

**2006**  
**Overview** Information and Communications  
for Development



2006

Overview

Information and Communications  
for Development

# Global Trends and Policies



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# **Contents of *Information and Communications for Development 2006***

*Foreword*

*Preface*

*Acknowledgments*

*Abbreviations and Acronyms*

## **PART I**

### **Chapter 1 Overview**

*Pierre Guislain, Christine Zhen-Wei Qiang, Bruno Lanvin,  
Michael Minges, and Eric Swanson*

### **Chapter 2 Foreign Direct Investment in Telecommunications in Developing Countries**

*Pierre Guislain and Christine Zhen-Wei Qiang*

### **Chapter 3 Extending Communication and Information Services: Principles and Practical Solutions**

*Björn Wellenius*

### **Chapter 4 The Role of ICT in Doing Business**

*Christine Zhen-Wei Qiang, George R. Clarke, and Naomi Halewood*

### **Chapter 5 Trends in National E-Strategies: A Review of 40 Countries**

*Aref Adamali, John Oliver Coffey, and Zaid Safdar*

### **Chapter 6 Tracking ICTs: World Summit on the Information Society Targets**

*Michael Minges*

## **PART II**

**User's Guide to ICT At-a-Glance Country Tables**

**ICT At-a-Glance Country Tables**

**Key ICT Indicators for Other Economies**

**Definitions and Data Sources**

*Contributors*

## Foreword

Information and communication technology (ICT) has a critical role to play in development efforts around the world. There was a time when the benefits of applying ICT in fighting poverty and promoting economic growth were not widely understood. Many in the development community questioned how high-tech (and often expensive) communication technology could be used to alleviate such dire challenges as starvation, homelessness, and lack of basic education and health services. Lately, however, this view has given way to an understanding of ICT as an essential component of broader efforts to harness the free flow of information to increase voice, accountability, and economic development.

In recent years, developing countries and the international development community have started taking concrete actions to incorporate ICT into their economic policies and development agendas. Many countries are preparing and implementing national e-strategies that emphasize the ubiquity of connectivity as well as new applications in areas such as e-government and e-business. The Millennium Development Goals (MDGs), drawn from the United Nations Millennium Declaration and adopted in September 2000, have several specific targets involving ICT as a tool for reducing poverty. Nevertheless, improving the identification and

measurement of the actual effects of ICT in development remains an important challenge going forward, especially in light of the rapid pace of change in the sector and the dearth of concrete, long-term data across countries.

In this context, *Information and Communications for Development 2006: Global Trends and Policies* offers a realistic assessment of experiences, trends, and outlook on the ICT sector, with a focus on actual results and justified expectations. It attempts to track and analyze global ICT development trends and to provide empirical evidence of the benefits that ICT is providing in terms of economic growth and poverty reduction. Indicators for the MDG targets, among others, have been incorporated into the ICT At-a-Glance tables compiled for this report.

It is our hope that this report will contribute to the creation of a basis for more systematic monitoring and evaluation of the progress and impact of ICT, as well as provide useful insights on ICT for development in general.

*Katherine Sierra*  
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*The World Bank*

## Preface

The international community is increasingly committed to the monitoring and evaluation (M&E) of development programs. The World Bank Group has sharpened its focus on results in its own strategies, operations, diagnostic work, and instruments. It has put a premium on better measurement of outputs and outcomes in order to assess progress toward well-defined goals, increase accountability, and better understand the Bank's contribution to sector performance—ultimately supporting policy advice and decision making.

The Global Information and Communication Technologies Department (GICT) is the World Bank Group department that focuses on the ICT sector. In response to the call for increased M&E efforts for ICT by the development community, most notably during the World Summits on the Information Society held in Geneva in 2003 and Tunis in 2005, GICT is undertaking several initiatives to advance methods of monitoring results in ICT for development projects.

GICT's results measurement agenda aims to strengthen the availability of ICT sector indicators at country, micro, and project levels. Consolidating data from many different sources, GICT has defined a core set of information-and-communication-related indicators to create tables that present a snapshot of country-specific ICT issues. These

“At-a-Glance” tables, found in Part II of this volume, provide an overview of ICT sector growth as it relates to the general economic status of particular countries.

The purpose of *Information and Communications for Development 2006: Global Trends and Policies* is to consolidate all these M&E efforts and share the findings with the development community. In addition to ICT At-a-Glance tables for 144 economies, this report includes analytical work that applies these data to a range of topics: investment trends, principles and practical solutions to extending ICT services, the role of ICT in doing business, trends in national e-strategies, and approaches to tracking ICT globally.

Further efforts are needed to coordinate and make M&E analysis fully operational in the arena of ICT for development. The World Bank Group stands ready to work with countries and the international community to determine how best to use ICT for poverty reduction and economic growth in the developing world. It is hoped that this report will play a positive role in these efforts.

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## Overview

Pierre Guislain, Christine Zhen-Wei Qiang, Bruno Lanvin,  
Michael Minges, and Eric Swanson

In the past few decades, information and communication technology (ICT) has transformed the world. Its potential for reducing poverty and fostering growth in developing countries has increased rapidly. Mobile telephones provide market links for farmers and entrepreneurs. The Internet delivers vital knowledge to schools and hospitals. Computers improve public and private services, and increase productivity and participation. By connecting people and places, ICT has played a vital role in national, regional, and global development, and holds enormous promise for the future.

It has been over 20 years since the first telephone company was privatized, 10 since the World Wide Web emerged, and 5 since the telecommunications bubble burst. How has ICT driven—and evolved in response to—these and other events? What has been learned about ICT trends and the policies that shape an information society? And how can further advances be fostered and facilitated?

*Information and Communications for Development 2006: Global Trends and Policies*, prepared jointly by the World Bank Group's Global ICT Department and Development Economics Data Group, analyzes ICT in light of lessons from both developing and developed countries. It examines the roles of the public and private sectors, identifying the challenges involved in adopting and expanding ICT use as well as the benefits (direct and indirect) of doing so.

Part I of the report assesses topics essential to developing ICT. It contains chapters on investment (chapter 2),

access (chapter 3), diffusion and use (chapter 4), country policies and strategies (chapter 5), and targets, monitoring, and evaluation (chapter 6). Each chapter provides a theoretical and qualitative framework supported by quantitative evidence. Where limited data impede comprehensive economic analysis, a case study approach is used.

Part II presents the new World Bank ICT At-a-Glance tables for 144 economies, which show the most recent national data on key indicators of ICT development, including access, quality, affordability, efficiency, sustainability, and applications. The data enable assessments and comparisons both over time and across economies, so they help gauge ICT capacity, performance, and progress, as well as suggest areas for future interventions. The tables also include detailed snapshots of the economic context and ICT sector structure in each economy.

Experience over the past decade has shown that a vibrant and competitive information and communication sector is a prerequisite for developing information societies. Lessons can be drawn that may be particularly valuable for countries launching new policies and programs to increase ICT's contribution to economic and social development and extend its reach to a greater part of the population. Additional and complementary efforts are also needed to ensure the success of such programs, particularly increased monitoring and evaluation, based on appropriate goals, targets, and indicators.

When tailored to needs, ICT has the potential to raise growth in businesses of any size and countries at any stage of development. Related, but even more important, is ICT's role in reducing poverty and inequality, both within and across countries. Thus it is crucial that ICT move closer to the mainstream of development economics and policies—nationally, regionally, and globally. Given ICT's far-reaching payoffs—and the many efforts required to achieve them—this report is aimed not only at ICT experts but also at the broader development community.

## Recent Progress and Lessons

**ICT plays a vital role in advancing economic growth and reducing poverty.** Research in the 1960s and 1970s showed how telecommunications strengthens economic production and distribution, public service delivery, and government administration. In the 1980s information became recognized as a crucial factor of production, along with capital and labor. And in the 1990s globalization and the increasing information intensity of economic activity, coupled with rapid technological change and

demand growth, made ICT critical to competitiveness and growth.

In recent years the world's policy makers have recognized that ICT provides key inputs for economic development, contributes to global integration, and enhances public sector effectiveness, efficiency, and transparency. There is also growing consensus that countries seeking to strengthen their investment climates (for foreign as well as domestic investors) should make it a priority to improve ICT access and quality. Moreover, country conditions that bolster ICT investment—including sound economic policies, strong property rights, liberalized markets, limited restrictions on entry and ownership, and predictable regulation—contribute to a healthy overall business environment and so to growth throughout the economy.

Firms that use ICT grow faster, invest more, and are more productive and profitable than those that do not (box 1). For example, sales growth is 3.4 percentage points higher and value added per employee \$3,400 more among developing country firms that use e-mail to communicate with clients and suppliers (table 1). Profits are substantially higher among firms using ICT.

### **Box 1** Information and Communication Technology—Essential to Productivity Growth and Private Sector Development

A vibrant private sector—one where firms invest, create jobs, and increase their competitiveness—promotes growth and expands opportunities for poor people in developing countries. ICT is an essential part of national infrastructure and private sector potential. It can create business opportunities, especially for companies located far from urban centers, and improve links among firms, suppliers, and clients. When used well, ICT can also make management and operations more efficient.

The Internet can be especially valuable for firms in developing countries because it provides opportunities to connect to markets and participate in trade, domestic and foreign. A recent survey of 56 developed and developing countries found a significant link between Internet access and trade growth—with the greatest benefits accruing to developing countries with the weakest trade links.

As with other factors of production, such as capital and labor, ICT use differs based on businesses' size, ownership, and export orientation. In developing countries Web site and computer (though not necessarily e-mail) use are more common among service firms than firms engaged in manufacturing, agroindustry, and construction. Web site and e-mail use are especially high in the telecommunications, information technology, real estate, and hotel and restaurant industries, and among exporters and foreign-owned firms.

Among regions, firms in Central and Eastern Europe use such technology the most, reflecting its correlation with national income. But Web sites and e-mail are also widely used in some low-income countries—Bangladesh, Kenya, Moldova, and Tanzania—suggesting that ICT is not a luxury.

**Table 1 Effect of ICT Use on Enterprise Performance in Developing Countries**

Indicator	Enterprises that do not use ICT	Enterprises that use ICT	Difference
Sales growth (percent)	0.4	3.8	3.4
Employment growth (percent)	4.5	5.6	1.2
Profitability (percent)	4.2	9.3	5.1
Investment rate (percent) <sup>a</sup>	n.a.	n.a.	2.5
Re-investment rate (percent) <sup>a</sup>	n.a.	n.a.	6.0
Labor productivity (value added per worker, dollars)	5,288	8,712	3,423
Total factor productivity (percent)	78.2	79.2	1.0

**Note:** n.a. Not applicable.

a. Because the investment and re-investment rates are limited dependent variables (that is, they are truncated below at zero), their marginal changes are not equal to their coefficients. For that reason their average rates are not calculated. The unconditional mean for investment is 6 percent and for re-investment, 44 percent.

**Source:** Authors' analysis based on data from the World Bank Investment Climate Surveys 2000–2003.

ICT is also crucial to sustainable poverty reduction, because it makes a country's economy more efficient and globally competitive, improves health and education services, and creates new sources of income and employment for poor people. In addition, ICT enhances social inclusion and promotes more effective, accountable, democratic government, especially when combined with effective freedom of information and expression.

**Over the past 25 years, developing countries have considerably increased ICT access, especially for telephone services.**

Developing countries accounted for more than 60 percent of

the world's telephone lines (fixed and mobile) in 2005, up from less than 20 percent in 1980 (table 2). During this period, population increased by half and real GDP more than doubled in these countries—while the number of telephone subscribers rose 28-fold.

Recent growth has been especially striking. Although the proportion of subscribers to total population in developing countries did not even double between 1980 and 1990, over the next decade it nearly quintupled, from 27 to 129 per 1,000 people. And between 2000 and the end of 2005, it is estimated to have tripled, reaching almost 400 subscribers per 1,000 people.

**Table 2 Population, GDP, and Telephone and Internet Access in Developing Countries, 1980–2005**

Indicator	1980	1990	2000	2005 <sup>a</sup>
Population (billions)	3.6 <i>81</i>	4.4 <i>83</i>	5.1 <i>84</i>	5.4 <i>84</i>
GDP (US\$ trillions) <sup>b</sup>	3.1 <i>18</i>	4.2 <i>18</i>	5.9 <i>19</i>	7.5 <i>21</i>
Total telephones (per 1,000 people)	14 <i>17</i>	27 <i>22</i>	129 <i>38</i>	393 <i>61</i>
Fixed telephones (per 1,000 people)	14 <i>17</i>	27 <i>23</i>	83 <i>43</i>	135 <i>57</i>
Mobile telephones (per 1,000 people)	n.a.	0.09 <i>4</i>	46 <i>32</i>	258 <i>63</i>
Internet users (per 1,000 people)	n.a.	n.a.	15 <i>20</i>	67 <i>41</i>

**Note:** Numbers in italics are percentages of the world total. n.a. Not applicable.

a. Projected.

b. In constant 2000 U.S. dollars.

**Source:** Authors' analysis based on data from World Bank 2005 and ITU 2003.

Most of the recent growth has involved mobile phones, which now outnumber fixed ones. In Nigeria the number of mobile subscribers jumped from 370,000 in 2001 to 16.8 million in September 2005, making its mobile market the second largest in Africa. In the Philippines, which has had more mobile than fixed telephone subscribers since 2000, mobile subscribers continue to multiply. By the end of 2005, the country had about 40 million mobile subscribers—six times more than in 2000.

Mobile phones have an especially dramatic impact in developing countries—substituting for scarce fixed connections, increasing mobility, reducing transaction costs, broadening trade networks, and facilitating searches for employment. With prepaid services and calling cards, even poor households have been able to benefit from increased telephone access.

Telephone services now reach many small cities and towns, and by 2005 half of the world’s households had telephones. Among developing regions the telephone subscription rate is highest in Europe and Central Asia, where between 2000 and 2004 it more than doubled to 730 per 1,000 people (figure 1). But growth was highest in Sub-Saharan Africa, with the rate tripling—albeit to a still-low 103 subscribers per 1,000 people.

Other types of ICT have also expanded rapidly in recent years. The latest estimates indicate that worldwide, Internet use more than quadrupled between 2000 and 2005. Again, Europe and Central Asia is in the lead among developing regions, with 117 Internet users per 1,000 people in 2004—four times as many as in 2000 and six to eight times as many as in South Asia and Sub-Saharan Africa. During this period

the fastest growth, 370 percent, occurred in the Middle East and North Africa.

**Liberalization and competition—and the resulting increase in private investment—have driven the development of telecommunications infrastructure and ICT in general.**

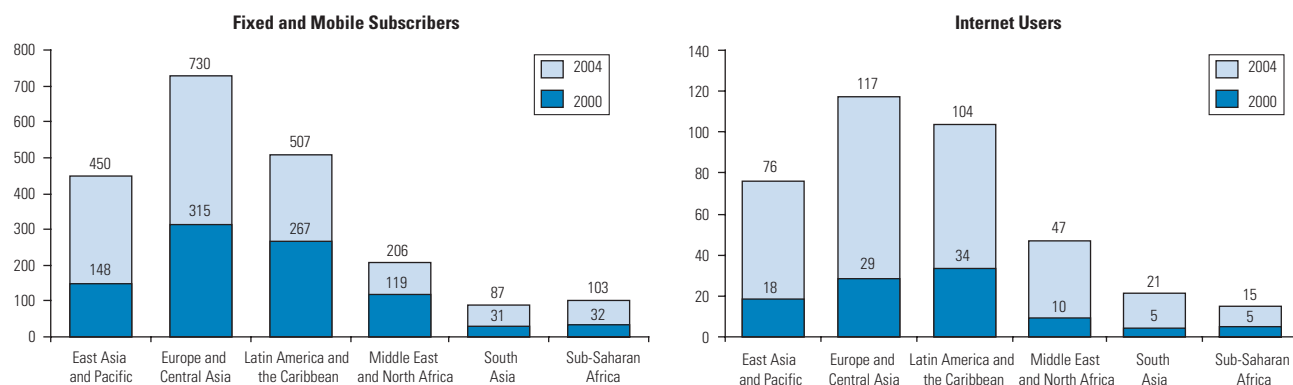
Capital is crucial to the development and expansion of robust telecommunications networks. Because developing countries often lack the capital—as well as the technology and managerial know-how—needed to develop such networks, many have turned to private investors, domestic and foreign.

By opening their telecommunications markets through well-designed reforms, governments can create competitive markets that grow faster, lower costs, facilitate innovation, and respond better to user needs. As a result, the traditional monopoly model of telecommunications services—based on extensive state control and protected national markets—has eroded, in concert with rapid technological advances in the sector and fundamental changes in economic policy in developing countries.

Over the past two decades telecommunications markets have undergone unprecedented liberalization in every region—though the pace and scale of reform have varied, and markets for fixed local and international telephone services remain closed or barely open in about half of developing countries. Effective competition between multiple providers helps expand access and results in cheaper, more modern services.

In 2003, 130 of 164 countries with available data had at least three competing providers of mobile services. The Democratic Republic of Congo has six competing mobile

**Figure 1 Telephone and Internet Access by Region, 2000 and 2004**  
(per 1,000 people)



Source: Authors’ analysis based on World Bank data.

telephone operators, giving it a mobile phone density 13 times that of Ethiopia—which has a similar income per capita but just one operator. In Algeria almost no one had a mobile subscription in 2000. But in 2003, after a second operator began providing services, nearly 5 percent of people did—and when a third operator entered the market in 2004, that share leapt to more than 15 percent by the end of the year and to 32 percent by September 2005. Similarly, Grenada issued new licenses in 2002, and between 2000 and 2004 the number of mobile subscribers soared from 45 to 860 per 1,000 people.

In markets for international telephone services, full competition leads to prices about half those in countries with limited competition. Among 30 African and Latin American countries that undertook telecommunications reforms in the 1980s and 1990s, those that introduced competition saw the sector grow and costs fall faster than those that delayed competition.

The Internet has also spurred a growing wave of innovation, ushering in new services and more cost-effective network solutions—especially in countries where service providers are allowed to build their own networks and gateways. New wireless technology is resulting in innovative business models and holds the promise of connecting poor users, extending competition to all market segments, and accelerating development of broadband infrastructure and access. Such technology is affordably priced and commercially viable in a number of countries, in both urban and rural areas. For example, a single broadband Internet connection in a village can provide access for numerous institutional programs (such as e-government and computers in schools) and private users.

**Privatization and technological advances have boosted foreign direct investment (FDI)—a major source of ICT financing.** In 1988 Chile privatized its incumbent operator, triggering the first wave of telecommunications-related FDI in developing countries, typically through divestitures of state companies to foreign investors. Since then more than 80 developing countries have privatized their incumbent telecommunications providers.

A second wave of telecommunications FDI started in the mid-1990s as governments, aiming to increase access to and revenue from communication services, awarded new licenses for mobile telephony and encouraged foreign investment. In 2000–03 mobile projects accounted for 51 percent

of FDI in telecommunications, up from 7 percent a decade earlier.

During both waves, foreign investors were seeking new markets, higher returns, and diversified exposure. Many governments welcomed FDI as a way to expand networks, develop new services, and generate revenue through license fees. FDI also brought stronger, longer commitments than did other types of foreign investment, as well as new skills, technology, and management approaches. Between 1990 and 2003, 122 of 154 developing countries received foreign investment in telecommunications.

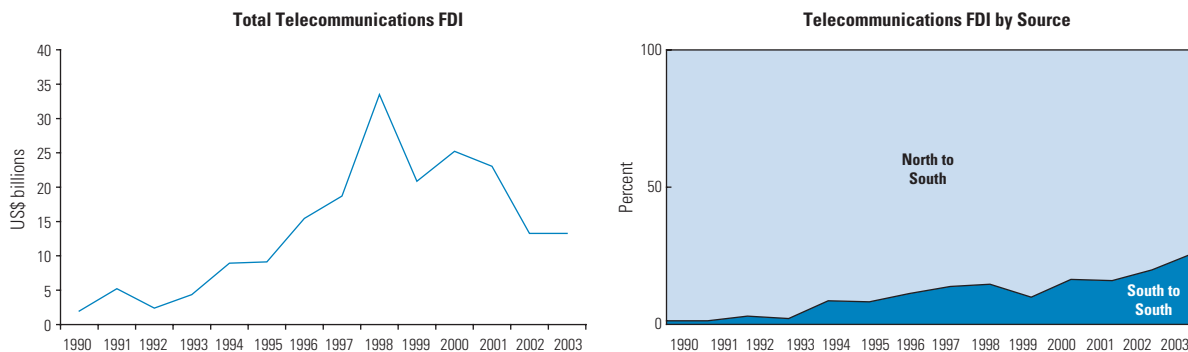
FDI in telecommunications jumped from \$2 billion in 1990 to \$33 billion in 1998—but gradually fell to about \$13 billion in 2002 and 2003. Still, the decline in FDI has been smaller for telecommunications than for other infrastructure sectors. And although FDI to acquire government assets dropped significantly after 2000, flows for sector expansion stayed at the same level as during the boom years.

During 1990–2003, telecommunications projects accounted for 12 percent of FDI in developing countries. Latin America and the Caribbean attracted more than half of FDI in telecommunications, while Europe and Central Asia received about a quarter. These large shares reflect the prominence of middle-income countries in telecommunications FDI: during 1990–2003 low-income countries received just 6 percent of such investment.

**Developing countries are home to a growing number of FDI providers.** Although the largest foreign direct investors in telecommunications are multinational corporations from Europe and the United States, in recent years FDI originating in developing countries has become a fast-growing trend. By 2003 these South–South investments accounted for more than a quarter of telecommunications FDI in developing countries, up from a negligible share in the early 1990s (figure 2). Most such investment came from countries that were among the early liberalizers in their regions.

Some investors from developed countries have reduced FDI due to the bursting of the telecommunications bubble in 2000, compromised balance sheets following major investments or acquisitions, disappointing returns on some projects (both at home and abroad), and pessimism about emerging markets. For example, many global players invested in the developing markets of Latin America and East Asia during the 1990s, but have since withdrawn. Global operators have also pulled out of Sub-Saharan

**Figure 2 Telecommunications FDI in Developing Countries, 1990–2003**



Source: Authors' analysis based on data from World Bank 2004.

Africa, creating a bigger role for financial and regional investors. The region's three largest mobile phone operators, accounting for nearly half of telecommunications FDI, are all regional firms.

But growing South-South investment is also due to growing wealth and capital account liberalization in some emerging market economies—trends that have increased the supply of capital in these countries and enabled their companies to invest abroad. By 2002, 4 of the 30 largest international telecommunications corporations were from developing countries. Other factors favoring South-South investment include geographic proximity and ethnic and cultural ties.

Most South-South telecommunications investors stick to their home or neighboring regions: during 1990–2003 more than 85 percent of such FDI stayed in the same region. Countries that avoid imposing unnecessary requirements that might exclude otherwise qualified bidders, and create a level playing field that provides fair opportunities to new entrants regardless of size or origin, are more likely to attract South-South and regional FDI.

**Consistent, predictable, and transparent sector policies and regulation are essential to remove market impediments.**

Obstacles to well-functioning markets often remain even after extensive sector reforms. In Peru all segments of the telecommunications market have been open since 1995, but telephone services in provincial towns and marginal areas of big cities remain well below the levels achieved in other developing countries with comparably open markets. The challenge everywhere is to enable operators to tailor their service offerings and technical choices as effectively and efficiently as possible.

The regulatory improvements needed to achieve that goal often include opening markets to new entrants (including small domestic entrepreneurs), rebalancing retail tariffs, establishing an effective cost-based interconnection regime, securing reasonable access to existing infrastructure, and making radio spectrum available to a wider range of service providers (box 2). Consistent and transparent processes—for legal, regulatory, and administrative procedures and institutions—are the main requirements.

Some traditional regulatory provisions may stand in the way of new technologies, decentralized supply, and other innovations. In addition, high taxation can discourage investment by telecommunications operators and suppress demand from users. And as the cost of manufacturing cell phones continues to fall, government taxes and duties on their import, sale, and use remain a binding constraint on extending information and communication services to poor people.

**Future Challenges—and Options for Addressing Them**

**Gaps in access to ICT remain large, as do differences in adoption of ICT applications.** Access to ICT is highly unequal across and within countries. In particular, developing countries still have far to go to make ICT commonplace in governments, schools, and businesses. Moreover, fast growth in large emerging markets—especially Brazil, China, and India—masks slower development elsewhere. Although progress has been made reaching out to rural areas and the urban poor, in many countries these groups still lag behind. And the advanced information and communication services available through the Internet initially reach mainly better-off groups.



## Box 2 Regulatory Measures That Help Markets Work Better

*Open entry.* Lifting restrictions on the entry of new service providers accelerates expansion to underserved and unserved areas. Replacing individual licensing with a regime of general authorization facilitates entry, eases the regulatory burden on companies and authorities, and enhances transparency.

*Cost-based pricing.* To minimize market distortions, retail prices must reflect differences in the costs of providing services. Geographically averaged prices discourage investment in high-cost areas. Tariff policy should be reviewed on a regular basis and prices rebalanced when necessary.

*Cost-based interconnection.* An effective interconnection regime is essential. High-cost areas should receive larger than average shares of revenues for completing outgoing calls and larger than average payments for incoming calls.

*Access to infrastructure.* New entrants must have reasonable access to the network infrastructure of incumbent operators. Unbundling the local loop, sharing physical infrastructure, and co-locating the equipment of different operators lowers barriers to competitive entry, increases revenues of incumbents, and reduces public inconvenience.

*Access to the radio spectrum.* Making radio spectrum available promptly and at low cost encourages the use of new wireless technology. Specific measures include increasing the allocation of spectrum for license-exempt use and mobile service.

A United Nations index measuring the availability and sophistication of e-government applications shows that developed countries score much higher than developing ones (UNPAN and UNDESA 2004). And whereas most developed nations have connected nearly all their primary and secondary schools to the Internet, just 38 percent of developing countries have done so—and less than 1 percent of many African countries (table 3). Differences in the number of secure Internet servers, a proxy for the availability of e-commerce, are similarly stark. While developed nations have more than 300 such servers per 1 million people, developing nations have fewer than 2. Canada has more secure servers than all developing countries combined.

**The public and private sectors both have important roles.** In market economies the private sector is primarily responsible for providing ICT services, and competitive, private sector–led markets go a long way toward making these services widely available. The public sector’s main role is to provide a sound policy framework, regulate markets where they do not work well enough on their own, and support additional service provision where markets do not achieve economic and social objectives. The public sector is also an increasingly important user of ICT, particularly in the context of e-government, making it a major actor in fostering ICT uptake.

**Table 3 Measures of Electronic Government, Education, and Commerce in Developing and Developed Countries, 2004**

Country group	E-government index	E-education (% primary and secondary schools connected to Internet)	E-commerce (secure Internet servers per 1 million people)
Developing	0.27	38	1.9
Developed	0.68	94	319
Ratio of developed to developing	n.a.	2.5	165

**Note:** Based on incomplete data, with 142 countries for e-government, 68 for e-education, and 122 for e-commerce. n.a. Not applicable.

**Source:** World Bank 2004; Netcraft 2004; UNPAN and UNDESA 2004.

**Targeted public intervention to expand services can maximize social returns.** Governments must play a leading role in promoting the modernization and extension of ICT infrastructure and services. Even in well-performing markets there is typically a divide between what service providers are willing or able to do on commercial grounds and what governments consider necessary from a development or broader economic perspective.

Thus, most developing countries continue to face ICT challenges, including service gaps among poor households and in rural areas (figure 3). Especially if such gaps persist after steps have been taken to make markets work, public resources can be used to narrow them and to develop sustainable markets for the private provision of the desired services. Many governments have made bridging gaps in access to ICT services an explicit public policy goal, as with universal service programs for telephones.

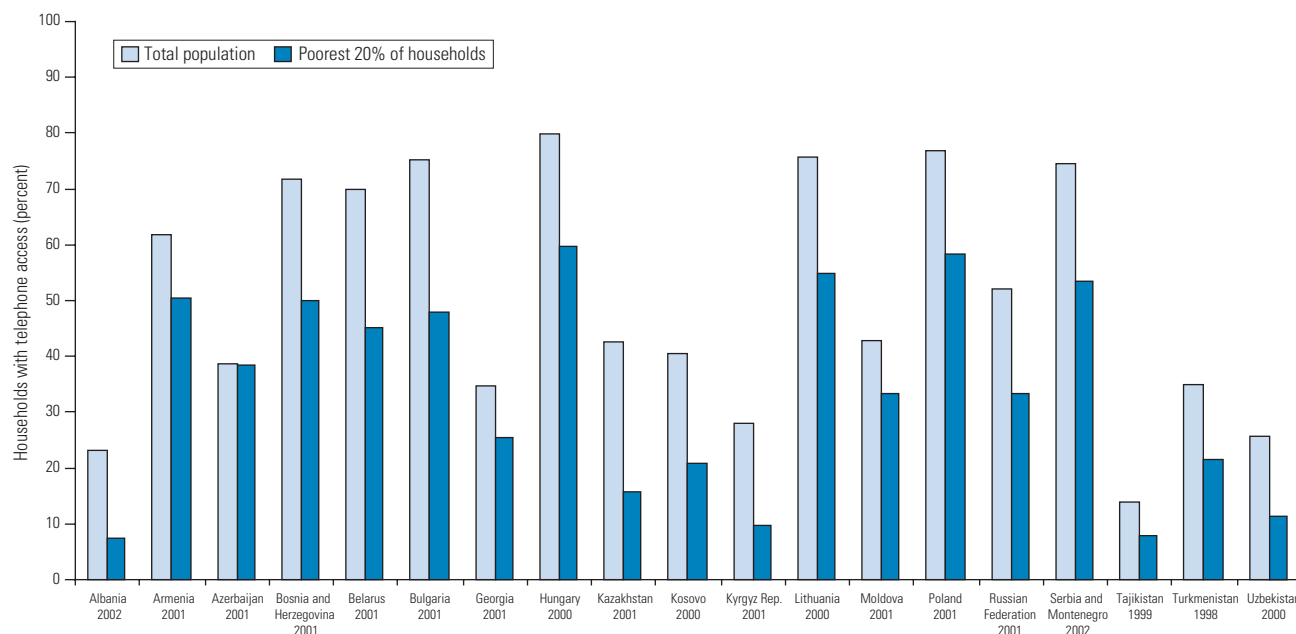
One successful approach has been to use competitive bidding to award subsidies to ICT providers. Subsidies can catalyze private investment by offsetting political constraints on prices, reflecting external benefits that would not contribute to operating revenues, and helping providers overcome entry barriers resulting from front-loaded investment requirements or financial market failures. Subsidies are transparent in that they have known costs, are subject to the discipline of public budgets, and can be paid

as output objectives are met. In addition, subsidies can be targeted to desired beneficiaries. Capital contributions and risk guarantees may also be appropriate in some cases.

Demand aggregation can be used to increase access to ICT services, particularly advanced ones such as the Internet. For example, by combining the demand for connectivity among public agencies, schools, and hospitals, then seeking competitive bids, governments can help finance and expedite the expansion of broadband networks, particularly in rural areas. Government commitment to buying broadband capacity reduces commercial risks for investors asked to build infrastructure with high upfront costs and untested market demand. This approach also fosters competition in this market segment by creating opportunities for new entrants.

Determining proper levels of public support for fledgling markets can be difficult, and requires the examination of costs and benefits from the viewpoint of the economy as a whole. Such support involves tradeoffs between various development goals and limited public resources, and even with the best policies it can take years for a market to develop. Moreover, not all unprofitable services merit public support: only projects that require support to become viable and yield economic benefits at least equal to their costs should be eligible for it. In addition, using public resources to help develop new markets is not always justified, especially if services are not in high demand and widely and

**Figure 3 Household Access to Telephones in Europe and Central Asia, by Country and Year**



Source: World Bank staff estimates based on household surveys 1998–2002.

equitably shared. Any public support for private businesses should also have a clear exit strategy.

**The private sector should play a critical role as an early adopter and significant beneficiary of ICT, yet businesses often face obstacles to ICT adoption.** The potential benefits of ICT—for growth, investment, profitability, and productivity—provide a sound basis for promoting its use by businesses in developing countries. This is especially important because firms play a significant role as early adopters of new technology. But businesses in developing countries often face obstacles to adopting and using ICT applications, including the following:

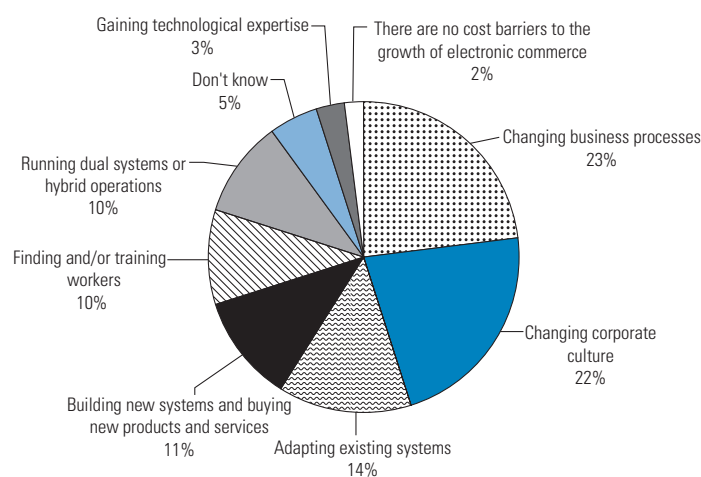
- Slow, unreliable, insufficient, and expensive telecommunications services. Corruption is part of the problem: many firms have to pay bribes for service licenses or telephone connections.
- Limited incentives to change business models and operating structures when the costs of adopting ICT are significant and returns uncertain (figure 4). Many firms—especially those that are small, domestically owned, or nonexporting—do not recognize the value of ICT strategies or applications for their activities, and do not feel that they need ICT beyond a basic level of connectivity.
- Lack of trust in online business activities and related legal impediments.
- Shortages of workers skilled in ICT.

To foster investment and use of ICT, governments must implement policies and regulations that remove such barriers and help businesses identify and exploit its potential. Steps should be taken to provide a supportive legal and regulatory environment for e-business (including e-security policies and programs), enhance technological diffusion, and overcome market failures in areas such as demand aggregation (for example, by launching e-government services of interest to businesses) and skill development (by providing and supporting ICT training). Although income is a major constraint on demand, businesses and people everywhere are willing to spend a significant share of their income on information and communication if given the chance.

Another policy priority is to increase liberalization and competition in ICT markets—to stimulate investment in bandwidth, raise demand through lower prices, and boost efficiency and innovation in the provision of services. Policies should also promote neutrality among competing and emerging technologies to encourage interoperability, innovation, and choice among services.

**E-strategies can prioritize and guide national ICT development.** The World Summits on the Information Society (WSIS), held in Geneva in December 2003 and in Tunis in November 2005, encouraged developing countries to adopt e-strategies. Such strategies, tied to a country’s overall development goals, are intended to promote and coordinate ICT investments and extend their benefits to larger segments of

**Figure 4 The Most Significant Costs that Obstruct E-Business**  
(percentage of survey respondents)



Source: WITSA 2000.

these countries' populations. E-strategies are being developed and implemented by governments around the world, in both developing and developed countries.

A review of 40 of these strategies conducted for this report finds that more than 85 percent aim to expand ICT use in governments and schools, expand telecommunications infrastructure, and provide an adequate legal and regulatory framework (figure 5). But the actions identified to achieve these goals vary considerably, partly because of income differences across countries. Other common themes include ICT industry development, information technology skill development, and e-business growth.

**Although many countries have made significant progress on e-strategies, more work is needed to make them effective tools for development.** E-strategies need to better address the obstacles identified above by providing stronger links to broader development goals—particularly in low-income countries—and increasing their focus on monitoring and evaluation. The likely development impact of an e-strategy can be assessed by evaluating its

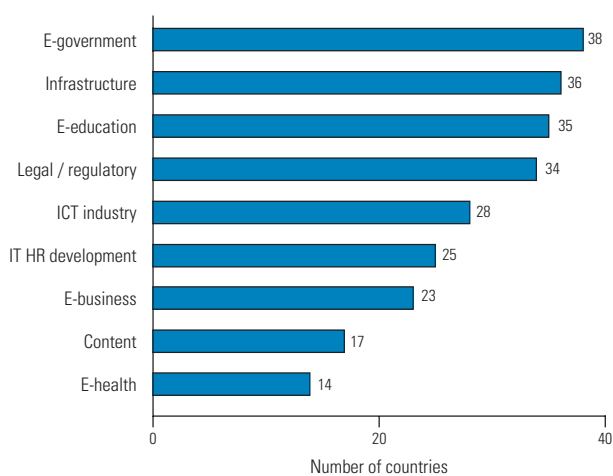
- links to the country's overall development goals—political, economic, and social;
- use of indicators to benchmark analysis and formulate clear and realistic goals and targets;

- implementation mechanisms, including institutions, processes, and resources; and
- monitoring and evaluation mechanisms, especially the responsibilities and budgets for these efforts.

The e-strategies reviewed were strong in establishing development links (especially the strategies produced by middle-income countries) and providing implementation details, and many were effective at setting targets (figure 6). But the strategies were much weaker when it came to monitoring and evaluation, with most saying little or nothing about institutions or structures for doing so. When formulating e-strategies, governments should make plans for monitoring and evaluation and commit resources to implement them. Such plans would help make e-strategy design and implementation more effective and relevant—without monitoring and evaluation it is impossible to measure the results and assess the impact of ICT initiatives.

**WSIS provided the first globally agreed targets for ICT development. These targets now need to be linked to action-oriented indicators.** Measuring the impact of ICT on development and evaluating the outputs of e-strategy implementation are essential for making e-strategies relevant and holding governments accountable for their implementation. WSIS set 10 far-reaching targets for ICT and information society development, to be achieved by

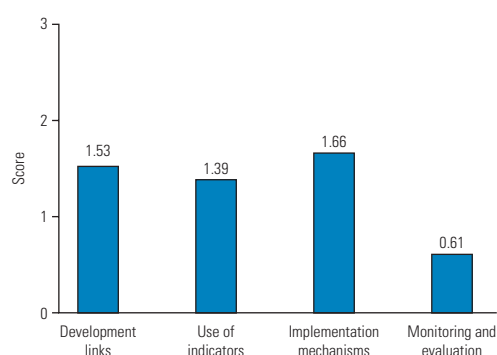
**Figure 5 Thematic Areas of Focus for E-Strategies, by Number of Countries**



**Note:** HR = human resources

**Source:** World Bank staff analysis.

**Figure 6 Strengths and Weaknesses of E-Strategies**



**Note:** Explanation of scoring—*development links*: none (0), mention general development goals (1), reference national programs (2), specify national and sectoral programs (3). *Use of indicators*: none (0), sporadic (1), common (2), extensive (3). *Implementation mechanisms* and *monitoring and evaluation*: none (0), vague (1), specific (2), no ambiguities (3).

**Source:** World Bank staff analysis based on a review of 40 e-strategies.

2015. These targets look beyond traditional measures of telecommunications development and include goals such as connectivity for governments, schools, hospitals, and rural areas.

Because these targets are broad—and, in some cases, poorly defined or difficult to measure or apply—this report proposes discrete, concrete, comparable indicators to help individual countries as well as the international community monitor progress and benchmark performance.

Although the targets provide a good starting point for quantifying ICT development, most countries will be unable or unwilling to pursue all 10 with equal vigor. Accordingly, monitoring and evaluation efforts should take into account the priorities that governments place on each target. A recent survey of policy makers found that connecting schools to ICT is the top international priority, followed by connecting scientific and research centers. Monitoring and evaluation should focus on targets that are clear, for which action can make a difference, and on which progress can be tracked between now and 2015. Finally, parallel activities are needed to identify policies that accelerate achievement of the targets, such as improving regulations and identifying appropriate financing and business models.

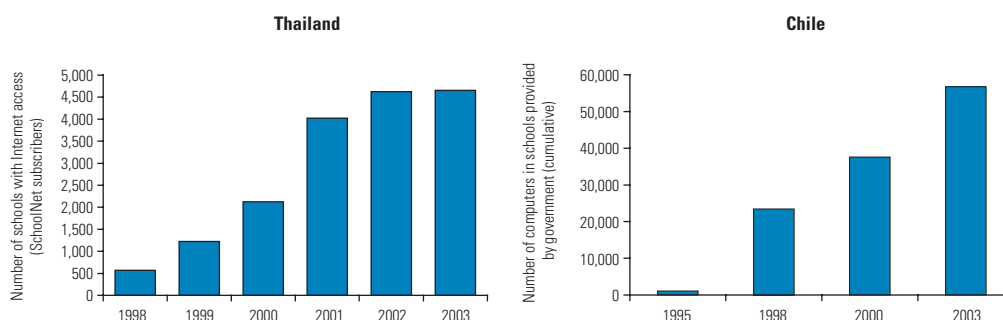
**Countries should increase efforts to collect and disseminate ICT data.** The availability of current data in most developing countries is limited, which does not allow for policy making based on timely and relevant benchmarking. Some developing countries compile measurable, comparable indicators to track their progress and benchmark their

performance in developing an information society. But many do not. For example, many governments cite school connectivity as an important ICT goal. Yet data on ICT prevalence in schools are lacking in many countries, making it difficult to measure progress or evaluate ICT’s contribution to education. A lot of the data needed to compile the indicators should not be difficult to collect, and can be gathered as part of normal administrative reporting.

Some countries with good monitoring data, such as Chile and Thailand, can demonstrate solid evidence of the success of their policies (figure 7). To foster progress toward the development of a global information society, all governments need to collect and maintain data for key ICT indicators.

The international community can facilitate more effective coordination of efforts to compile global information, establish a database for benchmarking, and provide technical assistance to interested countries. ICT data collected by national and regional authorities are often cumbersome to locate. These data need to be standardized and put in a central, global repository. In addition, agreement is needed on which data should be compiled and benchmarked internationally and which organizations should be responsible for various indicators. To support such efforts, this report compiles nearly 30 ICT indicators for 144 economies, which offer data on access, quality, affordability, efficiency and sustainability, and applications. They allow countries to compare themselves with other countries and to assess their progress in different ICT areas over a five-year period (2000 to 2004).

**Figure 7 Internet Access in Thai Schools and Computers in Chilean Schools**



Source: Enlaces 2005; NECTEC 2003.

## Recognizing—and Seizing— Opportunities

This report assesses what has worked well and what has not worked as well in developing ICT around the world. The digital divide between countries is not insurmountable, as shown by the phenomenal success of new technology—such as mobile telephony—in bridging the access gap, as well as the positive impact of efforts to stimulate competition and develop independent regulation of telecommunications markets. But many developing countries still require improvements in their ICT policies and strategies. Among the biggest challenges facing these countries are weak policy and implementation capacity, opposition from vested interests, and persistent obstacles to adoption of ICT. Many also lack adequate tools to monitor, evaluate, and guide investments in ICT and connectivity in underserved areas.

The World Bank hopes to make this report a regular publication. Doing so would contribute to continuity in benchmarking of ICT data and in monitoring and assessment of trends, themes, and programs supporting ICT in developing countries.

This report will have achieved its purpose if the views, analyses, data, and indicators it contains help stakeholders determine how their separate and collective efforts can yield the highest returns and contribute to inclusive information societies around the world.

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