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United Nations Conference on Trade and Development

## INFORMATION ECONOMY REPORT 2006

The Development Perspective

## **OVERVIEW**





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### **OVERVIEW**

Global economic processes, including international trade, are increasingly influenced by the creation, dissemination, accumulation and application of information and knowledge. Development can no longer be understood without full consideration of the widespread effects of information and communication technologies (ICTs) and their applications to enterprise activities. UNCTAD's *Information Economy Report 2006* has been produced, like its predecessors in the E-commerce and Development Report series, with the intention of helping bring to the forefront of the international agenda the implications for developing countries of the changes that ICT and e-business are bringing about in the productive, commercial and financial spheres. The Report is also intended to support the efforts of developing countries to overcome the challenges they face as they strive to narrow the digital divide and to enable their enterprises to become more competitive through the adoption of ICTs and e-business. To do so, the Report analyses the specific policy challenges facing developing countries, proposes possible means to address them and identifies and disseminates existing international best practice.

The first question to be considered is the extent to which developing countries are active participants in today's global information economy. This problem presents several dimensions. The most obvious one has to do with the differences in the level of access to ICTs between developed and developing countries. From a development point of view, one must also investigate how and to what extent the enterprises of developing countries are adopting ICTs and e-business, and whether their patterns of adoption and use are (or should be) different from those of their counterparts in developed countries. It is then necessary to examine the internal divides in developing countries that limit the chances that groups such as the poor, rural communities and women will be able to benefit from ICTs in terms of better economic opportunities. The participation of developing countries in international trade in ICT goods and services is another fundamental aspect of their involvement in the global information economy. Lastly, one should try to quantify the impact of ICTs at the micro and macro levels, particularly with regard to their effects on growth and economic development. All these questions are treated in chapter 1 of this Report, which presents the only internationally comparable statistical information available about e-business in developing countries, as well as in chapter 5, which examines in more detail the impact of ICTs on employment in developed and developing countries. Chapter 5, which has been produced by the International Labour Organization in close collaboration with UNCTAD, also demonstrates the usefulness of addressing related development issues through inter-agency cooperation.

Notwithstanding the magnitude of the issues involved, one has to acknowledge the efforts made by Governments in developing countries in recent years to bring the benefits of ICTs to their people. Today, many developing countries have formulated and implemented national ICT plans and policies setting out a road map for a national information society and for integration into the global knowledge-based economy. But how can countries determine whether they are still following the pre-defined strategy, and what needs to be done to revise and adapt existing policies to meet their goals? There are no international guidelines for developing countries to assess their national ICT strategies and plans. Chapter 2 proposes a model ICT policy review framework for developing countries and encourages Governments to carry out such reviews. In this regard, it is particularly important that the effects of ICT policies on the poor be fully taken into account before they are implemented. That is the reason why chapter 3 presents a framework that policymakers can use to design pro-poor ICT interventions in developing countries, or to assess their value in terms of their impact on poverty.

The impact of ICTs and e-business on the economic prospects of developing countries extends well beyond the more obvious examples of e-commerce or e-government applications. As general-purpose technologies, ICTs have the potential to enhance efficiency in most areas of economic activity. For example, chapter 4 of the Report looks into the effects of ICTs on the production and distribution of oil from two standpoints: first, how ICTs are making the exploitation of oil resources more effective (with a possible positive effect on supply); and second, how ICT applications in oil distribution can help alleviate the effects on oil-importing developing countries of rises in oil prices.

Effective decision-making in the field of ICT and e-business, with regard to either public policies or business competitive strategies, requires a sound understanding of the principles and dynamics that govern the interaction between technologies and the economic, legal and social environments of the developing countries in which those technologies are implemented. These interactions provide the focus of the last three chapters of the Information Economy Report 2006. Chapter 6 shows how, for technological as well as business strategy reasons, service-oriented architecture technologies and particularly Web services are likely to represent a major milestone in the evolution of e-business. Enterprises in developing countries should be aware of the latest trends in these technologies and consider the most appropriate strategies for their gradual adoption. Chapter 7 explains how the layered structure of the Internet is one of the main reasons for the success of this technology and how it is in the interest of developing countries that the potential of the Internet as an equalizer in international competition is not eroded by suboptimal governance. In particular, the chapter makes it clear that optimal governance measures are those that respect the principle of minimal Internet layer crossing — that is, that policy should be implemented at the Internet layer that is closest to the problem that is intended to be dealt with. Chapter 8 closes the Report with an examination of the recently adopted United Nations Convention on the Use of Electronic Communications in International Contracts, which will help developing countries establish a legal framework for e-business that follows international best practice and enables and facilitates e-business transactions at the national and international levels.

#### A call for action

A long and intense period of international dialogue on the issues of ICT for development came to a fruitful conclusion with the closing of the second phase of the World Summit on the Information Society (WSIS) in Tunis in November 2005. Stakeholders are now engaged in the translation into practical actions of the programme and principles that were adopted in the two phases of the Summit. The amount of work that needs to be done is formidable, the time available is short, and the challenges of a multistakeholder decision-making process are complex.

UNCTAD is fully committed to contributing to this endeavour within the scope of its mandate and expertise. In addition to its participation in several WSIS lines of action, UNCTAD has entered into a partnership with the International Labour Organization and the International Trade Centre, with the objective of addressing key issues of e-business and e-employment. The first activity of the partnership was the joint organization of the first facilitation meeting on "E-business and e-employment", which took place in May 2006. The meeting recognized the key role of stakeholders from Governments, civil society, academia and the private sector in shaping, promoting and implementing related projects and programmes. Another example of inter-agency cooperation to support ICTs for development is the joint organization of an UNCTAD–UNITAR seminar on free and open source software (FOSS). The event, held on 29 August 2006 at the UN in New York, examined the role of FOSS in economic and social development as well as its use in the UN system. Ensuring the full participation of all developing countries in the global information economy will require the active involvement and support of the whole international community, including bilateral and multilateral donors.

The great potential of ICTs as catalysts of social and economic development is clearly recognized. ICT dissemination and adoption in developing countries are supported by many donors as a powerful means to facilitate the achievement of major development goals in the areas of health, education, governance and others. A comprehensive approach to supporting ICT-for-development actions should pay adequate attention to the adoption of ICTs and e-business by the enterprises of developing countries. There is a growing amount of evidence from developed and developing countries that the adoption of ICTs by

enterprises helps accelerate productivity growth, which is essential for supporting income and employment generation. More widespread adoption of ICTs in the productive sectors of developing countries should also accelerate innovation and thus enhance the competitive position of developing countries.

In addition to the support of national and international development cooperation organizations, ICT and e-business for development initiatives have much to gain from South–South cooperation. This gives developing countries the possibility to share knowledge and capacity-building resources in an area in which a growing number of developing countries have achieved world-class expertise. UNCTAD actively supports South–South initiatives in the field of ICTs. An example of this was the signing of a Memorandum of Understanding with the Government of Brazil for capacity-building work in the field of FOSS in Africa.

In the final analysis, global knowledge sharing is also the fundamental purpose of this Report, whose chapters are summarized in the next few pages.

#### 1. ICT indicators for development: Trends and impact

In 2005, the Internet and its applications continued to spread through societies and economies around the globe. Mobile communications are growing rapidly in developing countries, which are now far ahead of developed countries in terms of absolute number of subscribers. This makes mobile phones the only ICT in which developing countries have surpassed developed countries in terms of users. But penetration rates in developing economies continue to be well below those of developed countries. In some developed countries, the penetration rate is over 100 per cent, while in several dozen developing countries it is under 10 per cent. Schemes to make mobile telephony more affordable account for much of the growth in developing countries. For example, in 2004 almost 88 per cent of mobile subscribers in Africa used prepaid services that were tailored to low-income markets.

Although developed economies have lost some of their share of total Internet users to developing countries, they still account for more than half of Internet users worldwide. The digital divide between developed and developing economies is maintained in terms of Internet penetration. The average penetration for developing economies is boosted by the case of selected countries with exceptionally high penetration, such as the Republic of Korea. Approximately one third of developing economies have a penetration rate of less than 5 per cent. Africa has the highest growth rates in terms of Internet users, since many countries start from very low levels, but it has the lowest penetration rates.

Internet access by enterprises is nearly universal in most developed countries, with penetration rates reaching almost 100 per cent among large enterprises. Internet access by enterprises in the developing world is less uniform, reflecting a very broad range of penetration rates. There is, however, a positive correlation coefficient of 0.54 between Internet penetration and ownership of websites by enterprises with Internet access. This suggests that the level of ICT knowledge in the economy might also be an important determinant of Internet use by enterprises, since setting up a website demands more than basic computer literacy.

With regard to the type (or mode) of Internet access, there are large differences between developed countries, where broadband is growing rapidly, and developing countries, where dial-up is still prevalent. This changing nature of Internet modes of access is a new dimension of the international digital divide. In rich countries, broadband subscribers increased by almost 15 per cent in the last half of 2005, reaching 158 million. In particular, enterprise broadband connectivity grew significantly in the EU, from 53 per cent in 2004 to 63 per cent in 2005. Broadband increases the capacity of enterprises to engage in more sophisticated e-business processes and deliver through the Internet, thus maximizing the benefits of ICTs. It is estimated that broadband could contribute hundreds of billions of dollars a year to the GDP of developed countries in the next few years, and has been compared to utilities such as water and electricity.

The growth of broadband is largely due to competition and declining prices, but it also depends on the available infrastructure. In many developing countries, because of the lack of economies of scale, the

incentive to expand broadband infrastructure outside urban areas is low. Wireless technology and satellites can help circumvent the cost of infrastructure for sparsely populated, remote or rural areas. Governments have an important role to play in improving access to broadband through infrastructure and policy. Government policy can either encourage or be a disincentive to competition, and thus have an impact on availability and prices. For example, while the Government of the Republic of Korea enforces competition and encourages new entrants in the telecommunications market, the United States has allowed growing consolidation of the industry. The result is that there is a wider choice and better offers for customers in the Republic of Korea than there are for customers in the United States.

Online sales and purchases are now commonplace in all developed economies, but vary across industries and countries. In the OECD countries, the share of enterprises purchasing online ranged between 20 and 60 per cent in 2004. Enterprises in developing countries are increasingly conducting e-commerce, but available data do not confirm the developed country trend that online purchases are more frequent than online sales. This can be partly explained by an overrepresentation of certain sectors in surveys, as is the case for the manufacturing sector in Argentina and Kazakhstan, or other business activities in the real estate sector in the case of Romania. As regards the manufacturing sector, the reason for the lower incidence of online purchases could be that in some emerging markets intermediate goods B2B is less developed than final products B2B. Information from developing countries on the use of e-business for internal business processes is very limited, but data on the use of the Internet for business applications seem to confirm the trend from developed countries in terms of the gap between SMEs and large enterprises, with some exceptions.

Data on the ICT sector show that, generally speaking, following the contraction in the early 2000s, developed countries experienced an increase in both value added and employment in the ICT sector in 2003. This increase in demand and supply in the developed countries' ICT sector opened up new prospects for developing country business partners. In 2003, the ICT sector represented 5.5 per cent of total business employment in developed countries and was a source of employment growth. ICT sector employment grew by over 8 per cent annually between 1995 and 2003, which represented an additional 1 million people employed. The majority (66 per cent) of those working in the ICT sector were employed in the services sectors, a figure that corresponds to the high share of services in a typical developed economy. Among the developing countries for which data are available, the Republic of Korea, Malaysia and the Philippines show a very large share of ICT employment in their business sector (above the OECD average). One explanation could be that in some developing countries the size of the business sector is still small and most developments in the private market are based on new technologies.

Exports of ICT-enabled services grew faster than total services exports during 2000–2003, thus creating new export opportunities for developing countries. In 2003, this was mainly due to the above-average 20 per cent growth rate of developing countries' exports, surpassing developed countries' performance. Developed countries' contribution to world ICT-enabled service exports remained high in 2003, at around 83 per cent. During 2000–2003, developing countries lagged behind the world compound annual growth rate, but some had exceptionally high growth rates. Developing and transition countries' exports of ICT-enabled services originated mostly in Asia (77 per cent), followed by America (10 per cent), Africa (7 per cent) and South-East Europe and the Commonwealth of Independent States (6 per cent). While currently the top 10 exporters of ICT-enabled services are all from developed countries, China and India will soon make their way into the top 10 rankings. In 2003, the \$836 billion value of the ICT-enabled sectors represented about 45 per cent of total services exports, compared with only 37 per cent in 1995.

An analysis based on foreign affiliates' flows demonstrates that trade in the ICT-enabled services carried out through the foreign affiliates of multinational companies largely exceeds conventional export and import flows as measured by the IMF Balance of Payments statistics. Furthermore, developing and transition economies have increased their commercial presence abroad. An analysis in relative terms shows that in most cases ICTs boost service exports more than sales through foreign affiliates. However, large exports of ICT-enabled services are also likely to be sold more through foreign affiliates. Developing countries' exports would benefit from improved access to foreign markets under all WTO GATS modes of delivery. Computer and information exports are the most dynamic ICT-enabled service sector, particularly in the developing economies. Between 1995 and 2004, computer and information services exports grew six times faster than total services exports. The share of developing countries in this export sector increased from 4 per cent in 1995 to 20 per cent in 2003, with the highest growth since 2000. This is partly explained by the corresponding low-level regulatory environment in the WTO. Continued trade liberalization in this sector would need to take into account developing countries' concerns about the movement of natural persons (Mode 4). Additionally, developing countries should seek improved market access commitments under the other modes of delivery in order to boost the potential for South–South trade in services.

Calls for the measuring of ICT impact on development have been an essential and persistent feature in the discussion on ICT measurement and the collection of statistical indicators. The chapter shows that most research on the impact of ICTs at the firm level revealed a positive impact on firm performance and increased market share, if complemented by organizational changes, the upgrading of skills and innovation. Age and size of the companies, as well as quality and speed of the Internet connection, also play a role. Other critical factors concern the regulatory environment in which the firm operates, the structure of the industry sector and the degree of competition in the market. Hence, to optimize impact, firm-level ICT strategies need to be introduced in conjunction with other changes in the management of firms.

ICT access and use can contribute to productivity growth in both developed and developing countries. UNCTAD research on measuring the impact of ICTs on GDP in developing countries has revealed a positive contribution even in poorer countries. But countries that already have a certain level of ICT uptake and education seem to benefit most from the new technologies. Therefore, Governments need to create an enabling environment, through their national ICT plans and policies, to promote ICT diffusion among economic and social actors.

#### 2. Reviewing national ICT policies for the information economy

During the past decade, ICTs have become part of many developing countries' development plans and poverty reduction strategies. Governments have formulated ICT strategies or "master plans" and set objectives to ensure the effective deployment and use of ICTs in their country, for the benefit of their citizens and enterprises. As of June 2006, out of 181 developing and transition countries and territories, almost a half (44 per cent) had already adopted a national ICT plan and a fifth were in the process of preparing one.

But so far, only a few developing country policymakers have carried out a comprehensive assessment of their national ICT plans. Reviewing the status of their ICT policies would help them better understand the policy challenges and opportunities presented by ICTs for the information economy and quantify the main achievements regarding the implementation of their ICT policy measures as foreseen in the national ICT plan. It would also allow them to identify critical success factors and best practices as well as reasons for failure, which is important for adjusting and reforming the ICT policies.

However, there are no international guidelines for developing countries to define and implement an ICT policy review (such as, for example, what the OECD offers to its member countries through the ICT peer review process). Therefore, as part of its ongoing work on ICT policies and on ICT measurement for economic development and trade, UNCTAD has developed a model framework for carrying out national ICT policy reviews.

This chapter presents the **UNCTAD model ICT policy review framework** for developing countries. It outlines the three major components of the framework, using selected best practice country examples and successful ICT policies from developing countries. The first component is the review of the global ICT environment, which provides an overview of a country's ICT uptake, focusing on the status of ICT penetration and use for different economic actors. Its second component is the assessment of the main components of the ICT policy framework, which examines in depth the national ICT policies that have been put in place by the Government, including the components of a national ICT plan, priority actions, concerned sectors, targets and relevant projects. The last component consists of the assessment of the

institutional framework and the implementation mechanisms, which considers the adequacy of the established implementation mechanisms and institutional framework and the extent to which changes have to be made to implement the policies contained in the ICT master plan.

The proposed framework is a generic model that could be used as a basis by developing countries. It will have to be adapted to the needs of each country, and could include additional elements to reflect specific national aspects not covered by the model. As part of its technical cooperation activities, UNCTAD carries out complete national ICT policy reviews at the request of member States and subject to the availability of funds.

#### **3. Pro-poor ICT policies and practices**

ICTs are supporting poverty alleviation efforts across the world. Radio allows women in post-war Sierra Leone to express their concerns and advocate regarding their needs. Information kiosks in Bolivia are enhancing the negotiation position of agricultural producers because they can now access market price information.

In 2000, Governments committed themselves to halving poverty. Misconceptions about ICT and poverty should not cut short the much-needed contribution that ICTs can make to that end. This chapter provides policymakers, practitioners and the donor community with an understanding of how ICTs can contribute to poverty reduction and an overview of recommended pro-poor ICT policies and programmes.

Poverty alleviation means taking development efforts a step further to specifically enhance the capabilities of the poor. In a similar fashion, ICT's contribute to poverty reduction by complementing specific propoor activities (for example, by supporting women's advocacy efforts in Sierra Leone), directly enhancing poor livelihoods (for example, by providing access to market information in Bolivia) or reducing barriers to poverty reduction (including disinformation or corruption). ICT's for poverty reduction mean taking ICT's for development efforts one step further to enhance the capabilities of the poor using ICT's as an instrument.

Today, there is a common understanding that ICTs are a necessary but insufficient tool for poverty alleviation. Basic infrastructure, skills and political will, for example, are also needed. Reality shows that different technologies have different contributions to make to poverty reduction and that, in order to be effective, pro-poor ICT efforts must be embedded in poverty reduction initiatives (including national development strategies) and best practices (such as multistakeholder and participatory approaches). Support is needed at all levels, and sustainability concerns, although necessary, should not crowd out financial resources. Efforts should be made to scale up and replicate best practices, while policies and programmes must be context-specific. Finally, only through a focused dialogue and research on pro-poor ICTs will technologies bring poverty alleviation.

Having identified how ICT policies and programmes can contribute to poverty alleviation, one may ask what barriers policymakers and practitioners face in effectively pursuing pro-poor ICT endeavours. Recommended ICT policies and practices often do not materialize for various reasons. International debates and commitments (including the World Summit on the Information Society) are not focused on ICT for poverty reduction. And any broad commitments have yet to be translated into policy and practice. Contested discourses continue to influence policies and practices – failure to alleviate poverty is in the detail, not in the broad commitments. Experience shows that implementation of ICT programmes is the most challenging part. For instance, while multistakeholder approaches have many virtues, their practical implementation is not one of them – working with other organizations is not easy. Moreover, scaling up successful best practices involves more than replicating good projects: it requires another level of commitment. The cross-cutting nature of ICTs, as well as the limited availability of quantitative measurement and qualitative assessments of ICT for poverty alleviation, renders these efforts invisible. Institutionally, there is little accountability or incentive to coordinate ICT strategies and poverty reduction policies. More fundamentally, the question of how power imbalances are dealt with remains unsatisfactorily unanswered.

UNCTAD offers a **Pro-poor ICTs Framework** to examine to what extent an ICT policy or programme is pro-poor. The framework (expanded from Rao's 8 Cs Framework for Analysis and Planning ICT interventions) helps policymakers understand, question and propose pro-poor ICT interventions. It questions key areas for meeting the needs of the poor, such as connectivity (is the technology accessible and affordable?), community (who benefits from the intervention?), capital (are there sufficient financial resources?) and coherence (is the ICT strategy/programme coherent with the development strategies?).

On the basis of these reflections, ICT policymakers and practitioners are encouraged to focus on ICTs for poverty reduction by promoting a better understanding of pro-poor ICTs (including the follow-up to the World Summit on the Information Society) and to make ICTs work for the poor by adopting best practices in ICT policies and interventions. They may also consider supporting approaches, including participation and decentralization, that enable the poor to be heard and to participate.

Other recommendations are to mainstream ICTs effectively into national and sectoral poverty reduction policies and into development assistance programmes, with an awareness of the cross-cutting nature of pro-poor ICTs; and also to promote the scaling up of successful programmes by providing an enabling environment as well as encouraging the development of pro-poor ICT networks and organizational capacities.

Finally, UNCTAD can support developing countries in carrying out poverty and gender analysis of ICT policies, and undertaking country reviews of policies and programmes across sectors and issues areas, and also support the collection of data disaggregated by sex, age, education and geography to help identify who is not benefiting from ICTs.

#### 4. ICTs in the oil sector: Implications for developing economies

Oil is playing a major role in the world energy balance and the demand for it will continue to increase in the foreseeable future. Ensuring that the supply of oil from existing and new oilfields and other fossil energy sources is forthcoming will be the main challenge for the petroleum industry and one of the means of avoiding future energy crises. Meanwhile, tight market conditions, including a lack of enough spare productive capacities in oil production and refining, are keeping prices high and making upgrading and improving of the oil supply chain an urgent task. Given the capital-intensive and skill-based nature of the oil industry, a key instrument for facilitating its modernization is ICTs. More intensive and efficient use of the latter is increasingly mainstreamed into the industry practices in both developed and developing economies. Moreover, computing, measuring and communicating devices embedded in modern oil technologies are making them more information-intensive. Consequently, the oil sector could be considered an integral part of the information economy.

As the production of oil is mainly concentrated in developing and transition economies where the oil industry technology standards are similar to those in developed countries, the impact of ICTs on improving the economic performance of the oil sector is affecting the production of crude oil in all those countries. ICT and related key technology-driven efficiency gains happen in both the upstream stages (exploration and production of crude oil) and the downstream stages (transportation, refining of crude oil and distribution of oil products) of the global petroleum industry. ICTs impact the effectiveness of the petroleum industry and offer opportunities for its further diversification, especially in the oil-exporting

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