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Investigating the role of Information and communication technologies in the Digital Economy and future Internet as a new phenomenon

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Abstract:

Developments in the digital economy are transforming all aspects of the economy, both the public and private sector. They are also having a profound impact on individuals, through social networking and the increasing use of e-commerce, on-line information and learning. Information technology is changing the face of business, education and training and is starting to have a big impact on the future of the internet. The purpose of this paper is to discover effects of IT and ICT on the internet as the main element of digital economy based on two approaches: the empirical approach and theoretical approach. In theoretical approach McKinsey survey and in the empirical approach the impact of creating new e-venture and e-business on digital economy and the analyses of the Economist Intelligence Unit and digital economy rankings have been studied.

As yet, there is no agreement on how the digital economy should be defined and measured. Different definitions and ways of measuring have been used in current researches and publications but we try to give a new definition of digital economy and clarify effects of internet on developed and developing countries in the future in this paper.

Key words: Digital economy, IT and ICT , E-business , E-commerce

1. Introduction

The growth, integration, and sophistication of information technology and communications is changing our society and economy. Consumers now routinely use computer networks to identify sellers, evaluate products and services, compare prices, and exert market leverage. Businesses use networks even more extensively to conduct and

re-engineer production processes, streamline procurement processes, reach new customers, and manage internal operations.

The digital economy experienced serious setbacks as we entered the third millennium. Starting in late 1999, the bursting of the Internet stock market bubble coupled with a virtual meltdown in the telecom sector brought enormous business and financial difficulties and scandals. Despite these adverse circumstances, however, expansion of Internet use has proceeded without interruption. Consumer and public confidence in the Internet and telecom sectors largely has been restored, fostering renewed growth and expansion.The Internet is increasingly integrated into the daily routines of households and businesses throughout the world. The rapid development of the digital economy during the last half of the 1990s was made possible by matching investment capital with revolutionary new ideas. The IT sector, in particular, benefited from the support of private venture capital firms,which provided about $5 billion to start-ups in 1995 and almost $115 billion five years later.By the end of 1999, these investments were concentrated in Internet startups, stimulated by the spectacular profits reaped from initial public offerings (IPOs) of Internet-related companies.

2. Data and Material

The digital economy is an economy based on digital technologies, including communication networks (the Internet, intranets, and extranets), computers, software, and other related technologies and the role of the internet and internet users is obvious .The worldwide Internet population is growing rapidly. As late as 1988, only seven countries were connected to the Internet.

- ✓ According to the CIA World Factbook (2003), 49 countries have at least one million Internet users.
- ✓ The Computer Industry Almanac (2004) projects that the worldwide Internet population will reach 945 million in 2004, and grow to 1.46 billion by the year 2007.
- ✓ Nielsen//NetRatings (2004) estimates that as of January 2004, the Internet universe consisted of 448 million individuals worldwide, representing a 6.2-percent increase from December 2003. Almost two-thirds of these (294 million) were active users.
- ✓ The U.S. currently accounts for 27 percent of worldwide Internet users, but by 2007, IDATE projects that nearly 80 percent of Internet users will live outside the U.S.
- ✓ According to the Computer Industry Almanac(2004), the countries with the largest estimated online population after the U.S. (185.9 million) are China (95.8 million), Japan (78 million), Germany (41.9 million), the United Kingdom (34.1 million) and South Korea (32.1 million).
- ✓ According to IDATE (2004), the countries with the highest Internet penetration rates are Sweden (69 percent), the U.S. (67 percent), South Korea (65 percent), Japan (55 percent) and Germany (52 percent).
- ✓ Around the globe, Internet users are spending more time on the Internet. Nielsen/NetRatings (2004) estimates that global usage from home averaged 25.5 hours per month in January 2004, up 6.6 percent from December 2003. The average length of a session was 51 minutes and the average duration of a page view was 48 seconds.
- ✓ The Computer Industry Almanac (2004) projects that worldwide Internet users will grow to 1.5 billion by 2007, an increase of two-thirds over 2004.

3. Research methodology

To perform our research we categorized digital economy into three phases : IT ,ICT, e-business and e-commerce. Then we clarify indicators of each phase and investigate the economic impact of them on the net economy.

3.1 Definition of IT and ICT

Information technology, refers to the technological side of an information system. It includes the hardware, databases, software, networks, and other electronic devices. It can be viewed as a subsystem of an information system. Sometimes, though, the term information technology is also used interchangeably with information system. As the world economy begins to recover from one of the worst economic crises in decades, information and communication technologies (ICT) is bound to play an increasingly prominent role as a key enabler of renewed and sustainable growth, given that it has become an essential element of the infrastructure underpinning competitive economies. ICT will continue spreading its revolutionary power to modernize economies and societies and improve living conditions and opportunities around the world. ICT performance will remain crucial not only for developed countries for sustaining and enhancing their innovation potential and long-term competitiveness, but also for middle-

income and developing countries in fostering structural transformations, increasing efficiency as well as reducing the digital economic, and social divides within their territories .If ICT plays a central role in ensuring economic sustainability, it can and must play an equally central role in promoting environmental and social sustainability, both as an industry and as a key element of enabling infrastructure.

3.2 definition of e-business and e-commerce

Electronic commerce (EC, or e-commerce) describes the process of buying, selling, transferring, or exchanging products, services, and/or information via computer networks, including the Internet. Some people view the term *commerce* as describing only transactions conducted between business partners.

When this definition of commerce is used, some people find the term electronic commerce to be fairly narrow. Thus, many use the term e-business instead. E-business refers to a broader definition of EC, not just the buying and selling of goods and services, but also servicing customers, collaborating with business partners, conducting e-learning, and conducting electronic transactions within an organization. Others view e-business as the "other than buying and selling" activities on the Internet, such as collaboration and intrabusiness activities.

E-commerce transactions can be divided between various parties, as follows:

- ✓ **Business-to-business (B2B):** In B2B transactions, both the sellers and the buyers are business organizations. The vast majority of EC volume is of this type.
- ✓ **Collaborative commerce (c-commerce):** In c-commerce, business partners collaborate electronically. Such collaboration frequently occurs between and among business partners along the supply chain
- ✓ **Business-to-consumers (B2C):** In B2C, the sellers are organizations, and the buyers are individuals.
- ✓ **Consumers-to-businesses (C2B):** In C2B, consumers make known a particular need for a product or service, and suppliers compete to provide the product or service to consumers. An example is Priceline.com, where the customer names a product and the desired price, and Priceline tries to find a supplier to fulfill the stated need.
- ✓ **Consumer-to-consumer (C2C):** In C2C, an individual sells products or services to other individuals.
- ✓ **Intrabusiness (intraorganizational) commerce:** In this case an organization uses EC internally to improve its operations. A special case of this is known as B2E (business to its employees) EC.
- ✓ **Government-to-citizens (G2C) and to others:** In this case the government provides services to its citizens via EC technologies. Governments can do business with other governments as well as with businesses (G2B).
- ✓ **Mobile commerce (m-commerce):** When e-commerce is done in a wireless environment, such as using cell phones to access the Internet, we call it m-commerce.

4. Research result and analysis

4.1 ICT's impact on digital economy and economic growth

The ICT industry—including telecommunications operators, computer and software producers, electronic equipment manufacturers—is playing an increasingly important role in the digital economy. It created approximately5 percent of total GDP growth between 2004 and 2009, and it represented 5.4 percent of world's GDP in 2009.That share is expected to reach 8.7 percent by 2020,McKinsey & Company(2006). Because of its size and the nature of its products, the industry has a notable role to play in encouraging economic growth and contributing to other social goods, including improving education and healthcare access and services. Furthermore, recent McKinsey research shows that the ICT industry can potentially contribute to reducing worldwide CO2 emissions by 15 percent in 2020—an enormous contribution—but we will focus here on the economic and social contributions of the industry, The Climate Group(2008). ICT enables economic growth by broadening the reach of technologies such as high-speed Internet, mobile broadband, and computing; expanding these technologies itself creates growth, and the fact that technologies make it easier for people to interact and make workers more productive creates additional benefits. McKinsey(2006) estimates, for instance, that just one action—bringing mobile broadband levels in emerging markets up to those of more mature markets—could add between US$300 and US$420 billion to the world's GDP and 10 to 14 million direct and indirect jobs in areas such as equipment manufacturing and outsourcing/offshoring services (see Figure 1).

ICT's role in enabling economic growth has become more significant as governments are investing to stem the effects of the global financial crisis.As US President Barack Obama noted in January 2009, "Increased broadband

spending, electronic medical records, green energy investments, and new computers for schools and libraries are all smart ways to keepAmerica competitive while also creating new jobs and spending." Obama, Barack(2009) And UK Prime Minister Gordon Brown has likened his government's efforts to extend the country's digital infrastructure to "the roads and the bridges and the railways that were built in previous times to stimulate the economy." Hinsliff, G (2009) . They are far from alone—Korea,Rep. (Korea) has long been a leader in broadband investment, and today countries from Greece to Malaysia have committed large amounts of money to develop their ICT sectors.Beyond economic benefits, the ICT industry is uniquely positioned to help build a more socially sustainable future. McKinsey's most recent consumer survey shows that the ICT industry is perceived to be among the top four industries in terms of its potential contribution to society behind only healthcare, agriculture, and utilities (Figure 2).The importance of ICT increased more than any other sector since 2006, McKinsey consumer surveys (2006, 2007, 2008) showing that consumers place growing importance on the industry as social contributor. Creating these economic and social benefits will require not only large investments and commitment from different stakeholders but also changes to existing regulatory frameworks, compromises between governments and industries, and strong public engagement.

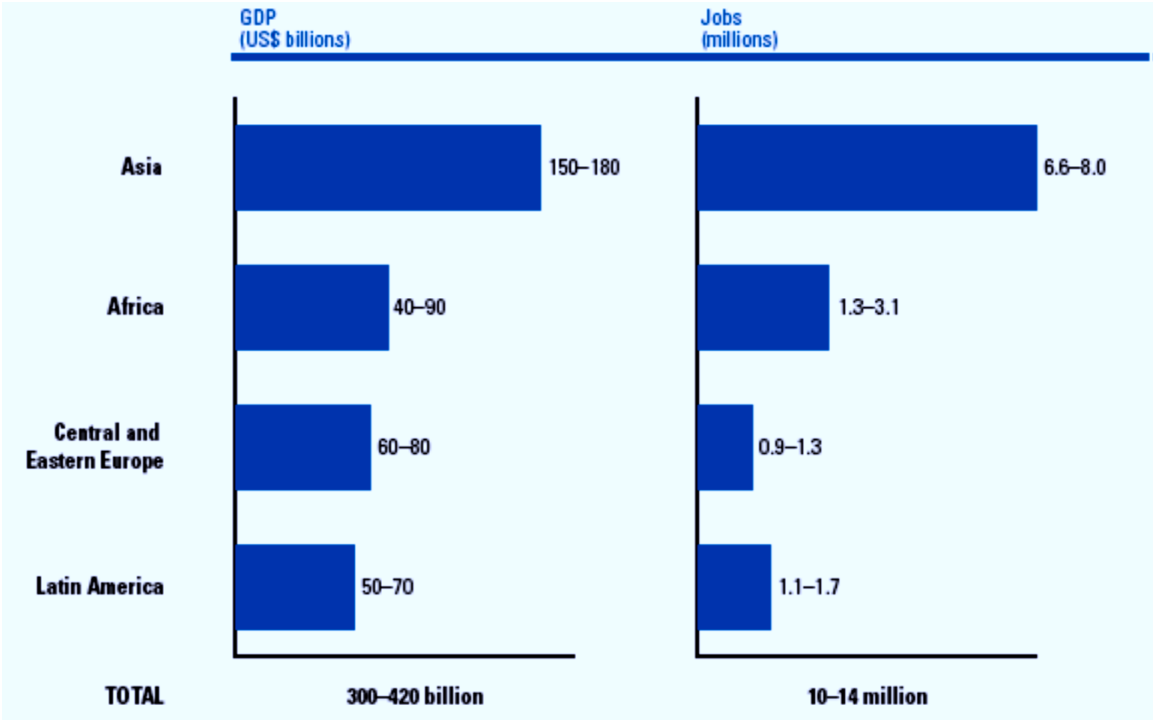

Figure 1: Economic effects of leveling out mobile broadband penetration (top-down estimates)
Source: McKinsey & Company analysis.

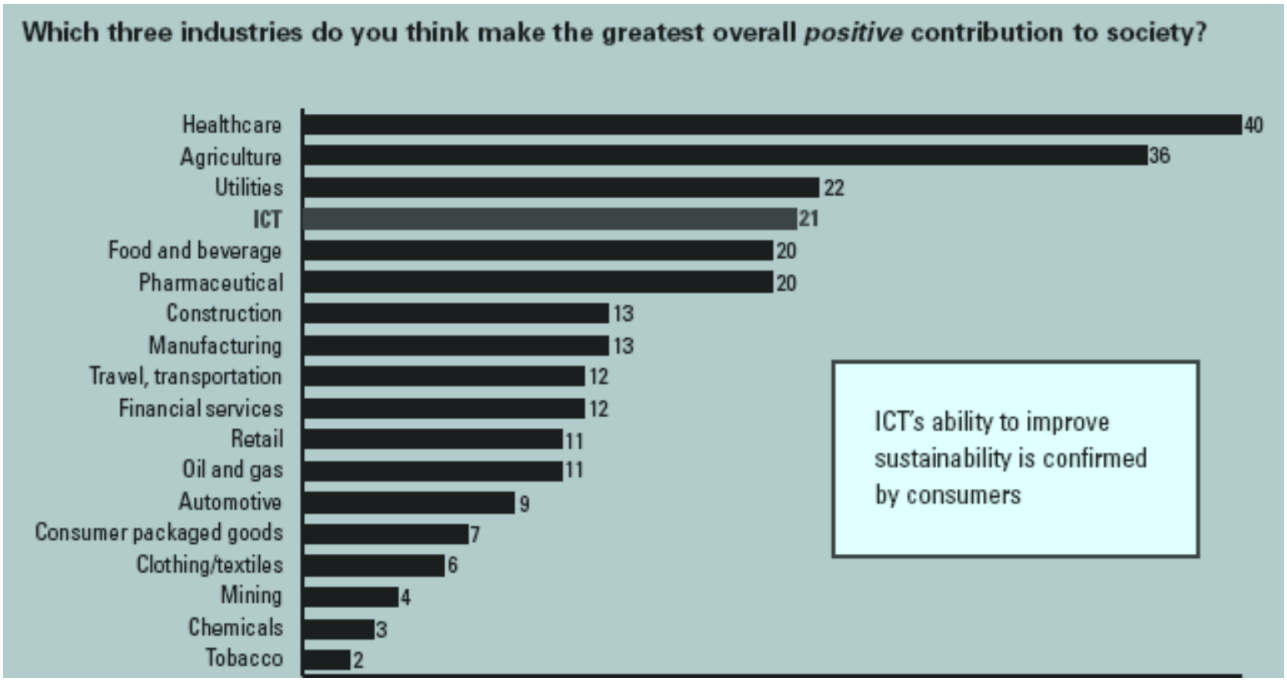

Figure 2: Perceived ICT contribution to society (percent of respondents**)**

Source: September 2008 McKinsey survey of 4,787 consumers around the world.

4.2 IT's impact on digital economy

Information technology (IT) industries have been the digital era's engines of economic transformation. In IT producing goods industries especially, the rate of increase in gross product originating, or value added, per worker (GPO/W) has been extraordinarily rapid. Economists have been puzzled, however, because measured GPO/W growth in many IT-using industries-especially IT-using service industries which dominate this group-has declined despite massive IT investments.

This paper evaluates the impacts of information technology by comparing trends in growth rates of GPO/W in the total private nonfarm economy and across three major industry groups defined as IT-producing, ITusing, and non-IT intensive.[3] IT-producing industries have been defined and listed in Chapter II of this report. IT-using industries are defined below. Non-IT intensive industries are those which are considered neither IT producing nor IT-using. In the following analysis, these three groups are further divided into either goods producing or service producing industries, as shown in Figure 3.

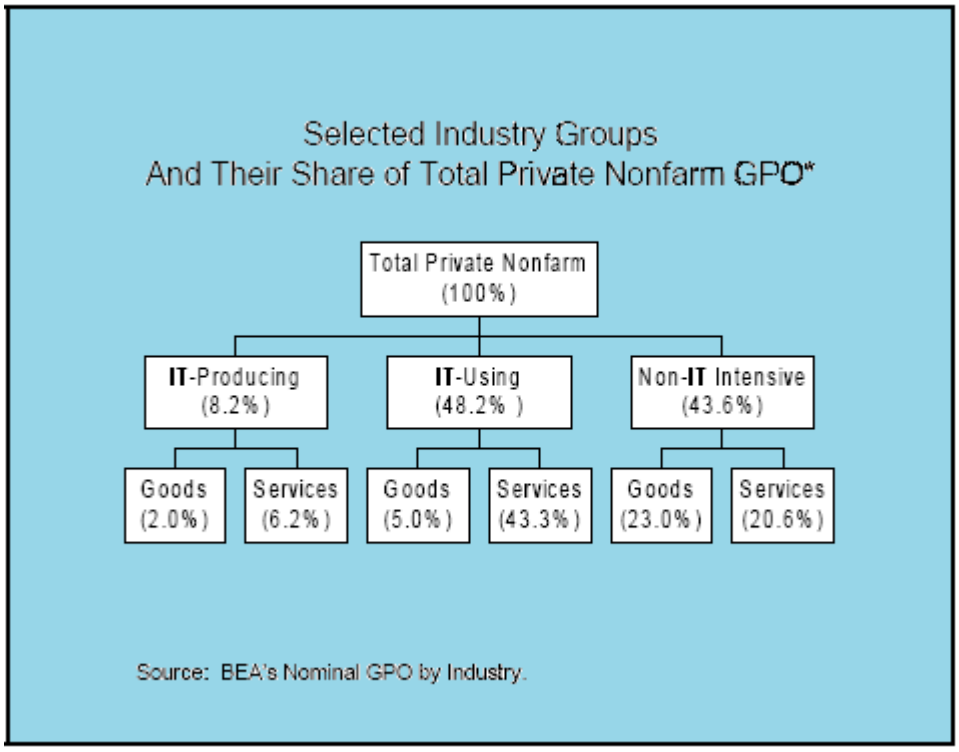

Figure 3

The above result is roughly consistent with the common empirical finding from IT productivity studies that IT has made positive contribution to overall output growth and modest GPO/W growth.

4.3 Impact of e-business and e-commerce on the digital economy

The impact of e-commerce on the economy extends far beyond the dollar value of e-commerce activity.

Businesses use e-commerce to develop competitive advantages by providing more useful information, expanding choice, developing new services, streamlining purchasing processes, and lowering costs. The Internet also imposes price discipline as customers have access to price and product information from many sources.

Many of the advantages of e-commerce were first exploited by retail "e-businesses" such as Amazon.com, eTrade, and Auto-by-tel that were created as Internet versions of traditional bookstores, brokerage firms, and auto dealerships. Freed from the geographic confines and costs of running actual stores, such firms could deliver almost unlimited content on request and could react and make changes in close to real-time.

Compared to traditional retail or catalogue operations, this new way of conducting business is changing cost structures, The Emerging Digital Economy Appendices (2002).

The emergence of these e-businesses has made their "brick and mortar" competitors consider their own e-commerce strategies, and many now operate their own online stores (*e.g.*, Barnes and Noble, Merrill Lynch). E-businesses do more than simply provide alternative shopping sites to real-world stores; they can also expand existing markets and even create new ones.

The move toward providing goods and services through a digital medium does not need to be "all or nothing." Businesses can use digital technology to augment their existing supply channels. Borders Group, Inc. announced that it will install Sprout, Inc.'s digital print-on-demand technology in its distribution center which services both Borders.com and Border stores. This new technology, which Sprout is also marketing to other book retailers and publishers, provides the ability to produce single-copies of bound paperback books, not only in distribution centers, but also at in-store production facilities after the book has been sold to the end consumer. This just-in-time production "reduces the cost of storing and shipping books for publishers and retailers, lowers the threshold for keeping slow-moving titles in print, increases the in-store exposure of titles not already on the shelf, and eliminates the risk of returns." Many of the same advantages that arise from retail e-commerce, hold for business-to-business e-commerce. For example, e-commerce can permit businesses to increase services they can offer their business customers. Milacron, Inc, a producer of industrial consumable products for metalworking, recently launched an e-commerce site designed to give the more than 100,000 smaller U.S. metalworking businesses an easy to-use and secure way of selecting, purchasing, and applying Milacron's more than 50,000 metalworking products. From this new site, these small customers are provided with a level of technical service beyond that supplied previously to even Milacron's largest customers, Borders Group, Inc (1999).

5. Digital economy ranking and the futture of the internet

The digital economy rankings assess the quality of a country's ICT infrastructure and the ability of its consumers, businesses and governments to use IT and ICT to their benefit. When a country uses IT and ICT to conduct more of its activities, the economy can become more transparent and efficient.

Reliable, convenient and affordable access to voice and data services continues to underpin a digital economy. In addition, as most studies shows continued, steady improvement in broadband, mobile and Internet connectivity levels across most countries in the world. Of the top 20 countries in the overall rankings, all but three -Taiwan, Austria (15th) and Ireland (17th)-had broadband penetration of more than 25% at the end of 2009; and only three-South Korea,the US (3rd) and Canada (11th)-registered mobile penetration levels of less than 100%, Digital economy rankings (2010).

More devices mean more access to the Internet, and all its productivity-enhancing benefits. Broadband is increasingly the default mode of access to the Internet: Pyramid Research, a telecoms research firm, estimates that there were over 450m broadband subscribers in the world in 2009. There are more than 40m smart phones in service in the US, according to media research firm Nielsen, and more than 30m BlackBerry devices and iPhones each globally. Even in emerging markets, broadband reaches deep—of the 390m people online in China (56th), over 100m have fixed broadband connections. Technology availability by itself is not enough to ensure it can be used. For one thing, it must be affordable, and fortunately this is increasingly becoming the case.

We believe that investing in IT and ITC became the main issue for policymakers and their countries in terns of being one of the economic leader of the world. As we can see in the figure .4 those countries that have been grown number of internet users are in the top ten of digital economy rankings in 2010.

Future of the internet is equal to increasing number of users, improving the quality of access and investing more capital in the IT and ITC's infrastructure.

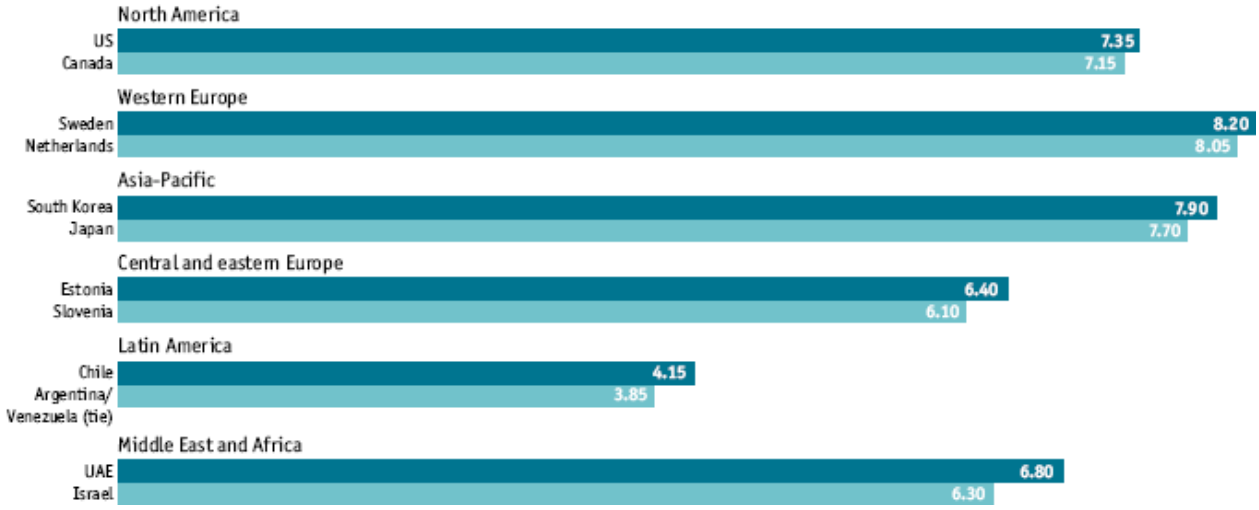

Figure 4: Digital economy rankings 2010 Beyond e-readiness

5. Conclusions

A robust and strong digital economy requires the removal of barriers through the deployment of accessible design elements in our computer, information technology and communications. By directing our research and policy directives to address these problems, we will overcome the digital divide and ensure full participation in the global digital economy .One of the main lessons to be learned from the development of the ICT and IT industry in the world has to do with the joint efforts of the government, the business sector, and research institutions in such a process. The government, in particular, played a leading role, by regulating the development of ICT through market mechanisms. Our overall conclusion is that fostering Digital Development to achieve, or leveraging Information and Communication Technologies for Development does require better rate of internet accessibility and access quality.

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