the quality of transport services.[38] Finally, the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) is very much involved in the development of standards for e-business.

Figure VIII. The use of information and communications technologies in ports



Source: Port of Rotterdam Information Network (http://www.pcr-info.nl/e/pcr/main.htm).

The implementation and use of ICT varies among ports and maritime operators around the world. In the following example from Singapore, one of the most advanced solutions is briefly reviewed.

Box 1. The port of Singapore: an example

Many industry commentators believe that Singapore (the Port of Singapore Authority (PSA)) has the most sophisticated port computer network in the world. Singapore has always been at the forefront of development in information technology (IT) for ports.

The Port of Singapore Authority is the world's single largest container terminal operator, handling over a million containers every month, including some 30,000 boxes and 40 container vessels every day. It is also the world's largest transshipment hub. It has invested US$ 160 million in its information technology system over the past five years, and it is now the largest computerized network in Singapore.

All of the container terminals in the port are operated by PSA, and this centralized management has made it easier to implement the very wide-reaching IT system.

The systems relevant to container shipping are CITOS (Computer Integrated Operations System) for managing the container terminals, PORTNET, a network for communication and information for shippers and shipping lines, and BOXNET, a network for communication and information for hauliers.

Other systems are CICOS (Computer Integrated Conventional Operations System) handling non-containerized cargo and CIMOS (Computer Integrated Marine Operation System), which is linked to MAINS (Maritime Information System) to manage and distribute information on vessel traffic through the port.

The most recent IT developments are the move of PORTNET to Windows Internet-based communication, setting up a new generation of CITOS, and installing remote-controlled bridge cranes at the new Pasir Panjang Terminal.

Source: Karl Jeffery, *Recent Developments in Information Technology for Container Terminals*, Cargo Systems, London, 1999.

[38] UNCTAD, "Study on the use of information technology in small ports: report by the UNCTAD secretariat" (UNCTAD/SDTE/TLB/1), 12 January 2001.

3. *ICT in air transport*

As with marine and road transport, ICT diffusion in air transport has been relatively rapid. The vast majority of both air navigation infrastructure suppliers and large commercial airlines now use GPS-based satellite tracking, allowing for ongoing consolidation of air traffic control infrastructure. Expert programs, Internet and EDI systems are also used for administering, routing, scheduling, and other management functions, and also by maintenance personnel. It should be noted that the airline industry is one of the most advanced of all industries in using EDI and electronic commerce to direct retail products such as airline tickets.

The airline industry's rapid adoption of electronic commerce may be a sign of similar moves to electronic markets in other transport industries, such as rail-freight, where it is still relatively new. During the airline industry's early ventures into EDI, there were no electronic connections between the airlines and their brokers, the travel agents. By the second stage, brokers and producers had become connected through computer reservation systems (CRS) containing electronic information on different airlines' products (such as fares and schedules), but consumers were still outside the loop. Currently, both CRS-equivalent systems, such as Cheap Tickets Inc. and Lastminute.com, and individual airlines are on the Internet, allowing for increasing amounts of direct sales between producer and consumer. This development has reduced or eliminated the role and costs associated with a physical intermediary, the broker. Direct electronic communications allow the airline industry to move towards personalizing relationships between industry and consumers, a change that may become the hallmark of the ICT era.

Direct electronic sales of tickets and other products (such as air-mile rewards) allow the airlines to develop detailed, individual databases on specific consumer tastes and buying patterns. Over time, they can use this information to customize products and services to maximize revenues and minimize costs, as well as improve customer service and satisfaction.

4. *ICT in rail transport*

The main distinction between rail and freight-trucking has been in the ownership and nature of the infrastructure used in each mode. Private ownership (or public/private partnerships) often dominates rail infrastructure, while public ownership dominates road infrastructure. Rail infrastructure is also more compact, with a limited number of users, compared with the larger and more diffused road network used by many commercial and private users.

These infrastructure differences may have contributed to the adoption of ICT technology in rail operations.

The ownership characteristics and relative concentration of rail infrastructure and rolling stock allow for the use of simpler tracking technologies. For example, the rail mode can use automatic car or locomotive identifiers such as bar codes and transponders, with readers attached to infrastructure, whereas trucking requires GPS. When the Union Pacific Railway in the United States wanted to track its trains by using ICT, it simply installed bar codes in the cars and fibre-optic cables along the tracks, improving on-time success rates from 48 to 94 per cent.[39] According to the same source, the main applications of ICT in today's rail freight in North America and Europe are:

(a) Radio and signals;
(b) Rail traffic dispatch and control;
(c) Automatic equipment ID and tracking;
(d) Electronic commerce and EDI;
(e) Shipment management;
(f) Mobile computing;
(g) Data warehousing.

[39] *Transportation in Canada - 1998 Annual Report.*

Future investments in ICT are projected to include:

(a) Internet;
(b) Satellite;
(c) Advanced train control;
(d) High-speed wireless;
(e) Expert/simulator systems;
(f) Seamless interaction with all modes, customers and suppliers.[40]

5. *Other ICT transport solutions*

In addition to the above-mentioned transport modes' specific employment of ICT, new information and communication technologies are also employed more generically in other private and publicly managed transport environments. For example, the United States Department of Transportation divides ICT applications in "intelligent transportation systems" into seven categories, as shown in table 3. The wide scope and sheer number of potential or current applications listed are an indication of the substantial impact that ICT will have not just in single modes of transport, but in general across all modes of transport.

TABLE 3. APPLICATIONS OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES IN INTELLIGENT TRANSPORT SYSTEMS

Information and communication technology classification	
Travel and transport management	En route driver information
	Route guidance
	Traveller services information
	Traffic control
	Incident management
	Emission testing and mitigation
Travel demand management	Pre-trip travel information
	Ride matching and reservation
	Demand management and operation
Public transportation operations	Public transportation management
	En route transit management
	Personalized public transit
	Public travel security
Electronic payment	Electronic payment services
Commercial vehicle operations	Commercial vehicle electronic clearance
	Automated roadside safety inspection
	On-board safety monitoring
	Commercial vehicle administration processes
	Hazardous material incident response
	Commercial fleet management
Emergency management	Emergency notification and personal security
	Emergency vehicle management
Advanced vehicle control and safety systems	Collision avoidance (longitudinal, lateral, intersection)
	Vision enhancement for crash avoidance
	Safety readiness
	Pre-crash restraint deployment
	Automated highway system

Source: Diebold Institute for Public Policy Studies, *Transportation Infrastructures, the Development of Intelligent Transportation Systems* (Westpoint (Connecticut), Praeger, 1995).

[40] Ibid.

The following section will examine various features of Internet and Web-based e-commerce applications that have direct implications for planning efficiency, tracing and tracking of freight and equipment, and for the information flow within the transport industry.

F. SPECIFIC ELECTRONIC BUSINESS APPLICATIONS IN TRANSPORT

The purpose of this section is to examine the nature of electronic business applications in transport services. This examination covers all the processes in the selling and buying of transport services, from the origin to the destination of the products being transported. This section also shows how electronic commerce as a whole is affecting the transport industry and, vice versa, how the supply of transport services may facilitate or impede electronic commerce in general. It also provides examples of e-business applications that have developed in the transport industry. In examining development in e-commerce and transport services, this section focuses on state-of-the-art applications, which are found, for the most part, in developed countries around the world, but also, with regard to certain applications, in the ESCWA region as well.

Naturally, the preconditions for utilizing e-commerce vary from country to country, from region to region, and from transport mode to transport mode.[41] However, the focus in the section below will be less on the stated different national/regional/mode-specific preconditions for implementing e-commerce, and more on the generic technological opportunities and challenges within the transportation industry. It should be noted that there might be certain variations in how the industry's components are used. Some of these components include:

(a) Tracing and tracking;
(b) Tariffs, pricing;
(c) Booking;
(d) Bill of lading;
(e) Freight exchange.

Recent surveys from the maritime transport sector actually indicate that most of the leading ocean carriers' web sites have taken the first steps towards automation of the transaction process on the Web, as illustrated in table 4.

TABLE 4. TRANSACTION CAPABILITIES OF WEB SITES OF OCEAN CARRIERS

	Container/ Cargo Tracking	Voyage/ Schedule Locater	Rate/Tariff Quote	Booking	Bill of Lading	Customs Report
MAERSK	✔	✔	✔	✔	✔	
Evergreen	✔	✔	✔	✔	✔	
P&O Nedlloyd	✔	✔				
MSC						
APL	✔	✔	✔	✔	✔	✔
COSMO	✔	✔	✔			
Zim	✔	✔				
NYK	✔	✔			✔	✔
CMA-CGM			✔			
HMM	✔	✔		✔	✔	
Yang Ming	✔	✔	✔		✔	
OOCL	✔	✔	✔	✔	✔	
Hapag-Lloyd	✔	✔		✔		
K-Line	✔	✔	✔	✔		
MOL	✔	✔	✔	✔	✔	
Hanjin	✔	✔		✔	✔	

Source: *Containerisation International*, November 2000.

[41] For more on this issue, see "Implications for developing countries and possible strategies to be adopted," in UNCTAD, *Building Confidence: Electronic Commerce and Development* (New York and Geneva, 2000) (hereinafter referred to as "Building Confidence").

Table 4 shows that the transaction capabilities of the web sites of major shipping lines apparently differ considerably between carriers, although basic information requirements are offered by practically all sites. This is clearly an important step in levelling the playing field for shippers in developing countries. However, the transaction capabilities offered by a number of sites, which are likely to become standard features in the near future are still not accessible to many traders. This is mainly due to the legal uncertainties surrounding Web-based contracts and the use of non-paper documents.[42]

Containerisation International estimates that up to *25* interactions between a container line and a customer can be turned into Web-based "self-service" or support functions,[43] though not all of these interactions are important to every customer or market segment. Eventually, carriers will learn how to use the Web to personalize service offerings and transactional flexibility for specific customers and markets, provide tools to help customers improve overall supply chain effectiveness, and accomplish carrier goals of cost reduction and revenue gains at the same time.

1. *Tracing and tracking*

Tracing and tracking (TT) are functions commonly used by transport service providers employing interactive Internet applications, regardless of whether these providers are road, rail, sea, or air transport carriers. All shippers have, in a sense, an interest in the movement of their consignments and the following TT functions are currently the most used:[44]

(a) Shipment tracking;
(b) Shipment monitoring;
(c) Container tracking;
(d) Equipment tracking;
(e) Vessel tracking;
(f) Fleet tracking;
(g) Flight tracking.

The pioneering work, together with the greatest demand for shipment tracking, appears to have developed in express or parcel delivery services. Tracking-related applications now constitute a very significant share of Internet applications used in freight transport services. While tracking is most widely used in express and parcel delivery transportation, freight forwarders, motor carriers, air cargo carriers, rail carriers, ocean carriers and other transport service providers also use it.

Tracing and tracking involve GPS, which keeps track of vehicles so that customers can ascertain exactly where a shipment is located at a given time. The use of bar coding to identify individual packages or consignments is an integral part of shipment tracing and tracking. Each package can be scanned at various points on the transport chain. Drivers or other delivery employees may use hand-held computers, which scan the parcels' bar codes, signatures of receivers and the time of delivery. This information is then transmitted directly to the carriers' central computers. Thus the records of a parcel's location are monitored at all times, from the time of pickup at origin to the delivery at the final destination point. If a package is misplaced and can not be located, the records make it easy to focus a search.

Service providers in the transport sector offer customers tracking possibilities through telephone, interactive touch-tone systems or the Internet. To receive information about the status of a package, the customer accesses the service provider's site and types in the number of their package. The transmission of the information on shipments may be tailor-made to suit the customer's requirements. For example, a customer may select a high frequency of transmission of shipment status data, such as every hour or two. At the other extreme, the transmission of the messages may be limited to notification of pickup and delivery.

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[42] UNCTAD, "Electronic commerce and international transport services: report by the UNCTAD secretariat" (TD/B/COM.3/EM.12/2), 31 July 2001.

[43] Dean Wise and James Brennan, "E-commerce – taking stock," *Containerisation International,* November 2000.

[44] Freight@Internet report on the impact of Internet technologies in the freight transport market, 1999, *Scientific American Newsletters* (http://www.sanewsletters.com/FEC/FIRtoc.html).

Tracing and tracking also enhance the ability of the carrier to find consignments and to redirect stray consignments. TT increases transport reliability and reduces the incidence of losses or theft. It enables customers to receive accurate information about the movement of their consignments and the expected arrival time. The value of tracking and tracing shipments is not limited merely to the ability to know the location of a consignment. In B2B transport services, TT also enables enterprises to manage the flow of shipments electronically and thus achieve more efficient and informed management of inventory and restocking, as well as production-line operations, marketing and customer services. For example, suppliers may be able to divert intermediate goods already in the pipeline to locations where the supply is more critical.

As shipment tracking offers considerable benefits, its technology is reported to be very costly. It is therefore evident that only big carriers or delivery service providers can provide shipment tracking. The feasibility of the system is, to a large extent, governed by the market. It is likely to be worthwhile when customers demand guaranteed delivery at specified times and are prepared to pay the premium. It may also be justified for tracking consignments that should not be lost or delayed for reasons such as high replacement costs or safety factors.

In the maritime shipping industry, tracing and tracking are widely available on the Internet. The international shipping company P&O Nedlloyd has easily accessible tracing and tracking facilities on their home page. Customers can choose to trace and track their orders by entering any of the following pieces of information:

(a) Booking reference;
(b) Bill of lading;
(c) Container tracking.

This function of tracing and tracking is illustrated in figure IX, which depicts an extract from the Nedlloyd home page, which also offers extensive scheduling and booking facilities.

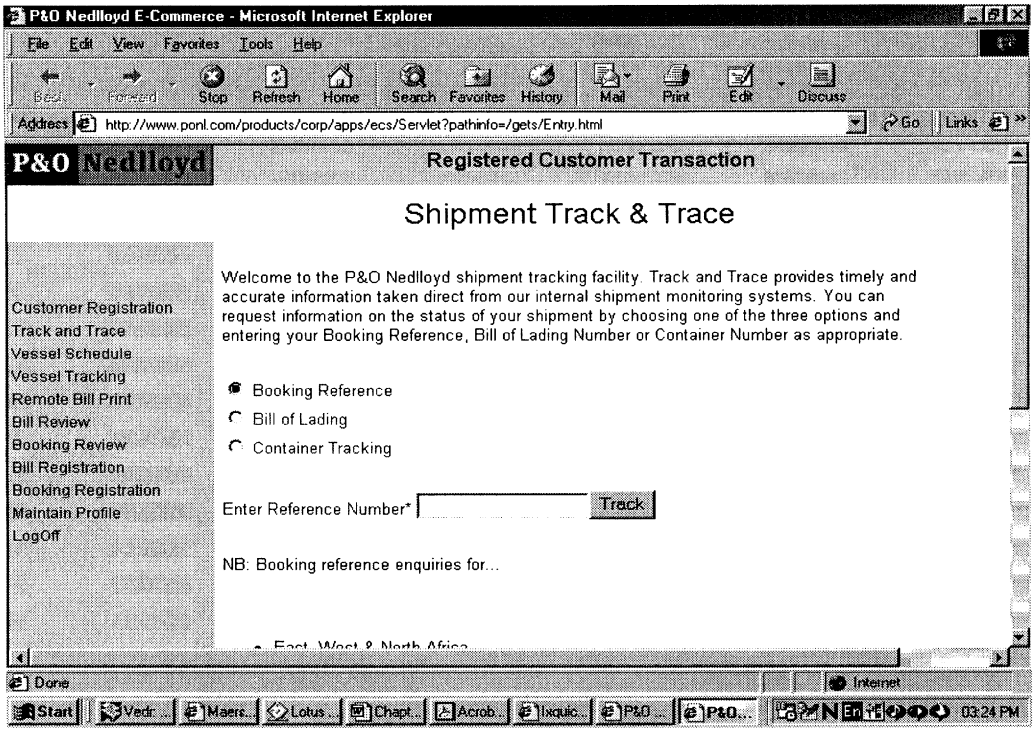
Box 2. Tracing and tracking by United Parcel Service

United Parcel Service (UPS) recently announced significant enhancements to the UPS on-line tools, which offer advanced shipping and logistics applications that allow businesses to link seamlessly their intranets and Internet web sites with UPS. The on-line tools enable customers to calculate shipping costs, select and compare shipping services, and track packages from the point of order entry to delivery. UPS is adding two new tools, enhancing two others, making all six tools available in XML, and providing customers with a list of approved service providers who can help with integration. In conjunction with the tool enhancements, UPS is offering an XML version of all UPS on-line tools. The two new UPS on-line tools that support XML are UPS Tracking (which provides up-to-the-minute shipment status, from origin to delivery) and UPS Rates and Service Selection (which lets on-line shoppers compare, price and select shipping services that best fit their needs and budgets). The XML tools support structured, self-descriptive, and extensible formatting of the data. XML documents have tags naming each data element, allowing optional elements to be omitted and unexpected or unwanted elements to be ignored. More than 60,000 businesses have licensed UPS on-line tools since their introduction in April 1999. The official UPS announcement stated that:

"The new tools include: (1) UPS Signature Tracking, which allows approved customers to track packages and receive the most complete proof of delivery available. Customers will receive the digitized signature of the person who signed for the delivery, the full delivery address, C.O.D. amount collected (if applicable), and the reference number associated with the delivery—all the elements needed to create an official proof of delivery to present to their customers to expedite payment.

"(2) The new UPS Shipping tool will allow approved customers who ship at least 50 packages a day to enable all their employees to create and print shipping labels from their desktops. Customers can customize the interface and control which services and features are available to specific groups of employees. This tool also makes it possible for businesses to share information such as address books, shipment histories and tracking information across internal systems." *Source*: Tim Geiken, Vice President of E-Commerce, UPS (http://www.pressroom.ups.com/pressreleases).

Figure IX. Tracing and tracking facilities from P&O Nedlloyd



Transport enterprises use, in addition to shipment tracking, the Internet and other electronic means to enable their customers to track containers and other transport equipment located at various depots, to determine if they are able to meet customers' requirements. In the rail industry, for example, Internet-based applications allow shippers to locate specific freight rail cars, showing their location, as well as details about the shipper, consignee, and commodity shipped. In maritime transport, a number of large carriers and seaports are introducing Internet applications to track vessels in order to provide real-time information on the location of vessels and departure dates. In air-freight transport, carriers and freight forwarders offer customers Internet-based flight tracking, so that it can be combined with shipment tracking.

Other tracing and tracking activities that can be supported by the Internet and considered as part of electronic commerce solutions are:

Posting, bookings and requests:

(a) Load availability;
(b) Equipment availability;
(c) Load booking;
(d) Pickup request;
(e) Quote request;
(f) Address look-up.

Time-sensitive information:

(a) Arrival and departure information;
(b) Interactive schedules;
(c) Transit time calculation;
(d) Terminal scheduling;
(e) Routing options;
(f) Traffic information.

More details on the specific functionalities of each of these systems may be found in freight@internet.

2. *Tariffs, pricing and booking*

The Internet offers new opportunities for streamlining and increasing transparency in the transport carriers' tariffs and pricing structures. In maritime transport in particular, transportation operators have traditionally used complex pricing structures; and the rates charged to the shipper are a function of many factors, including value, weight, stowage factors and port conditions. Carriers publish tariffs for individual commodities and trades, resulting in the publication of voluminous tariff books. As markets change, the tariffs are constantly amended, producing additional costly paperwork, which has to be distributed to agents and shippers.

More and more maritime transport carriers and airline companies, as well as third party firms, now offer tariff and pricing information on the Internet. It means that previous existing market structures such as liner conferences have largely disappeared and new pricing mechanisms have been established.[45]

Today, tariff and pricing information is being made ever more available on the carriers' or firms' web sites. Some of them provide online "calculators" enabling the shipper to input details such as cargo origin, destination and characteristics, and the "calculator" provides the required freight rate instantly. These systems are fully interactive and provide important benefits to shippers by simplifying and expediting the numerous tasks involved in freight rating, which would otherwise involve considerable time, cost and human resources to complete.

Maersk Sealand is one of the leading maritime carriers that offer extensive rates, tariffs, booking opportunities and tracing of freight and vehicles. Maersk Sealand is also the world's largest provider of containerized transport solutions. Their transport network spans all six continents, with about 325 offices in over 100 countries employing over 10,000 people. Maersk Sealand operates more than 250 maritime vessels with a total capacity of around 600,000 TEU. On their Internet site,[46] it is possible to calculate exact rates and tariffs.

In the example cited in figure X, it takes less than a minute to enter the Maersk Sealand home page and find the necessary tariff rate information. In the same example, the price for shipping one 20-foot dry container from the port of Beirut in Lebanon to Dar Es Salaam in Tanzania was tested. Base rate and other charges are instantly screened. Once the tariffs have been accepted, the customer has the option to continue with online booking, which is executed in three relatively easy steps, as shown in figures XI, XII and XIII.

The only requirement for using the booking system is that the customer needs to become a registered user to get a digital certificate, and booking can then be made at any time, that is, 24 hours a day, seven days a week. Bookings can be viewed and reused ("favourites"), which saves even more time for the customer as no new data need to be entered.

Maersk Sealand offers online Internet services all along the transportation chain, including all the following transactions and functionalities:

Scheduling → tariffs and prices → booking → tracking → bill of lading → accounting

However, carriers such as Maersk Sealand are not the only agents offering tariff and booking opportunities online. With the general aim of providing shippers supply chain visibility, several "intermediary" sites offer the shipper a unified source for shipment location, scheduling and status information, often spanning multiple modes, including price quotations, shipment costing, insurance/taxes/duties and document management. Key examples of such sites are: Tradiant.com, From2.com (which can quote all-inclusive delivery costs online at the time of transaction), e-transport.com (rate management software) and emodal.com (multimodal coordination at ports).

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[45] UNCTAD, *Building Confidence.*

[46] http://www.maersksealand.com/MaerskSealand/

The efficiency of the Web has stimulated these new "self-service" models, where shippers, or third parties representing shippers, can carry out virtually all their shipping processes online, from carrier selection through payment. These new third party intermediaries are rapidly automating pricing, compliance and booking, as self-service portals integrated directly into customers' web sites. Key examples include: iLinkGlobal.com and Freightdesk.com.

Figure X. Maersk Sealand Internet-based rate calculation service

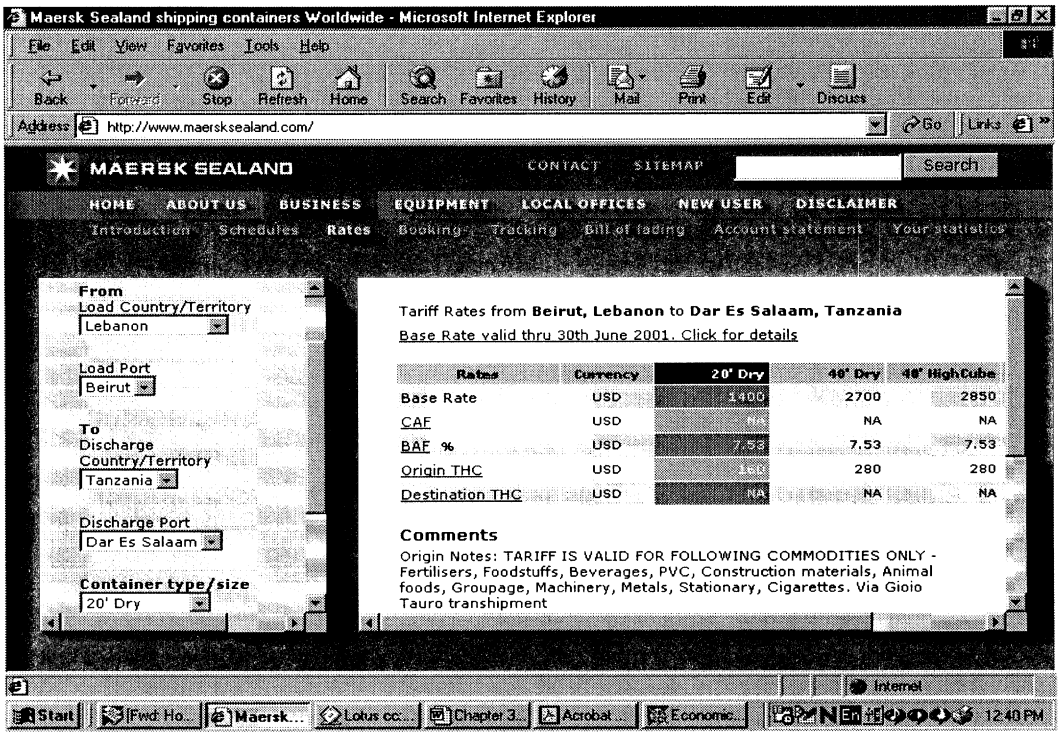


Figure XI. Maersk Sealand online booking system, step 1

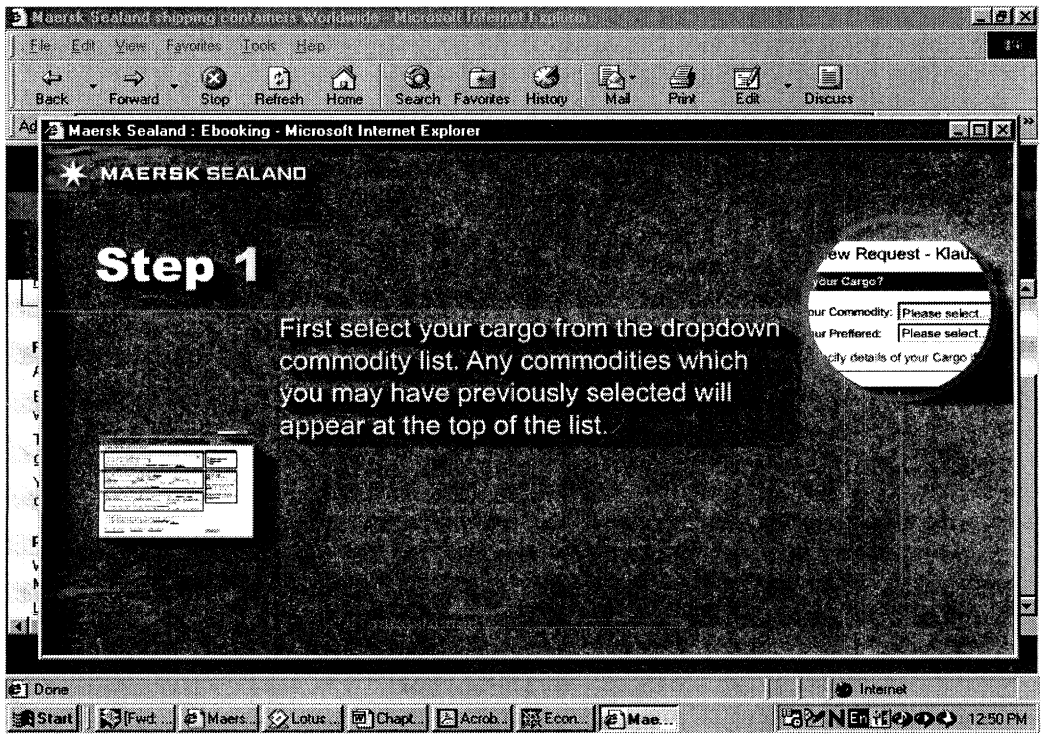


Figure XII. Maersk Sealand online booking system, step 2

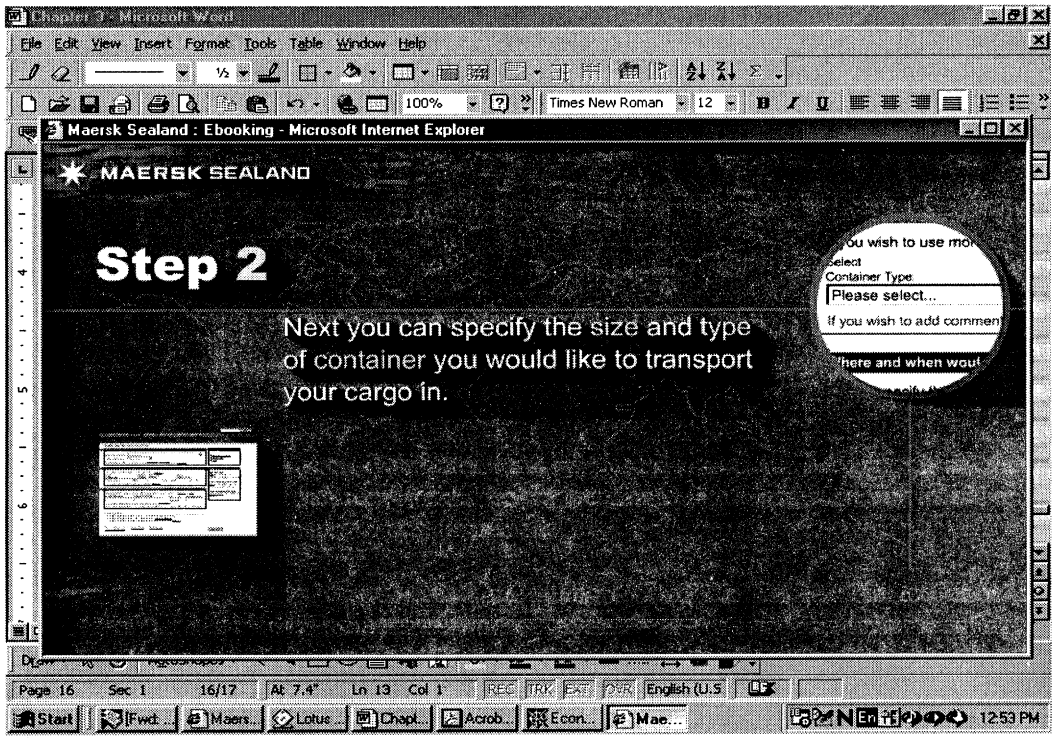
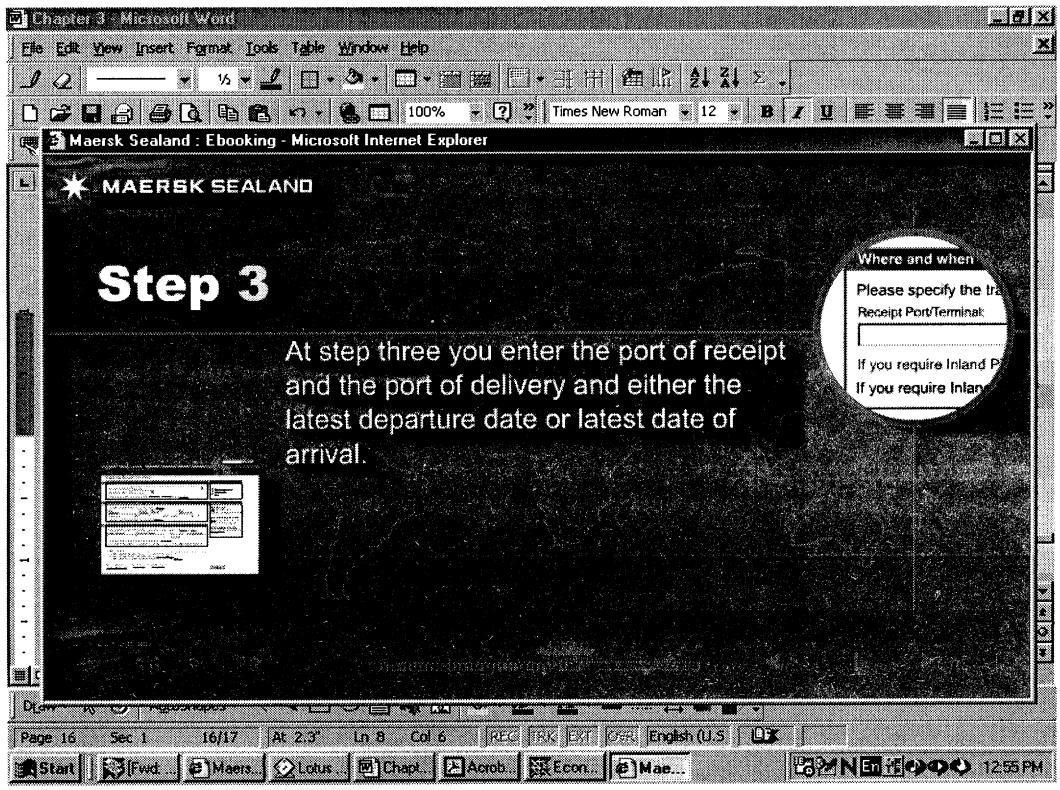


Figure XIII. Maersk Sealand online booking system, step 3



3. *Bill of lading*

Through the custom of merchants, the bill of lading has become recognized as a document of title, representing goods, and is considered the fulcrum of international trade. The attributes of the bill of lading are the following.[47] First, the bill of lading is a receipt issued by the carrier for the goods received from the shipper for carriage. The buyer therefore knows that they are in the physical possession of the carrier, who must in due course deliver them to the consignee. Secondly, the bill of lading is evidence of the contract of carriage between the carrier and the cargo owner and sets out its terms and conditions. Thus, if the goods are lost or damaged during the voyage, the holder of the bill of lading can lodge a claim against the carrier under it. Thirdly, the bill of lading is a document of title in the sense that it can be endorsed from one party to another, thereby transferring property in the goods if that is the intention of the parties. The bill of lading has therefore come to represent the goods that give the holder the right to claim delivery and the right of control.

Many international transport operators have started to offer and give access to bills of lading on the Internet. As the bill of lading is a contract between the transport carrier and the shipper and contains details of shipment (including shipper, consignee, freight charges and purchase number), carriers have now decided to provide Internet-based systems in which the shipper can prepare the bill of lading, in advance, on computer. The carrier may provide shippers with Internet access to view, print out and submit bills of lading from the carrier's web site. The information on the bill of lading can be transmitted to the consignee in advance of the cargo's arrival, thus enabling them to know what is being shipped. The ability to place the bill of lading on the Internet means that, in addition to its traditional role as a contract, it provides carriers, shippers and consignees with data and information that they can use to schedule and record shipments and to process transactions through the transport chain.

Nine of the leading 16 ocean container carriers offer bills of lading from their web sites, and a number of the above-mentioned "intermediaries" also offer these services. They include General Electric Information Services (GEIS). In partnership with Ocean Wide, Inc., General Electric is marketing a system that provides an e-commerce solution that allows shippers, trucking companies and freight forwarders to exchange trade documents with ocean carriers and the United States Customs.

Celarix[48] offers a number of commercially available Internet-based administrative billing and contracting services.

Yet another development is the Microsoft Value Chain Initiative, which attempts to bring together software, hardware and supply chain companies to establish an integrated architecture that will promote data-sharing among different software applications and among trading partners on a global basis, regardless of the format or communications method, and integrate these communications with operational systems.

The Bolero system even provides a mechanism for exchange of trade documentation, including transfer of rights from the first holder of the bill of lading to a new holder, thereby replicating the functions of the traditional paper bill of lading in an electronic environment. This is legally the most complicated issue (the third attribute of the bill of lading). Questions have arisen as to whether the law recognizes the validity of electronic signatures and authentication, and it has been questionable whether an electronic bill of lading is a negotiable document of title that can thereby be used for the transfer of the ownership of goods. However, Bolero started a system whereby subscription members can trade electronic bill of ladings with each other under a legal framework embodied in the Bolero Rule Book, which is binding on them. It constitutes a multilateral contract between all the users of the Bolero system and is governed by British law.

4. *Freight exchange*

For decades agents and brokers have helped shippers and carriers to meet at the marketplace in order to facilitate demand and supply needs in transportation. The role of the agent was to bring together those

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[47] UNCTAD, "Electronic commerce and international transport services: report by the UNCTAD secretariat" (TD/B/COM.3/EM.12/2), 31 July 2001.

[48] www.celarix.com.

offering cargo and those offering shipping capacity. This process took much time, as agents and brokers had to go back and forth to match the requirements of a multitude of shippers and carriers. A number of organizations and firms have now established web sites where carriers and shippers can buy or sell transportation services.

The online sales of transportation services makes it possible for carriers and shippers to post quickly their offers of cargo and shipping space worldwide at very low costs. The system is also flexible since the shipper or carrier may, for example, make offers only to the parties they designate on the Web. Since this type of exchange provides a real-time market, carriers and shippers are able to negotiate offers on the basis of the most up-to-date, market-driven freight rates.

In general, freight exchanges play two valuable roles: aggregation and facilitation. As aggregators, they bring a group of dispersed trading partners together into a virtual marketplace. As facilitators, they provide software tools and protocols that enable the traders to do business electronically, exchanging information, processing offers and bids, coming to terms on deals, and following through on them.

For all modes of transport, more than 120 sites now exist, which somehow has "blurred" the market for Internet-based exchange, as these portals and services try to differentiate between—or simply copy—functionalities from one another. Conventional wisdom holds that only a handful of independent marketplaces will survive, and the early rationalization and fusion of sites have already begun. However, there is still a long list of exchange and reverse auction sites for maritime container shipping, including the following examples:

- Capstan.com
- CargoExchange.com
- CargoNet.com
- CargoNow.com
- Celarix.com
- eModal.com
- eTransport.com
- Frieghtdesk.com
- Freightgate.com
- From2.com
- GoCargo.com
- IATN.com
- ILinkglobal.com
- Neomodal.com

The carriers' least favorite format is the reverse auction, wherein shippers post loads, and carriers bid prices down to win the loads. With carriers reluctant to cut prices in public markets, many of the independent web sites are downplaying and moving away from sole reliance on sport market transactions, owing to negative reactions from ocean carriers. In addition, prominent sites such as Celarix.com and Neomodal.com recently shut down their public marketplaces, although Celarix will continue to offer private marketplaces to its customers.[49]

The first generation of transportation B2B exchanges has actually, according to some analyses, had a difficult time.[50] First, the value proposition offered by most exchanges—competitive bidding among suppliers that allows buyers to get the lowest possible prices—runs counter to the most widely accepted current theories on buyer-supplier relations. Most companies have come to realize that getting suppliers at the lowest price may not be in their best economic interest. Other factors, such as quality, timing of deliveries and customization, are often more important than price in determining the overall value provided by a supplier. Actually, many companies have spent the past two decades methodically forging tighter, more strategic relationships with suppliers. The online exchanges focusing on arm's length, price-driven transactions work counter to this trend.

Secondly, the exchanges deliver little benefit to sellers. Suppliers have access to more buyers with only a modest increase in marketing cost, but that benefit is cancelled out by pricing pressures. Few suppliers want to be anonymous contestants in ruthless bidding wars. As a result, the buyer-biased exchanges that

[49] *Containerisation International*, November 2000.

[50] Richard Wise and David Morrison, "Beyond the exchange: the future of B2B," *Harvard Business Review*, November-December 2000, vol. 78, No. 6.

characterize B2B today will not be able to achieve a critical mass of participants. To be successful in the long run, B2B exchanges need to offer strong incentives to both buyers and sellers.

Finally, many exchanges have not taken the time to study their customers' priorities in depth, create distinctive offerings, or even map out paths to profitability. In some cases, they have simply used off-the-shelf software to set up simple auctions as quickly as possible. Because the software is readily available and relatively cheap, the barriers to entry are low, and the resulting proliferation of new exchanges is undermining the margins of all players. Thus the input of new entrants is leading to the same type of market fragmentation that the exchanges were designed to overcome in the first place.

Future freight exchanges will probably move in two new directions. First, since the best method of achieving sufficient market liquidity is to enlist every participant's support, the exchanges will move away from being for-profit entities and move towards being collective industry efforts run for the benefit of all. Secondly, exchanges will move beyond merely executing transactions to create the infrastructure and standards necessary to streamline communication between buyers and sellers. This will address pressing issues of efficiency, such as speeding up the flow of product information, automating billing and payment, and linking buyer and seller business processes more closely. It will allow the exchanges to handle not only simple products but also to handle more closely the complex custom components that account for most business processes. Covisint.com, the automotive mega-exchange, is already moving down this path. Conceived as a "for-profit" enterprise that would earn commissions on the transaction volume generated by its founders, Covisint has now changed in the face of resistance from suppliers. To ensure broad participation, the exchange has opened up its services to many other auto manufacturers as equity owners, and 40 suppliers have been given profit-sharing stakes.

Box 3. The National Transport Exchange and Teleroute.com

In road transportation, one of the most innovative freight exchange systems is the National Transportation Exchange (NTE),[a/] which is a B2B e-commerce marketplace based in the United States. Buyers and sellers interactively trade ground-transportation capacity at a market-driven price. Much like a stock market, the market-driven price is based on the dynamic elements of time, distance and shipment type. The Exchange provides a set of processes, technology interfaces, and membership requirements that permit complete processing to the point of execution. This includes shipment tracking, guaranteed payment and quality of transportation service.

The NTE system is used by shippers, third party logistics providers, freight forwarders and other intermediaries (so it does not exclude agent/brokers, but gives new tools with which to work). Using the Internet, the NTE is designed to link trading partners in a supply chain to optimize and automate the execution of trades between shippers and carriers. At this time, there are over 500 industry users/members, including shippers, consignees, contract and dedicated logistics companies, forwarders, brokers and truckload carriers.

NTE also uses partnerships and alliances as part of their overall business strategy. They currently have partnerships with supply chain software companies, such as Manugistics and mySAP.com, to provide integration and access to their clients, including automatic access to the NTE Internet trading community, which extends the optimization beyond the enterprise. Shippers and their trading partners can gain visibility and improved service for all shipments by leveraging the dynamics of the transportation industry.

With the integration of NTE, Manugistics and mySAP.com clients can optimize freight movement with their trade partners, with the added feature of using the trading exchange for real-time pooling of less-than-truck-load orders. The exchange can find the best-priced alternative that meets the service parameters required by the shipper.

According to the information on the NTE Web page, the average shipment placed on the Exchange, which is matched with an available carrier's capacity, is committed for shipment within three hours of being posted on the Exchange.

In Europe, *Teleroute.com* has established itself in the road transport market. In Europe as a whole, more than 120 million tons are transported annually thanks to Teleroute, where 56,000 offers are reviewed every day by 35,000 users. With a consolidated turnover of 50 million euros, Teleroute is the top supplier of e-commerce solutions to the transport sector. Teleroute was created in France in 1988, and is now present in 16 European countries.

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a/ www.nte.net.

Analysts predict that the second generation of freight exchanges will be structured very differently from the way they are today. Rather than being dominated by buyer-driven interest, exchanges will encompass several distinct, interdependent business models in the future.[51] The following five exchange models are expected to evolve, and are already in their infancy:

(a) *Mega exchanges*: Because scale and liquidity are vitally important to efficient trading, today's fragmented and, to some degree, illiquid exchanges may consolidate into a relatively small set of mega-exchanges that will occupy the centre of the B2B freight exchange universe. As transaction fees fall or disappear entirely, the exchanges may turn into nonprofit collectives.

(b) *Originators*: Surrounding the mega exchanges and plugged into them in various symbiotic ways will be the specialist originators, which will structure, identify and qualify bidders and which will create detailed, standardized requests for proposals that enable the bidders to provide comparable quotes even on highly specialized products. The originators can, in the end, aggregate orders and bundle them into larger order requests, and send them to mega exchanges for execution. The originators' role will probably be most valuable in markets with relatively expensive products that are neither commodities nor completely customized, such as automotive and aircraft components.

(c) *E-speculators*: These will seek to trade on the exchanges, and capitalize on the abundance of market information, and will tend to concentrate where relatively standardized products can be transferred easily among a large group of buyers. They can look for price volatility, which will provide trading spreads. E-speculators will need to develop strong financial and risk-management skills, and the speculators' advantage will come from having better, more timely market information than other participants. To get that information, speculators will have to enter into close partnership with at least one mega exchange or operate as the profit-making arm of an exchange.

(d) *Solution providers*: These exchanges will leverage distinctive technical expertise to become indispensable to customers and thus reduce the importance of price in buying decisions. These solution-providing exchanges will derive a substantial proportion of their profits from high-margin add-ons and consumables.

(e) *Sell-side asset exchange*: Many exchanges may become places where suppliers will trade orders among themselves, sometimes after initial transactions with customers are made on the mega exchanges. Sell-side swapping will be most valuable where markets are highly fragmented, both on the buyer and seller side, where for geographic or information reasons, demand and supply are often mismatched and where suppliers can benefit greatly from keeping expensive fixed assets fully utilized. Transportation, but also other businesses such as farming and construction are obvious examples.

The different attributes and characteristics of the expected new exchange models are summarized in table 5.

TABLE 5. AN OVERVIEW OF THE ATTRIBUTES OF POTENTIAL NEW B2B MODELS

	Key characteristics	Market industries	Required capabilities	Sources of competitive advantage	Profit sources
Mega exchange	Maximum liquidity Common transaction standards	Most vertical industries Major horizontal purchase categories	Large-scale transaction processing Perceived neutrality	Scope and liquidity Standard setting	Slim profits or non-profit

[51] Ibid.

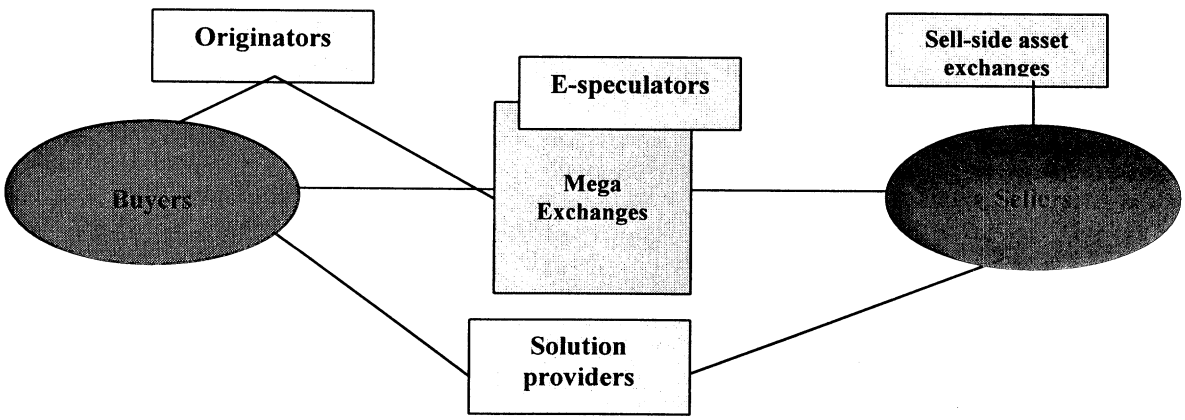
TABLE 5 (*continued*)

	Key characteristics	Market industries	Required capabilities	Sources of competitive advantage	Profit sources
Originator	Complex products Relatively expensive products	Electronics Automotive components Insurance	Consultative sales skills Deep product understanding Strong customer relationships	Deep knowledge of product category Effective use of decision support software Bundle transaction volume ability	Transaction commissions Slotting fees from vendors
E-speculator	High degree of product standardization	Electrical power Chemicals	Financial engineering In-dept knowledge of market dynamics	Timely market information Transaction scale Alignment with major buyer/seller	Playing the spread
Solution provider	Product cost a small portion of overall cost	Speciality chemicals Engineered plastics Cutting tools	Strong technical skills Problem solving mindset	Brand strength Rich set of offerings Customers lock-in	Higher product margins Valuable add-ons and refills
Sell-side asset exchange	High fixed costs Relatively fragmented supplier/customer base	Transportation Metal machining Construction	Strong supplier relationships Ability to offer additional relevant services Perceived neutrality	Liquidity First mover with key suppliers	Selling surplus and ancillary products/services to members

Source: Richard Wise and David Morrison, "Beyond the exchange: the future of B2B," *Harvard Business Review*, November-December 2000, vol. 78, No. 6.

The possible relation between the above-mentioned five emerging B2B exchange models is illustrated in figure XIV, which indicates a network of relations and possible interdependencies between the various exchange systems in the future.

Figure XIV. The possible future constellation of B2B exchanges



G. THE IMPACT OF ELECTRONIC BUSINESS ON TRANSPORT

Some of the above-mentioned electronic commerce solutions for improving the supply chain management and trade relations of transport companies in the ESCWA region can result in a number of impacts once they are implemented. These are summarized below.

1. *Wider customer and competitor base*

Current e-commerce solutions can make it possible for transport companies' transactions to take place without the limitations caused by distance between buyers and sellers. This means that sellers can reach a much larger number of customers directly, while buyers can obtain access to potentially unlimited sources of products. In addition, buying and selling take place without being constrained by availability of space in warehouses and shops. All this helps to expand the scope of the market and hence the number of "physical" origins and destinations for products to be transported. In turn, this increases the overall demand for transportation. However, the number of competitors will also increase. Market entry barriers become lower as transport companies can expand their activities across borders and test the performance and competitive advantages of their logistic operations on new markets.

2. *Faster exchange of information*

Electronic transactions in transportation are faster than traditional commercial transactions. The identification of products by buyers, comparison of prices, ordering, invoicing, payment and arranging for delivery can be automated and completed over very short periods of time. Today, traders in e-commerce will inevitably want to link their electronic sales to a transportation or distribution system that meets their requirements. This will in turn put pressure on transportation systems to respond by providing faster, reliable and more frequent services and transactions.

3. *Investments in ICT*

Since the very essence of e-commerce is the processing of transactions by electronic means, it is inevitable that transport services and operations serving e-commerce will also need to rely to a considerable degree on information processed and transmitted electronically. Specifically, there will be increased demand for the application of and investment in advanced information and communications technologies, in order to optimize the use of existing transport networks.

4. *Supply chain integration*

The transport chain consists of various participants, including suppliers or sellers of goods, agents, carriers, retailers and the final consumer, as depicted in the previous illustrated supply chain management system. The emergence of e-commerce makes it possible for a given participant in the transport chain to interact and to integrate quickly at low cost with any of the participants on the chain, without following the ordered sequence on the chain. Thus, for example, a carrier can deal on-line directly with shippers, without using the services of agents. A manufacturer of a product may sell directly to a distant final consumer without going through retailers or sales agents. This clearly opens totally new types of relationships, as well as possibilities for supply chain integration among such competitive forces as carriers, shippers and "intermediaries" in the transportation chain.

5. *Specialization in new transport services*

The combination of greater speed in commercial transactions and the increase in the number of trade origins and destinations will enhance the creation of new features in transportation systems. As sellers will need to respond quickly to orders from buyers, and as direct supplier–consumer interactions increase, sizes of consignments shipped will tend to be smaller, but more numerous. An outgrowth of this will be the expansion of courier and parcel services, specializing in the transportation of small consignments. There will also be increased demand for home delivery transport services. These types of services have enjoyed fast growth in the past and they are expected to get an additional boost as e-commerce expands.

6. *Dispersed transport networks*

Companies may soon find themselves dealing with numerous customers around the world, as their transport requirements can be met by accessing global transport and logistics networks. In this regard, recent trends seem to confirm that traders now prefer to use service providers who can supply comprehensive and integrated services, which traditionally have been supplied individually by forwarders, agents, transport companies, financial and insurance companies. Because of large financial and logistics requirements for operating such integrated services, transport service providers are now entering into new horizontal alliances with other transport service providers, as well as vertical alliances with intermediaries such as forwarders, agents, and even insurance and financial institutions. Lately, there has also been registered growth of third party logistics service providers.[52]

H. CONCLUSIONS

This chapter has focused on some general trends driving the implementation and use of e-commerce systems. Clear objectives, strategies and methods are needed to guide the transport sector in the ESCWA region into and around the e-commerce world.

The transport sector is, in comparison with many other sectors, unique in the way that information and communications technologies—most notably EDI— have been used for the optimization of the supply chain for some decades. It is important not just to erase those experiences and systems, but to build on them in the following ways:

(a) A step-by-step approach can be applied in electronic commerce. This could be started with simple Web storefronts and be continued with e-commerce portals and fully-fledged B2B e-commerce solutions.

(b) Actions should be initiated to guide companies and actors in the transport sector to test, implement and use these systems.

(c) The impact of e-commerce on the transport sector has been evaluated as very high, and more detailed assessments and tests of the benefits and opportunities in the ESCWA region should be initiated.

(d) It is recommended that transport companies, shippers and carriers should be assisted in introducing and using tracing and tracking systems, and in setting up freight exchange systems, online tariff, pricing and booking systems, and online bill of lading facilities.

(e) Considering the importance of maritime transport and shipping for the ESCWA region, the ports and harbour facilities should learn from the most advanced ICT and e-business experiences (such as Singapore, Dubai and Amsterdam) and prepare to integrate into similar systems and networks.

[52] Tage Schioet Andersen: *Third Party Logistics Systems* (Copenhagen Business School, Denmark, 1999).

III. INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND ELECTRONIC BUSINESS IN THE ESCWA REGION

INTRODUCTION

The potential for using ICT and electronic business depends on, and is limited by, the extent and quality of the local national telecommunication infrastructure, including the quality and capacity of international connections, the number of computers connected to the Internet or other networks, and the cost and quality of the services provided to users.

This chapter reviews the status of the telecommunication infrastructure in the ESCWA region and the use made of the Internet by Governments and companies in general and by the transportation sector in particular. Basic ICT indicators for the ESCWA region are summarized in table 6.

TABLE 6. ESCWA REGION: BASIC INDICATORS FOR INFORMATION AND COMMUNICATIONS TECHNOLOGIES

ESCWA members, ESCWA region and world	Population[a/] (Millions)	GDP per capita[a/] (US dollars)	Main telephone lines per 1,000 people[a/]	Mobile phones per 1,000 people[b/]	PCs per 1,000 people[b/]	Internet users per 1,000 people[c/]	Hosts under country domain name[d/]
Bahrain	0.7	10 924	266	301	140	166.7	1 121
Egypt	67.9	1 322	65	20	12	8.2	5 848
Iraq	23.0	185	30		-	0.6	1
Jordan	6.7	1 522	107	58	14	45.7	907
Kuwait	1.9	15 610	236	158	121	82.5	3 360
Lebanon	3.5	5 148	194	194	46	65.6	5 611
Oman	2.5	6 347	90	65	26	33.6	714
Palestine	3.2	-	58		-	35.3	
Qatar	0.6	20 708	261	200	136	102.7	31
Saudi Arabia	21.6	6 661	94	40	57	25.9	5 438
Syrian Arab Republic	16.2	1 348	97	2	14	1.8	0
United Arab Emirates	2.4	21 738	477	585	125	244.4	39 655
Yemen	18.4	387	15	2	2	0.8	53
ESCWA region	165.6	2 447	75	33	20	16.6	62 739
World	6 082	5 253	153	112	77	56.8	110 million

Sources: (a) ESCWA web site 1999 (http://www.escwa.org.lb/countries/); (b) ITU Internet and cellular indicators 2001 (http://www.itu.int/ti/industryoverview/index.htm); (c) Ajeeb Research (http://eit.ajeeb.com/ViewArticle.asp?Article_ID=28132); and (d) Internet Software Consortium (http://www.isc.org).

The countries in the ESCWA region display great contrasts in their capabilities and approach to ICT and e-business. Several of the Gulf countries, such as the United Arab Emirates, Qatar and Kuwait, are among the richest countries in the world and face few financial problems in paying for ICT technology. Yemen, however, is among the poorest countries in the world and therefore, not surprisingly, has a very low penetration of both computers and Internet users. As the wealthy countries tend to have small populations, it is also not surprising that, on the whole, the ESCWA region is below the world average in all basic ICT indicators.

As table 7 shows, telecommunications in all ESCWA member countries are operated by either State or corporate monopolies. In many ESCWA member countries, there is, however, a trend towards liberalization. A first step in that direction is often in the area of mobile telephony, in which seven ESCWA members currently have a duopoly. This is also the same number of countries that have, or are expected to have, an

open market for Internet service providers. As membership in the World Trade Organization may exert pressure to open up telecommunication markets, further liberalization can be expected.

TABLE 7. ESCWA REGION: TELECOMMUNICATION STRUCTURE

ESCWA member	Telecommunications	Mobile communications	Internet service providers (ISPs)
Bahrain	Corporate monopoly	Corporate monopoly	Corporate monopoly
Egypt	Corporate monopoly	Duopoly	Open Market (About 50 ISPs)
Iraq	State monopoly	State monopoly	State monopoly
Jordan	Corporate monopoly	Duopoly	Open market (About 10 ISPs)
Kuwait	State monopoly (to be privatized in 2001)	Duopoly	Open market (About 6 ISPs)
Lebanon	Corporate monopoly	Duopoly	Open market (About 22 ISPs)
Oman	Corporate monopoly	Corporate monopoly	Corporate monopoly
Palestine	Corporate monopoly	Corporate monopoly	Open market (About 7 ISPs)
Qatar	Corporate monopoly	Corporate monopoly	Corporate monopoly
Saudi Arabia	Corporate monopoly	Duopoly	Open market (About 36 ISPs)
Syrian Arab Republic	State monopoly	Duopoly	Expected to be open
United Arab Emirates	Corporate monopoly	Corporate monopoly	Corporate monopoly
Yemen	Corporate monopoly	Duopoly	Corporate monopoly

While the United Arab Emirates has a higher penetration of Internet users than many countries in Western Europe, the Internet is not available to ordinary citizens in Iraq and the Syrian Arab Republic, owing to political and security reasons. In Saudi Arabia, access to the Internet is strictly controlled by the Government. However, most Governments in the ESCWA region have expressed great interest in the possibilities of ICT, e-business and e-government for the economic and social development of their respective countries. In particular, Dubai (United Arab Emirates) has embraced e-business with exceptional enthusiasm and imagination, and recently inaugurated the first e-commerce free zone in the world.

In order to access the Internet, a user needs a computer and a modem in addition to a telephone line. Although the cost of computers in relation to performance continues to decline, a computer still represents an investment of several thousand dollars, a sum close to the average GDP per capita in the ESCWA region and thus within reach of only the most affluent.

In the future, wireless access to the Internet through a mobile phone is likely to require a smaller investment than fixed line access through a personal computer. Therefore, the availability and penetration rates of cellular phones in the ESCWA region are important in terms of potential wireless Internet access. In Japan, wireless access to information services has been a great success, with more than 25 million subscribers.[53] Several developers in the ESCWA region are already providing WAP (wireless application protocol) content, but the extent to which this technology will succeed is a matter of speculation.

With regard to e-business, this chapter focuses primarily on the use of the Internet in the conduct of business by Governments and companies. It should be noted that approximately 60 to 70 per cent of information technology investments in the Middle East are spent on what is known as enterprise resource planning (ERP),[54] which refers to "back office" operations such as accounting, human resource management, order management, production and inventory control and logistics. The result of these investments is not visible to the Internet and is therefore not reviewed in this report, although sophisticated e-commerce

[53] http://www.nttdocomo.com/i/index.html (July 2001).

[54] *Middle East Economic Digest (MEED)*, 2 February 2001.

application involves the integration of electronic data received from customers or trading partners with in-house, back office applications. Investments in ERP are therefore essential in preparing for future e-business investments.

Furthermore, much of electronic commerce is business-to-business dealings, the so-called B2B, and that too is not usually visible to the Internet as it is mostly conducted on secure networks such as Value Added Networks, which are networks separate from the Internet, or extranets, which are private networks set up by business communities using the Internet as the backbone for their communications and other forms of collaboration.

The Internet is particularly useful for activities such as buying and selling, presenting on-line catalogues and product information, collaborating, promoting products and services, doing research, managing employee and investor relations, providing on-line customer care, and just about any other business activity one can imagine that involves interaction or communication with employees, customers, stakeholders or trading partners. Many of these applications are covered under the concept of customer relations management (CRM) or "front office" operations.

There are some companies in the ESCWA region that have developed a sophisticated presence on the Internet allowing for on-line transactions of various kinds. In many cases, however, this presence is provided by multinational companies with operations in the region, such as: the express carriers UPS,[55] DHL[56] and FedEx;[57] large container lines such as Maersk Sealand;[58] and international airlines such as British Airways.[59] Local companies with advanced web sites include Crédit Libanais[60] in the banking sector, and Emirates Air[61] in transportation. Many news organizations in the ESCWA region have an impressive presence on the Internet, including several newspapers in each country with online editions.[62] There are also many portals catering to the Arab world, with links to directories of many kinds, including online shopping in the region.[63]

On the whole, however, the use of the Internet by businesses and Governments in the ESCWA region is still in its early stages and is largely limited to presenting basic information on products and services and providing e-mail contacts for communication. Table 8 summarizes the presence of the Internet in the ESCWA member countries in terms of registered host addresses and number of web sites as compiled by one portal specializing in the Arab business world. The table shows the number of host computers and web sites as listed by two directories, as well as the cost of access to the Internet in the ESCWA members.

The measure of a Government's presence on the Internet reflects closely a country's commitment to ICT and e-business and confirms that the leading ESCWA member countries in this regard are the United Arab Emirates, Egypt, Jordan and Lebanon. It should be noted, however, that the directory <middleeastdirectory.com/> is not necessarily comprehensive.

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[55] http://www.ups.com/regions/gr_mideast_countries.html.

[56] http://www.dhl.com/main_index.html.

[57] http://www.fedex.com/.

[58] http://www.maersksealand.com/.

[59] http://www.british-airways.com/.

[60] http://www.creditlibanais.com.lb.

[61] http://www.emiratesairline.com/.

[62] http://www.arabworldnews.com/.

[63] 4arabia.com; 4arabs.com; aiwagulf.com; ajeeb.com; al-bab.com; albawaba.com; arab.net; arabdatanet.com; arabia.com; arabist.com; arabji.com; arabworldnews.com; ameinfo.com; fayez.net; libanis.com; maktoob.com; mebusinessdaily.com; middleeastdirectory.com; middle-east-pages.com; nawal.com; planetarabia.com; zawya.com.

TABLE 8. ESCWA REGION: HOSTS, WEB SITE COUNTS AND INTERNET ACCESS COSTS

ESCWA members, ESCWA region and world	Hosts[a/]	Middle East Directory[b/]	National institutions-Government sites[c/]	Internet access cost (US dollars) (Residential dial-up: 40 hours per month)
Bahrain	1 121	209	12	58
Egypt	5 848	313	28	8*
Iraq	1	10	8	40
Jordan	907	109	26	21*
Kuwait	3 360	315	14	83*
				16.70**
Lebanon	5 611	238	34	15*
Oman	714	67	8	24
Palestine		41	28	25
Qatar	31	47	7	62
				357*
Saudi Arabia	5 438	291	12	40
Syrian Arab Emirates	0	69	5	62
United Arab Emirates	39 655	835	32	20
Yemen	53	25	9	66
ESCWA region	45 177			
World	109 574 429			

Sources: (a) <isc.org>; (b) <middleeastdirectory.com>; and (c) <gksoft.com/govt/en/>.
Notes: The data on Palestine refer to the territories under the jurisdiction of the Palestinian Authority.
* = unlimited access; ** = 15 hours peak, 30 hours off-peak time.

The cost of Internet access is crucial as to whether the access is affordable. In this regard, table 8 shows that prices vary widely across the region. For a residential dial-up service and 40 hours of Internet browsing, prices vary from US$ 8 in Egypt, with unlimited Internet access, to US$ 66 in Yemen. In many instances, the cost of a local phone call must be added on to these costs. Only five countries offer schemes with unlimited access, and in one of them, Qatar, that service costs a whopping US$ 357. Only Egypt, Lebanon and Jordan have pricing structures that are comparable to what is available in developed countries like the United States and Canada.

For the Internet to become widely accepted, prices must be affordable and services must be adequate. The best way to achieve both those objectives is usually to allow competition.

ICT and e-business techniques are tools and not ends in themselves. Whereas a conventional presence on the Internet can be a low-cost and effective means for businesses and Governments to provide essential information to citizens, customers, stakeholders and partners, a sophisticated e-business web site with on-line transaction capabilities can cost tens of millions of dollars. An investment of such magnitude is obviously an important business decision that must be taken with great care.

The current Internet penetration in the ESCWA region is about 1.7 per cent, about a third of the world average. This means that local on-line markets are very limited. In addition, many commercial web sites in the region are in English, addressing themselves primarily to an overseas or expatriate market or those of the local elite with a good knowledge of English. As the rate of Internet penetration increases, one can expect the number of Arab sites to increase accordingly, although it may also be that the existence of quality Arab content is a prerequisite for the growth of the Internet in the region.

The following sections review in detail the status of ICT and the use of the Internet for e-business in each ESCWA member, with particular emphasis on the transport sector.

A. BAHRAIN

1. *Infrastructure*

The Internet was introduced in Bahrain in December 1995, when the Bahrain Telecommunication Company, Batelco, the country's majority-owned telecommunication monopoly, introduced its iNet Services.[64]

As shown in table 9, the use of the Internet in Bahrain has grown rapidly; by early 2001, it was estimated that Bahrain had 35,000 subscribers and some 105,000 users. This means that the percentage of Internet penetration in Bahrain, at 17 per cent of the population, is 10 times the ESCWA average and the second highest in the region, after the United Arab Emirates.

TABLE 9. BASIC INTERNET INDICATORS IN BAHRAIN

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Bahrain	15 000	35 000	133	3	105 000	16.7
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Sources: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

Batelco is connected to the world primarily through the Fibre Optics Gulf (FOG) cable, which links Kuwait, Bahrain, Qatar and the United Arab Emirates, and through FOG to another global cable system: Fibreoptic Link Around the Globe (FLAG).

A basic personal Internet dial-up subscription cost about US$ 8 per month plus a usage fee of 2 cents per minute or US$ 1.20 per hour. A high-speed international Internet connection, at up to 2 Mbps, costs about US$ 12,200 per month for a business, and half that amount for an educational institution. Web hosting costs about US$ 67 in set-up charges, plus US$ 2.70 per megabyte memory per month.[65] This is expensive by standards in North America, where a dial-up subscription for unlimited use can be had for about US$ 10 per month.

Batelco's pricing policy appears to be based strictly on commercial considerations, that is, to charge the highest price that will not jeopardize business.[66] There are several Internet cafes in Bahrain where the general public can access the Internet for US$ 2.2 to US$ 4.2 per hour.[67]

In mid-2001, Batelco was still the sole Internet Service Provider (ISP) in Bahrain. However, the Crown Prince announced in February 2001 that plans were being drawn up to open the telecom sector to foreign competition and put an end to Batelco's monopoly.[68] Batelco itself has taken advantage of the opening of telecom markets in other ESCWA member countries and has invested in Internet access and data communication ventures in Egypt, Kuwait, Jordan and Saudi Arabia; the company is thus set to play a regional role in the development of electronic business.

A GSM mobile phone system was also launched in 1995, the same year that Internet access was introduced. By the year 2000, there were 30 cellular phones per 100 inhabitants, representing 55 per cent of

[64] http://www.batelco.com.bh/.

[65] http://www.inet.com.bh/InetServices/types.asp?CategoryId=1.

[66] The Global Diffusion of the Internet Project: An Initial Inductive Study (March 1998) http://mosaic.unomaha.edu/gdi.html.

[67] http://www.netcafeguide.com/countries/bahrain.html and http://www.netcafes.com/country.asp?selectcountry=Bahrain.

[68] *Middle East Economic Digest (MEED)*, 23 February 2001.

all telephone subscribers. This puts Bahrain's cellular penetration at 2.5 times greater than the world average of 12 subscriptions per 100 people.[69]

2. *E-business applications in general*

Electronic business is still very much in its infancy in Bahrain. Most web sites focus on providing information rather than on-line services. For example, of the 15 financial and insurance institutions listed on Batelco's Inet portal, none offered electronic banking.[70] The Bahrain Stock Exchange offers online quotes but not online trading.[71]

The Government of Bahrain has an impressive-looking portal with many links, not only to Government agencies but also to information on Bahrain in general.[72] However, the information content is less impressive and, in the case of the web site for the Ministry of Transport, the scant information available is limited to statistics from 1996 and 1997.

In order to promote electronic commerce, Batelco announced, in September 1999, the introduction of an electronic commerce web development service, @ltijara., which, with six partners, proposes to assist merchants in setting up online stores.[73]

There appears to be little Arabic content on Bahrain web sites. None of the commercial sites visited as part of this study had an Arabic version.

3. *Use of the Internet in the transport sector*

Bahrain International Airport has a web site with a wealth of useful information and links, but they are of a static nature. Dynamic information on arrival and departure time and delays, for example, is not available.[74] GulfAir, a Bahrain-based airline, offers online timetables and booking.[75] The booking service, however, is not done by Gulf Air itself but through a link to <travelcity.com>.

The seaport of Mina Sulman has a web site that provides basic static data on facilities and regulations.[76] The home page has a heading for vessel movements, but the link, when tried, was not active. The international container carrier Maersk Sealand has a Bahrain web site through which online customers can see schedules, make bookings, access selected rates and track shipments.[77]

Bahrain Customs has a web site with brief descriptions of procedures and tariffs. The web site also provides useful contact information, summary information on foreign trade statistics and links to other Bahrain agencies related to trade and transport.[78]

4. *Conclusions*

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[69] ITU Mobile subscribers per 100 people (2000): http://www.itu.int/ti/industryoverview/index.htm.

[70] http://www.inet.com.bh/DiscoverBahrain/Business/banks.asp.

[71] http://www.bahrainstock.com/.

[72] http://www.bahrain.gov.bh/english/index.asp.

[73] http://www.altijara.com/partners.htm.

[74] http://www.bahrainairport.com/.

[75] http://www.gulfairco.com/.

[76] http://www.bahrainports.gov.bh/.

[77] http://www.maersksealand.com/Bahrain/.

[78] http://www.bahraincustoms.gov.bh/.

The physical infrastructure for electronic business in Bahrain is in place, and Internet usage is growing quickly and is, at close to 17 per cent, already above the world average and second in the ESCWA region. However, public electronic commerce applications on the Internet are still very limited. In July 2001, the Middle East Directory listed 209 web sites for Bahrain but few, if any, go beyond the provision of static information.

B. EGYPT

1. *Infrastructure*

It is estimated that around one fourth of Egyptian families have a telephone. However, while the growth rate of main lines was about 15 per cent per year in the period 1995-2000, it was not sufficient to keep ahead of demand. The waiting list remained static at around 1.2 million for most of the 1990s, representing a waiting time of up to two years. The current goal is to increase growth to 1 million lines annually.

In a move towards corporatization, Egypt, in 1998, transformed the Government's telecommunication monopoly into Telecom Egypt, a joint stock company, and established the Telecommunication Regulatory Authority as an independent regulator. The Government has announced its intention to sell up to 20 per cent of Telecom Egypt's stock to the public, thus demonstrating its ambition to establish a telecommunication system that can compete with international standards.[79]

In regard to the Internet, Egypt has one of the most vibrant markets in the Arab world. The provision of Internet services is privatized and Egypt now has over 50 operational ISPs in more than 10 cities and areas, including Cairo, Alexandria, Sinai and the Red Sea area, providing Internet services for commercial enterprises and individual users.[80]

As can be seen in table 10, the number of Internet users in Egypt grew by some 27 per cent in 2000 and reached an estimated 560,000 in early 2001, making Egypt the largest Arab Internet market.

TABLE 10. BASIC INTERNET INDICATORS IN EGYPT

Country and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Egypt	55 000	70 000	27	8[a/]	560 000	0.8
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

a/ Tens of thousands of students are accessing the Internet through hundreds of accounts in universities.

The cost of accessing the Internet in Egypt is relatively low. One ISP, for example, offers one month unlimited access for 30 Egyptian pounds (LE), an amount equivalent to US$ 8, or a lifetime of unlimited access for LE 99 (equivalent to US$ 24) plus the cost of a local phone call.[81] Another ISP offers free unlimited access to the Internet.[82] For the latter option, the ISP must presumably be counting on income from activities such as advertising, in order to succeed with this business model. None of the ISPs visited advertised Web hosting costs on the Internet.

For international communications, Egypt uses a combination of microwave, satellite and submarine fibre-optic links. Egypt is a member of Arabsat, Intelsat and Inmarsat and is connected to the SEA-ME-WE2 submarine system. Egypt also participates in FLAG, an international submarine cable project, and is home

[79] http://www.mideastlaw.com/telecommunications_in_the_middle.htm.

[80] http://www.africanconnection.org/docs/factsheets/egypt.html.

[81] http://www.link.com.eg/.

[82] http://www.intouch.com/.

to landing sites in Alexandria and Suez.[83] A new submarine cable across the Mediterranean, Nautilus 1, will be put in place during 2001. The bandwidth capacity of 2.84 terabytes/second can theoretically transport 45 million phone calls simultaneously or 300 hours per second of digital video.[84]

The first mobile cellular service was launched in Egypt in 1996.[85] A second network was launched in 1998,[86] making Egypt the second country in the Arab region to introduce mobile competition. In 2000 there were approximately 1.5 million mobile subscribers.[87]

2. *E-business applications in general*

The Government of Egypt has great ambitions when it comes to ICT in general and the Internet in particular. In fact, Egypt is attempting to become a leading software exporter, much like India is today.[88] This is not a totally unrealistic goal, as there is a major need to Arabize software for the Middle East region, a potentially very large market with some 175 million speakers of the sixth most spoken language in the world. This is an area in which Egypt could excel, in the same way that it leads the Arab world in the production of books, films and broadcasts. In 1999, the value of Egyptian computer software was estimated at around US$ 50 million, and the country's National Plan calls for software exports to reach US$ 500 million in five years. In order to achieve this, the Government plans to spend US$ 100 million through June 2002 on human resource development projects in the high tech sector and to establish a National Institute of Information Technology capable of graduating 5,000 students a year.

In order to develop Egyptian content on the Internet, the Cabinet Information and Decision Support Centre began implementing the Egyptian Information Highway Project in 1995. As a result, pilot information networks have been launched covering culture, tourism, health care, environment, education, public services and local government administration. There is, however, a lack of home-grown content sites in Egypt, and the ratio of incoming versus outgoing Internet traffic of 4 to 1 indicates a low "pull" factor of Egyptian web sites. In a 1998 survey, it was reported that only 10 web sites offered some level of transactional back office and clearance mechanism to provide some form of Internet-enabled acquisition of goods and services.[89]

In April 2001, the Government announced an e-government initiative, Alhokoma.[90] According to the news release, Alkohoma has links to all of Egypt's ministries, with contact information, brief histories and descriptions of what the ministries do. Alhokoma allows users to download government forms in order to simplify citizens' dealings with government offices, with the slogan: "Download the forms, do the paperwork at home and spend less time waiting in line."

3. *Use of the Internet in the transport sector*

Customs revenues are estimated to make up 25 to 30 per cent of government income, and importers are frequently suspected of presenting undervalued invoices. The facilitation of customs procedures is therefore contrary to the traditional way of thinking of the customs officials. In fact, the system rewards customs officials when they detect under-declarations and they therefore, not surprisingly, have a tendency to

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[83] http://www.africanconnection.org/docs/factsheets/egypt.html.

[84] Report on Egypt, Paul Budde Communications, August 2001; <www.budde.com.au>

[85] http://www.vodafone.com.eg/.

[86] http://www.mobinil.com/.

[87] ITU Telecommunication Indicators Update – Egypt Country Profile, March 2001 (http://www.itu.int/ITU-D/ict/update/).

[88] ITU Internet Country Case Studies (http://www.itu.int/ti/casestudies/letters/egypt.htm).

[89] See Magda Ismail, "Electronic commerce in Egypt," paper submitted at the Expert Group Meeting on Trade Facilitation and Electronic Commerce in the ESCWA Region, held at Beirut from 8 to 10 November 2000.

[90] http://www.alhokoma.gov.eg/.

increase the value of an invoice whenever possible. Modern risk management techniques are not used, and all imported cargo is inspected and tested.[91]

The clearance process is not yet fully computerized, but there are reportedly plans to revive a modern, computerized customs system developed locally. There is currently no use of electronic data interchange to facilitate international trade transactions at the government level.

In other areas of trade and transportation, there are some applications of the Internet. Egypt Air offers a variety of useful information, including sales promotions and online schedules, and it is expected that information on Egypt Air will soon be available on the Internet through "Online Bookings".[92]

The National Navigation Company has a web site with some static information about the company and maritime links.[93] The Rafimar Group, a private sector shipping firm, has a web site with information on, among other things, shipping statistics and details about major Egyptian ports, including port dues and links to Egyptian maritime and shipping companies. Access to the Rafimar site is free but requires registration for access to some information.[94]

The Leth Suez Transit company has a web site with information on the Suez Canal, including a transit guide and toll calculator. The site also has detailed information on the infrastructure of several Egyptian ports.[95]

4. *Conclusions*

With 68 million inhabitants and a Government that actively promotes the development of the high tech industry, Egypt has great potential to become an important ICT hub of the Middle East and the major provider of Internet content for the Arab world. The relative poverty of the population is an obvious handicap. In July 2001, the Middle East Directory listed 313 web sites for Egypt, but few, if any, go beyond the provision of static information.

C. IRAQ

1. *Infrastructure*

The telecommunication infrastructure was almost completely destroyed during the Gulf war. The repair of the fixed line network requires investments exceeding US$ 1 billion over a period of 7-10 years. As of May 2001, 154 bids for the telecommunications sector, worth US$ 279 million, were submitted to the United Nations committee that oversees the Iraqi Government's commercial transactions. Around 83 contracts, totalling US$ 71 million, have been approved, and 71 contracts, valued at US$ 208 million, have been either rejected or put on hold.[96]

As can be seen in table 11, it is estimated that, with about 25 users per subscription, there are currently some 12,500 Internet users in Iraq.

The sole provider of Internet services in Iraq is the Ministry of Culture and Information. Internet access is a very recent phenomenon, enjoyed only by a small portion of the population. The first Internet cafe was set up by the Government in Baghdad and opened in July 2000. Similar cafes will be set up in Baghdad

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[91] See ESCWA, *Trade Efficiency in ESCWA Member Countries: A Comprehensive Study* (E/ESCWA/ED/1999/6).

[92] http://www.egyptair.com.eg/docs/home.asp.

[93] http://www.nnc.egnet.net.

[94] http://www.rafimar.com/.

[95] http://www.lethsuez.com/.

[96] Report on Iraq, Paul Budde Communications, Australia, August 2001, <www.budde.com.au>

and other major cities in Iraq.[97] The cost of use is reported to be 2,000 Iraqi dinars (equivalent to US$ 1) per hour or US$ 55 per month.

TABLE 11. BASIC INTERNET INDICATORS IN IRAQ

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Iraq	-	500	-	25[a/]	12 500	0.1
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

a/ The majority of users are accessing the Net through dozens of accounts in four Internet centres; the remaining users are government agency employees.

Private entrepreneurs are not permitted to set up Internet cafes, citizens with home computers cannot have a direct Internet link, and individuals are not permitted to set up their own networking companies. In spite of this and the fact that the Government can control information coming into Iraq, it is reported that censorship of the Internet is not as strict as might be expected. Users can access foreign news sites, United States Government web sites, and educational resources from around the world.[98]

Until very recently there was no mobile cellular phone system in Iraq, but in mid-2001 a GSM system was being installed with an initial capacity of 25,000 lines and a coverage of 50 kilometres around Baghdad.[99]

2. *E-business applications in general*

The prospect for e-commerce in Iraq is currently rather bleak. A 2000 survey on e-business readiness by the Economist Intelligence Unit placed Iraq at the very bottom of the list.[100]

3. *Use of the Internet in the transport sector*

No electronic business application in transport in Iraq was found during the research for this study.

4. *Conclusions*

The prospects for e-business in Iraq are currently not very promising owing to weak infrastructure, lack of ICT knowledge, Government-controlled access and high cost of the Internet. In July 2001, the Middle East Directory listed 10 web sites for Iraq.

D. JORDAN

1. *Infrastructure*

In 1995, Jordan began privatizing and liberalizing its telecommunication sector, creating the Telecommunications Regulatory Commission, an independent regulator. Furthermore, the Telecommunication Corporation has been transformed into a company, Jordan Telecom, in which the Jordanian Government retains 60 per cent interest. Jordan Telecom owns the nation-wide network that

[97] http://idg.net/crd_iraq_205974.html.

[98] Report on Iraq, Paul Budde Communications, Australia, August 2001, www.budde.com.au.

[99] "Bagdad à l'heure cellulaire," *L'Hebdo Magazine* (Beirut), 17 August 2001.

[100] http://www.nua.ie/surveys/?f=VS&art_id=905355788&rel=true.

constitutes the base for the various communication services in the Kingdom;[101] it has exclusive rights to provide local, national and international fixed telephony services, cellular mobile and leased lines until the end of 2004.

International connections consist of several satellite stations and connections to FLAG, the international submarine cable project, which has a landing point in Aqaba. Jordan also has a fibre-optic cable link to Saudi Arabia and microwave radio relay to Egypt and the Syrian Arab Republic.

The Internet is popular in Jordan and, as can be seen in table 12, there were about 35,000 subscribers and an estimated 210,000 users in early 2001. With an Internet penetration of 4.6 per cent, Jordan has 2.5 times the ESCWA region average and is only slightly below the world average of 5.6 per cent.

TABLE 12. BASIC INTERNET INDICATORS IN JORDAN

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Jordan	25 000	35 000	40	6[a/]	210 000	4.6
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

a/ Tens of thousand of users are accessing the net through hundreds of accounts in 350 Internet cafes.

Whereas Jordan Telecom is a monopoly, the provision of Internet services is an open market. In January 2001 there were a total of eight ISPs,[102] one of which is owned by Batelco, the Bahrain Telecommunication Company. Global One, the first and largest ISP in Jordan, introduced the Internet in 1996. Global One was taken over by Jordan Telecom in January 2001, raising questions as to the future of a competitive marketplace.[103]

A dial-up connection to the Internet with unlimited access costs 14 Jordanian dinars (JD), equivalent to US$ 21, per month.[104] Users located close to certain Jordan Telecom Exchanges in Amman are offered broadband Internet access for the hefty price of between JD 125 and JD 426 (equivalent to US$ 176 - $US 600) per month depending on the speed.[105] As a comparison, a similar service can be obtained in Canada, with its admittedly much larger user base, for about US$ 27 per month.[106]

The technique offered is ADSL (Asymmetric Digital Subscriber Line), which allows a user to download Internet content at speeds from 512 kbps to 1 Mbps, and upload from 128 kbps to 256 kbps over a normal telephone line, compared with the maximum speed of 56 bps that can be obtained using a normal modem. An added advantage of ADSL over a normal modem is that it allows the user to have uninterrupted access to the Internet while simultaneously being able to use the telephone for voice communication.

There are approximately 390,000 mobile cellular subscribers in Jordan giving a penetration of about 6 per cent, almost twice the ESCWA region average.

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101 http://www.jordantelecom.jo/news_promotion.htm.

102 "e-Ministry for Amman," *Middle East Economic Digest (MEED)*, 23 February 2001.

103 http://www.go.com.jo/NewOwner_NewRates.htm.

104 http://www.go.com.jo/quality_price.htm.

105 http://www.go.com.jo/ADSL_Internet.htm.

106 http://bell.sympatico.ca/english/home.html?s=3_1&p=hse/pricing.html.

2. *E-business applications in general*

In February 2001, Jordan's Posts and Telecommunications Minister called for the establishment of an "e-ministry" within the next 12 months. The role of this new ministry would be to implement convergent policies in telecommunications, posts and information technology. The Minister also called for a major drive to boost Internet subscriber numbers in Jordan to 500,000 within the next two years.[107] Whether this will actually happen or not, it shows a belief in ICT, within the Government of Jordan, as a driving force for the development of the country.

Amman is considered together with Dubai and Cairo as one of the top three IT hubs in the Middle East.[108] The leading regional portal, Arabia Online, launched in 1995, and the Middle East's first regional wireless content provider, Info2Cell.com, are Jordan-based. The Arab Bank and the Jordan Kuwait Bank offer Internet banking, and several banks offer mobile and phone banking.[109]

However, growth is hampered by the limited access of the average Jordanian to computers and the Internet: the cost of an Internet-ready computer is about half the average annual income. In order to address this issue, the Education Ministry has launched a three-year programme to provide computer laboratories for all public schools in Jordan and has introduced English language training at the first primary level. At the same time, the Government is equipping community centres throughout the country with computer facilities and is due to present a set of ICT-oriented legislation to the Parliament during the current session.[110]

3. *Use of the Internet in the transport sector*

Jordan introduced a new Customs Law in 1998, which among other things, allows for electronic transmission of data for customs clearance.[111] As part of this project, an automated system for customs clearance, Jarash, has been installed at the Queen Alia Airport in Amman and at the port of Aqaba. Jarash is essentially an Arabized version of the UNCTAD ASYCUDA++.[112] This system allows direct data input by traders and customs brokers and is thus an important step in the modernizing and automating of Jordan's trade and transport system.

The use of the Internet in transportation is still very limited. The port of Aqaba has a very basic web site with static information, which includes contact information and a description of the facilities.[113] The airports have graphically more elaborate web sites, with useful, but still strictly static information.[114] The Free Zone Corporation has a web site with helpful information for traders and investors.[115]

The national airline, Royal Jordanian, has a more sophisticated web site, which includes provisions for online booking for registered users, flight schedules, flight availability, arrival and departure information, and baggage and cargo tracking.[116] Some of the functions, such as flight schedules and arrival and departure information, did not work when tried, and the flight availability function was not all that user-friendly, as a new inquiry had to be made for each single flight with no option to see a weekly schedule. However, the web site is ambitious and shows promise.

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[107] "e-Ministry for Amman," *Middle East Economic Digest (MEED)*, 23 February 2001.

[108] "Cairo's leading online role," *Middle East Economic Digest (MEED)*, 2 February 2001.

[109] "Building e-organisations," *Middle East Economic Digest (MEED)*, 2 February 2001.

[110] Ibid.

[111] http://www.customs.gov.jo/framenew.html.

[112] http://www.asycuda.org/english.htm.

[113] http://www.nis.gov.jo/portscorp/doc1.html.

[114] http://www.jcaa.gov.jo/airports.htm.

[115] http://www.free-zones.gov.jo/.

[116] http://rja.com.jo/.

As for other transportation entities, there are several established sites, such as Amman Shipping & Trading Company[117] and United Trading & Distributing Co,[118] but their content is limited to basic information about their respective companies.

4. *Conclusions*

The Global Diffusion of the Internet Project, a September 1999 study on the Hashemite Kingdom of Jordan, concluded that:

> "the Internet in Jordan is used by public and private organizations almost exclusively to announce presence and to provide information on the history and nature of the organization... After visiting literally hundreds of web sites we found not a single case in which transactions could be executed via a web-based application... In view of the above, we characterize the level of sophistication of use as minimal; only the most basic conventional services are provided with no evidence of processes being changed as a result. This is not surprising given the small user base and the consequent impossibility of basing operations on Internet infrastructure."[119]

However, things are changing, the infrastructure is improving, the user base is growing and the Government is actively pursuing ICT-friendly policies. In July 2001, the Middle East Directory listed 109 web sites for Jordan, a few of them with transaction capabilities.

E. KUWAIT

1. *Infrastructure*

Damage to the infrastructure was extensive following the 1990 Iraqi invasion. However, rebuilding the telecommunications infrastructure has been a high priority and today Kuwait has a fully restored world-class system owned and operated by the Ministry of Communications.

The Ministry of Communications is both the regulatory and the operating entity. In an attempt to liberalize the telecom market and allow for private sector participation, the Government is preparing for privatization during 2001. It intends to sell 25 per cent of the operator to a strategic partner through the transfer of shares and then, through a public offering, up to 51 per cent of the holdings. In June 2001, the Government sold half of its 49.2 per cent stake in Mobile Telecommunications Co., the country's largest mobile operator.

The quality of the telecom network is reported to be excellent and all local calls and faxes are free within the country. The cost of an international phone line is expensive, however.[120]

Kuwait's international connections are made up of satellite networks and fibre-optic cable links. Kuwait is connected to other Gulf States via the 1,300-km FOG link, which in turn is connected to the FLAG and SEA-ME-WE2 undersea cable networks.

Internet services were introduced in 1994, and in 2001 there were an estimated 165,000 users in Kuwait, as shown in table 13. There are six ISPs, and the monthly cost for a 24-hours-a-day unlimited access dial-up connection is about 25 Kuwaiti dinars (KD), equivalent to US$ 83. For the more casual user, five

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[117] http://www.astco.jo/.

[118] http://www.utdc.com.jo/.

[119] http://mosaic.unomaha.edu/gdi.html.

[120] Report on Kuwait, Paul Budde Communications, September 2001, www.budde.com.au.

hours peak and 10 hours off-peak usage per month costs about KD 2 (equivalent to US$ 6.75).[121] This is expensive by international standards.

TABLE 13. BASIC INTERNET INDICATORS IN KUWAIT

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Kuwait	40 000	55 000	38	3	165 000	8.3
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

There are two competing mobile phone operators with an estimated total of 300,000 subscribers. This gives a penetration rate of about 16 per cent, slightly above the world average of 12 per cent.[122]

2. *E-business applications in general*

In 1998 it was reported in a study that Kuwait hosted the greatest number of Internet sites in the Gulf region, almost half of the total.[123] The same study noted that the interest in the Internet was due to the Government, but the commercial sector had been the most active overall. The study further noted that: virtually all large companies, public and private, had leased line connections and a Web presence; that many medium-sized companies were similarly connected; that the employment of the Internet in Kuwait was conventional in that the use of the Internet had not transformed any government, educational, or business practices; and that there was no evidence of any impending changes.

However, several banks, such as the National Bank of Kuwait, offer sophisticated Web services in the form of online banking, WAP banking, online brokerage and online shopping.[124] In another initiative, in the area of real estate, the Kuwait Finance House announced that it will digitize all its archives of maps and tabular data in an Internet-ready format and make them available to clients and house-hunters.[125]

In February 2001, the Kuwaiti Minister of the Ministry of Communication and the Ministry of Finance announced that plans were being finalized to set up an e-village as a catalyst to increase the speed of ICT development in the country. At the same time, the Minister stated that the country's six main telephone exchanges should be upgraded to digital technology within the next six months.[126]

3. *Use of the Internet in the transport sector*

No information was found on the Web regarding import, export and customs clearance procedures. There are, however, several other web applications in the transport sector. Kuwait International Airport provides a description of facilities, airline directories with links, up-to-date weather reports and forecasts, and flight information.[127]

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[121] http://www.globalnet-center.com/prices.asp.

[122] ITU Telecommunication Indicators (2000)

[123] *The Global Diffusion of the Internet Project*, March 1998.

[124] http://www.nbk.com/.

[125] http://www.itp.net/news /97046514755029.htm.

[126] http://www.itp.net/news/98100735367272.htm.

[127] http://www.kuwait-airport.com.kw/.

Kuwait Airways offers a number of services online, including flight schedules, cargo tracking, lost luggage tracking and information on services and installations.[128]

The Kuwait Free Trade Zone has a web site with some descriptive information. The Zone is located in the port of Shuwaikh, which does not appear to have a web site of its own. However the Zone's web site has the following information about the port:

> "During the past few years, KPA (Kuwait Port Authority) has engaged in a massive renovation and modernization of its management and operation system resulting in a considerable increase in both efficiency and productivity. The privatization of the cargo and container handling activities; modifications to the handling systems; and computerization of the tariff, financial and administration systems has made the KPA a modern port facility."[129]

The United Arab Shipping Company is jointly owned by six shareholding States members of the Gulf Cooperation Council. The company's main office is in Kuwait; it has a web site that offers information on services, vessels, agents, containers and sailing schedules.[130]

4. *Conclusions*

Kuwait is a wealthy country. It is therefore not surprising to find that the Internet penetration rate, at 8.3 per cent, is the fourth highest in the region and five times the regional average. Certain sectors such as the banking sector appear well advanced with respect to Internet applications. Customs and the ports, however, do not yet have an official presence on the Internet. In July 2001, the Middle East Directory listed 315 web sites for Kuwait.

F. LEBANON

1. *Infrastructure*

Telecommunications in Lebanon is the responsibility of the Ministry of Post and Telecommunications,[131] which, with the Government-controlled company Ogero,[132] develops and operates landlines and international connections. At the end of the 15-year period of civil strife in Lebanon in 1990, there were only some 300,000 lines that were working, and not very well. Since then, more than 300 digital exchanges have been installed, providing more than 990,000 lines. Contracts have been awarded to increase the capacity to 1,730,000 lines, the equivalent of one fixed line per three persons.[133]

International communications take place through two undersea fibre-optic cables. The first connects Tartous in the Syrian Arab Republic; Tripoli, Beirut and Saida in Lebanon; and Alexandria in Egypt with a capacity of 9,000 simultaneous calls. The second connects Lebanon, Cyprus, the island of Crete in Greece, and France with a capacity of 7,560 simultaneous calls. There is also a fibre-optic and radio link connecting Beirut and Damascus with a capacity of 189 simultaneous calls, and two satellite earth stations at Arbanieh and Jouret El Ballout.[134]

In February 2001, Ogero reported that it had awarded a contract to install a nation-wide Gigabit Ethernet Metropolitan Area Network, primarily for corporate use but also with a view to its eventual use as

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[128] http://www.kuwait-airways.com/#.

[129] http://www.kuwaitfreezone.com/english/about_shuwaikh_frame.html.

[130] http://www.UASC.com.kw.

[131] http://www.mpt.gov.lb/.

[132] http://www.ogero.gov.lb/.

[133] http://www.cdr.gov.lb/cdr/2001/english/Etele.htm.

[134] Council for Development and Reconstruction, Progress Reports 1996-2001 (http://www.cdr.gov.lb/cdr/indexe.html).

an Ethernet Service Provider. In addition, so-called Intelligent Networks will be deployed by the end of 2001.[135]

In February the Minister of Post and Telecommunications announced a draft telecommunications law to prepare the sector for privatization. The draft law proposes to merge some ministry departments with Ogero to create LibanTelecom. This new entity will operate Lebanon's 750,000 or so active landlines, as well as all Internet and data networks, and become the country's third cellular-phone operator. The draft law also calls for the creation of a special commission to regulate the sector.[136] The plan is that LibanTelecom, although initially 100 per cent Government-owned, will eventually be privatized.

According to the ITU, Lebanon had no Internet hosts in 1994, but 88 in 1995. Since then, Internet use has grown fast and by the spring of 2001, user penetration was estimated at 6.6 per cent, slightly above the world average. As can be seen in table 14, there were some 262,500 Internet users in the beginning of 2001.

TABLE 14. BASIC INTERNET INDICATORS IN LEBANON

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Lebanon	65 000	75 000	15	3.5	262 500	6.6
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

The provision of Internet services in Lebanon is highly competitive: 32 companies have applied for ISP licences and 22 are active.[137] A dial-up service Internet connection costs US$ 15 per month for unlimited access,[138] only slightly higher than in North America. However, to this must be added the cost of a local phone call which, at about US$ 1.40 per hour, quickly adds to the total cost. A digital leased line is expensive: a 2 Mbps line costs about US$ 1,925 in set-up fees plus a monthly rental fee of US$ 1,586 if the leased line is more than 20 km long.[139]

Two 10-year cellular phone build-operate-transfer (BOT) contracts were awarded in 1994, and by the year 2000 there were more than 600,000 numbers, giving a penetration rate of 19 per cent. This is almost six times the ESCWA region average and puts Lebanon in fourth place in the region after the United Arab Emirates, Bahrain and Qatar. In June 2001, the Government decided to terminate abruptly the two BOT contracts. The Government will presumably invite tenders for licences to operate the two mobile networks before the end of 2001. In addition, the new telecommunication law includes provisions for a third network to be run by the yet-to-be-established Liban Telecom.

At least one mobile operator offers a WAP portal for mobile Internet access.[140]

2. *E-business applications in general*

Lebanon was one of the first countries in the Middle East to embrace the Internet, with the result that Lebanese Web development companies have exported their skills to surrounding countries and have been instrumental in helping companies in the Syrian Arab Republic, Egypt and Saudi Arabia set up Internet

[135] http://www.mpt.gov.lb/in.htm.

[136] http://archive.dailystar.com.lb/leb/2001/February01/01_02_01/B3.HTM.

[137] http://www.mpt.gov.lb/isplist.htm.

[138] http://www.fiberlinknetworks.net/lynx/creditrefill/credit.asp.

[139] http://www.mpt.gov.lb/leased.htm.

[140] http://www.plugged.com.lb/default.asp.

services, as well as expand to the European continent. Computer literacy is also developed to such an extent that the Faculty of Engineering at the American University of Beirut no longer offers students introductory computer courses, as they had to do in the mid-1990s.

The great number of ISPs, Internet portals and Web directories shows that many Lebanese companies have recognized the value of having an Internet presence.

At least two banks offer online electronic banking services and one of them offers mobile (WAP) banking as well.[141] Other banks are following suit.

Several companies are selling their products on the Web, but a recent study by ESCWA reports that direct shipment from Lebanon is impossible given the high shipping costs charged by fast courier companies for small shipments, as well as long bureaucratic export procedures that result in long delays. To overcome this problem, merchandise is shipped in large quantities, stocked with partners, in warehouses or on other company premises, and from there it is shipped to customers.[142]

A few web sites go beyond offering static information. An example of such a government e-service is the site of Ogero, the Ministry of Post and Telecommunication's operating arm, which allows customers to verify their telephone bills online.[143] However, the great majority of company sites are limited to static information about products and services and contact details.

The Government has started to put a regulatory framework in place and a law to regulate e-banking, e-payments and electronic signatures is in Parliament.[144]

3. *Use of the Internet in the transport sector*

The Government of Lebanon has embarked on an extensive programme of administrative reform of the public sector, including the Lebanese Customs. The Customs component involves, among other things, the implementation of an automated system for Customs clearance, named "NAJM," which is essentially an Arabized version of the ASYCUDA++ system developed by UNCTAD. An upgrade of the system is under way to allow traders to input their declarations electronically. In addition, Lebanese Customs has a static web site with some information on applicable laws and regulations and the complete Harmonized Systems tariff for reference.[145]

The two airlines, Middle East Airlines (MEA) and Trans-Mediterranean Airways (TMA), both have web sites with mostly static information.[146] The TMA site offers online quotations, but it did not work when tried. The MEA site offers timetables, service and contact information. The Beirut International Airport also has a static web site, the most interesting feature of which is that one can search for arriving and departing flights for all airlines serving the airport.[147] The site does not provide information on delays and expected arrivals and departures, however.

The port of Beirut[148] has a web site with detailed tariffs, a description of facilities, statistics for the years 1998 and 1999, and there are provisions for adding information on quay occupancy.

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[141] http://www.creditlibanais.com.lb/ and http://www.netbank.com.lb/.

[142] ESCWA, "Electronic commerce in Lebanon" (E/ESCWA/ED/2000/WG.1/6), 19 October 2000, paper submitted at the Expert Group Meeting on Trade Facilitation and Electronic Commerce in the ESCWA Region, held at Beirut from 8 to 10 November 2000.

[143] http://www.ogero.gov.lb/htdocs/olbill.asp.

[144] See *Lebanon Opportunities*, June 2001

[145] http://www.customs.gov.lb/.

[146] http://www.mea.com.lb/ and http://www.tma.com.lb/.

[147] http://www.beirutairport.gov.lb/.

[148] http://www.beirut-port.gov.lb/.

4. *Conclusions*

In spite of the fact that Lebanon is more advanced in the use of the Internet than most countries in the ESCWA region, public e-commerce on the Internet is still in its early days. In July 2001, the Middle East Directory listed 238 web sites for Lebanon.

G. OMAN

1. *Infrastructure*

Oman has a modern nationwide digital infrastructure. The Government telecommunication company, General Telecommunication Oman, was incorporated in 1999 to form OmanTel. At the same time it was announced that the Government intended to sell 20 per cent of the company to a strategic partner. Following that, the plan is to sell an additional 10 per cent to the Omani public and, eventually, to open the Omani telecommunication market to competition.[149] As of mid-2001, this had not yet happened, but in early 2001 the Minister of National Economy stated that the Government would speed up the privatization process of various government bodies during that fiscal year, including telecommunications, and would also set up regulatory bodies for both the telecom and postal departments.[150] In a separate announcement, it was stated that Egypt would advise Oman on the liberalization of the telecom industry.[151]

Public access to the Internet in Oman was introduced in 1997 and, as shown in table 15, there were some 84,000 users by early 2001, equivalent to a penetration rate of 3.4 per cent, or twice the ESCWA region average.

TABLE 15. BASIC INTERNET INDICATORS IN OMAN

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Oman	20 000	28 000	40	3	84 000	3.4
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

Since its inception in January 1997, OmanTel Internet Service, which is the sole ISP in Oman, has grown from only 48 lines with 1 Mbps bandwidth to over 2,400 lines with over 29 Mbps bandwidth. On 15 May 2001, it was announced that a contract had been awarded to Siemens to make Internet broadband technology (ADSL) available to users. It is estimated that the market for fast Internet access in Oman will reach about 6,000 new users in the next two years.[152]

The cost of dial-up access consists of a one time set-up fee of 10 rials Omani (RO), equivalent to US$ 26, a monthly charge of RO 2 (equivalent to US$ 5) and a fee of 180 baizas per hour (equivalent to about US$ 0.50). A leased line of 2 Mbps capacity costs RO 9,500 per month (equivalent to US$ 24,300).[153] This is expensive by international standards and makes it likely that Internet access will be limited to companies and the upper economic tier of society.

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[149] http://www.tradeport.org/ts/countries/oman/mrr/mark0010.html.

[150] http://www.hatiftelecom.com/news/oman.html.

[151] http://www.itp.net/news/96755846225455.htm.

[152] http://www.hatiftelecom.com/news/oman.html.

[153] http://www.gto.net.om/.

2. *E-business applications in general*

Most information on Omani web sites is descriptive and static in nature.[154] However, e-government and e-business initiatives in countries including Qatar, Bahrain and the United Arab Emirates have put Oman under pressure to accelerate its development in the new economy. In that respect, a new company, Oman TradaNet, has been created to run an e-commerce digital exchange for sourcing and selling products and services over the Internet.[155]

The Muscat Municipality has established four e-government services for parking violations, building permits, municipal licences and rental contracts.[156] It appears that the service is limited to verifying the status of applications/transactions on-line and that on-line payment facilities are not yet available.

3. *Use of the Internet in the transport sector*

The port of Salalah[157] was incorporated in 1997 as a joint venture, with 30 per cent foreign and 70 per cent Omani Government and private/public investment. The Salalah Port Services Company (SPS), which is the port authority, has a 30-year management contract with Maersk Sealand, one of the largest container operators in the world.[158]

The port has a web site with a wealth of information, including a description of the facilities, detailed rates for both marine and stevedoring services, and vessel schedules. On the web site, there is also a description of the port's IT system, which states that it can currently receive the following three EDI messages: vessel stow plan (BAPLIE); vessel pre-planning details (MOVINS); and container discharge/load confirmations (COARRI).

For the Seeb international airport, the only information that could be found was a directory of phone numbers.[159] No other web site related to international trade, transport and border-crossing procedures in Oman was found.

4. *Conclusions*

Oman was late in making the Internet available to the public. However, the Government has embraced ICT, and rapid steps are being made to increase the rate of Internet penetration and advance the application of high technology in all sectors of the economy. In July 2001, the Middle East Directory listed 67 web sites for Oman.

H. PALESTINE*

1. *Infrastructure*

The Palestinian Telecommunication Company, PalTel, has been licensed to develop, operate and manage the telecommunication sector in territories under the jurisdiction of the Palestinian Authority since January 1997. PalTel is a public shareholding company.

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[154] http://directory-oman.com/; http://omanonline.com/index.html and http://www.omanet.com/.

[155] http://www.itp.net/news/97497648081823.htm.

[156] http://www.mctmnet.gov.om/PubServ/index.html.

[157] http://www.salalahport.com/.

[158] http://www.maersksealand.com/.

[159] http://www.omanet.com/seeb.htm.

* The information on Palestine in this section covers the territories under the jurisdiction of the Palestinian Authority.

In its 1999 annual report, PalTel reports that it has increased the number of fixed lines to 222,200 from 83,300 in 1996 and that capacity will soon reach 475,532 telephone numbers. Furthermore, an Internet backbone consisting of 540 km of fibre-optic cable has been laid.

In 1999, the territories under the jurisdiction of the Palestinian Authority were allocated an international access code: 970.[160] Further international cyber recognition was achieved in March 2000 when the Internet Corporation for Assigned Names and Numbers granted the Palestinian Authority a country code top level domain code, "ps", putting the Authority on a par with countries.[161]

In order to obtain full independence for the Palestinian telecommunications network from Israeli operators, international tenders have been offered for the construction of two earth stations for satellite telecommunications.

Internet access has been possible since the mid-1990 in selected localities, mostly through Israeli ISPs. In its 1999 annual report, PalTel reported that Internet services would be provided throughout the territories under the jurisdiction of the Palestinian Authority by the beginning of 2000, which would offer connectivity for all ISPs, institutions and companies.

As can be seen in table 16, it is estimated that there were about 60,000 Internet users in the territories under the jurisdiction of the Palestinian Authority in early 2001. There are seven private ISPs[162] and a dial-up account for unlimited use costs about US$ 25 per month, plus local call charges.[163]

TABLE 16. BASIC INTERNET INDICATORS IN PALESTINE

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Palestine[a/]	-	12 000	-	5	60 000	3.5
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: for 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

a/ The information on Palestine covers the territories under the jurisdiction of the Palestinian Authority.

The mobile cellular network in the territories under the jurisdiction of the Palestinian Authority went live in September 1999. By 2000, the network was expected have 90 per cent indoor and 95 per cent outdoor coverage. The capacity of the mobile cellular system was 70,000 numbers in 1999, expandable to 120,000. The system is operated by Jawwal, which became an independent operating company in the spring of 2001, although 65 per cent of it is still owned by PalTel. Within 10 years, it is expected that there will be about 370,000 cellular users in the territories under the jurisdiction of the Palestinian Authority.[164]

2. *E-business applications in general*

In spite of the difficulties of living under occupation, and the fact that the Palestinian Authority was created only recently, it has worked hard to promote the use of ICT in general and also to use it within its agencies. A good overview of the use of the Internet in the territories under the jurisdiction of the Palestinian Authority can be found on the portal "Palestine-net";[165] and the web site of the Palestinian Authority.[166]

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160 http://www.paltel.net/about/index.html.

161 http://www.ditnet.co.ae/Itnews/newsmar2000/newsmar66.html.

162 http://www.ameinfo.com/info/isp.htm.

163 http://jrol.com/business/dialup.htm.

164 http://www.paltel.net/invest/anual99/page4.htm.

165 http://www.palestine-net.com/business/list.html.

166 http://www.pna.net/.

Alburaq,[167] a portal launched by PalTel in 1999, was chosen as second-best Arab portal in a contest held by the Emirates Media Institution.[168]

The Web is used for providing information, and the applications are conventional. No site that offered transactional activities was found.

3. *Use of the Internet in the transport sector*

No Internet site related to international transport or to border-crossing procedures was found, and only one site by a shipping and clearing agent, with very basic information on services provided, was found.[169]

4. *Conclusions*

The official Palestinian attitude towards ICT and the Internet is very positive, and considerable progress has been made in building a modern digital telecommunication infrastructure. However, the economic difficulties and unemployment caused by the Israeli occupation and the intifada make it unlikely that most ordinary people will be able to benefit from either computers or the Internet for some time. In July 2001, the Middle East Directory listed 41 web sites for the territories under the jurisdiction of the Palestinian Authority.

I. QATAR

1. *Infrastructure*

All telecommunication infrastructures in Qatar is owned and operated by Qatar Telecom, Q-Tel. Q-Tel was a government monopoly until late 1998, when the Government sold off 45 per cent of its stake in the company. At the same time, the company was granted a 15-year monopoly, so it is not expected to face any significant competition in the near future.[170] Q-Tel is also the exclusive ISP in Qatar.

The Internet was first introduced by Q-Tel in 1996 with the launch of its ISP, Internet-Qatar. Internet usage is growing in popularity, particularly in the business and government sectors. As can be seen from table 17, the number of Internet users was estimated at 75,000 in early 2001, giving Qatar a penetration rate of 10 per cent, the third highest in the ESCWA region after the United Arab Emirates and Bahrain.

TABLE 17. BASIC INTERNET INDICATORS IN QATAR

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Qatar	18 000	25 000	39	3	75 000	10.3
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

The Government is committed to universal service, but Internet access is costly by international standards. A variety of packages offer dial-up accounts that are available for a monthly rental of 50 Qatar rivals (QR), which is equivalent to US$ 14.30, plus QR 4.20 per hour (equivalent to US$ 1.20) for sporadic access, to QR 1,250 per month (equivalent to US$ 357) for unlimited access, three e-mail addresses and five

[167] http://www.alburaq.net/.

[168] http://www.paltel.net/press/press27.html.

[169] http://www.aca-palestine.com/.

[170] "Special report telecoms: Qatar," *Middle East Economic Digest (MEED)*, 25 August 2000.

MB Web space plus a domain name. A leased line with 2 Mpbs capacity can be rented for QR 95,000 per month (equivalent to US$ 27,170).[171] It should be noted, however, that local calls are free in Qatar.

Q-Tel has international connections through several satellite links and the regional FOG network, an undersea fibre cable that connects Kuwait, Bahrain, Qatar and the United Arab Emirates. The FOG network is in turn connected to the rest of the world via the FLAG network.

Since 1993 Q-Tel has also had a mobile cellular network; its penetration rate in 2000 was approximately 20 per cent, again the third highest in the region after the United Arab Emirates and Bahrain. In late May 2000, a contract was awarded to the French company Alcatel to add 100,000 lines to the GSM network and to introduce the wireless application protocol in preparation for mobile access to the Internet.[172]

2. *E-business applications in general*

Although government users represent approximately half of all Internet users in Qatar, the Internet is not an integral part of government operations yet. The Centre for Geographic Information Systems (GIS), however, is making an impact on the way civil engineering and related planning are being conducted. The Centre has developed a GIS that is linked by an intranet, a private wide-area network based on the Internet protocol, to 16 government ministries and agencies. This fibre-optic network provides all subscribers with access to highly accurate maps of Qatar. The GIS is not accessible from the Internet, but the public can access certain information, such as residential plans and pipe/wire runs, via kiosks at the municipal water and sewage agency and the office that issues building permits.[173]

The Government of Qatar has established an e-commerce committee, which has outlined a two and a half year strategy to create an on-line government portal. In September 2000, an on-line work permit system went live. The next candidate is likely to be the Ministry of the Interior, which is responsible for services such as visas, drivers' licences, car registration, passport issuance and issuance of ID card. The intent is to offer 24-hours-a-day, 7-days-a-week service, instead of just morning opening hours. Services will be delivered through several channels such as the Internet, mobile phones and kiosks. The Central Bank is working on building a payment gateway, which will serve the portal.[174]

The country's first business-to-business e-marketplace, C1QT, was launched in April 2001 as a joint project between Commerce-One Middle East and Q-Tel. C1QT will drive the start-up and operation of Qatar's first on-line exchange, which is expected to cover all stages of a business transaction from order to payment, including catalogue management and consultation, order approval processing, and delivery and invoicing as well as on-line auctions and tender offers. It will introduce e-procurement to the business and industrial community as an economical and faster way of doing business.[175] Unfortunately, C1QT does not appear to have a web site on which one can follow the progress of the project.

3. *Use of the Internet in the transport sector*

Qatar Customs has a web site, which provides some basic information on import and export procedures as well as trade statistics for the years 1995-1998.[176]

Qatar Airways has a web site that offers basic information on the company and its services, including flight schedules.[177]

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[171] http://www.qatar.net.qa.

[172] "Special report telecoms: Qatar," *Middle East Economic Digest (MEED)*, 25 August 2000.

[173] The Global Diffusion of the Internet, March 1998 (http://mosaic.unomaha.edu/gdi.html).

[174] http://www.itp.net/features/97556902273780.htm.

[175] http://www.itp.net/news/print/98757290616026.htm.

[176] http://www.customs.gov.qa/customs/en-main.htm.

[177] http://www.qatarairways.com/.

As for maritime shipping, the Qatar National Navigation and Transport Company, which has a government monopoly on agencies, has a web site with some basic information about the company.[178]

No information on the Internet was found in regard to either seaports or airports.

4. *Conclusions*

Qatar's telecommunication system is among the most advanced in the world, and the Government has ambitious projects under way to provide e-government services to its citizens and residents. However, there is no competition and the use of the Internet and the Web was, when this report was written, expensive, conventional and limited to static information. In July 2001, the Middle East Directory listed 47 web sites for Qatar.

J. SAUDI ARABIA

1. *Infrastructure*

Saudi Arabia has succeeded in constructing one of the most sophisticated telecom networks in the world and telecommunications has become the fastest growing sector of the economy. As of 2001, telecommunications had expanded by 30 per cent during the previous four years.[179]

Public access to the Internet was introduced in Saudi Arabia only in 1999. Saudi Arabia was thus the last country on the Arabian Peninsula to make public access to the Internet available. The telecommunication infrastructure is owned and operated by the Saudi Arabian Telecommunication Company (STC) which is a corporatized State monopoly.[180]

The Gulf region's first wide-area network was created in 1985 by the King Abdulaziz City for Science and Technology (KACST) and IBM. The purpose of this network was to provide information support for academic institutions and research. In 1989 a national X.25 packet switch network, *al-Waseet*, was commissioned by the Ministry of Post, Telegraph and Telephone. In addition to providing business data communications and a nationwide network for the Saudi Arabian Monetary Agency, more than 15,000 point-of-sale terminals installed in stores around the country are connected to their respective corporate headquarters over *al-Waseet*.[181]

Most of the country's telephone lines were analog in the mid-1990s, and dial-up connections were normally limited to 9.6 kbps, insufficient for Internet activities other than electronic mail. Since that time, the public switched telephone network has been expanded by 1.5 million lines, for a total of about 4 million, and transmission and switching have been digitized, thus making the system network friendly. This gives a phone penetration of about 10 per cent, slightly above the ESCWA region average of 7.5 per cent but below the world average of 15 per cent. The Government of Saudi Arabia is considering the possibility of a further expansion of 4.6 million lines, which would more than double the capacity. Since 1998, STC has had an international satellite link to the Internet in New York via a subsidiary of MCI Worldcom.

In June 2001, Saudi Arabia moved a step closer to a competitive telecommunications market as the Shoura Council passed a draft bill aimed at breaking the monopoly of STC. This bill also calls for the creation of an independent telecom watchdog, but the Government still has to approve it.[182]

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[178] http://www.qatar.net.qa/qnntc/.

[179] Report on Saudi Arabia, Paul Budde Communications, August 2001, (http://www.budde.com.au/Search/index3.asp).

[180] http://www.stc.com.sa/.

[181] Mosaic Group, The Global Diffusion of the Internet Project, March 1998 and February 1999 (http://mosaic.unomaha.edu/gdi.html).

[182] *CommsMEA* (Communications Middle East and Africa), June 2001 (http://www.itp.net/corporate/).

When it was decided to establish a public Internet service in Saudi Arabia, KACST was made the sole international connection point. KACST established the Internet Service Unit, which is responsible for maintaining the national Internet hub and firewall as well as overseeing the ISP licensing process. A great deal of thought, money and effort has gone into preventing access to unauthorized web sites, and KACST announced that by the fall of 2001 it would double the number of blocked sites from 200,000 to over 400,000.[183]

There are about 40 licensed Internet Service providers. However, STC owns both the backbone and the final connection to the customer, and connections are expensive, with the result that ISPs pay about 80 per cent of their revenues to STC and KACST.[184] The cost of dial-up access is also expensive by international standards. Saudi Online, for example, offers unlimited plans for 140 Saudi Arabian rivals (SRIs) per month (equivalent to US$ 40), to which should be added the cost of a local call of SRIs 0.05 per minute (approximately US$ 0.85/hour).[185]

In spite of the high cost, the Internet has been accepted rapidly, and in the spring of 2001 there were already about 190,000 subscribers and some 570,000 regular users, as can be seen in table 18. The STC is reported to expect 3.3 million Internet users by 2004.[186]

TABLE 18. BASIC INTERNET INDICATORS IN SAUDI ARABIA

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Saudi Arabia	100 000	190 000	90	3	570 000	2.6
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

There were approximately 840,000 mobile cellular numbers in 1999. In early 2000 a contract was awarded to install a further 1.1 million lines, and STC has predicted that about 1 million lines a year will have to be added, given the speed at which the customer base is growing.[187] STC is reported to be working on introducing mobile Internet (WAP) capabilities.[188]

2. *E-business applications in general*

It has been reported that the Government of Saudi Arabia has instructed the Ministry of Finance and National Economy to devise a coordinated strategy for Kingdom-wide e-government, and the Ministry of Commerce to formulate the rules and regulations to govern e-commerce in the Kingdom. More immediately, KACST is putting in place a Public Key infrastructure system that will ensure the security of e-commerce. In addition, the Monetary Agency is piloting an online payment system for business-to-business e-commerce based on technology from SWIFT, the international banking network. The Saudi Arabian Monetary Agency is also developing an improved electronic securities trading system called Tadawul. Furthermore, there is an educational project, the Watani project, which will invest SRIs 5 billion to bring the Internet and information technology into all the Kingdom's schools.[189]

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[183] *Arabian Computer News*, June 2001.

[184] Ibid.

[185] http://www.saudionline.net.sa/billing/services.asp and http://www.stc.com.sa/.

[186] *Arabian Computer News*, June 2001.

[187] *Middle East Economic Digest (MEED)*, 23 February 2001.

[188] *Arabian Computer News*, June 2001.

[189] E-Government in Action 2001: Saudi Arabia, Supplement to *Arabian Computer News*, June 2001.

Most web sites are limited to static information, but there are also examples of more sophisticated sites such as the Juffali electronic shopping mall.[190] As in most countries in the ESCWA region, there are also many newspapers and magazines with online news, as well as Saudi Arabian radio and television, presented on the web site of the Saudi Arabian embassy in Washington, DC.[191]

3. *Use of the Internet in the transport sector*

No online information regarding customs clearance, border crossing and import and export procedures was found.

Saudi Arabian Airlines has a web site that offers cargo tracking plus a variety of static information including flight schedules. On-line reservation and ticketing is promised soon.[192] The three main airports have web sites with a multitude of static information and provisions for eventually providing flight departure and arrival information.[193]

The Saudi Arabian Port Authority has a web site with links to the eight seaports that are administrated by the Authority. The web site has vessel arrival and departure schedules and static information regarding port statistics, rules and regulations, tariffs, summary information on services and facilities and details about the organization and the Saudi Arabian port privatization programme.[194]

Some of the private terminal operators have web sites. One example is Globe Marine Services in Jeddah which, in addition to static information on services and facilities, offers e-business services which so far include online booking, requests for quotations and tracking.[195] The other four or five terminal operators with web sites linked to the Port Authority site provide static information only.

4. *Conclusions*

The Internet is still a very recent phenomenon in Saudi Arabia. Services are expensive and the infrastructure inadequate, although rapidly improving. The Government is very concerned with shielding users from access to non-authorized web sites, and all international access passes through the Government's firewall. In spite of this, the Internet has grown fast in the private sector and the Government is committed to introducing e-government and to bringing information technology to all schools. In June 2001 there were 291 web sites in Saudi Arabia listed in the Middle East Directory.

K. SYRIAN ARAB REPUBLIC

1. *Infrastructure*

All local and international telecommunications services are provided by the State monopoly operator, the Syrian Telecommunications Establishment (STE), which is responsible for all forms of fixed and wireless communications and Internet connections. Extension and modernization of the telecommunications network is taking place to increase it to a capacity of 3.45 million lines by 2002. STE has a national target of over 4 million fixed lines by 2004. This will double the country's teledensity, bringing it up to 20 per cent.

There is no separate regulator, nor are there plans to create a regulatory authority. The Syrian Arab Republic has no plans for total liberalization and full competition for telecom services in the foreseeable

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[190] http://www.juffalimall.com.sa/.

[191] http://www.saudiembassy.net/.

[192] http://www.saudiairlines.com/english/.

[193] http://www.pca.gov.sa/KAIA/kaia.htm.

[194] http://www.saudiports.gov.sa/.

[195] http://www.globemarine.com.sa/ebusiness/ebusiness.htm.

future. Partial liberalization is increasing, especially in the operation of newly introduced services through partnership contracts with STE involving either national or international private companies.[196]

The Syrian Arab Republic is a latecomer to the Internet and mobile cellular telephony. A pilot project to introduce the Internet in the country officially was launched in June 1999. Access was initially given to businesses and institutions while access for home users was slated for a later date. STE is the sole Internet service provider. As can be seen in table 19, in early 2001 the number of Internet subscribers was 8,000 and the number of users was 32,000.[197]

TABLE 19. BASIC INTERNET INDICATORS IN THE SYRIAN ARAB REPUBLIC

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Syrian Arab Republic	4 000	8 000	100	4	32 000	0.2
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

The cost of an Internet subscription is reported to be about US$ 18 per month plus US$ 1.10 per hour. In November 2000 a tender was launched seeking partners to establish a consortium of public and private companies to build and operate the country's national Internet backbone network. Completion of the project by end-2001 will see 50,000 access points provided for the Syrian Arab Republic, with an additional 20,000 access points by 2005.[198]

On 15 April 2001, two local GSM networks began operations in the Syrian Arab Republic, following the end of a trial phase that started in February 2000. Lebanon's Investcom and SyriaTel, a subsidiary of the Egyptian mobile telephone operator Orascom, operate the two networks under 15-year build-operate-transfer agreements. According to STE, the mobile network services will cover 90-95 per cent of the country's populated areas by the end of 2001. There were 60,000 subscribers at the time of the start of the new networks, and it is estimated that by the end of the 15-year contract period, each network will be capable of serving 850,000 users.[199]

2. *E-business applications in general*

The Internet is still a very recent and very limited phenomenon in the Syrian Arab Republic, and web sites provide strictly basic information and news. The Syrian portal, Syria on-line, which has links to business, news, and the Government, gives a good picture of the extent and use of the Internet in the Syrian Arab Republic.[200]

In April 2001, the Syrian Computer Society held its annual scientific seminar on the theme "Information and Communication Technology in the Economy". It was reported that the Syrian First Lady attended the majority of presentations, and that a number of Ministers and decision makers also participated. This participation can be interpreted as evidence that there is interest—or at least curiosity—with regard to ICT at the highest political levels.[201]

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196 Report on Syria, Paul Budde Communications, August 2001, www.budde.com.au.

197 http://www.ditnet.co.ae/Itnews/newsjul2000/newsjuly2.html.

198 Report on Syria, Paul Budde Communications, August 2001, www.budde.com.au.

199 "New GSM networks kick off, " *Middle East Economic Digest (MEED)*, 27 April 2001.

200 http://www.syria-online.com/.

201 http://www.syria-online.com/news/news_artc/ict.html.

3. *Use of the Internet in the transport sector*

There does not appear to be any Syrian transport-related presence on the Web as of yet, nor is there any information in regard to goods clearance and border-crossing procedures.

4. *Conclusions*

The Syrian Arab Republic has been slow to adopt ICT, and the penetration rate and use of the Internet are still very limited. However, the country's new President has vowed to ensure that every house in the Syrian Arab Republic will have Internet access, so the pace may well pick up.[202] In June 2001 there were 69 web sites listed under the Syrian Arab Republic in the Middle East Directory.

L. UNITED ARAB EMIRATES

1. *Infrastructure*

The United Arab Emirates is the wealthiest country in the ESCWA region, and also the country in the region that has invested most purposefully in developing its ITC infrastructure. The result is that the United Arab Emirates has the highest number of main telephone lines per capita, the highest number of cellular phones per capita and the highest number of Internet users per capita. As shown in table 20, the number of Internet users in early 2001 was estimated at 660,000, giving a penetration rate of 24.4 per cent in the country.

TABLE 20. BASIC INTERNET INDICATORS IN THE UNITED ARAB EMIRATES

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
United Arab Emirates	160 000	220 000	38	3	660 000	24.4
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

Telecommunication services are the domain of the Emirates Telecommunications Corporation, Etilsat, which is a State-owned monopoly. The United Arab Emirates has a modern telecommunications infrastructure, and mainline telephone density is 48 per cent, on a par with countries such as Ireland or Italy. Furthermore, in January 2001, Etilsat announced a billion dollar, three-year project to upgrade the country's telephone network, incorporating new packet switching technology.[203]

As for international connections, the United Arab Emirates is linked to Kuwait via Qatar and Bahrain by the FOG cable, and to much of the rest of the world through the FLAG cable. In addition, Etilsat has signed a memorandum of understanding with 16 international telecommunication administrations in South-East Asia, the Middle East and Western Europe to put in place a new submarine digital superhighway, SEA-ME-WE3.[204]

Etilsat also has five digital satellite earth stations providing international access via links to Intelsat, Arabsat, Inmarsat and Etilsat's own satellite, which was launched in October 2000 and is scheduled to begin commercial mobile phone services in 2001.[205]

Etilsat launched public access Internet services in 1995, and by early 2001 Internet penetration was approximately 24 per cent, as shown in table 20. This puts the rate of Internet penetration in the United Arab

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[202] http://www.ditnet.co.ae/ITnews/newsjul2000/newsjuly2.html.

[203] *Middle East Economic Digest (MEED)*, 12 January 2001.

[204] http://www.etisalat.co.ae/a_story2.htm.

[205] http://www.thuraya.com/.

Emirates above that of European countries such as Spain and France, which have rates of 13 and 14 per cent respectively.[206]

Etilsat operates the sole ISP under the name Emirates Internet and Multimedia. A basic dial-up service is offered for a monthly charge of 20 UAE dirhams (Dh). (It should be noted that US$ 1 is equivalent to Dh 3.85.) In addition to the monthly charge of Dh 20, there is a user charge of Dh 1.00 – Dh 1.80 during off-peak and peak hours respectively. Thus 40 hours of hours cost between US$ 15.60 and US$ 24, considerably above international standards. A one-time registration fee of about US$ 50 also applies. No unlimited access service is offered.[207]

Public Internet access is also possible through Internet kiosks. By July 2001, 11 kiosks have been installed in the Abu Dhabi, Dubai and Sharjah international airports, and plans have been made for more kiosks to be set up in the near future, and installed in shopping malls and other public areas. Users can use the kiosks to check their e-mails and browse the Internet, and businesses can use them for advertising. The cost is about one dollar per hour, and payments can be made through credit cards, prepaid cards or through Emirates Internet accounts.[208]

The United Arab Emirates introduced cellular GMS services in 1994, and by June 2001 there were 1.7 million mobile phone subscribers, compared with 1.1 million fixed line subscribers. With a mobile phone penetration of 58 per cent, the United Arab Emirates is among the 20 highest users of GSM in the world.

Mobile Internet services (WAP) were launched in April 2001, and by June there were 85,000 subscribers. It is expected that Etilsat will launch a third-generation mobile network, GPRS (General Packet Radio Service), by October 2001 and enhance the EDGE technology (Enhanced Data for Global Evolution) by the end of 2002 in order to achieve mobile data transmission rates of up to 384 kbps.[209]

2. *E-business applications in general*

The United Arab Emirates is a regional trading centre and has become a hub for air and sea transport as well as telecommunications. The country is also a major financial centre, having acquired much of the business that left Beirut at the beginning of the Lebanese civil strife that started in 1975. The United Arab Emirates has a world-class ICT infrastructure, although not all customers find the Internet service of the Government monopoly to be satisfactory,[210] and more companies in the Emirates have embraced the Internet than in any other country in the region.

As in most of the ESCWA region, however, the use of the Internet is generally limited to providing information about products and services. An exception is the Emirates Bank group, based in Dubai, which provides electronic banking to its retail clients and is working towards being a "one-stop shop" for banking and ICT services to the region's other banks and institutions.[211]

In order to develop the country's e-commerce infrastructure, Etilsat started a business unit in 1999, Comtrust, which offers services such as digital certification, public key infrastructure and secure payment solutions, in addition to e-retailing solutions and dedicated e-commerce hosting.[212] It has also been reported

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[206] ITU Telecommunication Indicators 2001 (http://www.itu.int/ti/industryoverview/).

[207] http://www.emirates.net.ae/.

[208] http://www.emirates.net.ae/kiosk/index.html.

[209] http://www.itp.net/news/99344669266743.htm.

[210] "Electronic commerce in the United Arab Emirates," paper submitted at the Expert Group Meeting on Trade Facilitation and Electronic Commerce in the ESCWA Region, held at Beirut from 8 to 10 November 2000; and *CommMEA*, June 2001.

[211] http://www.emiratesbank.com/.

[212] http://www.comtrust.co.ae/default.htm.

that the United Arab Emirates Central Bank has pledged Dh 30 million (US$ 7.8 million) to construct an Internet banking platform for the country's smaller banks.[213]

Dubai has made particularly noteworthy efforts to become a centre for ICT not only for the region, but for the world. In October 2000, the Dubai Internet City, the first free zone for e-commerce in the world, was opened.[214] The Internet City is complemented by the Dubai Media City[215] and Dubai Idea Oasis,[216] which together make up e-Dubai. The guiding idea is that venture capital and intellectual capital will congregate and propagate in Dubai, attracted by a benign regulatory environment, world-class infrastructure, reliable logistical support and a high quality lifestyle. Some of the benefits offered by the free zone include 100 per cent foreign ownership, 50-year renewable land leases and blanket exemption from all taxation.[217]

Another interesting Government initiative is Tejari.com, which is an electronic marketplace created by the Dubai Port Authority with the backing of the Government of Dubai.[218] Tejari is a business-to-business (B2B) electronic marketplace, with an advantage over many other e-ventures in that the Government of Dubai has committed to conduct most of its purchasing activities through the platform. Tejari charges participants a non-published fee based on transaction volume.

In addition to the above, the Dubai e-government task force has announced the appointment of a project manager for the implementation of e-government across 14 different departments. The project, which includes the re-engineering of business processes within and between government agencies, will take 18 months to complete and will eventually result in a complete e-government infrastructure.[219]

On the United Arab Emirates Government home page, new tenders and quotations are listed as well as government fees and e-government services, such as the issuance of industrial licences and certificates of origin.[220]

The Crown Prince of Dubai, who was responsible for launching the Dubai Internet City, the e-commerce free zone and the Dubai e-government project, has also initiated an IT education project. This project aims to convert the government schools' conventional education system into an e-based learning system in order to ensure a qualified workforce for the future.[221]

3. *Use of the Internet in the transport sector*

Transportation and border-crossing issues are dealt with at the level of each Emirate. Of the seven Emirates, two Customs authorities have web sites: Dubai and Sharjah. The Dubai Ports and Customs introduced an electronic customs clearance system called e-Mirsal, in June 2000.

E-Mirsal, which is the e-commerce version of the Mirsal cargo community system, allows agents, shippers, transport companies and other companies in the cargo business to process their customs clearing documents and payments 24 hours a day, 7 days a week, using the Internet. The system processes up to 8,000 transactions per day for Dubai's air, land and sea Customs offices. Mirsal integrates air, land and sea

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213 *E-Government in Action 2001* – supplement to *Arabian Computer News*, June 2001.

214 http://www.dubaiinternetcity.com/.

215 http://www.dubaimediacity.com/.

216 http://www.dubaiideasoasis.com/.

217 *Middle East Economic Digest (MEED)*, 10 November 2000.

218 http://www.tejari.com.

219 *E-Government in Action* – a supplement to *Arabian Computer News*, June 2001.

220 http://www.uae.gov.ae/.

221 http://www.itep.co.ae/itportal/english/main.asp.

customs processes in one network linking nine individual Customs offices. The Dubai Ports and Customs web site provides static information on procedures and duties.[222]

The Sharjah Customs web site has basic information on procedures and tariffs as well as a directory of shipping lines and agents.[223] There is also an inactive link to an Internet customs clearance site, suggesting that something is being planned in that regard.

The web site of the Abu Dhabi port Mina Zayed contains strictly static information such as services and facilities, but is noteworthy because it has detailed published tariffs.[224] The port of Fujairah has, in addition to static information, a daily shipping list. It also has access to tariff information for registered users with a password.[225] The web site of the port of Khor Fakkan has some information about the port and useful links to the Sharjah Emirate in general.[226]

The Dubai Port Authority (DPA) operates two ports: Port Rashid and the Jebel Ali Free Zone. The two ports are about 35 km apart. Each port has its own data-processing centre using the same database. The two centres are networked through high-speed communication lines, and each one can back up the other in case of a breakdown. The terminals are highly computerized. The handling of containers is supported by an electronic data interchange system, which can receive electronic bayplans (the Edifact BAPLIE message) and a proprietary EDI manifest.

The information received by the electronic bayplan, an electronic map of the location of containers on a vessel, is integrated into the proprietary Container Terminal Management System. Once the ship is loaded, an updated bayplan is transmitted to the shipping line. The port has introduced bar coding, global positioning technology and radio data transmission in order to improve tracking of cargo through the port and to handle equipment positioning and monitor crane movements.[227]

The Dubai Port Authority web site provides static information on facilities, services, directories and statistics and, in particular, detailed tariffs. The web site also has schedules of vessels in port and expected arrivals. The Dubai Port Authority is in the process of improving customer interaction and document-processing by developing a secure Web portal where agents, shipping lines and forwarders will be able to track and view the status of shipments as well as submit work orders and requests.

The Dubai airport's web site offers useful information on flights and weather.[228] Sharjah Airport's web site is more extensive and offers cargo tracking as well as flight schedules and weather information in addition to static information of various kinds.[229]

A US$ 1.4 billion expansion of Dubai Airport is planned, and in July 2001 it was reported that all tendering for this project would be conducted online through the Middle East AirportXchange (MAX), an offshoot of a Malaysian electronic procurement site for airports. MAX is 51 per cent owned by Dubai's Civil Aviation Authorities, and other airports in the Middle East will be encouraged to buy in.[230]

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222 http://www.dxbcustoms.gov.ae/.

223 http://www.sharjahcustoms.gov.ae/.

224 http://www.portzayed.gov.ae/.

225 http://www.fujairahport.com/.

226 http://sharjah-welcome.com/Commerce/facilities/ports.htm.

227 http://www.dpa.co.ae/; and Cargo Systems, Recent *Developments in Information Technology for Container Terminals*, by Karl Jeffery.

228 http://www.dubaiairport.com/.

229 http://www.shj-airport.gov.ae/.

230 http://www.ax-max.com/ and the *Daily Star* (Beirut), July 4, 2001.

The Emirates Airline has a more advanced web site that allows booking online for travels starting in the United Arab Emirates, the United Kingdom, Kuwait, Singapore or Germany. Payment is by credit card, with the interesting condition that the credit card holder must be a passenger.[231]

4. *Conclusions*

The United Arab Emirates is the wealthiest country in the ESCWA region, and information technology has been embraced with enthusiasm. Dubai in particular has made information technology the main focus of its strategic development plan and counts on it to diversify the economy and lessen its dependency on oil. Interesting initiatives include the Dubai Internet City and various e-government undertakings, such as the Tejari electronic marketplace for government procurement. Contrary to the trend in most of the world, there is no sign that the Government monopoly telecommunication company will have to face competition any time soon. However, as a member of the World Trade Organization, the United Arab Emirates will eventually have to open its telecommunication activities to allow for competition, so at some time in the future this point will have to be addressed.

In June 2001 there were 835 web sites listed for the United Arab Emirates in the Middle East Directory, not surprisingly the highest number in the ESCWA region.

M. YEMEN

1. *Infrastructure*

The national telecommunications operator, the Public Telecommunications Corporation, provides all domestic local and long distance services. International calls, mobile telephony, data transmission and Internet access are provided by TeleYemen, a joint venture company established in 1990, with the Public Telecommunications Corporation holding 49 per cent of the shares and Cable and Wireless holding 51 per cent.

The Internet was introduced in 1996 and, as can be seen in table 21, by early 2001 there were an estimated 3,500 subscribers and 14,000 users. This corresponds to a penetration rate of about 0.1 per cent of the population, the second lowest in the ESCWA region after Iraq. Contrary to Iraq, however, the Government in Yemen has not attempted to control access to the Internet.

The low percentage of penetration is strongly linked to the relatively high cost of an Internet account. A starter package giving four free hours per month involves a registration fee of 5,750 Yemeni rials (YRls), equivalent to US$ 35, plus a monthly charge of YRls 1,600 (equivalent to US$ 9.80), plus YRls 9 (equivalent to US$ 0.05) per additional minute. A subscription for 30 hours per month costs US$ 44 plus US$ 2.16 per additional hour.[232] This puts the Internet well beyond the reach, in terms of income, of even an above-average Yemeni.[233]

A cellular mobile service was set up by TeleYemen as early as 1992. This was a monopoly operation until February 2001, when Sabafon launched an additional GSM network in Yemen, initially covering the capital city of Sana'a, with an expansion planned to cover the majority of the country's population by the end of the year 2001. The company expects to invest US$ 60 million over the next 12 months, and should spend around US$ 170 million over the next 15 years. Sabafon is backed by Orascom Telecom of Egypt and Oman's al-Zubair Group.[234] However, as with the Internet, the mobile phone penetration at 16 per 1,000 inhabitants is still among the lowest in the region.

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[231] http://www.emiratesairline.com/.

[232] http://www.y.net.ye/tariff.html.

[233] Mosaic Group, The Global Diffusion of the Internet Project (March 1998) (http:///mosaic.unomaha.edu/gdi.html).

[234] http://www.cellular-news.com/2001/02_17_2001.htm.

TABLE 21. BASIC INTERNET INDICATORS IN YEMEN

ESCWA member and region	Number of subscribers		Percentage growth 2000-2001	Users per account	Users (2001)	Percentage of population (2001)
	2000	2001				
Yemen	3 000	3 500	17	4	14 000	0.1
ESCWA region	505 000	757 000	50	3.7	2 810 000	1.7

Source: For 2001: Ajeeb Research Unit; for 2000: Internet Arab World.

TeleYemen had a monopoly on all telecommunication services until the cellular GMS licence was awarded in the spring of 2001. In the year 2003, TeleYemen's monopoly on overseas calls will expire and its Internet access monopoly is also threatened.[235] This promises better and less expensive services for the users.

2. *E-business applications in general*

In spite of the high cost of Internet access and poor and unreliable service, according to an article on YemenWeb,[236] there still seems to be a great interest in the Internet and its possibilities in Yemen. The Yemen software company, Yemensoft, lists 95 major clients on its Web page.[237] TeleYemen's home page also has an extensive list of Web applications in Yemen,[238] including no less than 12 Yemeni newspapers with online editions. Most, if not all, sites provide static information for information and marketing purposes. Most sites are in English and very little content is in Arabic, which suggests that most Yemeni web sites are directed at foreign users and the Yemeni elite.

An interesting use of ICT was demonstrated by the General People's Congress, the ruling political party, which successfully established its own private nationwide computer network in 1993 to support its candidates' election campaigns.[239]

3. *Use of the Internet in the transport sector*

Yemen Airways has a website that provides a phone number for reservations in the United States and Canada, an e-mail address and some links to other sites about Yemen.[240]

Some information on the Aden Free Trade Zone and the port can be found on the Arab World Online site.[241] There is no information on customs clearance and border-crossing procedures and no other transport related site was found.

4. *Conclusions*

Yemen is the poorest country in the region and a relatively recent State, created in 1990 with the unification of the former Yemen Arab Republic (North Yemen) and the People's Democratic Republic of Yemen (South Yemen). However, there is a strong feeling on the part of the leading members of the business community that use of ICT, especially the diffusion and effective application of the Internet, is critical for the economic development of the country.[242] In June 2001 there were 25 web sites listed for Yemen in the Middle East Directory.

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235 http://pressemedia.com/jemen/telekom.htm (in German).

236 http://www.YemenWeb.com/.

237 http://www.yemensoft.net/oclients.htm.

238 http://www.y.net.ye/.

239 Mosaic Group, The Global Diffusion of the Internet Project (March 1998) (http://mosaic.unomaha.edu/gdi.html).

240 http://home.earthlink.net/~yemenair/.

241 http://www.awo.net/country/aden.asp.

242 Mosaic Group, The Global Diffusion of the Internet Project (March 1998).

IV. THE ROLE OF GOVERNMENTS

INTRODUCTION

The implementation, use and development of e-business raise a number of issues that require action or attention from Governments, public actors and institutions. Some of these issues (such as commercial law) require fast and legal binding actions by the public sector. Other issues (such as security factors and payment systems) might be solved between commercial partners and/or customers alone.

International efforts are now under way to address certain policy issues concerning the deregulation of telecommunications, intellectual property protection, security and encryption, and privacy protection. There must be additional international attention focused on issues relating to customs and taxation, electronic payment systems, and the unified treatment of paperless commercial transactions. To promote the introduction of electronic commerce, further initiatives by the public and private sectors will be beneficial.

Governments are advised to adjust their legal and financial management systems to the information age, and to support efforts for building the required infrastructure and basic research. Excessive and conflicting regulations with regard to the electronic commerce marketplace must be eliminated in order to allow users to benefit from the advanced services made available through private enterprise.

While there is not yet any detailed common plan for the Governments in the ESCWA region, the United States Government, the European Union and the Japanese Ministry of International Trade and Industry have all released reports on issues that the private and public sector must address in order to promote electronic business effectively. The issues that are being considered are:[243]

(a) Customs, taxation and cross-border transactions;
(b) Electronic payment systems;
(c) Uniform commercial code for commerce conducted on the Internet;
(d) Intellectual property rights;
(e) Copyrights;
(f) Trademarks;
(g) Privacy;
(h) Security and encryption;
(i) Telecommunications infrastructure;
(j) Content;
(k) Technical standards;
(l) Human resources.

The Global Information Infrastructure Commission has published a comparison of these reports that reviews how each one of the frameworks proposed by these nations approaches the 12 key issues above. The following is a brief review the United States, EU and Japanese consensus position and the most important conclusions.

1. *Main principles of e-commerce*

(a) As in traditional commerce, the private sector will provide the leadership for the growth and development of electronic commerce, including the establishment of reliable and trusted business practices for conducting commercial activities in the digital age.

(b) Governments of every country should create a favourable environment for open and fair participation in electronic business, and support business procedures that are in harmony with generally accepted international commercial practices.

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[243] Global Information Infrastructure Commission, "GIIC Recommendations for Promoting the Use of Electronic Commerce", 1998 (http://www.giic.org/focus/ecommerce/ecrecs.html).

(c) Governments should support technological developments that will lead to the establishment of global interconnectivity and interoperability.

(d) The legal system of each country, and international agreements between nations, should, if necessary, be adjusted to accommodate electronic business.

(e) Laws must be established and enforced to avoid cyber-crime, such as money laundering.

(f) Education to increase information literacy among all citizens is essential.

2. *Customs, taxation and cross-border transactions*

Unreasonable tax burdens will hinder the growth of electronic commerce. Any new public policy should remove obstacles to achieving the maximum economic growth possible and enable more people to conduct electronic commerce.

(a) Taxation of electronic business should be guided by the principle of neutrality, which means that all transactions should be treated equally regardless of whether the transactions are through electronic means or through traditional channels of commerce.

(b) Intangible products sold and delivered over the Global Information Infrastructure (GII) should be treated the same way for tax purposes as products purchased off-line in the tangible world.

(c) Tangible goods purchased electronically and physically delivered should be subject to the same transactional tax requirements imposed on the mail order industry.

3. *Electronic payment systems*

Electronic payment systems are still in the relatively early stages of development, and the timing of many future developments is likely to be slower than some people expect, for there are many obstacles to growth. These include issues relating to interoperability, security and privacy, and verification and authentication of transactions.

The marketplace and self-regulation of industry may not be able to address all the issues related to electronic payment systems. Government action may be necessary to ensure the safety and soundness of electronic payment systems, to protect consumers, or to respond to law enforcement objectives. However, government actions must be flexible in accommodating the needs of emerging marketplaces.

4. *Uniform commercial code for commerce conducted on the Internet*

(a) Electronic business practices should primarily be shaped by the private sector through custom, usage and voluntary agreements of the parties.

(b) Governments should ensure that the legal environment for commercial transactions is flexible and can accommodate electronic business practices.

(c) Governments should work towards the worldwide harmonization of laws relating to the use of electronic means of conducting contractual transactions.

5. *Intellectual property rights, copyrights, patents and trademarks*

(a) Governments should establish and adhere to clear and effective copyright, patent and trademark protection in order to prevent piracy and fraud.

(b) Governments should implement the obligations contained in treaties on copyright of the World Intellectual Property Organization (WIPO).

(c) Governments should provide adequate and effective protection for patents.

(d) Governments should work towards the establishment of international agreement on uniform standards regarding trademarks as they relate to the Global Information Infrastructure.

6. *Privacy*

The increasing capability of computers and telecommunications to obtain and correlate personal information about individuals will continue to raise privacy concerns. If not addressed, these concerns could severely limit the growth of electronic commerce.

(a) Privacy principles should rest on two precepts: notice and consent. This means that data-gatherers should inform consumers what information they are collecting and how the data will be used. Data-gatherers should also provide consumers with a meaningful way to limit the use of personal information.

(b) Government data controllers should be accountable for maintaining high standards of personal data protection. This is also true for private and non-government entities.

7. *Security*

To promote confidence in, and usage of, electronic commerce, the private sector is using many security techniques, including encryption, that are of increasing usefulness in ensuring the integrity, security, and privacy of commercial transactions. Many of the security technologies, such as digital signature and other means of authentication, are being introduced with minimal controversy.

(a) Recommended principles for security are: free choice of technology by users, market-driven security technology, industry-led standards for cryptographic methods, and precisely defined government responsibilities and regulations.

(b) Governments should work towards a common, worldwide legal framework for digital signatures and other measures to ensure authentication, integrity and confidentiality of businesses, individuals, public safety and national security.

8. *Telecommunication infrastructure*

(a) Flexible laws and regulations should be drafted to open markets to competitors on a fair and equitable basis.

(b) An independent regulator should have the authority to regulate rates and carrier behaviour and should be able to resolve disputes between parties in a timely and efficient manner.

(c) Anticompetitive behaviour should be met with appropriate remedies.

(d) Subsidies should be monitored with the objective of eliminating them.

(e) Governments should adhere to the WTO Agreement on Basic Telecommunications Services.

9. *Technical standards*

Inadequate standards and the lack of interoperability and interconnection will delay the development of electronic commerce. Common standards and interoperability are not only desirable but necessary for electronic commerce to promote innovation, spread technology, and lower the price of services. The private sector has to lead in developing these standards in an appropriate way.

Governments should support international cooperation between countries and companies to establish standards for interoperability and interconnection of the Global Information Infrastructure.

10. *Human resources*

(a) The world has been transformed from an industrial economy, in which machines dominated productivity, into an information-based economy, in which intellectual content is the dominant source of value added, which knows no geographic boundaries. Therefore, lifelong learning will be essential for everyone. Governments and the private sector should work together to promote lifelong learning for all in society.

(b) Governments should review current labour laws in order to streamline them so that workers are ready and able to share in the new and different employment opportunities generated by electronic commerce.

In this chapter, different issues of e-business will be reviewed with reference to their degree and dependence on government action. There is also a review of issues that may be addressed by the various private businesses and/or in cooperation with customers' communities and institutional actors involved in e-business. However, it has not been possible to analyse in detail all the issues raised. Therefore, the electronic business issues reviewed here focus on legal aspects, payment systems, and security, which are considered some of the most important questions to address in the ESCWA region.

A. LEGAL ISSUES

In order to enable traders and transport companies in the ESCWA region to benefit to the maximum extent from the opportunities offered by e-business, there is a need for an appropriate legal basis, as the new emerging technological innovations have not yet been accommodated in domestic laws or international legislation.

For the countries in the ESCWA region, as in many other countries outside the region, the current laws, based on paper documents, do not facilitate or promote e-business. On the contrary, the requirements under certain national laws or international conventions, applicable to international trade transactions, for "written", "original" or "manual signature" create serious obstacles to the use of electronic means of communication in international trade. The international community and national authorities are gradually working towards creating a legal environment appropriate to electronic trading, and ESCWA member countries need to adjust to this work and participate actively in it.

Some countries have adopted, or are in the process of preparing, legislation covering certain aspects of e-business. The international instruments adopted in recent years contemplate the use of alternatives to paper-based methods of communication. However, there is a general consensus that electronic business is not taking place within a legal vacuum, and that a totally new legal framework needs to be created. It is also widely acknowledged that there is a need to adapt the existing laws and regulations to accommodate electronic business. This would increase both legal certainty and the trust of both businesses and consumers in electronic business. Recent studies by UNCTAD confirm that, on the whole, the current rules concerning international trade transactions do not satisfactorily accommodate the reality of electronic trading, as in many instances electronic messages remain potentially unacceptable as legal means of communication.[244]

Thus, there is an urgent need for an overall legislative framework to remove the existing legal impediments to the use of electronic means of communications in international trade and transportation. This is particularly true for ESCWA member States.

As early as 1985, the United Nations Commission on International Trade Law (UNCITRAL) called upon all Governments to: "review legal requirements of a handwritten signature or other paper-based methods of authentication on trade related documents with a view to permitting, where appropriate, the use of electronic means of authentication," a recommendation that was endorsed by the General Assembly in paragraph 5 of its resolution 40/71 of 11 December 1985.

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[244] UNCTAD, *Building Confidence; Electronic Commerce and Development* (New York and Geneva, United Nations, 2000).

UNCITRAL continued to monitor the area of electronic data interchange, and concluded that paper-based requirements, combined with the lack of harmonization in the rules applicable to electronic business, constituted a barrier to international trade, and that uniform rules for electronic business were necessary. In 1992, UNCITRAL embarked upon the preparation of legal rules on the subject and gave its final approval to the resulting Model Law on Electronic Commerce on 14 June 1996. The Model Law was in turn adopted by the General Assembly in December 1996.[245]

The Model Law dealt with many of the legal issues raised by paper-based legal rules, such as: the requirement for a "written document", "signature" or "original", the evidential value of electronic messages, the storage of electronic messages, documents of title and negotiability, allocation of liability, validity and formation of contracts, and incorporation by reference.

However, in addition to the concern about paper-based requirements as a barrier to electronic business, there is also a concern that lack of harmonization in the rules generally applicable to electronic business would result in effective barriers to trade. Areas that have been identified as involving legal issues relevant to electronic business include: data protection, taxation, customs duties, security and authentication, intellectual property rights, liability of Internet service providers, illegal and harmful content, Internet governance (more specifically, domain names), and consumer protection.

The following is a brief account of some of the main legal issues that may create obstacles or uncertainties for ESCWA member countries involved in electronic business.

1. *Taxation*

The rapid growth and development of e-business beg a number of questions about taxation and tax policy relevant to the public regulation of the transport sector framework in the ESCWA region.

Concerns have been expressed that e-business could result in the erosion of tax bases. Consumption taxes are levied on the principle of taxation at the place of consumption and according to rates set in individual countries. E-business, however, has the potential to undermine the application of domestic and national tax rules. For the value added tax (VAT) system, the supplier is normally responsible for collecting consumption taxes, but suppliers may face significant difficulties in proving the location of their customers. The supplier may also be beyond the fiscal jurisdiction of the fiscal authorities where consumption takes place. In practice, this issue appears more critical for products, which can be digitalized and delivered online.

Regarding potential tax loss related to physical products traded across borders, but ordered over the Internet, many countries have a *de minimis* relief for low value transactions, whereby being below the value threshold these products legitimately fall outside the tax net. An emerging issue here is the need to minimize distortion to competition and to find the right balance between the cost of collection and the amount of forgone taxes. Given the present size of e-business, erosion of the tax base is not currently a serious issue, but it may create a big problem in the medium to long term.[246]

However, the technology that underlies e-business also opens up a number of opportunities that tax authorities should use to improve the efficiency of tax administration, and to enhance service to taxpayers. The Internet technology has the potential to improve greatly communication between tax authorities and taxpayers and to enhance access to information for tax authorities, thus helping them to encourage voluntary compliance with tax obligations. In particular, the Internet facilitates the electronic assessment, filing and collection of taxes. Overall, e-business should not only be seen as a threat to tax yields, but also a means to reduce the cost of complying with tax rules and enhance tax collection.

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[245] UNCTAD, "Legal dimensions of electronic commerce: report by the UNCTAD secretariat" (TD/B/COM.3/EM.8/2), 4 May 1999.

[246] Jonathan Coppel, *E-Commerce: Impacts and Policy Challenges,* Economics Department Working Papers No. 252 (OECD, 2000).

(a) *Taxation challenges*

It must be noted, however, that electronic business through the Internet also implies challenges for tax administrations, with regard to their control and monitoring mechanisms and their ability to detect tax evasion and fraud.

In theory, those trading "online" could be subject to the same tax treatment as those trading by other means. However, at present this theory cannot be easily applied to electronic business, owing to the difficulty of determining the operation and the parties involved, and because it may also be difficult to determine which country has jurisdiction for taxing an operation, inasmuch as most of the criteria applicable are aimed at solving conventional situations. An additional problem is the high dynamism of technology that allows for anticipating that the solution found to current problems might not be the appropriate one for solving those to be generated from the evolution of such technology in the near future.
The Internet has not only eliminated the national borders for carrying on business, but may have also blurred the identity of the businesses and individuals that carry them out. In addition, the almost instant nature of the Internet-based business transactions, as well as their linkage to different operators, makes it very difficult to monitor them, especially if one takes into account that such transactions and operators may be disseminated throughout the ESCWA region or even the whole world.

The "dematerialization of products" in some online operations, as well as the elimination of intermediaries that may facilitate the control and collection of taxes at the source, carries with it the risk that the tax administrations may be faced with a strong erosion of tax revenues, without having the means for counteracting it.

The ease of access to tax havens promoted by the Internet also creates greater challenges for the tax authorities, which must face barriers that hinder verification functions. These barriers include the bank secrecy laws and the general reluctance of tax haven officials to provide information, even non-banking, no matter how basic it may be.

Other challenges to be overcome by the tax administration are (a) the existence of electronic invoicing and records that render audits difficult and, even more critical, (b) electronic cash and other payment systems effected through the Internet, which worsen the current problems with the underground economy, owing to the anonymity and lack of transparency of the operations.

(b) *Possible solutions*

Some years ago, proposals were made that would involve adjusting the tax bases to consider changes in the economy, such as taxing the electronic flow of information with a "bit tax".

The current prevailing thesis is that transactions via the Internet should be given the same tax treatment as that applied to commerce undertaken through traditional means. How to achieve this is one of the main issues being discussed in several countries and, even more, at the international level in different forums.

The criteria originating from the traditional principles of taxation are aimed at solving conventional situations. Therefore, when it is said that electronic business should be subject to the same tax treatment as commerce undertaken through other means, this leads to the question as to what extent, and in which way, this may be done given the problems of "erosion of territoriality" and "dematerialization of products" created by the Internet.

It is widely known that electronic business significantly increases the difficulties that may be posed by a transaction carried out through conventional means, as regards determining the existence and nature of the transaction, the identity of the parties involved, and even which country has jurisdiction for applying the tax.

In sum, the great challenge posed by the Internet in the field of principles and tax legislation is that of determining whether traditional solutions are adequate for dealing with electronic business and, if not, how they can be adapted to the new context. The question then is whether ESCWA member countries have to adapt their legislation to electronic business activities, by creating new taxes or modifying existing taxes, or whether they maintain the status quo in taxation and impose regulations that may imply the contrary. This

leads to another question, as to whether the Internet technology and operators obtain and use mechanisms that allow adequate application of the tax legislation in force.

In the ESCWA region, it might be that both solutions—adaptation of the tax legislation as well as the modus operandi of electronic business—may have to be utilized and developed jointly. The goal should be to devise a legal framework for electronic business that includes the modernization of the tax systems in the international sphere, and to facilitate the increase of electronic business, by giving the businesses, consumers and Governments the necessary confidence for making use of all potential.

The international most widely accepted series of taxation principles is aimed at showing that taxes must be understood as a means and not an end: the means for obtaining resources to provide the necessary public services for the satisfaction and development of society.[247]

It seems to be widely accepted worldwide that the tax principles listed below should also apply to electronic business.[248]

(c) *Broad taxation principles applicable to e-business*

(i) *Neutrality.* Taxation should be neutral and equitable vis-à-vis different forms of electronic business as well as conventional and electronic forms of commerce. Business decisions should be motivated by economic rather than tax considerations. Taxpayers in similar situations carrying out similar transactions should be subject to similar levels of taxation.

(ii) *Efficiency.* Compliance costs for taxpayers and administrative costs for the tax authorities should be minimized as much as possible.

(iii) *Certainty and simplicity.* The tax rules should be clear and easy to understand so that taxpayers can anticipate the tax consequences in advance of a transaction, including knowing when, where and how the tax is to be imposed.

(iv) *Effectiveness and fairness.* Taxation should produce the right amount of tax at the right time. The potential for tax evasion and avoidance should be minimized.

(v) *Flexibility.* The systems for the taxation should be flexible and dynamic to ensure that they keep pace with technological and commercial developments.

Hence, the implementation of a taxation framework for electronic business, and the administrative arrangements that will support that framework, are considered high priorities by a number of regional and international organizations. The European Union is adjusting its tax treatment in the light of electronic business transactions. The Inter-American Center of Tax Administrations (CIAT) has proposed a Model Agreement for the Exchange of Tax Information, approved by the thirty-third General Assembly held in San Salvador in 1999, which covers Argentina, Brazil, Canada, Mexico and the United States.[249]

For the ESCWA member countries, all these developments mean that currently, and increasingly in the future, the tax administration must act in an environment characterized by a vast network of economic relations, many of which were established through electronic business, with businesses begun or concluded in a country, but with points of connection with the jurisdictions of various countries. Therefore, increasing

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[247] Executive Secretariat of CIAT (Inter-American Centre of Tax Administrations), "Addressing the key tax policy and administration issues raised by e-commerce," paper submitted at the conference on Tax Administrations in an Electronic World, hosted by the Canada Customs and Revenue Agency and held in Montreal, Canada, from 3 to 6 June 2001.

[248] OECD, *Electronic Commerce: Taxation Framework Conditions – A report by the Committee on Fiscal Affairs,* as presented to the Ministers at the OECD Ministerial Conference on "A Borderless World: Realising the Potential of Electronic Commerce," 8 October 1998.

[249] Executive Secretariat of CIAT (Inter-American Centre of Tax Administrations), "Addressing the key tax policy and administration issues raised by e-commerce."

cooperation is required between the tax administrations of different ESCWA member countries, and countries external to the region, to promote joint actions for combating tax fraud and evasion, thus allowing the action of a specific national administration to go beyond its borders to other places where individuals, goods or relevant information may be found.

In view of the above, it would be advisable for the ESCWA member countries to work towards similar solutions with respect to tax systems and administrations. These solutions could be the result of an international consensus achieved in the efforts to ensure technical improvement of the tax structures and administration in order to adapt to the new economic scenario.

To achieve such convergence, it is important to ensure the participation of the international organizations that could constitute a multilateral forum in which the countries of the ESCWA region may be represented, with a view to achieving consensus on the criteria and standards applicable in the field of taxation and, at the same time, establishing a favourable environment for effective international cooperation between the various tax administrations.

Very much in line with these recommendations, the OECD Committee on Fiscal Affairs has agreed on a number of standard taxation framework conditions for electronic business, which may be very relevant for the ESCWA member countries to take into consideration and eventual adaptation.

(d) *Elements of a taxation framework*

The OECD Committee on Fiscal Affairs recognizes that the taxation principles that guide Governments in relation to conventional commerce should also guide them in relation to electronic business. The Committee believes that, at this stage of development in the technological and commercial environment, the existing taxation rules can implement these principles. This approach does not preclude new administrative or legislative measures, or changes to existing measures, relating to electronic business, provided that those measures are intended to assist in the application of the existing taxation principles, and are not intended to impose a discriminatory tax treatment of electronic business transactions. It should be stressed that any arrangements for the application of these principles to electronic business adopted domestically, and any adaptation of existing international taxation principles, should be structured to maintain the fiscal sovereignty of countries, to achieve a fair sharing of the tax base from electronic business between countries and to avoid double taxation and unintentional non-taxation.[250]

The challenge facing tax authorities and governments in the ESCWA region is how to implement the above-mentioned five broad taxation principles in a rapidly changing environment. However, in a number of areas, the OECD Committee on Fiscal Affairs has been able to agree on the elements of a taxation framework that will incorporate these principles, which are presented in box 4.

Box 4. Electronic commerce: elements of a taxation framework

Taxpayer service

(i) Revenue authorities should make use of the available technology and harness commercial developments in administering their tax system to ensure continuous improvement of taxpayer service.

Tax administration, identification and information needs

(ii) Revenue authorities should maintain their ability to secure access to reliable and verifiable information in order to identify taxpayers and obtain the information necessary to administer their tax system.

[250] Ibid.

Box 4 (*continued*)

Tax collection and control

(iii) Countries should ensure that appropriate systems are in place to control and collect taxes.

(iv) International mechanisms for assistance in the collection of tax should be developed, including proposals to be inserted in the OECD Model Tax Convention.

Consumption taxes

(v) Rules for a consumer tax on cross-border trade should result in taxation in the jurisdiction where the consumption takes place, and an international consensus should be sought on the circumstances under which supplies are held to be consumed in a jurisdiction.

(vi) With regard to consumer taxes, the supply of digitalized products should not be treated as a supply of goods.

(vii) Where business and other organizations within a country acquire services and intangible property from suppliers outside the country, countries should examine the use of reverse charge, self-assessment or other equivalent mechanisms where this would give immediate protection of their revenue base and of the competitiveness of domestic suppliers.

(viii) Countries should ensure that appropriate systems are developed in cooperation with the World Customs Organization, and in consultation with carriers and other interested parties, to collect tax on the importation of physical goods, and that such systems do not unduly impede revenue collection and the efficient delivery of products to consumers.

International tax arrangements and cooperation

(ix) While the OECD believes that the underlying principles of the international norms that it has developed in the area of tax treaties and transfer pricing (through the Model Tax Convention and the Transfer Pricing Guidelines) are capable of being applied to electronic business, there should be a clarification of how the Model Tax Convention applies with respect to some aspects of electronic business.

Source: Executive Secretary of CIAT (Inter-American Centre of Tax Administrations), "Addressing the key tax policy and administration issues raised by e-commerce," paper submitted at the conference on Tax Administrations in an Electronic World, hosted by the Canada Customs and Revenue Agency and held in Montreal, Canada, from 3 to 6 June 2001.

In general, it seems to be advisable for the ESCWA member States that the tax authorities in the region take an active role in encouraging protocols and standards for electronic business that are compatible with these principles.

For the taxation authorities of the ESCWA member countries, a number of issues need to be addressed in the short and long term. To address these issues, which are also currently being faced in the United States, Europe and other regions of the world, the ESCWA member countries must:

(a) Take steps to agree upon (common) broad taxation principles that should apply to e-business;

(b) Align with the internationally agreed principles as a fundamental starting point;

(c) Adjust to the internationally agreed elements of a taxation framework;.

(d) Be involved in the ongoing process of identifying concrete steps that can help implement and extend the taxation framework and consider the feasibility and practicality of these steps;

(e) Develop a binding plan for the introduction and use of a common taxation framework in the region.

2. *Commercial law*

Most national laws and international conventions require a written document, and include provisions requiring certain transactions to be concluded or evidenced in writing or certain information to be presented in writing.[251]

Written documents may be required for a variety of reasons. If written documents are required to ensure the validity of the contract, failure to comply with the requirement would render the transaction null and void. If, however, a written document is required by law for evidentiary purposes, the absence of said written document would not generally affect the validity of the contract, but its enforceability in the event of litigation.

National or international legislation, however, often refers to "writing" or "document" without providing a definition of these terms. In such a case, it is assumed that the drafter envisaged a written document, as that was the only format available.[252]

A written signature or other form of authentication is normally required to establish the identity of the signatory and his intention to associate himself with or be bound by the contents of the document. The most common form of authentication required by law is a manual signature. The more recent national laws or international conventions, however, permit the required signature to be made by other forms of authentication such as stamp, perforation or facsimile, or by electronic means.[253]

The signature requirement, closely linked with the use of paper documents, remains nevertheless as a major obstacle to the growth of electronic business.

The requirement that certain pieces of information or documents have to be presented in an original form is regarded as creating an important obstacle to the development of e-business. Indeed, since the concepts of "writing", "signature" and "original" are closely interlinked, the requirement is often for a written, signed, original paper document. An original may be required in order to ensure the integrity of a document and that the information presented in a document has not been altered.[254]

The security of information and authenticity of messages are of paramount importance in an electronic environment. The absence of a paper document and a handwritten signature makes it difficult to distinguish the original message from a copy. The need for some form of security procedure is even more pressing in the context of open network communication systems such as the Internet.[255]

The issues of the admissibility and evidential weight of electronic messages in judicial and administrative proceedings play a central role in the development of e-business. While the rules governing the admissibility of evidence in certain jurisdictions are rather flexible, there are legal systems that adopt a relatively strict approach to the subject and exclude electronic messages as acceptable evidence.[256]

The requirement for storage of certain documents or information in paper form for accounting, tax, audit, evidence and other legal or administrative purposes constitutes an additional barrier to the development of electronic trading.

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[251] UNCTAD, *Electronic Commerce, Legal Considerations* (UNCTAD/SDTE/BFB/1), paras. 91-179, May 1998.

[252] Ibid., para. 91.

[253] Ibid., para. 102.

[254] Ibid., para. 114.

[255] Ibid., para. 60.

[256] Ibid., para. 121.

Replacement of negotiable documents of title, such as bills of lading, by an electronic equivalent constitutes the most challenging aspect of implementing electronic business in international trade practice. This is due to the attributes of the negotiable document: transferability, title bearing and tangibility. The legal rules that govern negotiable documents (such as bills of lading) premise rights in goods, on the physical possession of an original paper document. The challenge is the replacement of negotiable documents with all the legal effects attached to the piece of paper. There is therefore a need for a legal regime to allow the parties to transfer legal rights in goods, such as ownership rights, through the exchange of electronic messages.

As a general rule, a contract concluded orally is valid in most legal systems, but a number of questions and uncertainties arise in the context of contracts concluded by electronic means. Questions arise as to the validity of such contracts, especially when there are legal requirements for, *inter alia,* the writing, signature, time and place of the drawing up of such contracts, and the proof of the terms of the contract in case of dispute. The time when the contract is drawn up is important in determining the transfer of property and transfer of risk of loss or damage in case of sale of goods. The place where the contract is concluded may determine which national law is to govern the contract in the absence of an effective choice of legal provisions as well as establishing jurisdiction in case of litigation.[257]

Another question that arises in the context of electronic business is the incorporation of the underlying general terms and conditions of contracts that are generally found on the reverse side of paper documents, such as bills of lading, airline tickets, and other standard form contracts. Since, in the electronic environment, no reverse side of the document exists, the achievement of an acceptable solution becomes crucial for the development of electronic business.[258]

The UNCITRAL Model Law on Electronic Commerce, adopted in 1996, is aimed at providing national legislators with a set of legal principles and guidelines for removing some of the above uncertainties and issues referred to in this section.[259]

For the ESCWA member States, all the above-mentioned commercial law issues need to be reviewed and evaluated, and subsequent adjustments to the current legal framework must be considered. It is advisable that the ESCWA member countries monitor and follow international practices in this regard to ensure interoperability and alignment with international standards and norms.

Though the amount, level and quality of e-business in the ESCWA region varies from country to country, commercial law in general does not support or encourage electronic business. Even in member States such as the United Arab Emirates, which house some of the best technical infrastructure in the region, one of the best credit card coverages, payment gateways, and one of the most efficient and advanced delivery systems, the laws that are applied in the country are not commensurate with the needs of electronic business.

Therefore, it is recommended that a regional committee should be established and given the task of evaluating the status and future of commercial laws in the region, and of updating them to satisfy the requirements of electronic business.

3. *Intellectual property rights and data protection*

Protection of patents, copyright and trademarks constitutes a serious challenge for the development of electronic business in the ESCWA region as well as in other parts of the world. Initiatives are being taken on both international and regional levels with regard to intellectual property rights.

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[257] Ibid., para. 163.

[258] Ibid., para. 172.

[259] http://www.wipo.int/about-wipo.

To deal with some of the intellectual property protection issues raised by electronic business, the World Intellectual Property Organization adopted the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty in December 1996. These WIPO treaties contain a general update of the legal principles underpinning international protection of copyright and the rights of performers and phonogram producers on the Internet. In addition, they clarify that national law must prevent unauthorized access to and use of creative works which, given the global reach of the Internet, may be downloaded anywhere in the world. Discussions continue in WIPO aimed at the adoption of a Protocol on Audio-Visual Performances and of a Treaty on Intellectual Property in Databases.[260]

In September 1999, WIPO adopted the Digital Agenda—a work programme for WIPO over the coming years in response to the influence of the Internet, digital technologies and the intellectual property system. WIPO is formulating appropriate responses that will encourage dissemination and use of intellectual property such as music, films, trade identifiers and knowledge on the Internet, as well as ensure protection of the rights of their creators and owners. The Digital Agenda is aimed at integrating developing countries into the Internet environment, and it focuses upon adjusting the application of intellectual property law in Internet transactions and the emergence of new norms in this respect. A key element of the Digital Agenda is dispute resolution facility ("Domain Name Dispute Resolution Service") and the development of effective online systems to resolve disputes.[261]

All ESCWA members except for Palestine and the Syrian Arab Republic are also members of WIPO.[262] Those ESCWA members in WIPO should be making an effort to enforce intellectual property protection in conformity with WTO and WIPO agreements. For instance, the Lebanese Copyright Law of 3 May 1999 updates the national protection of copyright and neighbouring rights to new technologies and encompasses technological change and new areas of interest. It essentially recognizes software and copyright-protected work. However, in the area of trademark registries, Lebanon has seven commercial registries that issue trademarks, but no examining entity supervises them. Until a central agency is established to control the application of intellectual property rights and trademarks, players in the e-business market may experience violations of their business designs and trademarks.[263]

Therefore, the implementation of a harmonized legal framework throughout the ESCWA region to encourage the development of intellectual property (as well as privacy and data protection rights) still seems to be a distant goal. As in Europe, harmonized rules and regulations in these areas should be aimed at and aligned to the challenges of the digital world, which will enable the ESCWA member countries to ratify, for instance, the WIPO treaties concerning protection of authors (WCT), performers and phonogram producers (WPPT), data protection and privacy laws.

In other parts of the world, harmonization and implementation of new intellectual property rights rules (copyright rules) are rapidly being implemented. The European Union recently adopted (9 April 2001) new copyright rules addressing the issues of intellectual property rights on the Internet.[264] Box 5 reviews the European copyright rules.

Another important area in the intellectual property field is the allocation of domain names. In 1988, WIPO launched an international process of consultations to develop recommendations concerning the intellectual property issues associated with Internet domain names, including dispute resolution. The final report and the recommendations arising from the WIPO consultation process were submitted to the Internet Corporation for Assigned Names and Numbers (ICANN).

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[260] Ibid.

[261] http://www.wipo.int/about-wipo/en/index.html.

[262] http://www.wipo.int/members/members/index.html.

[263] Antoine Feghali, *Trade Facilitation and Electronic Commerce: Lebanon Case Study*, 2000.

[264] CORDIS (Community Research & Development Information Service), "Copyright rules for a European Information Society agreed," CORDIS *focus*, issue No. 171, 23 April 2001.

Box 5. Copyright rules in Europe and the new European Directive

Following the adoption of new copyright rules, measures have been initiated in the European Union member States to include the harmonization of rights of reproduction, distribution; communication to the public; legal protection of anti-copying devices; and rights management systems. Some of the main features of the new copyright rules include a mandatory exception for technical copies on the Internet for network operators in certain circumstances, an exhaustive optional list of exceptions to copyright which includes private copying, the introduction of the concept of fair compensation for rights holders, and a mechanism to secure the benefit for users for certain exceptions where anti-copying devices are in place.

The new Copyright Rules Directive is seen as complementary to the e-commerce Directive, which has already been adopted in creating a harmonized legal framework throughout the European Union to encourage the development of an Information Society. Its adoption will also enable the Community and its member States to ratify the 1996 WIPO treaties concerning protection of authors (WCT) and performers and phonogram producers (WPPT). The European Commissioner for the Internal Market, Fritz Bolkestein, welcomed the news, stating that it was is a "significant achievement...and... the most important measure ever to be adopted by Europe in the copyright field...(bringing) European copyright rules into the digital age. Europe's creators, artists and copyright industries can look forward with renewed confidence to the challenges posed by electronic commerce."

Source: "Copyright rules for a European Information Society agreed," CORDIS *focus*, 23 April 2001.

ICANN is responsible for the laws and regulations that govern business though the Internet and that control domain names and grant licences to the companies allowed to register domain names. During the latest ICANN Board of Directors meeting, held in Marina Del Rey (California), Abu-Ghazaleh Intellectual Property submitted an application to ICANN to be approved as a registration centre for domain names in the Arabic-speaking world. It was expected that this approval would be granted by mid-2001, thereby offering Arabic-speaking people and companies the opportunity to register and protect their domain names.[265]

Finally, in consultation with the private sector, OECD has begun to examine specific issues raised by the basic privacy principles of the 1980 OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data, in relation to global networks. The effective implementation of the Guidelines in today's networked world constitutes another important challenge for building trust in electronic business.[266] The European Union seems to be in the forefront regarding protection of personal data. Box 6 presents the latest legal initiatives in the EU to protect personal data when transferred to third countries.

Box 6. Standard contractual clauses in the EU for the transfer of personal data to third countries

In the domain of personal data protection, new standard contractual clauses for the transfer of personal data to third countries have recently been prepared for approval by the European Union. This current Data Protection Directive originated in 1995 (EU Directive 95/96EC) and deals in detail with the protection of individuals in the processing of personal data and the rules set out for the free movement of such data. New clauses to this Directive have now closed the data protection gap in the country of destination, as the Data Exporter and the Data Importer warrant to process the data in accordance with basic data protection rules, and agree that individuals may enforce their rights under the contract.

[265] Arab Knowledge Management Society (AKMS)and Talal Abu-Ghazaleh International (TAGI), *Towards an Arab Knowledge Society,* Joint Report, April 2001.

[266] OECD, Forum for Electronic Commerce, 1999.

Box 6 (*continued*)

The Data Importer must now agree to process the personal data received in accordance with the data protection law applicable where the Data Exporter is established, or in accordance with a set of core data protection principles annexed to the draft decision ("mandatory data protection principles"). In those cases in which the Data Importer is based in the United States and has not publicly declared its adherence to the Safe Harbor system, the Data Importer is also given the choice of using the Safe Harbor Principles as substantive data protection rules. In addition, and in any case, the parties agree to limit the use of the data to the purpose specified in the contract, to grant Data Subjects their rights of access, rectification, deletion and objection with the same extension recognized in Directive 95/46/EC and to limit onward transfer. Data Subjects receive the consideration of third party beneficiaries to the contract and, if necessary, they may sue either party to the contract before the Data Exporters' jurisdiction. Furthermore, the parties agree and warrant that they are jointly and severally liable vis-à-vis the Data Subjects for any damages resulting from the violation of the standard contractual clauses. This warranty means, in practice, that Data Subjects can obtain compensation from the Data Exporter established in the European Community for those damages resulting from a violation of the obligations contained in the standard contractual clauses committed to by the Data Importer in the third country.

Source: European Commission, Internal Market DG, "Transfer of personal data to third countries," *Single Market News*, No. 26, May 2001 (http://www.europa.eu.int/comm/internal_market/en/smn/smn/26/26mn22.htm).

4. *Consumer protection and dispute resolution*

Although most of the problems are not new in character, the tremendous increase in the volume of consumer transactions with foreign firms gives the problem of consumer protection a new dimension. Limited or non-existent face-to-face contact between business and consumers increases the need for an effective global approach to consumer protection in the ESCWA region.

It is generally recognized in this context that electronic business will not reach its full potential until consumers are assured that the online environment is a safe and predictable place for them to shop or do business. It is important in this respect that consumer laws, policies and practices assist in building consumer trust by protecting consumers from unfair or deceptive acts or practices, helping to establish a more balanced relationship between sellers and consumers in commercial transactions.

To assist in the legal protection of consumer rights, and enhance consumer confidence in electronic business, inspiration may again be found and adopted from international organizations and/or other regions of the world.

In the European Union, the existing body of law and policy on consumer protection is generally applicable to electronic business and covers all the stages of the business-to-consumer commercial relationship, including commercial communications (advertising, promotion and marketing) with regard to goods or services, (pre-) contractual information and disclosures, contract formulation, payment, delivery, guarantees and after-sales services and, ultimately, redress.[267]

On the international level, OECD is currently involved in the preparation of a set of guidelines for action at national level.[268]

From all sides, the development of appropriate dispute resolution mechanisms, as well as a framework that will allow operators to know in advance what law will be applicable to their transactions, constitutes an important challenge essential for consumer protection as well as for the commercial development of the Internet. In this respect, the existing dispute settlement mechanisms do not very often provide a satisfactory

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[267] UNCTAD, "Building Confidence," 2000.

[268] OECD, *Consumer Protection in the Electronic Market Place*, 1998.

solution for the resolution of disputes arising from electronic business. This is particularly true in the context of consumer transactions where, in many countries, the consumer could sue in his own jurisdiction. This is the principle that applies according to the EC Convention on Jurisdiction and the Enforcement of Judgments in Civil and Commercial Matters (Brussels, 1968) and the 1998 Lugano Convention on Jurisdiction and the Enforcement of Judgments in Civil and Commercial Matters. The nature of electronic business makes this solution impractical for companies involved in B2C transactions that offer goods and services worldwide, as these companies could face the possibility of being sued in various parts of the world.

For B2B transactions in closed networks (such as EDI), legal solutions could be found by leaning towards the governing "interchange agreement" between the parties regarding applicable law and dispute settlement. However, this situation is more complicated in open networks like the Internet, where uncertainties about the identity and location of the parties remain important problems and causes of dispute. In such cases, the relevant system of law can/must be determined on the basis of an agreement by the parties prior to the contract or business transaction in question. However, should there not be any agreement, the applicable law would be determined from the relevant international convention.[269]

To assess the pertinence of existing norms governing applicable law and jurisdiction in an electronic environment, the Permanent Bureau of The Hague Conference on Private International Law convened a Round Table on Private International Law, Internet and Electronic Commerce in Geneva in September 1999. The recommendations adopted at the Round Table will be relevant for the current negotiations on a worldwide convention on jurisdiction and the effects of judgements in civil and commercial matters.

For the ESCWA members, it is recommended that they should take steps to implement consumer protection and establish regional and international applicable standards and norms for dispute resolution related to electronic business.

5. *Recommendations*

This is a summary of the recommendations related to legal issues presented in this chapter. The recommendations make up the grounds for discussion based on the ambitions, time horizon, priorities and resources of the ESCWA region and its member countries.

(a) *Taxation issues*

(i) ESCWA member countries should take steps to agree upon (common) broad taxation principles which should apply to, support and stimulate e-business;

(ii) There should be alignment with the internationally agreed principles, which could be a fundamental starting point;

(iii) The existing taxation framework should be adjusted to the internationally agreed elements of a taxation framework;

(iv) The ESCWA members should be involved in the ongoing process of identifying concrete steps that can help implement and extend the taxation framework, and they should consider the feasibility and practicality of these steps;

(v) A binding plan should be developed for the introduction and use of a common taxation framework in the region.

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[269] Torben Soll, *Evaluation of Electronic Public Procurement Pilot Projects in the European Union* (EU Commission, DG Internal Market, 2000).

(b) *Commercial law*

(i) The ESCWA members should evaluate to what degree the requirements for written documents, written signatures and original forms will block or hold back the development of e-business;

(ii) The ESCWA members should establish a working group or regional committee to revise commercial law issues related to the evidential weight of electronic messages, storage of documents, negotiable status of documents, validity of contracts and incorporation of general terms and conditions of underlying contracts;

(iii) The ESCWA members should adjust and align commercial law with international practices in this regard to ensure interoperability inside and outside of the region with international commercial standards, laws and norms;

(iv) The ESCWA members should ensure that rights and responsibilities of individual consumers and commercial businesses acting on the Internet are similar to those in the paper-based world.

(c) *Intellectual property rights*

The ESCWA members should revise intellectual property right and copyright laws and prepare them in alignment with international standards established by WIPO concerning protection of authors, performers, phonogram producers, intellectual property in databases, software and audio-visual performances.

(d) *Consumer protection*

(i) The ESCWA members should ensure that consumer laws, policies and practices assist in building consumer trust and protection;

(ii) The ESCWA members should ensure that consumers—and companies—have the same protection and liability in the digital world as in the real world, and they should align the consumer protection laws with international standards and procedures.

(e) *Dispute resolution*

The ESCWA members should ensure that dispute settlement laws, rights and opportunities are suited to the digital world, and they should enable mechanisms for the resolution of online disputes.

B. PAYMENT SYSTEMS

New financial procedures and monetary structures have been introduced to reflect the technological possibilities and economic necessities of the Internet. The globalization of the economy and the widespread increase in the number of Internet end-users and merchants make way for radical changes in the way that the consumers pay for goods and services. Adoption, implementation and use of new electronic payment systems is a challenge for the transport sector in the ESCWA region, but it also offers many benefits and efficiency gains when properly employed.

Traditionally payment means that a value is transferred using a variety of payment systems: cash, documents or credit cards. Cash has been provided in the form of bank notes and coins, which are mainly issued by national Governments. Documents for payment have been provided in the form of bills of exchange, checks drawn on a bank, money orders written by an accepted authority such as a national post office, letters of credit and payment card vouchers.

The traditional payment mechanisms have different characteristics. The extent to which the parties are identified ranges from total anonymity (cash) to total identity (credit cards). The traceability of the transaction ranges and the taxability of the transaction vary among the different payment methods. The reason why so many mechanisms exist is that there are many different circumstances in which value is

exchanged, and each of the mechanisms has niche-markets in which it is perceived by at least some parties to have advantages. In this respect, the payment mechanisms of the Internet have some of the same characteristics.

However, the fundamental difference between the electronic payment systems and traditional systems is that everything is digital, and is designed to be handled electronically from the start. Everything about the payment has been virtualized into strings of bits. This virtualization will make many of the electronic payment options appear similar to each other: often the differences are due more to the companies and consortia developing the software than to the logic involved.

According to the American Banking Association, digital payment systems coupled with safe cryptographic resources have the lowest transaction costs. In addition, the cost can be as low as US$ 0.01 per transaction against US$ 1.075 using the traditional banking mechanism.[270] This overwhelming cost reduction makes digital money a serious candidate to replace paper money in the future.

However, as with traditional payments using money, electronic payments systems must ensure that nobody is able to commit fraud or steal credit card information. For a digital payment system to be successful, the following are required:[271]

Box 7. Requirements for digital payment systems

Acceptability. The payment infrastructure needs to be widely accepted
Anonymity. If the customers desire it, their identify should be protected
Convertibility. The digital money should be converted into other types of funds
Efficiency. The cost per transaction should be near zero
Flexibility. Several methods of payment should be supported
Integration. Interfaces should be created to integrate with existing applications
Reliability. The payment systems must be available and must avoid single points of failure
Scalability. New customers and merchants must be allowed into the payment system
Security. Safe transactions must be ensured over open networks like the Internet
Usability. Payment systems should be easy to use in the real world

In order to make the digital payment infrastructure successful in the ESCWA region, several studies in this field emphasize that a digital payment system should allow anyone to use it. The studies also emphasize that the system needs to be widely accepted. Users should be able to limit their losses, by creating thresholds that require additional approval before the payment is made. The monitoring of the payments should be easy as well. The system should be easy to use, and most payments should be made automatically. Everybody should be able to pay with the system, or to cash in the money without the need for an intermediary, such as a bank. The payment solution should be an open standard that can be used by any business. Therefore, buyers and sellers, as well as the transaction servers, should be independent of the standard. Anyone who wants to process the payment should be able to do so. In order to be attractive to both customer and companies, the customer and company bases need to be large enough. The developers of the payment system need to attract as many companies as possible in order to attract customers.[272]

1. *Types of digital payment systems*

Every digital transaction involves a buyer and a seller of products, information or services, and can in principle be carried out via the Internet. In order to conduct a digital financial transaction, a financial

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[270] Joilson Dias, "Digital money – the welfare implication of this technological advance," in World Market Series Executive Briefing on e-Services for Trade, Investment and Enterprises, World Markets Research Centre, 2001.

[271] David Kosiur, *Understanding Electronic Commerce* (Redmond [Washington], Microsoft Press, 1997).

[272] International Trade Centre, UNCTAD/WTO, *Secrets of Electronic Commerce: A Guide for Small- and Medium- Sized Exporters* (Geneva, 2000); UNCTAD, *Building Confidence,* 2000; and Data and Investment Consult-Lebanon. *The White Book On Middle East E-Commerce and E-Finance.*

institution is typically required to carry out the money transfer, and financial networks are used for clearing. In most cases, two financial institutions are involved. The issuer is the financial institution used by the buyer and the acquirer is the financial institution used by the seller. Electronic payments start with the communication between buyer and issuer, whereby the buyer asks the issuer to release money by withdrawing it from a bank account or issuing a credit card. The money is then sent to the acquirer for clearing. If the acquirer validates the money, a message will be sent on to the seller. The reseller can then start the order processing, and the money is put into the seller's account.

Some divide the digital payment categories according to their size of payment. Micro-payment systems are very similar to ordinary cash, while consumer payments are most likely done by credit or debit card. Business payments are executed in most cases by direct debit or invoice.[273]

Micro-payments. Transaction with a value of less than US$ 5. Suitable payment solutions are based on the electronic cash principle, as the transaction costs for these systems are nearly zero.

Consumer payments: Transaction with a value of between approximately US$ 5 and US$ 500. Typical consumer payments are executed by credit card transactions.

Business payments. Transactions with a value of more than US$ 500. Direct debits or invoices seem to be the most appropriate solutions.

A common framework for Internet payment needs to be developed, in order to support the above-mentioned requirements and payment systems in the ESCWA region. So far, many isolated solutions have been developed. The following sections examine specific solutions.

Three different types of payment systems have been established on the Internet:

(a) Pre-paid systems
(b) Instant-paid systems
(c) Post-paid systems.

The main characteristics and advantages and disadvantages of these systems are analysed below with respect to their relevance to the ESCWA region.

2. *Post-paid payment systems*

Post-paid systems allow the customer or the company to buy a product and pay afterwards.

(a) *Credit cards*

Credit cards are one of the most common post-paid systems, both in the real (traditional) world and in the digital world. The credit card payment system has some advantages over other forms of payment. They are issued and accepted worldwide and offer consumers the ability to collect all charges and pay the total at a later time. The credit card system provides good consumer protection, and customers have the right to give back goods within a certain time frame and dispute charges, as they are not charged directly to the account of the customer. Credit cards are not bound to national currencies, and the mechanism of using credit cards via the Internet is very similar to the system of mail and telephone order transactions. Credit cards are, however, very expensive. This is primarily because of the low level of security (which relies on embossing, magnetic

[273] Daniel Amor, *The E-business (r)evolution: Living and working in an interconnected world* (Hewlett-Packard Professional Books, 2000).

strips, signatures and stop-lists) and the resultant high and increasing cost of fraud. In addition, transaction processing costs are significant.[274]

In order to make credit card payments secure, two standards have been established over the past few years: SSL (Secure Sockets Layer) protocol encryption developed by Netscape, and SET (Secure Electronic Transactions) developed by Visa and MasterCard. The differences between SSL and SET are evident. SSL only encrypts traffic between the Web browser and Web server (the customer's computer and the merchant's computer), while SET offers a complete payment solution, which involves not only the customer and the company, but also the bank, which is needed for credit card payment. SET uses digital certificates to ensure the identities of all parties involved in a purchase, and encrypts credit card and purchase information before transmission on the Internet. Additional security is under introduction in SET 2.0, when smart cards will be supported. Credit cards will then have an additional chip on the plastic card, which will contain the digital certificate and the public and private key of the user that is required to perform a SET transaction. Currently, only debit cards have the chip. Using a chip card, the customer will be able to use any SET enabled network device anywhere, including computers and TV set top boxes at home, computers in the office and kiosks in public.[275]

SET is currently the leading standard in credit card payments via the Internet, but there are many other possible ways to pay via credit card. The disadvantage of these other payment methods is mainly that they are not open and are bound to a certain service provider. They include WireCard.[276] CyberCash,[277] and First Virtual.

(b) *Electronic invoice*

While many credit card transactions are very common in the B2C areas, invoices are more common in the B2B sector. In many cases, the B2B transaction volume is too high for credit card transactions, and many companies traditionally only pay via invoice. Changing the type of payment would require a reorganization of the whole process (including back office systems and bookkeeping), which for many businesses would cost too much. Finally credit card companies want up to 4 per cent of the transaction in fees, which in business sectors with many small daily money transactions—or in highly competitive markets such as transport haulage—can be the difference between profit and loss.

Online invoicing offers the possibility to cut costs and automate the manual process. One of the first banks to offer the possibility to implement electronic billing is the Bank of America, which has started to offer integrated electronic billing to their on-line banking customers.[278] This creates a whole new service sector on the Internet, and instead of going to many different places for paying invoices, billing services can aggregate all bills and the customer is able to pay all bills in one single location. The billing portal sites are very profitable for many companies, as every customer is going to return to the site at least several times a month, making it easy for the companies to start cross-selling activities based on the user profile, which could include the billing information. Therefore, not only are banks trying to get into the online billing market, but traditional Internet portals such as Yahoo and Excite are also interested.

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[274] In the credit card payment system, there are four players: the customer, the merchant, the issuer and the acquirer. In order to use a credit card, the customer and the merchant need to establish relationships with the issuer with respect to the acquirer. The issuer gives the consumer a credit card. The merchant applies to an acquirer for the ability to accept one or more card brands. When the customer buys something from the merchant, the merchant verifies the validity of the credit card by sending the credit card information to the acquirer. Over the financial network, the request is then passed on to the customer's bank for verification. The bank then returns the authorization to the merchant through the acquirer. This may sound complicated, but it is the way the credit card system is working today.

[275] Kosiur, op. cit.

[276] www.wirecard.de.

[277] www.cybercash.com.

[278] www.bankofamerica.com.

The potential size of the online invoicing market can be estimated by the following statistic: it is estimated that more than 22 billion monthly bills, and other periodic bills, are mailed out to North American consumers. This is clearly a major economic inefficiency that presents a huge opportunity for online billing. If these bills are sent online, and if only 5 per cent of billing is done online, it will be enough to grow the service from about US$ 50 billion today to US$ 350 billion by 2005. In consequence of this potentially lucrative market and the accompanying huge efficiency gains for merchants and customers, several big players are now entering the online invoicing market. In 1999, the AOL Netscape unit joined with Sun and three of the biggest United States banks (Chase Manhattan, First Union and Wells Fargo) in a consortium known as Spectrum to simplify e-bill payment. AOL also made a five-year pact with Quicken to allow the 20 million users of AOL to receive, view, track and pay both electronic and paper-based bills online. Microsoft's MoneyCentral joined with Citibank and First Data Corp, the dominant United States financial transaction processor, to form the TransPoint bill payment service. Not to be outdone, Yahoo has partnered with the CheckFree electronic billing company to launch Yahoo! BillPay on its web site.[279]

It has been said that "e-billing may be the next killer application on the Web, and is certain to capture the vast majority of all bill payments by 2010."[280]

(c) *Internet checks*

Electronic checks work in a manner similar to conventional checks. The customers receive digital documents from their banks and need to enter the amount of the payment, the currency and the name of the payee for every payment transaction. In order to cash in the electronic check, it needs to be digitally signed by the payer.

The electronic check can be better than the paper check in one significant aspect. The sender can protect himself or herself against fraud by encoding his/her account number with the bank's public key, thereby not revealing his/her account number to the merchant. As with the SET protocol, digital certificates can be used to authenticate the payer, the payer's bank and the bank account.

The use of checks around the world differs a lot. Check payments are more widespread in the United States than in Europe, and probably than in any other part of the world. Most electronic checks are based on the United States system, whereby checks need to be signed both by the payer and the payee. A number of Internet check payment systems are in use, but as in the case of Internet credit cards, these are by nature not open systems, but bound to a certain service provider: PayNow[281] (developed by CyberCash, whereby the consumer pre-loads a CyberCash wallet with value) and eCheck[282] (developed by the Financial Services Technology Corporation [FSTC]).

CyberCash was recently bought by VeriSign, and the future of the CyberCash products remains uncertain as they face integration with other VeriSign products such as PayFlow.

The eCheck was originally developed by a consortium of banks and clearing houses[283] (FSTC), but later (October 1999) joined forces with CommerceNet, by transferring the management of the eCheck from the FSTC to CommerceNet. Based on the Financial Services Markup Language (FSML) and digital signatures, eCheck leverages the check payment system from the real to the virtual world with fewer manual steps involved. It fits within current business practices, eliminating the need for expensive process re-

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279 Frank Feather, *Futureconsumer.com : The webolution of shopping to 2010* (Toronto, Warwick Publishing, 2000).

280 Ibid.

281 www.cybercash.com

282 www.echeck.com

283 The eCheck Initiative is a cooperative effort of more than 15 banks, government entities, technology vendors and eCommerce organizations worldwide, including Agorics Incorporated, Bank of America, Certicom, Defense Finance and Accounting Service, Federal Reserve Financial Services, Fleet Bank, GTE, IBM, IntraNet, RDM Corporation, SafeNet, Sun Microsystems and the United States Treasury.

engineering. The eCheck has been designed to minimize start-up expenses, apply universal industry standards and provide ubiquity for participants. The eChecks utilize state-of-the-art security techniques of authentication, public key cryptography, digital signatures, certificate authorities, duplicate detection and encryption, and all this makes the system highly secure.[284]

Electronic checks can be delivered either by direct transmission over a network, or by electronic mail. In either case, existing banking channels can clear payments over their networks.

3. *Instant-paid payment systems*

In general, instant-paid payment systems are considered the most complicated systems to implement, as they require direct access to the internal databases of the banks in order to make payments instantly. Security needs also to be implemented more strictly than in the other payment methods, as instant-paid systems are the most vulnerable in terms of risk and fraud.

(a) *Debit cards*

Debit cards are generally used more in Europe than in other parts of the world, whereas credit cards are more widespread in the United States. The main difference between credit and debit cards is that, in order to pay with a debit card, a personal identity number (PIN) is needed, as is a hardware device that is able to read the information that is stored in the magnetic strip on the back, unlike the credit card, which has all the information also printed on the front of the card.

Security measures for existing debit cards are relatively strong, because they require the customer to confirm that he or she knows something that only the card-owner should know: the PIN code. However, although the costs from error and fraud are very low, the communication costs associated with fully online transactions are very high.

So far, the businesses with debit cards are rarely on the Internet, as computers are still not equipped with a hardware terminal that is able to read the magnetic strip. As the prices for such devices drop, they will become a commodity that will be sold together with every computer. Meanwhile, the trend is moving from magnetic strips to electronic chips on smart cards. Smart cards are currently used mainly for electronic cash, but in the future they may replace both debit and credit cards as well.

(b) *Direct debit*

Direct debit is slowly starting to be used in online transactions. Direct debiting may be useful, especially for small to medium payments (such as payments for last-minute flights and last-minute shipping). In such cases, the customers are directed towards a special Web page for payment—during their online shopping—on which they need to enter their bank account information so that money can be debited directly from the account as soon as the customer has placed his or her order. The only problem with this system is the valid signature. The Web page must typically be printed out by the customer, signed and faxed. If tickets are bought online at the last minute, the merchant, after receiving the fax, either sends out the tickets or leaves them at the departure section in the airport for pickup by the customer.

Subsequently, the key problem for more widespread use of direct debit is the original signature, which is used to authorize the money transfer. Once digital signatures are widely accepted, special software on the merchant server will pass on the transaction to the bank, where the money transfer will be initiated in an instant.

In the ESCWA region, direct debit systems are used in the United Arab Emirates. The United Arab Emirates Central Bank offers a payment mechanism of direct debit. The Bank is currently introducing

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[284] "CommerceNet to join FSTC on eCheck initiative," press release, October 1999 (www.echeck.com).

secured socket layers for security of the transactions, and will also introduce Public Key Infrastructure and smart card technologies.[285]

4. *Pre-paid payment systems*

Pre-paid systems basically work by saving digital money to the hard disk or to a smart card. They can be considered the digital equivalent of cash. The file containing the digital money is called a "virtual wallet". The electric money can be used at any time to pay for goods and services on-line. The advantage of electronic cash is that it is anonymous. Nobody is able to trace back who paid for the service or goods. However, as soon as goods have to be delivered physically this advantage is gone. Another disadvantage is the storage on the hard disk or the smart card: if someone loses the file, the money is gone, just as a wallet can be lost in the real world.[286]

(a) *Different electronic cash solutions*

The digital cash system uses software to save the equivalent of cash onto a hard or a floppy disk, which means that coins and bank notes are replaced by digitally signed files. The advantage of this system is that the cost of passing on the money is very low (the only cost is the price of the Internet connection itself).

The difficulty with electronic cash is to implement it in a very secure way. As the money is stored in files, it should be made clear that by copying the files the value of the cash is not increased, nor should it be possible to alter the amount of the digital money on anyone's hard disk. Electronic coins and notes should have digital marks that make it impossible to use them more than once. The use of encryption technologies, digital signatures and electronic signatures helps to reduce the possibility of fraud.

In order to offer the same advantages of coins and bank notes, digital money should not reveal the identity of the person who has paid with it, and electronic money should be exchanged directly between the two partners involved, without involving a bank. The possibility of splitting up the value is also very important, as electronic cash is the one system that seems to fit best with the possibility of performing commercial transactions involving small amounts of money, even in real time, on the Internet.

Technically electronic cash is being circulated if a bank issues digital cash (also called tokens) and debits the customer's account with a withdrawal equal to the value of the currency (tokens) issued. The bank validates each token with its digital stamp before transmission to the customer's personal computer, Webphone or other devices. When the customer wants to spend some money, he or she transmits the proper amount of tokens to the merchant, who then relays them to the bank for verification and redemption. To ensure that each token is used only once, the bank records the serial number of each token as it is spent. If a token's serial number is already recorded in the database, the bank thereby detects someone trying to spend the token more than once, and would then inform the merchant that the token is worthless. Full anonymity can be obtained by using a scheme called "blind signatures,"[287] which allows the buyer to obtain electronic cash from a bank without the bank being able to correlate the buyer's name with the tokens it issues.

However, many of the first generation electronic cash solutions that have introduced purely digital cash for use on the Internet, either by loading the cash onto a smart card or directly onto the hard drive of the user's PC, have failed. It was believed that electronic cash could fulfil the need for microcash used for paying items such as transport tickets, weather reports, images or sound clips.[288] Some of these microcash

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[285] ESCWA, "Electronic commerce in the United Arab Emirates," paper prepared for the Expert Group Meeting on Trade Facilitation and Electronic Commerce in the ESCWA Region, held in Beirut in November 2000.

[286] Feather, op. cit.

[287] According to Daniel Amor, blind signature is a patent-pending algorithm invented by David Chaum, founder of DigiCash, which means that the bank issuing the tokens cannot trace back the tokens to the customers, as the bank does not see the original serial number, since this number will be made invisible to the bank when it returns by multiplying it with another random number (the so-called "blinding factor").

[288] Kosiur, op.cit.

solutions looked successful in the beginning (for example, DigiCash[289] and Netcash[290]). However, they seem to require more time to reach critical mass and become commercially successful. DigiCash needed an issuing bank in between to convert the issued tokens, while NetCash required a complex infrastructure that was too difficult to implement and use by many Internet users in the early days.[291]

Instead, companies such as IBM and Microsoft have introduced software that generically is called a "digital wallet." The IBM Consumer Wallet lets Web shoppers enter their credit card information once and store it securely in a wallet icon on their desktop (which only eliminates the repetition of typing credit card details when shopping). Microsoft's version also carries universal log-in features so users can sign on once to access multiple web sites.[292]

Other early solutions built on the token-based systems include CyberCoins and MilliCent, for which intermediaries such as ISPs or brokers are required, but none of them seem to be active any longer, as their web sites no longer can be activated.

For some of these systems, the biggest issue is security. From a governmental point of view, concerns have been raised about the introduction of electronic cash. New electronic currency systems that are not directly linked to a physical currency may affect governmental control over the currencies and the monetary system in two ways. First, these currencies may influence the supply of money by changing the way money is multiplied and, secondly, price levels and interest rates could also be affected by digital currencies if they reach critical mass. In the end, the central banks relinquish their legal monopoly to issue money or money substitutes. Governments also fear that electronic cash will be used for criminal activities, such as money laundering.

(b) *Smart cards*

In Europe, smart cards are widely used, and they are increasingly accepted in the United States. Debit cards, health care cards and phone cards all have embedded chips, which contain money, health and account information. Every debit card issued in Europe (called the "EC card") contains information on the owner and the account. In addition to storing these pieces of information, systems have been developed to also store cash onto the chip. The money on card is saved in an encrypted form and is protected by a password to ensure the security of the smart card. In order to pay with a smart card, it is necessary to introduce the card into a hardware terminal. The device requires a special key from the issuing bank to initiate a money transfer in either direction.

Smart cards reduce the amount of money in shops after closure each day, as merchants can transmit the money electronically to their bank account at the moment of payment. Actually the virtual money that has been used to pay for the goods can be transmitted instantly to the bank of the merchant. The major advantage of the smart card is that it can be used in both the real and the cyber worlds. For a customer using the smart card, it is possible to go to a bank, load the card and pay on the Internet. The other way is also possible: a company can offer a service on the Internet, charge their customers, who then transfer their money to the company card, and the company can then cash the money in at the bank or pass the money on to pay for another service. Electronic cash as described above can only be used on the Internet. Smart cards can act as a bridge. Online auctions where everyone can offer something will profit from smart cards, as people can exchange money directly without the need for an intermediate.

Smart cards are relatively secure, and their advantage lies in the simplicity of the off-line operation. Together these translate into low transaction costs. In Europe, a number of standards have been established, among them the Mondex card in the United Kingdom and the MoneyCard[293] ("GeldKarte") in Germany.

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289 www.digicash.com.

290 Developed by the University of Southern California in 1994.

291 Amor, op. cit.

292 Feather, op. cit.

293 http://www.voeb-zvd.de/geldkarte.htm.

Box 8. The Mondex card and the GeldKarte

Mondex Smart Card

Mondex is a subsidiary of MasterCard international, which allows money to be transferred by smart card readers that are attached to telephones, money cellars, and through special electronic wallets. The reader is able to dial into a bank and initiate the transfer between user and bank. Once money has been loaded on the smart card, customers and merchants can transfer it to business partners by using the electronic wallet; the balance on the card can be checked by using the wallet, money teller or Mondex telephones. It is not required to have a bank as an intermediate step in every case. The system guarantees anonymity just as real cash does. This is also its main disadvantage, since it is not possible to track down criminal transactions. Only very few Internet sites accept the Mondex card, but Mondex representatives believe that it is only a matter of time until more sites do, as their products offers great possibilities for implementing micro payments with no transaction costs charged (users only have to pay a monthly fee of about 1.50 pounds sterling). The Mondex system is based on strong security features that make it virtually impossible to forge money. Mondex uses the Value Transfer Protocol (VTP), which uses strong cryptography to protect the movement of the money, and Mondex values can only be moved between Mondex cards, which makes it a closed system.

MoneyCard–"GeldKarte"

Over the past two years, member banks of the ZKA (Germany's Association of Banking Institutions) have supplied over 60 million MoneyCard electronic purse to the German market by adding an electronic chip to their eurocheck cards. The German MoneyCard ("GeldKarte") contains a chip, which offers the functionality of electronic cash. The MoneyCard is different from Mondex, in that a special teller machine is necessary to get the money. At the time of this writing, only a few sites have accepted the MoneyCard, owing to this infrastructure, but its acceptance rate in shops and transport ticket machines is high, and MoneyCard will probably soon become a very attractive alternative for electronic business. Unlike credit card companies, which charge around 4 per cent of the transaction, the MoneyCard enables banks to charge only 0.3 per cent (or a minimum 0.01 euro). Because of these low transaction costs, the MoneyCard is feasible for micro-payment, which can be used to pay for transport tickets, web pages, and documents, and the merchant can receive the money during the ordering process, as the process is only completed if enough money has been loaded on the smart card. The necessary loading of money from special teller machines is also the disadvantage of the MoneyCard, and the geographical limitation of the system (it only works in Germany, so far) is also a weakness for the system as other international systems, such as the Mondex card, may replace it. To make the MoneyCard really successful, other countries need to use it, and even more important is that smart card readers become a commodity integrated into the keyboard, for example, and do impose (hidden) additional transaction costs on the customer.

Sources: S. Rother, "Analysis and evaluation security features of Germany's GeldKarte", TUVIT (http://www.tuv-it.de/de/SUCHEN/index-s.htm); and www.mondex.com.

Smart cards have still not found their way to the ESCWA region, though in Egypt smart cards will soon be introduced into the market as an alternative to credit cards.[294]

5. *Comparing payment technologies*

Table 22 shows a summary of comparisons between the above-mentioned three types of payment techniques. A review of the summary of post-, instant-, and pre-paid payment technologies makes it clear that, for the ESCWA region, the post-paid systems, in general, best meet the digital payment requirements, as they have been established on the Internet for some time. Pre-paid and instant-paid systems are not as common on the Internet, and some development and implementation costs and time are still foreseen in this regard. The standards for pre-paid and instant-paid have still not been settled, and many different and competing solutions are still being tested and developed.

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[294] Ismail, op. cit.

TABLE 22. COMPARISON OF THREE TYPES OF PAYMENT TECHNOLOGIES

	Post-paid	Instant-paid	Pre-paid
Acceptability	High	Low	Low
Anonymity	Low	High	Middle
Convertibility	High	High	High
Efficiency	Low	High	High
Flexibility	Low	Low	Low
Integration	High	Low	Middle
Reliability	High	High	High
Scalability	High	High	High
Security	Middle	High	Middle
Usability	High	Middle	Middle

From the perspective of the ESCWA region, the most prudent course may be to prepare, implement and use the most developed systems (post-paid systems) and monitor or await commercial breakthroughs in other pre- or instant-paid systems until the costly development phase of the solutions has passed.

A more proactive approach would, of course, be to jump ahead of the development process, that is, to "leapfrog" the development stages, and try to implement and use not the payment systems of "today", but those of "tomorrow". However, considering the general state of e-business in the region, the limitations in the infrastructure, and the uncertainty about standards and technological maturity, it may be costly and risky to leapfrog current developments, as the cost of choosing or developing systems that do not fulfil the above-mentioned requirements are very high.

For the transport section in the ESCWA region, a different comparison of the payment systems may be relevant or useful in supplementing the above comparison. As e-business in the transportation sector in the region is primarily is based on B2B, and in the medium to long term on B2C, it may be useful to compare the online payment categories with the specific payment solutions, as shown in table 23.

TABLE 23. PAYMENT TECHNOLOGIES AND ON-LINE PAYMENT CATEGORIES

	Pre-payment	Instant-payment	Post-payment
Micro payment	Smart Card Electronic Cash	Smart Card	Smart Card
Consumer payment	Smart Card Electronic Cash	Debit Cards Direct Debit	Credit Card Invoice Internet checks
Business payment	Smart Card	Debit Cards Direct Debit	Invoice Internet checks

Note: Several of the payment technologies could be used for pre-, instant- and post-payments. However, only their most common use is noted. For instance, credit cards may be used for both pre- and post-payments, but they are only mentioned under post-payment, as this is considered the most significant marketplace for credit card payments. Since smart cards are the most feasible micro-payment technology, they are mentioned in all categories.

In comparing tables 22 and 23, it is interesting to note that, for the B2B environment in the ESCWA region, the number of mature e-payment solutions may not be high, but those available are among those with the highest user penetration, availability and highest potential for efficiency and effectiveness, such as electronic invoicing and electronic checks. In the B2C environment, it may be feasible to combine these solutions with traditional credit cards and, in the medium to the long term, electronic cash. The transport sector traditionally is highly competitive, and only a few percentage points of payment of credit card transaction charges may ruin the business. Therefore, low commission debit cards and direct debit card solutions may attract interest as they combine efficiency with relatively low costs. However, a precondition to all these solutions is that the political, legal and regulatory framework for the implementation and use of these payment systems is put in place. This means that security issues are given priority (including public key infrastructure, digital certificates and digital signature). User awareness, information and education as to

system benefits, strengths, weaknesses and opportunities must be targeted at the actors in the transport sector, while incentives, technical support and know-how must be provided to the business sector to implement and use these systems.

6. *Aspects of the current and future payment technologies*

This chapter has so far focused on the payment systems that developers and consortia have been working on in recent years to provide electronic versions of the payment systems used in daily business transactions. In addition to the covered electronic versions of the standard methods for making payments (cash, checks, and credit cards), this section will review some analyses of electronic data interchange, which has been used for handling payments on networks (other than the Internet) for some time, and is of particular importance to the transport sector.

Some other future payment technologies will also be covered in accordance with their relevance to the transport sector.

(a) *Electronic data interchange*

EDI has been widely used in the transport sector since the 1960s; it is a proven technology used mostly by large corporations and their satellite suppliers working together over a private network, the Value Added Network (VAN). These VANs offer reliability and security that has been difficult to duplicate on the Internet until very recently, and are therefore still used extensively in the transport sector.

Typically, EDI service providers maintain a VAN, with mailboxes for each business partner. The provider stores, then forwards, EDI messages between partners. Each company using EDI has to agree on the contents of each form they will use for conducting business via EDI. These forms are transmitted via e-mail over the VAN; each participating company has to run EDI translation software on its computers to convert EDI data into formats used by the company database.

EDI using VANs is poorly suited to the formation of virtual organizations or rapidly changing partnerships, which are becoming the norm in present-day transport business. In the past, the vast majority of EDI transactions were negotiated and set up via trading partner agreements (TPAs) that specified data interchange on a one-to-one basis. Both the setting up of these agreements and the terminating of partnerships are expensive and slow to implement, particularly by today's one-click standards.

EDI service providers are now offering Internet access to bundled EDI services hosted at their computer centres, relieving businesses of the need to maintain much of the hardware and software. With the move towards more flexible implementation of EDI, such as using forms the user can complete in a Web browser, small and medium-sized transport companies should also find it easier to utilize EDI.

EDI has been constrained by long preliminary negotiations to define transaction forms suitable to both business partners, making it unsuitable for many of the fast-paced temporary alliances in today's transport business. In addition, each business sector has defined its own particular EDI forms, making cross-overs between business sectors difficult. The rapid development in the area of XML,[295] the next generation of HTML, is now viewed as the standard way information will be exchanged in environments that do not share

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[295] XML is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere. For example, computer makers might agree on a standard or common way to describe the information about a computer product (such as processor speed and memory size) and then describe the product information format with XML. Such a standard way of describing data would enable a user to send an intelligent agent (a program) to each computer maker's web site, gather data, and then make a valid comparison. XML can be used by any individual or group of individuals or companies that wants to share information in a consistent way. HTML—the HyperText Markup Language—made the Web the world's library. Now XML is making the Web the world's commercial and financial hub. In the process, the Web is becoming much more than a static library. Increasingly, users are accessing the Web for "Web pages" that are not actually on the shelves. Instead, the pages are generated dynamically from information available to the Web server. That information can come from databases on the Web server, from the site owner's enterprise databases, or even from other web sites, and that dynamic information need not be served up raw. It can be analysed, extracted, sorted, styled, and customized to create a personalized Web experience for the end-user (Charles Goldfarb, http://www.xml.org/xml/goldfarb.shtml).

common platforms. Special purpose XML languages and standards are announced on an almost daily basis, with several hundred already adopted since XML 1.0 was released in February 1998. In addition, strong initiatives are making EDI transactions simpler to specify and set up, as well as use over the Internet. These initiatives could make it possible for businesses of all sizes to use EDI over the Internet.[296]

However, EDI is a system that encompasses more than just making payments. It offers more capabilities and options than the payment systems reviewed above. Much of EDI can be used to handle purchase orders, inventory, and shipping information, without even touching on the matter of transferring funds. One use of EDI, called financial EDI (FEDI), deals specifically with making payments, and thus parallels the payment systems covered in this chapter, although it is strictly for B2B transactions.

FEDI is typically set up between banks and their corporate custmers to allow the banks to receive payment authorizations from payers, and make payment settlements to payees. Funds transferred between banks are handled using the typical bank networks, such as the CHIPS and SWIFT automated clearinghouses.

Mainly because the cost of operations on the Internet is lower than on a VAN, many transport companies in Europe and United States have moved or are moving into experimenting with EDI over the Internet. Furthermore, EDI has proven itself to be too complicated and expensive for many small and medium-sized transport companies. As a result, EDI has not been widely adopted in the SME transport segment, and therefore EDI has not fundamentally changed the way business is conducted.[297]

Today transport business can be conducted in new ways that are eminently efficient and less costly. The Internet and XML have lowered the entry barriers to e-business, in terms of both cost and complexity. The advent of XML, however, should not be interpreted as the end of EDI. XML does not replace EDI, but rather extends it to bring e-business to small and medium-sized (transport) companies. In many ways, XML complements EDI, making it possible to realize the original idea of EDI, though some transport enterprises still have reservations about the robustness and reliability of the Internet.[298]

(b) *Wireless payment systems*

Wireless payment and trading advantages are increasing daily owing to rapid advances in the technology, rapid growth in wireless coverage, cost reductions in networking and improvement in hand-held devices (such as Palm, Workpad and Ipaq) as well as bandwidth efficiency. Today, far more can be accomplished in wireless services, which was not cost-justifiable a year or two ago. With the third generation (3G) of wireless expected to reach maturity between 2003 and 2005, 3G is expected to deliver enhanced voice and data transfer, and thereby also electronic (wireless) payment solutions. Operation systems are developed to facilitate wireless operations (including Windows CE, Palm OS, Linux and EPOC). However, the main uncertainty is the price for the payment services, especially as UMTS licences have been sold at very high prices in some parts of the world. Furthermore, each one of these hand-held devices will require certain ways of communicating, as they require their own gateways to communication to the application servers. Various sizes of screens create different data and screen layouts. Different keyboards generate different navigational options and different keys. The security of wireless payment systems is also one of the serious challenges facing consumers, companies and banks in these systems.[299]

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[296] www.xml.org.

[297] Jeffrey Ricker, Drew Munro and Doug Hopeman, *XML and EDI: Peaceful Co-Existence*, White Paper (XMLsolutions Corporation, www.xmls.com).

[298] Ibid.

[299] Rod Ghani, "The future of banking and financial systems", World Market Series, Executive Briefing on E-Services for Trade, Investment and Enterprises, World Market Research Centre, 2001.

A number of wireless systems are currently marketed or under development. Their characteristics are listed below:[300]

(a) WAP (WirelessApplication Protocol). The current-generation mobile data technology that reformats Web pages to fit onto tiny wireless screens. Introduced in 1999, WAP services have been criticized for being slow and difficult to use;

(b) 2.5G: The next step in wireless data, it was set to launch in mid-2001 in the EU and in 2002 in the United States. The 2.5G systems send data separately from voice for delivery at least three times faster than current networks;

(c) 3G: Third-generation services let voice and data more efficiently share the airwaves and could be more than 10 times faster than 2.5G.

Today WAP may be viewed only as a forerunner of 2.5G and 3G; the functionality, speed and coverage of WAP are not suitable for B2B electronic business, and are only suitable for a few specific transactions for B2C. So far, the only real successful wireless Web system is the Japanese NTT DoCoMo which in 1999 introduced its own "i-mode" wireless data technology; the system grew to include nearly 5 million Japanese users as of 2001. Analysts predicted in 1999 that the number would reach 500 million wireless Web users worldwide by 2003, which sparked an investment frenzy in wireless technology. Since then hundreds of wireless startups have folded, and expectations today are more modest. However, 2.5 and 3G are much more promising when viewed from the standpoints of functionality, speed and coverage, but the price of the technology and its transactions makes the commercial breakthrough of large-scale payment solutions based on wireless applications still uncertain.

7. *Political impact of digital currencies and payment systems*

Many concerns regarding the impact on the money supply and governmental control have arisen since the introduction of digital currency. In the short run, Governments will retain control over their currencies by adjusting the control of the money supply. The reason is that companies mostly deal with invoices and end-customers, in most cases, use credit cards. These types of payment do not require a new currency, but use currencies that are under governmental control. Customers paying in United States dollars or Lebanese pounds will not influence the value of the currencies directly.

However, new digital currency systems that are not directly linked to a physical currency may affect the monetary system by influencing the supply of money and by influencing price levels and interest rates.[301]

Governments make money by issuing money, as the cost of printing a bank note is lower than its value. This so-called *"seigniorage"* and interest-free lending to the Government by the public are the revenues that a Government receives every year. Through the introduction of digital currencies, some portion of the Government's revenue is taken away. Introducing a digital currency by a private company is like printing private money. As a result, the central banks relinquish their legal monopoly to issue money or money substitutes.

Most States do not intend to issue electronic money. In most cases, private companies are offering the electronic cash, with one exception being Finland, where a company wholly owned by the Central Bank there is issuing an electronic wallet.

If private companies are allowed to print money, the revenues related to *seigniorage* will be shared between the Governments and these companies. The acceptance of a currency depends on public confidence. If there is enough confidence in these companies, they will start to develop competition. Other than a Government, which does not let consumers participate in the profits, private companies may distribute the

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[300] e.biz, *Business Week*, January 2001.

[301] Dias, op.cit.

profits to their customers, which will lead to totally new perspectives in the currency industry as well as new forms of convenience, service and quality. Online banks could compete with the Governments by paying interest on digital currency deposits.

No legal framework has been established that allows private companies to create commercial types of digital currencies. Tests have been made, but Governments fear that digital currencies will be used for criminal activities (such as money laundering). For the Internet to succeed, digital currencies are not necessary, but the Internet has already deregulated many markets and will probably not stop at the currency market.[302]

8. *Recommendations*

(a) A working group or committee should be established in the ESCWA region to prepare, implement and disseminate the most developed electronic payment systems (post-paid systems).

(b) Policies should be formulated and their progress monitored, and help should be provided for the timely commercialization of other pre- or instant-paid systems.

(c) Assistance should be provided in transferring and integrating EDI payment systems (of special relevance to the transport sector) with the Internet.

(d) The introduction and use of wireless payment systems and mechanisms should be facilitated.

(e) Consideration should be given as to which stages of the development of payment technology may be suitable to leapfrog, and a determination should be made as to which are the most relevant cases with regard to adjusting them to internationally proven technologies.

(f) The political, legal and regulatory conditions of the framework for the implementation and use of the digital payment systems should be put in place.

(g) Priority should be given to digital payment security issues (including public key infrastructure, digital certificates and digital signatures).

(h) User awareness, as well as information and education on the benefits, strengths and opportunities of the payment system, should be enhanced.

C. SECURITY ISSUES

Communication via the Internet is by its nature open and uncontrolled. This conflicts with the needs of digital businesses in the ESCWA region, which require privacy, confidentiality and integrity for their transactions. The growing demand for electronic business also raises awareness of security issues and concerns about achieving the goal of secure business via the Internet. The news is full of reports on Internet security that are hypercritical and increase fears that business on the Internet is dangerous. Network-based fraud is growing dramatically, and has made Internet security a business and government issue and not just a technical issue to be resolved in the IT departments of companies considering an Internet business strategy.

Today technology is able to make a system secure, but more than pure technology is required. Many problems have been reported in the past, and it is certain that even more incidents will happen in the future. However, a closer look at the reasons behind the attacks on systems will often reveal that human error, neglect of proper procedures, and wrongly configured software are the main problems. These errors cannot be eliminated with more or better technology, but with an all-encompassing corporate and/or public security strategy.

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[302] Ibid.

The major problem on the Internet is the identity of the other users. In a real shop, a customer is identified by her or his appearance, but on the Internet everyone looks the same. Although it is possible to pretend to be someone else in real life, on the Internet it is even simpler. On the Internet, nobody can be sure about the identity of the other person without additional technologies. Even if a person can be identified, it is often not possible to do business, as this requires a signature, which cannot be done without a legal framework. Information security is the major issue on the Internet, but it cannot be implemented if the basics are not in place. Governments are slowly starting to provide legal frameworks to punish attackers and allow the creation of standardized digital signatures and certificates.

In order to enforce security, it is necessary to prevent unauthorized access to electronic data on the business critical systems of the companies. The result of unauthorized access can be disclosure of information and the alteration, substitution or destruction of content.

Organizations and people using computers can describe their needs for information security and trust in terms of five major requirements:

(a) Confidentiality
(b) Availability
(c) Non-repudiation
(d) Integrity
(e) Legitimacy.

(a) *Confidentiality.* To control who gets to read the information and to ensure that unintended parties cannot determine what was sent;

(b) *Availability.* To ensure that authorized users have continued access to information and resources;

(c) *Integrity.* To ensure that information and programs are changed only in a specified and authorized manner and that the data presented are genuine and have not been altered or deleted in transit;

(d) *Legitimacy.* Means that non-authorized persons cannot use resources in a non-authorized way;

(e) *Non-repudiation.* Inability to deny association with data.[303]

The above five components may be weighted differently depending on the particular application, system, business and customer relations. A risk assessment must be performed to determine the appropriate mix. A number of different technologies can be used to ensure information security.

Confidentiality and integrity can be implemented through cryptography, which offers a high degree of security. When the data are encrypted, no one is able to tell what the information is about. Through strong authentication, it is possible to ensure that nobody sees, copies or deletes a certain piece of information. The use of strong authentication and strong encryption ensures that the only way to break in the system is to have the necessary certificate for authentication and the key for the encryption. An authorization system is able to prevent access in a non-authorized way by authenticated people. Non-repudiation requires a trusted third party, who time-stamps the outgoing and incoming communications and is able to verify the validity of a digital signature. By putting a time-stamp on every piece of information that moves between two parties, it becomes easy to find out if a certain e-mail has been sent out on time.

Security of the encryption key, assignment of liability, responsibility for the key and audit of access to the key are all ongoing issues that must be addressed. There is no doubt that a cryptographic system,

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[303] André Gholam, *E-security Tricks and Bricks: Enhancing eCommerce and Finance in a Digital Economy*, presented to the Conference on Enhancing eCommerce and eFinance in a Digital Economy, held in Beirut in 2001.

correctly managed and implemented, offers the highest security level for electronic information available today.[304]

1. *The security threats*

In order to ensure the security of information critical to their business, every company needs to develop an information policy that ensures that the processes are in place when something happens. This policy can include several or all of the solutions below, according to the risk assessment of the individual activities, the scope of the business and its requirements.

The process for developing an information policy is like a circle, which returns always to the starting point to increase safety. New technologies and ideas require continuous updating of the information policy. Just like the company's Web page, which needs continuous updates, the security process requires continuous updates. A security policy must include the following:

(a) To consolidate the resources that need to be protected (including computers, printers, routers, firewalls and buildings);

(b) To catalogue the threats for every single resource;

(c) To undertake risk analysis of each catalogued item and estimate the percentage of each threat;

(d) To implement the most cost-effective security systems;

(e) Specify surveillance and update schedules.

The Internet offers a wide range of possible security threats. Although most of these threats are not very likely, it is necessary to evaluate how dangerous such attacks could be. The threats can be divided into four basic categories, as listed below:

(a) *Security threats on the Internet*

(i) Loss of data integrity: information is created, modified or deleted by an intruder;
(ii) Loss of data privacy: information is made available to unauthorized persons;
(iii) Loss of service: a service breaks down owing to the action of a hacker;
(iv) Loss of control: services are used by authorized persons in an uncontrolled way.

Computer hackers are people who try to achieve one or more of these goals at any given time. An on-line bank in Germany,[305] for example, registers about 1,000 attacks per day. It is not known how many of these attacks are really serious, but it shows that people try their luck.

(b) *Stories of breaches of security*

(i) A Continental Airlines reservations employee stole more than 2.2 million kilometres of airline tickets for his family and friends. The theft was discovered after many years during a routine control.

(ii) A hacker penetrated a company credit card server and stole 300,000 card numbers. He asked for US$ 100,000 to divulge the flaw in the company's security. The company refused, and the hacker subsequently published the numbers on a web site.

(iii) MCI Worldcom employees who had been fired from the company introduced a virus into the company servers, which modified the contents of the files and encrypted the data. The virus was set to work after 5 p.m. and during weekends.[306]

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[304] Mohamed Al-Hashimi, "Securing E-business," Cisco Systems Levant, 2001 eforum on Enhancing E-commerce and Efinance in a Digital World, held in Beirut in 2001.

[305] Amor, op. cit.

[306] Gholam, op. cit.

Modern security technologies have made attacks more difficult, but every day information on new vulnerabilities in application software and operating systems is published, which offers new possibilities for attacks. There are many ways to attack a system. The most typical ways are:

(a) Monitoring the communication between two partners (if a user contacts his/her mail server, for instance, the login and password are sent to the server and anybody on the Internet is able to intercept the transmission);

(b) Simply stealing the hardware and software (databases);

(c) Intercepting the electromagnetic output of devices such as monitors;

(d) Executing a denial of service attack by attacking the known vulnerabilities of the operating system or application software or by exhausting the service by overloading the service with too many requests;

(e) Using a Trojan horse (which is hidden and harmless-looking software), whereby the Trojan horse is activated when the software is launched. Information collected by the Trojan horse is sent out to the hacker, who then can use the information to enter the system;

(f) Masquerading (also known as "spoofing"), whereby, by pretending to be someone else, a hacker is able to enter a computer system. IP spoofing is the way most attacks are conducted. Many systems are restricted to a certain set of IP addresses. By pretending to be a certain IP address, it is possible to get automatic access to certain resources;

(g) Resorting to physical intrusion is a more traditional way, as well as bribing the security personnel at the target site.[307]

2. *The security tools*

In order to move a business from a private network to the Internet, there are some security issues that need to be resolved.

(a) *Authorization*

First of all, it needs to be determined who has access to which applications and company-sensitive information. A general authorization process needs to be implemented as well as a data classification (including public, internal use only, confidential and restricted categories). Authorization in general consists of a system architecture, which prevents the unauthorized access to services and data by strictly enforcing rules on what a user is allowed and is not allowed to do, based on their authenticated identity. However, authorization systems can vary from a simple password to a digital signature. Messages are sent with a "hash code" that matches code held by the recipient. Data may also be digitally signed as well as encrypted to ensure that no one has tampered with them. Finally, an authorization system can be coupled to an accounting system, which audits what authorized staff have done.

(b) *Encryption*

Cryptology, from the Greek words "krypto", meaning "hidden" and "logos", meaning "word", signifies "hidden word" and is used to describe the fields of research in cryptography and cryptanalysis.[308]

Using encryption is important and will change the way businesses work. Strong encryption allows a company or individual to send confidential documents, including contracts and personal information, by e-mail or to save confidential information on a mobile computer, without having to fear that someone will steal it.

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[307] Ibid.

[308] Amor, op. cit.

The most important application that needs to be encrypted is e-mail. Without cryptography, e-mails are the electronic equivalent of traditional postcards. Encrypted e-mails are as if the sender put the e-mail into an envelope, which is then put into a safe. Without the right key, nobody is able to see the content, although anybody could take away the safe.

Encryption became a fundamental business tool when the computer world changed from mainframe systems to a server-client based world. But this was only the beginning. The Internet, which is currently the basis for most business transactions, is an insecure network, as everybody is able to grab transmissions going from one place to the other. Security issues on the Internet are being resolved slowly, as changing fundamental standards has become difficult. Online banking and online payment are the most prominent Internet applications that rely on encryption, but nearly all e-business activities rely heavily on various forms of encryption. Having or not having encryption in a communication can—in the digital world of e-business—mean to have or to lose business. By using encrypted web sites and e-mail, business managers are able to create new e-business models that were not possible before.

As noted above, cryptography is a field of research in itself, and different cryptography methods are available as follows:

(i) Secret key cryptography (also called symmetric cryptography) is the traditional and oldest form of cryptography. A single key is used for encryption and decryption. The two parties involved in the communication need to agree on the key before exchanging the information.

(ii) Public key cryptography (also called asymmetric cryptography) has one major advantage over symmetric algorithms. It does not rely on a secure way to exchange the password. It needs the two parties to agree on a common key, which can be intercepted while transmitting the key information from one party to the other.

(iii) Steganography. Messages that are encrypted using steganography look like harmless messages with attached images or sounds. This kind of software tries to hide the information in the ordinary noise of digital systems of sounds and images. The best steganographic software packages are commercially available.[309]

Encryption technology can be divided into several encryption strengths ranging from weak to unbreakable, as listed below.

(i) Weak. Password-protected text documents from word processors. These programs use very weak encryption that can be broken in with simple tools.

(ii) Robust. Using symmetric encryption technologies, one can create robust encryption, but the weakness lies in the transmission of the key, which cannot be sent over insecure networks.

(iii) Strong. Using public key infrastructure, one can transmit the key over insecure networks.

(iv) Unbreakable. One-time pads. This system uses a key that is as long as the message itself and can only be decrypted with the pad on which it has been encrypted.

(c) *Public key infrastructure*

PKI is a recent innovation—a complete set of products—which provides very high security. PKI works in such a way that every user has a private key and a public key. The public key is shared. The private key is kept secret. Company A wants to send a signed and encrypted message/operation to Company B: Company A signs the message with the private key, Company A encrypts the message with Company B's public key.

[309] Kosiur, op. cit.

When Company B receives the message, B decrypts the message with Company B's private key and B verifies the signature with A's public key.

According to the Butler Group, the public key infrastructure comprises a complete set of products including public-key digital certificates (for electronic means of identification), somewhere to store them, means of revoking them, automatic updating of key pairs and certificates before expiry, key storage, back-up and recovery, and secure client side software.[310] Companies such as Cybertrust, Nortel, VeriSign and GlobalSign (implemented in Lebanon) are offering centrally managed, outsourced PKI services.

(d) *Digital certificates*

In order to use public key cryptography, it is necessary to generate a public key and a private key. Usually that is done with the program that is going to use the key, such as the web browser or e-mail program. A more secure way of distributing public keys is to use one of the certification authorities. A certification authority will accept a user's public key, along with some proof of the user's identity, and serve as a repository of the digital certificate. Thereby, a digital certificate becomes a client-based security solution and is the most commonly used way for binding a cryptographic key with one or more attributes of a user, and offers security in terms of authentication, integrity and non-repudiation. A digital certificate is a file, which is encrypted and password-protected and includes personal information about the owner of the certificate, such as the name of the holder, postal and e-mail address. A public key is included and used to verify the digital signature of a message sender previously signed with the matching private key. The name of the certifying authority that issued the digital certificate, and the duration of the certificate's validity, must also be included.[311] Technically, digital certificates are used to secure the communication between browsers and servers, between customer and companies, or between two e-mail partners (by different encryptions).[312]

United Parcel Services has started two services that allow businesses to send signed legal documents instantly over the Internet. The shipping company has launched a digital certificate-based confidential document exchange service and a service to exchange documents between disparate e-mail systems. Both services cost customers less than the price of shipping an overnight letter.

(e) *Smart cards*

Smart cards are another client-based security solution; they have been heavily promoted in Europe and are now becoming popular throughout the world. Smart cards have an embedded microchip instead of a magnetic strip and are protected by the PIN code. The chip contains all the information a magnetic strip contains, but offers the possibility of manipulating applications on the card. Newer smart cards are able to hold more than a single application. The applications do not even have to be from one organization only; for example, the application of electronic cash provided by a bank can be on the same card as the access control to one's office. Three types of cards have established themselves: contact cards (which need to be inserted into the reader), contactless cards, and combi cards. Smart card applications have become popular as they enable customers to pay for goods and services, and as more and more keyboard makers include smart card readers into their keyboards. The latest releases of operating systems include drivers for smart cards in the standard installation, Smart cards may soon become one of the preferred, and safest, methods of authentication and payment on the Internet.

(f) *Biometric identification*

Biometric identification is another client-based security option, which is a means for automatically identifying persons based on their unique physical characteristics or behavioural traits. It is an upcoming

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[310] "The net imperative," *The Economist, 26* June 1999, cited in UNCTAD, *Building Confidence: Electronic Commerce and Development* (New York and Geneva, 2000).

[311] Certification authorities: VeriSign (www.verisign.com), Belsign (www.belsign.be), Xcert (www.xcert.com), etc.

[312] Kosiur, op. cit.

alternative to digital certificates and smart cards, with the advantage that it is strictly based on something that the client knows or something that the client possesses (including fingerprints, iris/retina scanning, speaking, writing, and standard ways of doing things) and thereby offers a solution to the password problem by replacing the authentication method so that no passwords have to be remembered.

(g) *Virtual private network*

A virtual private network (VPN) offers a controlled pathway through the Internet open only to authorized users and authorized data. VPNs "tunnel" through the Internet, wrapping user data in Internet Protocol (IP) packets that hide the underlying routing and switching structure of the Internet from sender and receivers.[313]

(h) *Server-based security*

Network security can be implemented through different means, but most commonly through a firewall. Firewalls are systems that protect trusted networks from untrusted networks and vice versa. A firewall implements an access-control policy, which allows users from either network to access certain resources on the other network. Every owner of a network needs to determine if there are any resources that need protection. E-business companies will probably need a firewall to protect their internal documents from the outside world. Firewalls play a central role in any security strategy. They allow internal clients to access resources on the Internet without exposing the internal clients to external threats. For the outside world, the whole company is accessing the Internet as one person through the use of proxies. This strategy does not reveal anything about the internal networking structure of the company.[314]

3. *Recommendations*

There is no 100 per cent security for e-business. Recent years witnessed a proportional increase in electronic crimes. However, the importance of security concerns over Internet-based e-business seems to have been overemphasized, as a wide range of security tools, which can eliminate many of the perceived risk elements, are currently available. For instance, using a credit card number on an e-business enabled web site is significantly less insecure than doing so over the telephone to confirm a hotel reservation or even handling the card over in a physical store or taxi, contrary to what is commonly believed. As demonstrated, many of the security concerns and risk factors can already be effectively suppressed by each single company by employing commercially available products (secure servers), and the customer can contribute to added security (by using secure smart cards, digital certificates, and biometric identification solutions). Other solutions are awaiting public regulation to support already marketed solutions (such as digital signature and digital certificates) to become legally binding and commercially safe. The diagram in figure XV indicates which security issues can be addressed by different security tools.

In an ideal world, security measures must be global and provide end-to-end security: the challenge for national States, Governments and public actors in this respect is to monitor and provide fast follow-up of new and actual barriers and threats holding back secure electronic business transactions.

In this chapter, a certain lack of confidence in electronic business has been identified in the ESCWA member countries. As long as consumer and business security regulations are not fully established in the region, this lack of confidence may develop into a major threat for not only the (still emerging) e-business activities in the region, but also for the economy as a whole. Consumers and companies must be able to rely on secure transactions, and especially the security of the financial transactions involved. The Governments in the region can address the above-mentioned security issues by implementing the security-related rules and regulations, and thereby play a leading role in establishing efficient security tools on the Internet, binding together merchants, customers and public institutions in commercial transactions.

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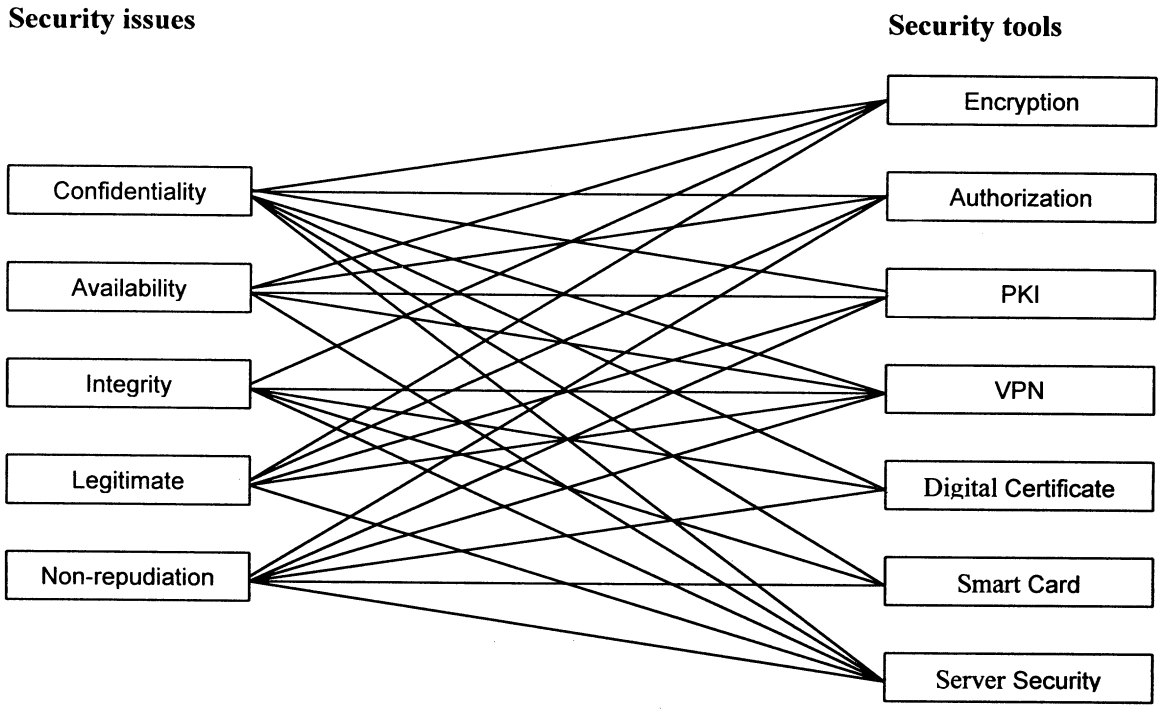
[313] Ibid.

[314] Abdel-Kareem Friehat, "E-commerce security", COMNET-Jordan, paper presented at the Expert Group Meeting on Trade Facilitation and Electronic Commerce in the ESCWA Region, held at Beirut in November 2000.

Figure XV. The relation between security tools and security needs



V. SUMMARY AND RECOMMENDATIONS

A. SUMMARY

E-business encompasses everything related to doing business on the Internet, or any other electronic network. E-business includes buying and selling on the Internet, but also activities such as marketing, advertising, research, hiring and relations with business partners, investors and employees.

Currently more than a hundred million computers around the world are connected to the Internet, which has thus become an open communication facility of global reach as well as a vast repository of information with an estimated 2 to 4 billion pages on the Web. In the year 2000, the number of countries connected to the Internet was 214, with less than half a dozen countries yet to be linked, and some 429 million people using the Internet throughout the world.

Transportation companies have for many years used ICT to maximize planning efficiency for scheduling and routing; to track vehicles, cargoes and operators; to transmit automatically transport-related documents, such as manifests and bills of lading, through electronic data interchange; and to execute financial transactions through the transfer of electronic funds.

More recently, the Internet has become ubiquitous in the transport sector, and companies use it to provide customers with scheduling and tariff information and services such as on-line booking and tracing. Electronic markets have also been established on the Internet to buy and sell transportation services. In the tourism and airline industry, the Internet is often used to do pre-trip planning and to make reservations and bookings on-line.

The earliest e-business application in transport was electronic data interchange. The essence of EDI is that the information contained in a document is tagged and coded in such a way that computers can interpret it without human intervention. The data from an external business partner can thus be imported into an in-house computer application without manual data entry and subsequently initiate automatic processes.

Modern customs administrations have adopted computer assisted risk assessment and audit methods to simplify trade procedures and speed up border crossing formalities, as well as to improve the execution of law enforcement tasks. As part of this process, EDI is used to receive transport documents and customs declarations.

The potential for adopting e-business is limited by the extent and quality of the local telecommunication infrastructure and the international connections, the number of computers connected to the Internet and other networks, and the cost and quality of the services provided.

The countries in the ESCWA region display great contrast in their capabilities and approach to ICT and e-business. Several of the Gulf countries have world-class telecommunication networks, while others are just beginning to build the infrastructure required for the Internet and mobile phones.

The Internet is not widely available to ordinary citizens in Iraq and the Syrian Arab Republic, whereas the United Arab Emirates has a higher percentage of Internet users than many countries in Western Europe. Dubai in particular has embraced e-business with great enthusiasm and imagination and recently inaugurated the first e-commerce free zone in the world. Countries including Egypt, Jordan and Lebanon are actively attempting to develop information technology industries, modeled on the success of India, and many other Governments in the ESCWA region have ambitious plans to introduce e-government.

Telecommunication services are provided by monopoly operators in all ESCWA member countries, but many are slowly moving towards opening up their markets to competition. Seven ESCWA member countries have a duopoly in the mobile telephony market, and six have an open market for Internet service providers.

The cost of accessing the Internet varies widely across ESCWA member countries but is generally high in comparison with international norms. Only five ESCWA member countries offer customers the option of unlimited access, and the cost of that service varies from a low of US$ 8 in Egypt to a high of US$ 357 in Qatar. The cost of a dial-up service with 40 hours use of the Internet varies from US$ 8 in Egypt, as already noted, to US$ 83 in Kuwait. In most ESCWA member countries, the cost of a local phone call must be added to the cost.

Currently most Internet material in the ESCWA region is in English, but the market for Arabic Internet material is potentially very large as, with some 175 million speakers, Arabic is the sixth most widely spoken language in the world. This offers exciting opportunities for many ESCWA member countries. In addition, more quality content in Arabic may well be a requisite for sustained growth in Internet penetration in the region.

There are some companies in the ESCWA region that have developed a sophisticated presence on the Internet, allowing for online transactions of various kinds. In many cases, however, this presence is provided by multinational companies with operations in the region, such as express carriers, large container lines or international airlines. The local sectors that appear most advanced in the use of the Internet are the banking sector and the publishing sector. Several banks offer on-line banking both through the Internet and through mobile phones, and in all countries there are online editions of most newspapers. There are also many portals catering to the Arab world with links to directories of many kinds, including online shopping in the region.

On the whole, however, the use of the Internet by businesses and Governments in the ESCWA region is in its early stages and largely limited to presenting basic information of products and services and providing e-mail information for communication.

However, the future potential for e-business is still high. The B2B and B2C market is still in its infancy in the ESCWA region, but many generic e-business models are ready to be implemented. E-business supports supply chain management (and vice versa) in the transport sector, and both B2B and B2C e-commerce can be started by implementing simple web storefronts, which help to reduce the manual trading processes between businesses and/or customers. When companies are first established on the Internet, the steps for using portals for purposes such as freight exchange, and for proceeding to the more advanced multipoint B2B e-commerce, are already prepared.

It has been found that up to 25 business transactions between a shipper and a customer can be integrated on the Internet, either by Web-based "self-service" storefronts, portals or B2B integration. Most widespread, and potentially the most efficient and effective, are tracing and tracking systems, tariff, pricing and booking facilities, exchange of electronic bills of lading, and various freight exchange systems. A large number of international transport companies are currently offering and/or using these kinds of applications and they, in various ways, contribute to maximizing planning efficiency, streamlining administrative functions, improving logistics coordination and automating transport-related documents handling and financial transactions.

However, recent experiences from the United States indicate risks in e-business. In particular, suppliers (including hauliers and truckers) are reluctant to move into Internet-based freight exchange procedures and B2B e-commerce. Suppliers have felt threatened by the concentration of purchasing power of buyers and shippers on "collaborative buying" portals such as covisint.com, as many claim they have mainly been used to squeeze prices, instead of realizing efficiency gains from supply chain integration. However, it is important for both transport buyers and suppliers to realize that e-business can result in attractive efficiency gains within the supply chain for both parties. The e-business system being used can provide the key to tailoring these mutual integration efforts, although the degree of integration can vary.

ICT and e-business techniques are tools and not ends in themselves. Whereas a conventional presence on the Internet is a low-cost and effective means for businesses and Governments to provide essential information to citizens, customers, stakeholders and partners, a sophisticated e-business web site with online transaction capabilities can cost in the tens of millions of dollars, and is therefore an important business decision that must be carefully weighed.

Although it is generally recommended that the private sector should provide the leadership for the growth and development of e-business, including the establishment of reliable and trusted business practices, there are many issues that need to be addressed by Governments to ensure that e-business techniques can flourish for the benefit of all.

Governments must put in place the regulatory framework for the building of an appropriate infrastructure and the provision of quality service at an affordable cost. Governments must also put in place the legal frameworks that will allow commercial transactions to be conducted and contracts to be established in a digital world. This includes the protection of intellectual property rights, security, patents, trademarks, privacy, security, electronic payment regulations, and regulation of taxation. Furthermore, commercial law issues, such as requirements for "written document", "signature", and "original documents" need to be revised, as do the regulations governing the evidential weight of electronic messages, storage of documents, negotiable status of documents and validity of contracts. Furthermore, the incorporation of general terms and conditions of underlying contracts must be updated. In all these areas, Governments should endeavour to enact legislation that is sufficiently flexible to accommodate the needs of emerging business practices and marketplaces.

B. RECOMMENDATIONS

Both Governments and the private sector in the ESCWA region have important responsibilities in the promotion of ICT and e-business in general and in the transport sector in particular.

Governments, in consultation with the private and non-governmental sectors, must ensure that legal and regulatory frameworks are in place, which will allow:

(a) Infrastructure to be built and operated efficiently;
(b) Private companies to maximize the use of ICT and e-business;
(c) Services of high quality to be offered at affordable prices;
(d) People to be educated to make use of these empowering tools.

Using the Internet to provide information to users is an efficient and low-cost way of improving service to users for both Governments and the private sector. Specifically, Governments can use the Internet to improve the delivery of information and services to companies and citizens and thereby create more transparent and service-oriented government.

In order to improve the application and diffusion of ICT and e-business in the transport sector in ESCWA member countries, the following specific recommendations are presented. At the same time, it should be noted that that the transport sector cannot be viewed in isolation from society as a whole.

1. *ICT and e-business in transportation*

(a) Governments and companies should take a step-by-step approach towards implementing e-business solutions, starting with simple web storefronts containing static, but important, information for users, and continuing, when appropriate, with e-business portals that contain interactive or downloadable information, and finally moving to fully-fledged business-to-business solutions when they are financially or strategically viable.

(b) Transport companies, shippers and carriers should introduce and use tracing and tracking systems, and set up freight exchange systems, online tariff, pricing and booking systems, and on-line bill of lading facilities.

(c) Ports and harbour facilities should learn from "best practices" around the world, something that is relatively easy to do using the Internet, and should apply appropriate solutions to their local context.

(d) Governments in the ESCWA region should, in cooperation with the private sector, harmonize and simplify procedures related to regional and international trade and transport.

(e) Customs administrations should publish comprehensive information on procedures and regulations related to international trade and transport, and make it available on the Internet together with information on forms and documents, fees, schedules, locations, working hours and contacts.

(f) Transport companies, government organizations and customs administrations should introduce EDI in order to simplify the data entry process, improve the quality of the data and speed up the customs clearance processes.

(g) In order to speed up the release of goods and better focus their law enforcement obligations on high-risk cargo and traders, customs authorities should introduce computer assisted risk management procedures.

(h) Port Authorities, both sea and air, should publish on the Internet all relevant information related to the use of the facilities, such as schedules and tariffs, in order to make it easier for customers to use the installations.

2. *Role of Governments: legal and regulatory issues*

(a) Governments should review legal systems and, if necessary, adapt them to accommodate electronic business practices while aligning them with international norms, standards and principles.

(b) Governments should ensure that taxation of electronic business is guided by the principle of neutrality, that is, that all transactions should be treated equally regardless of whether the transactions are through electronic means or through traditional channels of commerce. Taxation regimes should also be harmonized within the region and internationally.

(c) Governments should review commercial laws, and ensure that current requirements for "written document", "written signature" and "original forms" do not block or hold back the development of e-business.

(d) Governments should review other commercial legal issues related to the evidential weight of electronic messages, storage of documents, negotiable status of documents, validity of contracts and incorporation of general terms and conditions of underlying contracts.

(e) Governments should ensure the use, security and soundness of electronic payment systems to protect consumers and to meet law enforcement obligations, such as money laundering. Governments should stimulate the market to commercialize new pre- or instant-paid systems, and to facilitate the introduction and use of wireless payment systems. However, actions should be flexible to accommodate the needs of emerging marketplaces.

(f) Governments should establish appropriate security infrastructure by legalizing techniques such as public key infrastructure, digital certificates and digital signatures.

(g) Governments should work towards worldwide harmonization of laws relating to the use of electronic means for performing contractual transactions and establish appropriate dispute settlement procedures.

(h) Governments should adhere to clear and effective copyright, patent and trademark protection in order to prevent piracy and fraud and implement the obligations contained in the World Intellectual Property Organization treaties on copyright.

(i) Governments should put in place measures for privacy protection, based on the principles of notice and consent, with Government and private data gatherers informing citizens/consumers about what information is being collected and how the data will be used. Furthermore, people should be able to limit the way personal information about them is being used.

(j) Governments should ensure open and fair competition in the building of telecommunications infrastructure and in the delivery of ICT and e-business services. An independent regulator should have the

authority to regulate rates and carrier behaviour and should be able to resolve disputes between parties in a timely and efficient manner.

(k) Governments should ensure that consumers and companies have similar protection and liability in the digital world as they do in the paper-based world, and Governments should align consumer protection laws with international standards and procedures.

(l) Governments should avoid as far as possible the regulation of Internet content.

(m) Governments should support international cooperation between countries and companies to establish standards for interoperability and interconnection of the global information infrastructure.

3. *Role of Governments: providing information and increasing efficiency*

(a) Governments should make use of the Internet to provide information to citizens regarding laws, regulations and procedures to improve services and to make Government more transparent.

(b) Governments should promote the use of Arabic content on the Internet.

(c) Governments should use the Internet to provide full information in English and Arabic regarding international trade and investment in order to facilitate doing business in the ESCWA region.

(d) Governments should use, where feasible, e-business techniques for procurement and other government requirements and services.

(e) Governments should work with the private sector to promote lifelong learning for all in society, and should promote computer literacy so as to eliminate the digital divide.