

THE INFORMATION ECONOMY AND THE INTERNET

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Summary

The information economy, which has emerged from the increasing integration of commerce and communication technology, has redefined markets, employment patterns, and professional identities around the world.

Traditionally, workers were involved directly in the production, transportation, and distribution of material goods. Increasingly, however, employees create, manage, and disseminate information. Like material goods of the industrial age, information is now one of the most important commodities in the global economy. This article examines how globalization and technological advancements have defined a global economy that commodifies information, and how the Internet is at the epicenter of this global economy, disseminating information to the far reaches of the world with great efficiency and cost-effectiveness.

The Information Economy and the Internet begins with a historical survey of the information economy, examining the shifts from the industrial and postindustrial eras to the “information revolution” and the successes and challenges created by the shift to the information economy. It then traces the development of the Internet from its origin as a tool for the United States Department of Defense, to a system of communication channels for scientists and academics, to a space for civic discourse, to a tool for commerce. The article analyzes the global trends, regional expenditures on information and communication technology, and the development of electronic commerce that have enhanced the growth of the information economy. It addresses the challenges and concerns emerging from the rise in corporate networked communications, assesses the impact of telecommunications infrastructural development, and presents some specific examples from various global regions. It looks at regions that have suffered from underdeveloped telecommunications infrastructures and how they are catching up in the information economy. Finally, the article looks to the future and to possible cooperation and collaboration between companies, governments, and financial institutions to work towards a sustainable economy in the third millennium.

1. Introduction

Globalization and technological advancements have defined a global economy that commodifies information, has blurred borders, and has fundamentally changed the way we communicate, buy, and sell. Information and communication technology are seen as an essential key to economic prosperity. Information and communication technology has enabled new heights of free enterprise. This intersection of free enterprise and information and communication technology has led to the development of the information economy, resulting in rising prosperity on a global scale. This article explores how globalization and technology have created the information economy, how the Internet has transformed global communication and commerce, and what the future holds for a globalized economy built on information and communication technology.

What characterizes the information economy? Could it be the increase in capital investment in technology initiatives and industries? What about the increase in technology-focused stock exchanges, initial public offerings (IPOs) of stocks by technology firms, and the dramatic growth of wealth gained from them? Why have national governments made information and communication technology development and training a top priority? Why have businesses rushed to “get online”?

This article focuses on the impact of telecommunications infrastructural development; so-called developing regions such as Asia, Eastern Europe and the former Soviet bloc, and Africa have fallen behind in the information economy because of poor telecommunications infrastructure. Once solely government owned and operated, national telecommunications systems are gradually being privatized and upgraded. New cooperation between industries, governments, and financial institutions has emerged as a result (see *Government and Governance in the Network Age: Can Cyberspace Really be Regulated?*). Now some of the strongest domestic growth of many industrializing regions is in the area of telecommunications, which is seen by many as key to economic growth.

Although the information economy has benefited many individuals and corporations around the world, new problems and challenges have emerged. This article examines these concerns. While another article (see *Internet Access, Cost and the Information Gap*) will examine in detail problems such as the unequal balance between the technology “haves” and “have-nots”, this article will briefly look at those who are being marginalized by the information economy. On the other hand, many who were formerly on the sociocultural, political, and economic margins of various global societies and regions such as Asia have emerged as leaders of the information economy. Through communication technology, particularly the Internet and one of its most utilized service, the World Wide Web, the information economy has afforded opportunities for technically astute individuals to become “paper” millionaires through hi-tech startup ventures. This article examines these individuals and ventures, and provides an understanding of economic, political, and subtle cross-cultural contexts of the information economy.

2. Transformation from Industrial to Postindustrial to Information Economies

It has been called the “Information Revolution,” the “Knowledge Revolution,” “the bellwether of the twenty-first century,” “the new wealth of nations.” It is characterized by an economy largely based on information. The information economy is a fundamental historical shift in global economic development. Up until the late eighteenth century, agriculture was the primary means of economic development and employment throughout the world. Employment in agriculture has steadily declined since that time, even though agricultural production has not declined, in the face of industrialization.

Two hundred years ago, the first major shift in global economy began. The Industrial Revolution was initiated in Great Britain in the 1780s and spread throughout Europe and North America in the nineteenth century. During the nineteenth century, industrialization became the primary model for global economic development. Under the industrial model, workers were involved directly in the production, transportation, and distribution of material goods. Manufacturing, in such areas as mining, transport, and retailing dominated the labor market. The division of labor became more intense. Cities and towns grew quickly and self-sufficiency decreased. Throughout the first half of the twentieth century, industrialization flourished, reaching a peak in the United States and Western Europe in the 1950s and 1960s. At this point, employment in industry steadily declined, although, similar to the agricultural model, production did not decrease.

From the industrial model, advanced economies moved toward a postindustrial era, characterized by the service industries such as administration, tourism, consulting, and leisure pursuits. These two shifts, from agriculture to manufacturing as the dominant employer, and manufacturing to service, are the first major “crossovers” in economic history.

The transformation to the information economy is the third major “crossover,” which has emerged as the current worldwide economic model. This economic model has dramatically changed the way the world communicates, sells, and purchases when

compared to the Industrial Revolution and the postindustrial era (see *Economic Development*). Increasingly, employees create, manage, and disseminate information primarily through advanced information and communication technologies like the Internet. Like material goods of the industrial age, information is increasingly characterized as a commodity, a resource, and a source of competitive advantage. If stock market performance or the vast wealth of high-tech entrepreneurs is an indication, information is a very valuable commodity indeed.

Prior to the information economy, work and business were limited geographically. Business primarily took place at the factory or the site for distribution of goods. Now, with the Internet's ability to disseminate information instantaneously, the borders of production and consumption are far more fluid. Traditional modes of employment are changing, and flexibility is enjoyed by many employees in the information and communication technology sector. Telecommuting, where one can work from a laptop computer at home or elsewhere, off-site collaboration, and other forms of flexible work practices are flourishing. One can write the text for a World Wide Web site in the Middle East, for example, while a colleague can create the web site's hypertext markup language (HTML) code and architecture in Latin America, and another can finalize and upload the completed site from an Internet service provider in Central Europe.

Headlines throughout the world hail this new economy (see *Economic and Technological Issues in Media*). Along with the attention that has been paid in the news, other voices, in the academic press, political discourse, and everyday talk, center around the importance of information and communication technology and how the Internet has transformed economics. At the end of the 1990s and the very beginning of the year 2000, millions of people around the world were watching the stock markets, particularly the meteoric rise of information and communication technology companies' stocks.

These millions, who may never have paid attention to stock values previously, were purchasing shares either through traditional means via stockbrokers, or through one of the new phenomena that characterize the information economy—online brokerage firms. People were “laughing all the way to the bank” (or to their computer to watch their online stock sites provide “real time” share prices). Or they were crying because they did not jump on the technology stock bandwagon early enough, when technology companies, perhaps too new to be fully understood, were grossly overvalued in relation to their profit margins. Technology firms operating at a loss of millions of dollars had stock values of hundreds of dollars per share. Even negative news coverage of these firms or further losses did not alter their rising share value.

Record numbers of companies file their Initial Public Offerings (IPOs) on the stock market, with both management and employees making millions from their shares. Initial Public Offering became the buzz term of the late 1990s, with “day traders” buying and selling shares in record numbers as more and more technology firms filed on the stock market. These companies have mainly listed on the technology-heavy United States-based National Association of Securities Dealers Automated Quotation, or NASDAQ. The NASDAQ stock market is an interesting exemplar of the information economy. Not only does it focus on technology firms, but also it is the world's first and largest screen-based electronic stock market, which operates on a computer network that largely

mirrors the World Wide Web. It also is an exemplar of the information economy for its globalization of stock trading, with the initiation of NASDAQ Japan. Other nations are following the lead of NASDAQ. For example, two technology-focused stock markets are scheduled to launch.

3. Transformation of the Internet

In the information economy, information, or “knowledge,” has become the most important form of global capital. However, it is not only information, but also the technology that delivers it that characterizes the information economy. Clearly, the primary technology that acts as the vehicle for the information economy is the Internet, the network of networks that has transformed the way the world communicates.

The Internet, while presently a backbone to the information economy, was originally designed for very different purposes than for commercial transactions and economic growth. The Advanced Research Projects Agency Network (ARPANET) was the precursor to the Internet. It was developed in the late 1960s and early 1970s by the United States Department of Defense as an experiment in wide-area-networking that would survive a nuclear war (see *Government and Governance in the Network Age: Can Cyberspace Really be Regulated?*). Launched in 1969, ARPANET involved a ground breaking new system for routing digitized messages between interconnected computers. It broke from the established mode of telecommunications systems, which used a circuit switching technology, to a revolutionary system of packet switching. In packet switching, each message sent over the network is broken up into numerous packets, each assigned a destination address and sent along various paths across the network. The packets, upon reaching their destination, are reassembled. While circuit switching involved an allocation of the network exclusively for each voice-to-voice message transmission, packet switching afforded the opportunity for the network to be shared by a number of users.

As ARPANET developed into the mid-1970s, the information and communication technology experts affiliated with the US Department of Defense developed a system of protocols. These protocols are instruction sets that make network communication possible. Perhaps the most important set of protocols is the transmission control protocol/internet protocol (TCP/IP). TCP/IP greatly enhanced the ability to share and disseminate information over what was to become the Internet.

Researchers expert in the development of the Internet note that for nearly the first decade of the existence of the network of networks that was to become the Internet, the United States Department of Defense controlled every aspect of its financial backing and technological development. However, the technologies used to develop the Internet were made available in the public domain, beyond the United States military apparatus. At first, a small group of scientific and academic researchers used the technology. Later, during the 1980s, the United States National Science Foundation (NSF) expanded the use of the system, so much so that there was a split between military and civilian use. At this point, the system was far more widely available to the “average” computer user.

Early computer users managed bulletin board systems, or BBSs, a term which refers to both the distributed computer networked systems and the computer users who post and

read articles on them. Bulletin board systems were originally implemented from 1979 to 1980 at Duke University in North Carolina, and were supported mainly by Unix machines. Bulletin board systems quickly grew to become international in scope. Before the advent of the World Wide Web, bulletin board systems were probably the largest decentralized information network in the world.

Another early development was Usenet, a network that included network connections in government agencies, universities, high schools, and other educational organizations, corporations, and home computer systems. In the beginning, not all Usenet hosts were housed on the Internet. In early 1993, Usenet hosted over 1200 news groups, known as simply “groups,” and an average of 40 megabytes (which is roughly the equivalent of several thousand paper pages) of new discussion, technical articles, news, and other communication every day. Six years later, in November 1999, the number of news groups had grown to over 37 000.

With the development of BBSs, Usenet, and other online communication channels, the public domain nature of the Internet in its early years was quite different from the Internet’s strategic position in the information economy today. The Internet was seen as a bastion of free speech, and of democratic, open, and equal communication flow. Further, because of the structure of the Internet as a network of networks, there was, and is, no central location of a “main” network, no one governing body to manage and maintain it. No one individual, government, or non-governmental organization owned it, nor does anyone own it today.

Certain services of the Internet, primarily BBSs and electronic mail, or e-mail, became a force for non-governmental civic discourse across traditional geographic, economic, and political borders. For example, while conventional forms of communication, such as telephone and post, were cut off in certain regions of political dispute, such as northern and southern Cyprus, electronic mail remained possible. In fact, in the 1990s, it was the only way that civilians could communicate across the politicized border without appealing to governmental powers and government controlled communicative channels. Another example is the case of the Yugoslav successor states. During the various wars that have ravished southeastern Europe, telecommunications channels have been shut down or controlled by governmental powers, or literally blown away. Despite these problems with telecommunications connectivity, the ZaMir Transnational Net, a digital electronic mail network, has been one of the most valuable tools for the antiwar and human rights organizations in the region. The ZaMir Transnational Net (*Za Mir* in Serbo-Croatian means “for peace”) has improved communication between peace-oriented people and groups, humanitarian organizations, non-governmental organizations (NGOs), independent media in the Yugoslav successor states, and refugees and their families. Through the Internet, the ZaMir Transnational Net opened communication channels that were otherwise closed to peace-related organizations and committed and concerned individuals (see *Non-governmental Organizations and Institutions and International Communication and World Affairs*).

While the Internet is certainly still a very important communicative medium for non-governmental organizations and for millions of people worldwide, through the years the Internet has transformed into the hub of commercial activity that grounds the

information economy. Although it seems that the “dot com” phenomenon of countless electronic commerce (or e-commerce) companies, Internet consultancies, and related businesses has emerged only recently, the business world has been taking advantage of the Internet for many years.

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Biographical Sketch

Dr. Laura Lengel began her research on information technology when she was a Fulbright Scholar and American Institute of Maghreb Studies Fellow in North Africa. She is an international and intercultural communication researcher and lecturer with professional experience spanning four continents. Her publications, including her book *Culture and Technology in the New Europe* (2000), address technology, research methods, and international and intercultural communication.