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ICT AND E-BUSINESS FOR DEVELOPMENT

Note by the UNCTAD secretariat[1]

Executive summary

This note outlines some trends in ICT and e-business adoption and usage in developing countries that have been identified, inter alia, in the course of UNCTAD's recent work on e-measurement. The note argues that such trends show the importance of conducting ICT policy reviews and suggests how interested developing countries could implement a practical review mechanism. This could include an examination of the role of pro-poor policies and measures in the overall context of ICT-for-development strategies and the interaction between ICT and poverty reduction strategies. Finally, the note refers to the relationship between innovation and ICT and e-business policies, pointing to some areas of interest for developing countries.

[1] This document was submitted on the above-mentioned date as a result of processing delays.

CONTENTS

INTRODUCTION

1. The purpose of this note is to put before the Commission on Enterprise, Business Facilitation and Development for its consideration some of the main results of UNCTAD's recent work in the field of ICT, e-business and development. This work was undertaken within the framework of the mandate established in the São Paulo Consensus and the more specific recommendations made by the Commission at its tenth session (21–24 February 2006).

2. The Commission requested that the UNCTAD secretariat should "ensure the development perspective of the *Information Economy Report* and include it as an integral part of the Commission's agenda for due consideration with the objective of facilitating consensus-building". In order to implement this mandate, it was pointed out during the tenth session that it would be advisable to bring the release of UNCTAD's *Information Economy Report* closer to the usual dates of the sessions of the Commission. For organizational and logistical reasons, this was not possible for the 2006 issue. However, in order to support the consideration of the main aspects of the *Information Economy Report 2006* (IER 2006), this note summarizes the Report's conclusions in four areas, namely ICT and e-business in developing countries, the role of ICT and e-business policy reviews in order to monitor progress and assess impact, ICT and e-business policies in poverty reduction strategies, and lastly the relationship between ICT and e-business and innovation policies, with specific reference to issues that may be of interest to developing countries.

3. The quantitative information on ICT and e-business adoption presented in this note, as in the IER 2006, could not have been obtained without the work of the Partnership on Measuring ICT for Development, which includes ITU, OECD, UNCTAD, the UNESCO Institute for Statistics, the UN ICT Task Force, the World Bank, the UN regional commissions (ECA, ECLAC, ESCAP, and ESCWA) and Eurostat.[2]

4. This note is structured as follows: part I presents quantitative information on ICT and e-business trends and their impact on development. Part II looks into the importance of reviewing national ICT and e-business policies for development, including, as a subset of the policies to be examined, a brief reference to the main aspects of a possible framework to assess the contribution of ICT and e-business policies to poverty reduction. Part III contains a succinct introduction to the policy issues that may be of greater interest to developing countries concerning the relationship between ICT and e-business and innovation, with a view to identifying areas where further work may be necessary.

I. ICT INDICATORS FOR DEVELOPMENT: TRENDS AND IMPACT

5. The following paragraphs will provide a general picture of the status of ICT access and use in developed and developing countries, looking at mobile telephony, the Internet, broadband, e-commerce and other e-business activities. This information is based on data from national statistical offices and other sources, including ITU, OECD and Eurostat, as well as UNCTAD. When interpreting data from developing countries, it should be taken into account that, in many of them, national ICT surveys are not yet fully internationally comparable. Readers are encouraged to refer to the IER 2006 for further data and in-depth

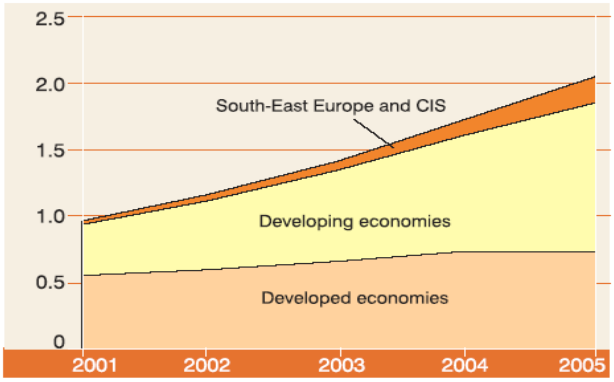
[2] For more information about the Partnership, see http://measuring-ict.unctad.org.

analysis of the issues outlined here, as well as for details about the statistical sources and methodology.[3]

A. Mobile phones

6. There are more mobile phone users now in developing countries (1,175 million subscribers in 2005) than in developed ones (810 million), making this technology the only one in which developing countries have taken the lead in terms of number of users. In addition, for users in developing countries, mobile phones often have economic importance in addition to their value as a means of personal communication. For many users in developing countries, mobile phones are enablers of business, in particular for micro-entrepreneurs. The direct economic gains that can be derived from enjoying access to a mobile phone are a factor in the growth in the number of subscribers in developing countries

Figure 1. Mobile phone subscribers by level of development
(Billions)



Source: UNCTAD calculations based on the ITU World Telecommunication Indicators Database, 2006.

7. The worldwide number of mobile phone subscribers passed the 2 billion mark in 2005, with Asia accounting for more than 40 per cent of them. Private research estimates that, by the end of 2006, the number of global mobile phone subscribers will be approximately 2.6 billion. By region, growth in subscribers in 2004–2005 was fastest in Africa (67.4 per cent), followed by Oceania (58.8 per cent), Latin America and the Caribbean (37 per cent), and Asia (25.2 per cent).

8. Averaging 22.8 per cent in 2005, penetration rates in developing economies remain well below those of developed countries, which averaged 83 per cent in 2005. In some developed countries, the penetration rate is over 100 per cent, while in several dozen developing countries it is under 10 per cent. However, the gap in terms of mobile phone penetration has diminished over time between developed and developing countries. Growth in penetration rates in 2004–2005 was fastest in Africa (63.9 per cent), followed by Oceania (56.2 per cent), Latin America and the Caribbean (35.2 per cent) and Asia (23.7 per cent).

[3] The Report is available in full on line at http://www.unctad.org/ecommerce.

B. Internet

1. Individual users

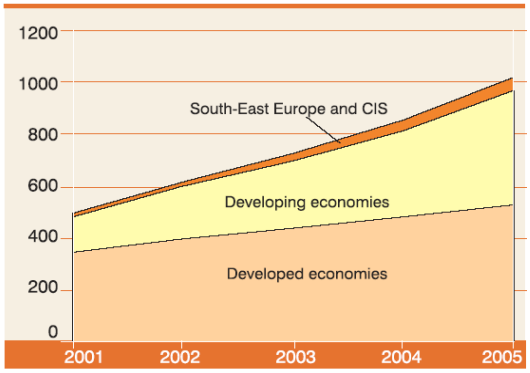
9. The number of Internet users worldwide and Internet penetration rates continue to grow. The digital divide between developing and developed economies remains in terms of Internet penetration (8.5 per cent versus 54.4 per cent in 2005). Around one third of developing economies have a penetration rate of less than 5 per cent.

10. In 2005, Asia accounted for nearly 40 per cent of all Internet users, almost a third of whom were in mainland China. In fact, China is second only to the United States in terms of the number of Internet users worldwide. Although mainland China's penetration rate is only 8.6 per cent, Macao (China) and Hong Kong (China) have penetration rates of 36.9 per cent and 50.1 per cent respectively, and Taiwan Province of China stands at 58.1 per cent. The regional leaders in terms of penetration are the Republic of Korea (69.0 per cent) and Japan (66.6 per cent).

11. In Latin America and the Caribbean, Brazil and Mexico accounted for over 60 per cent of Internet users in 2005. Another 25 per cent of users were located in Argentina, Chile, Colombia, Peru and Venezuela. However, there were very high growth rates for Caribbean island countries and Central America. In terms of penetration rates, the average in 2005 was 15.5 per cent, with Caribbean islands showing the highest rates in the region. Brazil has the highest penetration rate among the larger countries of the region, at 19.5 per cent.

12. In 2005, Africa had the highest growth rates in terms of numbers of Internet users (52.5 per cent), since many countries started from very low levels, but it has the lowest penetration rate (3.6 per cent) after Oceania (3.5 per cent). South Africa, Egypt and Nigeria account for approximately 14 per cent of African users each. Concerning penetration rates, South Africa (10.8 per cent) and Egypt (6.8 per cent) also have above-average rates in the context of the region.

Figure 2. Internet users by level of development (Millions)



Source: UNCTAD calculations based on the ITU World Telecommunication Indicators Database, 2006.

2. Enterprise access

13. Internet access by enterprises is nearly universal in most developed countries. Penetration is particularly high in sectors such as financial services, wholesale trade and real estate, renting and business services industries. The situation is more varied in the

developing world. 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. The structure of a particular economy and of its enterprise sector may also result in differing predispositions for Internet use by enterprises. Enterprises involved in more knowledge-intensive production tend to have a greater demand for Internet access, and so do larger enterprises compared with smaller firms.

C. Broadband

14. Broadband access to the Internet is increasingly important for the development of countries' information societies. Broadband connections are faster, they are ever-present, always on, flexible, less costly and more secure. Individuals are able to obtain more services and a richer experience from the Internet, with greater ease; enterprises are able to add value to their online interactions with customers and suppliers and make them more efficient; and Governments are able to enhance the e-government experience for their citizens. Broadband is increasingly available worldwide (38 per cent of all Internet subscribers in 2004).[4]

15. In the OECD countries, broadband subscribers increased by almost 15 per cent in the last half of 2005 to 158 million. In terms of broadband penetration, the leaders were Iceland and the Republic of Korea, both with more than 25 per cent penetration. At the other end of the scale, Slovakia, Mexico, Turkey and Greece have less than 3 per cent penetration each.

16. All non-OECD developing economies for which data on broadband are available have been showing very low penetration rates, with varying growth rates. The only exceptions are in Asia. The Special Administrative Regions of China (Hong Kong and Macao), as well as Taiwan Province of China, have a relatively small subscriber base but penetration rates of 23.6 per cent, 14.8 per cent and 20.2 per cent respectively. This is the reverse of the situation in mainland China, which had the largest number of broadband subscribers among developing economies, but very low penetration (2.9 per cent). The Republic of Korea and Singapore continued to be outliers in 2005, with 25.5 per cent and 15.4 per cent penetration respectively.

17. To an important extent broadband growth is related to a fall in its cost due to increased competition and technological progress. However, the availability of infrastructure matters too. For example, in the European Union, the development of broadband by building on pre-existing networks has determined the prevalence of DSL, while in the United States, pre-existing infrastructure has resulted in the dominance of cable (65 per cent of broadband connections). In many developing countries, because of the lack of economies of scale and infrastructure, the incentive to expand broadband outside urban areas is lower. Wireless technology and satellites can help circumvent the cost of infrastructure for remote or rural areas, or for areas without a critical mass of users.

18. 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, the Government of the Republic of Korea, whose vision of development through the ICT sector and ICT-enabled services is dependent on broadband deployment, enforces

[4] ITU World Telecommunications Report 2006: Measuring ICT for Social and Economic Development.

competition and encourages new entrants in the telecommunications market. The result is very wide consumer choice and terms of access to broadband.

Enterprise access to broadband

19. In developed countries, enterprises are increasingly adopting broadband to connect to the Internet. In the EU, where 63 per cent of enterprises have broadband access, there are prospects for continued growth and broadband has had a positive impact on certain economic activities, particularly business process outsourcing. Enterprise broadband connectivity has grown significantly (from 53 per cent in 2004 to 63 per cent in 2005).

20. Among developing economies, the Republic of Korea remains an exceptional case in enterprise broadband penetration. In 2005, it was the worldwide leader, with 92 per cent of enterprises having a broadband connection. Singapore is the other exception, as broadband Internet access among enterprises has overtaken narrowband: 55 per cent for all enterprises, with the percentage rising to 77 per cent for enterprises with 10 or more employees. For other developing economies, Internet modes of access other than broadband are still the norm, in particular dial-up modems, and there is still no clear picture regarding the growth rate of broadband access among enterprises.

21. Broadband increases the capacity of enterprises to create and deliver value through the Internet, including by optimizing internal business processes. Broadband enables or enhances the adoption of certain applications that improve enterprise productivity. It can be expected that new applications and business models will continue to emerge as broadband access grows. Voice over Internet Protocol (VoIP) is an example of a broadband service with cost-saving potential that is gaining ground. SMEs in ICT-enabled services will clearly depend on broadband. But in other sectors, medium-sized enterprises will be more likely than small companies to implement e-business applications dependent on broadband.

D. E-commerce

22. E-commerce, defined as placing and receiving orders online, continues to grow. Most e-commerce worldwide occurs between businesses (B2B), although business-to-consumer trade (B2C) is growing steadily among developed countries. For example, in the United States, B2B accounted for 93 per cent of all e-commerce in 2004.[5] In Europe, the volume of B2B online trade has increased, with almost half of firms' purchases occurring online.[6]

23. Online sales and purchases are now commonplace in all developed economies, but vary across industries and countries. Data from OECD indicate that, in OECD economies, between 20 and 60 per cent of enterprises buy online and between 10 and 20 per cent sell online. Online purchase is more present in real estate, renting and business activities, as well as the wholesale and retail sectors, while online selling is generally most prevalent in manufacturing, wholesale and retail trade, and tourism.

24. Levels of online purchasing and selling also vary greatly among developing countries. Contrary to the usual pattern throughout the developed economies, in which more enterprises purchase online than sell online, data from some developing and transition countries show the

[5] US Census Bureau (2006). 2004 E-commerce Multi-sector Report. Posted in May 2006 at http://www.census.gov/eos/www/ebusiness614.htm

[6] European Commission (2005). Information Society Benchmarking Report 2005, available on the Internet: http://europa.eu.int/information_society/eeurope/2005/index_en.htm

opposite situation. This can be partly explained by an overrepresentation of certain sectors in surveys. As regards the manufacturing sector, the reason for the lower incidence of online purchases would require further research on e-commerce at the different stages of the value chain, but it could be that in some emerging markets B2B is less developed for intermediate goods than for final products.

Table 1. E-commerce in selected economies,* 2005 or latest available year

	Selling online % of all enterprises	Purchasing online % of all enterprises	Delivering online % of all enterprises
Argentina (2004)[a]	37.4	36.5	4.5
Brazil	27.1	28.5	..
Bulgaria (2004)	2.9	7.0	1.1
Cameroon	..	..	1.7
Chile (2003)[b]	1.2	1.8	..
China[b]	9.1	8.1	7.2
Kazakhstan	13.1	13.7	..
Kyrgyzstan[c]	..	..	1.6
Macao (China) (2003)	7.4	8.9	..
Morocco	5.2	9.0	9.0
Panama[d]	23.1	29.7	..
Qatar	34.9	28.3	..
Rep. of Korea (2004)	6.8	23.9	..
Romania (2004)	5.4	2.6	1.9
Russian Federation (2004) [e]	20.2	23.2	4.3
Singapore	13.5	30.8	..
Thailand[f]	7.2	8.7	..

*Enterprises with 10 or more employees.

Notes:
[a] Survey of the manufacturing sector only.
[b] A breakdown by number of employees is not available, so the figure could include micro-enterprises with 0-9 employees.
[c] Of enterprises with computers.
[d] Provisional figures.
[e] Enterprises with 50 or more employees.
[f] Enterprises with 15 or more employees
Source: UNCTAD e-business database, 2006.

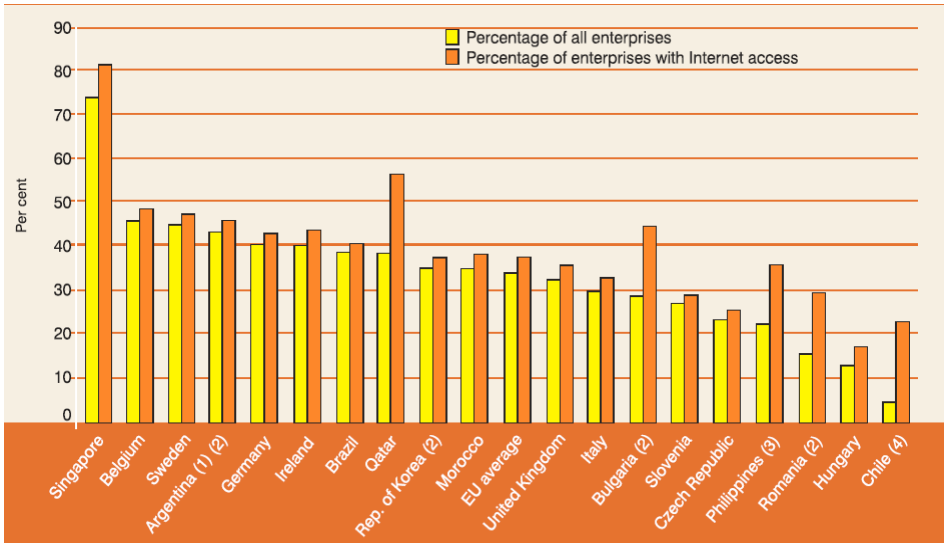
E. Other e-business

25. Other e-business refers to the use of the Internet for internal business processes and for interactions with government institutions (e-government). Also, remote work via the Internet and the use of the Internet for human resources development, which is often termed e-learning and refers to training that is provided through ICT structures, are of interest with respect to Internet use in enterprises.

26. In 2003, sharing and editing documents collaboratively was by far the most important e-business activity in developed countries (30–40 per cent of enterprises), followed by online applications supporting human resource management (15–30 per cent of enterprises). There are no available data on such e-business activities from developing countries. Accordingly, the presence of an intranet is used as a proxy in order to compare developing countries and developed countries (in this case, the EU). Thus, 34 per cent of enterprises (excluding the

financial sector) in the EU had an intranet in 2005. As the figure below shows, there are wide variations across developing countries. At a more disaggregated level of data, in developed and developing countries alike, firm size and ICT intensity per industry sector determine varying levels of intranet use and should be taken into consideration when comparing the data.

Figure 3. Enterprises using intranet,* 2005 or latest available year

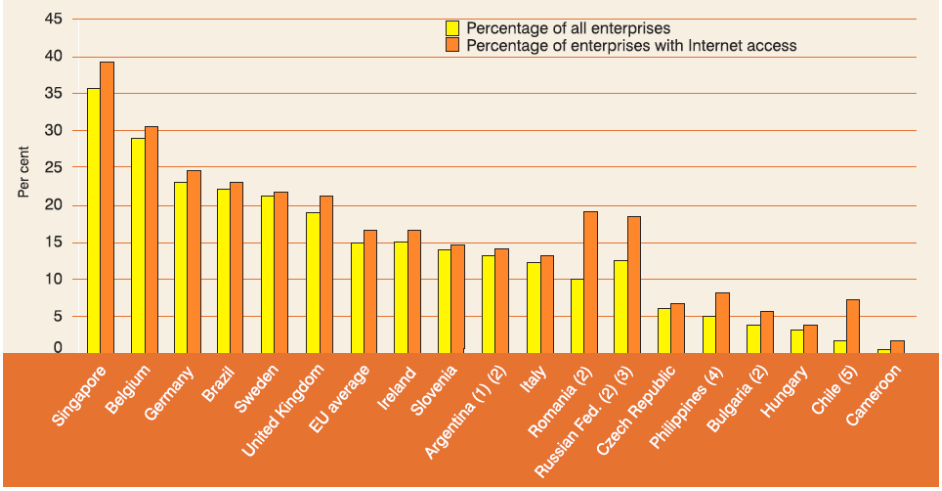


*Enterprises with 10 or more employees.
Notes:
(1) Survey of the manufacturing sector only.
(2) Reference year is 2004.
(3) Reference year is 2001. Refers to establishments with average total employment of 20 or more.
(4) Reference year is 2003. A breakdown by number of employees is not available, so the figure could include micro-enterprises with 0-9 employees.
Source: UNCTAD e-business database, 2006, and Eurostat, 2006.

27. The use of an extranet can indicate an even more evolved e-business capability, since it allows interaction with external users. The added complexity means that there are usually fewer enterprises using extranets than intranets. SMEs constitute the majority of enterprises and employment in developing countries, and thus their access to and use of ICTs deserves special attention. The Internet can provide SMEs with market and trade information and reduce the cost of communication with customers and suppliers. SMEs can also use ICTs for e-business applications, although they have a lower capacity than large enterprises to adopt ICTs, usually owing to fewer resources for ICT investment and also because of less accessibility to e-business know-how. As a general rule, there is a gap between SMEs and larger enterprises in the use of e-business applications, and the gap tends to widen as the complexity of the application increases. Although the reasons for this vary depending on economic sectors and among countries, SMEs might also find that e-business applications for internal business processes might not be suitable for their size and industry, or are not affordable. For example, only 9 per cent of EU enterprises with 10 to 49 employees use

enterprise resource planning systems (ERPs), as opposed to 59 per cent of enterprises with more than 250 employees.[7]

Figure 4. Enterprises using extranet,* 2005 or latest available year



*Enterprises with 10 or more employees.
Notes:
(1) Survey of the manufacturing sector only.
(2) Reference year is 2004.
(3) Enterprises with 50 or more employees.
(4) Reference year is 2001. Refers to establishments with average total employment of 20 or more.
(5) Reference year is 2003. A breakdown by number of employees is not available, so the figure could include micro-enterprises with 0-9 employees.
Source: UNCTAD e-business database, 2006 and Eurostat, 2006

28. Information from developing countries and transition economies 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 in developed countries in terms of the gap between SMEs and large enterprises, with some exceptions as shown in table 2. It should be noted that, unlike most developed countries, several developing countries collect data on Internet e-business in micro-enterprises (0–9 employees), which are important actors in their economies and societies.

[7] See E-Business Watch (2005). The European E-Business Report, 2005 edition, Luxembourg: Office for Official Publications of the European Communities.

Table 2. Use of the Internet for e-business activities broken down by company size, 2005 or latest available year

	Internet banking			E-government			Online customer services			Delivering products online		
	Micro-enterprises (0–9 employees)	SMEs (10–249 employees)	Large enterprises (250 or more employees)	Micro-enterprises (0–9 employees)	SMEs (10–249 employees)	Large enterprises (250 or more employees)	Micro-enterprises (0–9 employees)	SMEs (10–249 employees)	Large enterprises (250 or more employees)	Micro-enterprises (0–9 employees)	SMEs (10–249 employees)	Large enterprises (250 or more employees)
Argentina (2004)[a]	25.0	67.0	82.6	12.5	44.6	59.6	19.4	35.3	36.6	2.8	4.5	4.2
Bulgaria (2004)	..	25.6	56.8	..	31.4	65.2	..	3.5	8.4	..	1.1	2.7
Kazakhstan	..	..	..	..	..	..	10.0	17.8	31.7	..	..	..
Kyrgyzstan[b]	..	..	..	..	..	..	..	..	..	0.4	1.4	4.2
Morocco[c]	8.1	33.0	50.0	..	..	..	..	..	..	..	..	..
Romania	5.2	24.4	58.9	0.3	10.0	21.8	..	..	..	0.4	1.9	2.4
Russian Fed. (2004)[d]	..	..	..	..	..	..	1.0	3.0	5.4	1.2	3.4	5.6
Singapore	25.0	57.7	63.0	..	..	..	..	..	..	16.0	35.6	53.0

Notes:
[a] Survey of the manufacturing sector only.
[b] Of enterprises with computers.
[c] Survey does not cover enterprises with fewer than 5 employees.
[d] Micro-enterprises refer to 0-49 employees; SMEs refer to 50-199 employees; large enterprises refer to +199 employees
Source: UNCTAD e-business database, 2006.

F. Trade in ICT-enabled services

29. World exports of ICT-enabled services grew faster than total services exports during the period 2000–2003, thus creating new export opportunities for developing countries. Both developed and developing countries saw their ICT-enabled services exports expand between 1994 and 2004. This growth became stronger after 2000. Between 2000 and 2003, exports of ICT-enabled services from developing countries grew at a compounded annual rate of 7 per cent, compared to 10 per cent for world exports of ICT-enabled services, although some developing countries did show exceptionally high growth rates. After 2003, trade statistics suggest a strong recovery for ICT-enabled services exports from developing countries. In 2003, such exports from developing countries grew at an annual rate of 20 per cent, while the rate in developed countries was 17 per cent. 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 that ICT-enabled sectors were worth represented about 45 per cent of total services exports, compared with only 37 per cent in 1995.

30. Trade in ICT-enabled services carried out through the foreign affiliates of multinational companies largely exceeds conventional export and import flows of such services as measured by 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.

31. Computer and information services 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 after 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.

G. ICT and growth

32. The following paragraphs present some results from UNCTAD's work on measuring the impact of ICTs on GDP growth in developing countries as an indication of the starting point from which further research work needs to be undertaken. Most existing research on measuring ICT impact has focused on developed countries. To extend the work on ICT impact measurement to developing countries, in 2005 UNCTAD carried out empirical research on the macroeconomic impact of ICTs with special focus on developing countries and using the Orbicom infodensity model as a basis. The analysis is based on the Infodensity composite index developed by the Orbicom Digital Divide Initiative, which defines Infodensity as "representing the ICT productive function of an economy", composed of ICT-enhancing capital and labour.[8]

33. The goal of the UNCTAD analysis was to estimate whether a relative measure of ICT uptake can justify differences in output growth on a more global scale.[9] ICT uptake was found to be highly correlated with per capita GDP at purchasing power parity (PPP). The ICT/GDP relationship appeared to have grown more robust, with the 2003 values more evenly distributed along the regression line, confirming a strong linkage between the level of ICT advancement of a country and per capita GDP. On average, GDP levels seem to have become more responsive to changes in ICT uptake.

34. Since the correlation between ICT uptake and GDP per capita provides no proof of a causal relationship, a panel data estimate was run to measure the impact of ICTs on per capita GDP within a more comprehensive growth model framework, taking into consideration data on investment, trade, population growth and inflation.[10] The results suggest that ICTs have a positive effect on income growth. In addition, the estimated elasticity coefficients (which help capture the relationship between the ICT and GDP growth rates) indicate that a 1 per cent increase in the Infodensity index of a country would result, on average, in a 0.1 per cent increase in per capita GDP in 1996 and in a 0.3 per cent increase in 2003.

35. The model was also run separately for five different country groups with different levels of ICT uptake, on the assumption that economic growth has not been equally sensitive to changes in the ICT indicators across different levels of ICT performance. Results suggest that, over time, countries with lower ICT endowments could catch up, given the upward trend

[8] See Orbicom (2003). Monitoring the Digital Divide…and Beyond, Quebec: National Research Council of Canada.
[9] See chapter 1 of the IER 2006 for information about the data and methodology used in the study to which these remarks refer.
[10] The model is specified in chapter 1 of IER 2006.

of their coefficients. The lower results of the least-ICT-endowed countries could indicate an insufficient or inefficient incorporation of ICTs into the production processes of those countries. Market rigidities (such as difficult access to credit, lower degree of technological advances diffusion, lower rates of enrolment in higher education resulting in limited high-skilled labour endowments, etc.) could limit a more efficient incorporation of ICTs into the production process in the countries concerned, preventing them from taking full advantage of their ICT-related investments. Another explanation could be stronger spillover and network effects. Countries with a higher ICT stock could theoretically benefit from a higher level of interaction of their domestic ICT networks, thus creating added value at very low cost and achieving higher productivity gains.

36. Results show that ICT adoption can make an important positive contribution to gains in per capita income – even in poorer countries. However, the best results are retrieved from group estimations for the intermediate level of ICT uptake. In other words, countries with similar shares of world GDP and ICT uptake seem to be benefiting most from the opportunities provided by ICTs. Since human capital is a central component of the Infodensity index, the results strongly reflect the level of skills and education available in the countries as a key determinant for the impact of ICTs on development.

37. Achieving certain levels of ICT uptake and education therefore seems to be of great importance in order for countries to be able to benefit from ICT. In this context, Governments have a critical role to play in the creation of an enabling environment through their national ICT plans and policies to promote ICT diffusion among economic and social actors. The ICT policy reviews discussed in the following section have been developed by UNCTAD as instruments to support interested developing countries in these efforts.

II. REVIEWING NATIONAL ICT POLICIES FOR THE INFORMATION ECONOMY

38. In 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 usage 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, 80 had already adopted a national ICT plan and 36 were in the process of defining one. Given these numbers, the question arises as to the impact of the plans and policies that are being implemented. Also, ICT policies are dynamic tools that must be continuously updated in order to keep up with national, international and technological developments There is therefore a need to review the status of national ICT plans and to understand the impact they have had so far on economies and societies.

39. Assessing national ICT policies and their impact is a current concern in most countries. Several developed countries, for example Austria, Denmark and Norway, have already implemented a systematic policy evaluation process to make policy decisions more effective. In this context, they have developed a comprehensive set of internationally comparable ICT indicators in conjunction with the Organisation for Economic Co-operation and Development (OECD). As part of its work on the contribution of ICTs to sustainable economic growth, OECD carries out national peer reviews of ICT diffusion to business. These country reports review the status of diffusion of ICTs, describe policies and provide specific recommendations aimed at ICT uptake in enterprises.

40. As for developing countries, only a handful of them (for example Chile, Cuba, Dominican Republic, Egypt, Nepal, Oman, Republic of Korea, Rwanda, Syrian Arab Republic and Thailand) have so far carried out an assessment of their national ICT plans. The format and scope of their evaluation vary, but their assessments are all motivated by the need to ensure that appropriate revisions of priority policies and recommendations are formulated in preparation for new ICT plans to accelerate socio-economic development.

41. In general, the benefits that Governments can derive from conducting ICT policy reviews include the following:

(a) An understanding of the policy challenges and opportunities that ICTs present for the information economy;

(b) A quantitative assessment of the main achievements regarding the implementation of a number of ICT policy measures as foreseen in national ICT plans;

(c) The identification of critical success factors, best practices and conditions, as well as reasons for failure, to be able to adjust and reform ICT policies;

(d) The formulation of new and targeted policy decisions to support and accelerate ICT penetration with government, businesses and the community.

42. Currently, there are no international guidelines that developing countries could use to define and implement such ICT policy reviews comparable to, for example, the OECD peer review process mentioned above. That is the reason why, as part of its ongoing work on ICT policies and e-business for development, UNCTAD has developed a model framework for carrying out national ICT policy reviews.

43. UNCTAD's model ICT policy review framework for developing countries is described in detail in chapter 2 of the IER 2006. The framework comprises three main components, based on selected best practice country examples and successful ICT policies from developing countries:

(a) A review of the general economic environment and ICT diffusion to assess the extent to which ICTs are available and used in the country;

(b) An assessment of the key policy components of the national ICT master plan and their implementation: ICT infrastructure, legal and regulatory framework, the development of ICT human resources (capacity building), and the development of sector-specific policies and ICT applications to promote e-business, e-government, ICT-related trade and investment policies, and technological innovation; and

(c) An assessment of the institutional framework, implementation mechanisms and the roles of each stakeholder.

44. An ICT policy review should start by restating the objectives of an active or proposed national ICT policy. It reviews the policy against the backdrop of the economic, demographic and social environment in the country. It points out factors that can affect the implementation of the national ICT policies, and then provides a short overview of the major national economic and social key indicators at the time of the preparation of the ICT master plan and at the time of the review.

45. The second component begins with an overview of a country's ICT uptake, focusing on the current status of ICT penetration for different economic actors. As part of the national ICT plan, it is critical for Governments to set measurable targets which then need to be assessed, for example in terms of the link between ICT policies and the performance of specific sectors, ICT growth and use over time, or the impact of ICTs on productivity, growth, enterprise development and trade. In addition to the core ICT indicators recommended by the international community, national ICT policy reviews should assess the development of other information society indicators, such as ICT skills and computer literacy, the level of investment in ICTs, and indicators related to e-government and education, security and trust.

46. The framework for ICT policy reviews also includes the examination of the national ICT policies that have been put in place by the Government and a discussion of whether they have been successful in terms of meeting initial goals. It identifies the components of a national ICT plan, priority actions, sectors concerned, targets and relevant projects. If necessary, it also recommends how the policies can be improved. The primary focus is on the review of policies implemented to accelerate ICT diffusion in a country and identify successful achievements as well as bottlenecks. Specific recommendations on action needed to achieve the policy objectives are provided. Aspects to be covered include the following:

(a) Objectives, priority areas and strategic approach;

(b) ICT infrastructure development;

(c) Legal and regulatory framework;

(d) Development of ICT human resources/skills;

(e) Business development;

(f) E-government;

(g) ICT-related trade and investment policies; and

(h) Technological innovation.

47. The third component of the reviews, namely the assessment of the institutional framework and implementation mechanisms, considers the adequacy of implementation mechanisms and the institutional framework and the extent to which changes have to be made to implement the policies contained in the ICT master plan. The focus is on the role of the main bodies that formulate, implement and monitor ICT plans through the collaboration of all stakeholders. Issues to be looked at include:

(a) The integration of ICT policies within national development plans;

(b) The institutional set-up for implementation mechanisms of the national ICT policy master plan;

(c) Financial resources; and

(d) The monitoring of the implementation of ICT policies.

48. The proposed framework is, of course, a generic one that should be considered as a basis that will have to be adapted to the needs of each developing country, and it could include additional elements to reflect specific national aspects not covered by the model.

49. Potential challenges related to the use of the proposed model review may include:

(a) The limited availability of information related to the implementation of policy measures, including data, achievements and failures;

(b) The lack of defined indicators of achievement, both qualitative and quantitative, which can be used to benchmark and assess ICT policies;

(c) The lack of commitment on the part of the relevant stakeholders in charge of policy planning and implementation to provide information, as well as their lack of willingness to conduct self-appraisals;

(d) Potential institutional conflicts among different (public and private) stakeholders; and

(e) The limited participation of relevant stakeholders in the evaluation process.

50. Developing countries that are considering carrying out an ICT policy review should pay attention to the following:

(a) Planning the adequate timing of the review is essential. Time requirements vary and are subject to the demand of each country, while largely depending on the progress made in the implementation of the ICT master plan;

(b) Clearly defining policy objectives and indicators of achievement at the time the policy decisions are made is vital for assessing the success of a measure and planning future policy decisions; policymakers need to be able to establish such evaluation indicators, and they should work closely with National Statistical Offices to obtain relevant statistical data;

(c) Committing financial resources is a prerequisite for undertaking a review; and

(d) Promoting a multi-stakeholder process helps temper potential conflicts between stakeholders and increases the commitment of all involved.

51. A sustainable, long-term-oriented national ICT master plan calls for the implementation of continuous monitoring and evaluation procedures at different levels. The implementation process itself is a comprehensive and gradual process that cannot be realized overnight. Policy reviews demand a continuing and sustainable commitment by all relevant stakeholders. Policy makers should guarantee this through the definition of clear monitoring and evaluation procedures, including a realistic time frame, the creation of budgetary mechanisms and the assignment of roles and responsibilities. These notions apply to all countries, regardless of how advanced their ICT policy and review process is:

(a) Countries that are at an early stage in formulating and developing their ICT master plan can already start anticipating an ICT policy review by ensuring the integration of monitoring and evaluation procedures into their master plan;

(b) Countries whose national ICT master plan is at an advanced stage should review their monitoring and evaluation procedures and try to optimize them on an ongoing basis;

(c) Countries that have already defined monitoring and evaluation procedures should make sure that reviews are carried out regularly, including the measurement of related ICT indicators.

52. As part of its technical cooperation activities, UNCTAD offers to carry out country reviews to help developing countries adjust their ICT policies and implementation mechanisms aimed at developing the information and knowledge-based economy. The reviews would assess the implementation of national ICT master plans within the context of UNCTAD's mandate to examine how ICT and e-business development issues have been operationalized in country development strategies and to identify policies and programmes favouring the development of the information economy. Specific e-business policies and cross-cutting policies that are intimately linked to the development of the information economy would be evaluated. Other components that form an integral part of an ICT national master plan, such as sectoral policies related to ICT and social development, including health and culture, could be added in partnership with other relevant organizations (e.g. WHO, UNESCO). ICT policy reviews would be carried out at the request of and in close cooperation with member States and would be subject to available funding.

53. An integral objective of ICT policies for development that would be reviewed as part of the proposed exercise is poverty reduction. The following paragraphs briefly introduce some elements of a policy framework that might help policy makers and other stakeholders to include a strong pro-poor component in their ICT policies and interventions.[11]

54. ICTs hold a potential to contribute to poverty-reduction strategies. However, for this potential to materialize fully, a better understanding among policymakers and practitioners of the role of ICT in poverty-reduction policies and programmes may be needed.

55. A direct contribution of ICTs to poverty reduction can come from its effects on overall economic performance by improving productivity and competitiveness and hence economic growth and job creation. But ICTs may also contribute to poverty reduction in several other ways. For example, ICTs can enhance poor livelihoods by providing poor people with access to relevant market information at an affordable cost. They can complement specific pro-poor programmes so that they reach more people or become more cost-effective. And they can help bring down institutional barriers to poverty reduction, for example by increasing transparency.

56. Current thinking on this question[12] tends to conclude that the potential contribution of ICT to poverty reduction is significant but dependent on conditions that include, among many others, the availability of basic infrastructure, skills and political will. To support policy-makers in this area, UNCTAD proposes a Pro-poor ICTs Framework to help examine the extent to which an ICT policy or programme under consideration can be considered "pro-poor". The framework is intended to help policy makers understand, question and propose pro-poor ICT interventions. It questions key areas to meet the needs of the poor, such as connectivity (is the technology accessible and affordable?), community (who benefits from

[11] See chapter 3 of IER 2006 for a detailed description of the proposed framework.
[12] A review of literature on ICT and poverty reduction is included in chapter 3 of IER 06.

the intervention?), capital (are there sufficient financial resources?), or coherence (is the ICT strategy/programme coherent with development strategies?).

57. Based on these considerations, ICT policy makers 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 adopt best practices in ICT-related poverty reduction interventions. They may also consider supporting approaches, including participation and decentralization, that enable the poor to be heard and participate.

III. ICT, E-BUSINESS AND INNOVATION

58. The final part of this note refers to another set of policies mentioned above among those that any national ICT policy review should consider, namely science, technology and innovation. Science and technological innovation are strongly linked to ICT development, but their crucial development role extends much more broadly. Science and technological innovation are essential for the overall social and economic development of a country. They contribute to development by providing the means to address specific development problems that a society may be facing (for example, improving health care) and by enhancing productivity, thanks to which economic growth and development can proceed faster.

59. Innovation is more than the deployment of more advanced machines or computers: it is a process of social change. This was recognized, for example, in the Tunis Agenda for the Information Society, which refers to the importance of an enabling international and domestic policy environment for encouraging investment and innovation, as well as to the driving role that civil society and the private sector have in innovation. In earlier phases of the development of the information economy, ICT tended to be seen as one of the main drivers of innovation, probably the leading one. As the deployment of ICT has progressed to reach nearly universal prevalence in the enterprises of developed countries, ICT has become not a driver but a prerequisite for innovation to happen, at least in the context of the more scientifically and technologically advanced countries. In other terms, the capacity of enterprises to compete with other enterprises by introducing new products, services or productive processes no longer depends on their levels of ICT equipment (which does not differentiate them much from their rivals), but on their levels of ICT absorption, the extent to which they incorporate ICTs into their business processes and how profoundly these have changed as a result. In other words, in developed economies innovation has become more a matter of adopting e-business than of deploying ICTs. E-business becomes an enabler of innovation. The long-term effects on innovation and hence on productivity and growth, such as those referred to in part I, section G, of this note, derive from the reshaping of business structures and processes through the adoption of e-business.

60. Developing country policy in this area should take into account the fact that the process through which e-business adoption leads to faster innovation and improved competitiveness is not a simple one, and it is not one that is likely to be immediately replicable across economic sectors or business environments. The organizational change that must accompany the introduction of e-business for it to enable innovation is strongly dependent on non-ICT elements, such as the ability of workers to acquire new ICT-related skills, or the organization’s capacity to manage knowledge. This is particularly relevant for SMEs, where tacit knowledge, which needs to be codified and protected before it can be managed using ICT, can represent a considerable share of their knowledge capital. Financial

and regulatory conditions also affect the effectiveness of e-business as an enabler of innovation.

61. What makes e-business different from the other factors affecting innovation is that it is quickly becoming a factor present in all business processes, from product design to after-sales service, and from procurement to personnel management, and this is happening in all business sectors. Accordingly, policies to support innovation cannot be conceived without full-fledged consideration of ICT and e-business.

62. Developing countries whose enterprises are achieving higher levels of ICT adoption may consider the need to shift the focus of their e-business policies from awareness and ICT acquisition towards the support of e-business as an enabler of innovation and organizational change. This reinforcement of the linkages between ICT and innovation policies (defined as policies aiming at supporting the creation, adaptation and adoption of new or improved products, processes or services) should not be seen as making innovation policy more oriented towards technology: e-business-led innovation has a strong influence on work methods, business organization, product design, marketing, customer relations, etc. In practice, few developing countries have adopted what could be called a “modern” approach to e-business and innovation (in the sense of the blurring of the border between innovation and e-business policies). In most cases, a distinction is still made between the policies dealing with innovation from the technological point of view (managed by ministries such as education or science and technology) and innovation as an instrument for firm and economy-wide modernization and competitiveness (managed by the economic ministries).

63. Since the innovation-related impact of e-business is increasingly visible in many economic sectors and activities, developing countries should also examine their innovation policies from the view point of how their sectoral instruments and interventions interact with each other. Coordination may be achieved by bringing all e-business and innovation policies under the supervision of a single public entity. Another approach may be to address the problems of policy coordination through the involvement of as many stakeholders as possible, both within the public sector and from private e-business users. This second approach may bring about a better balance between top-down and bottom-up policy-making. The greater the integration and interaction of and among stakeholders, the more successful a system of research and innovation is likely to be. Developing countries, however, often reveal a lack of integration capacities. Here, Governments play a crucial role in creating research networks at national, regional and international levels.

64. An important aspect of the question for developing countries, given the predominant role of SMEs in their economies, is how to make smaller enterprises more innovative. A useful approach in this regard may be the consideration of new business models in which firms operate as members of business networks. Another aspect to consider is the fact that the pace at which innovations are being adopted by competitors is accelerating. This represents a particular challenge for SMEs, and makes the dynamics of innovation a factor that should be given particular consideration in innovation policies that target SMEs.

65. For SMEs to become committed to innovation, it is also important that policy interventions are perceived as immediately delivering an enhancement of their capabilities. They must understand how e-business and innovation will improve their performance. E-business should not be seen as a complement to what they already do, but as a fundamental part of the development and long-term sustainability of the enterprise.

66. The interaction between e-business and innovation presents an equally new problem to policy makers in developed and developing countries. However, given the earlier stage of adoption of e-business in most developing countries, there is an opportunity for developing countries to analyse and adapt international best practice. However, the transfer of the e-business-led innovation experience from country to country and from sector to sector presents considerable difficulty. For example, for a given policy to be considered "best practice", its results need to be measured and benchmarked. This requires some temporal perspective, which is impossible to achieve unless policy goals and instruments are kept in place for a minimum amount of time. While it is important that policies evolve and adapt, particularly through interaction with all stakeholders, innovation policies cannot succeed without some level of continuity.

67. In spite of these difficulties, some general observations can be made about the main features of the approach that developing countries could consider in order to reinforce the links between their e-business and innovation policies:

(a) Their innovation policies should be made accessible and visibly relevant to SMEs. Presentation of policy programmes is crucial;

(b) Success requires continuity. Polices should be assessed and evolve through adaptation;

(c) The instruments to be used should be easy to integrate into the strategies and plans of enterprises. For this, policies must address real business issues, as enterprises see them;

(d) Given its effects across sectors and business activities, e-business should be integrated into overall development strategies and policies, beyond innovation. There is a need to develop a policy framework that treats ICT, e-business and innovation in a coherent manner.

CONCLUSION

68. ICTs and e-business can have a significant positive impact on development by enabling enterprises to take full advantage of technological progress and innovation. In order to ensure that this potential is exploited, Governments need (1) to benefit from reliable and internationally comparable information about ICT and e-business adoption and use, and (2) to conduct ICT policy reviews, including pro-poor ICT policies when relevant.

69. This emphasizes the need to explore in-depth the policy aspects of ICT and e-business for development, including the question of financing ICT for development as referred to in part B of the Tunis Agenda for the Information Society.

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