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MEASURING BUSINESS ACCESS TO ICT

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The views expressed are those of the author and do not necessarily represent the views of the International Telecommunication Union or its Members.

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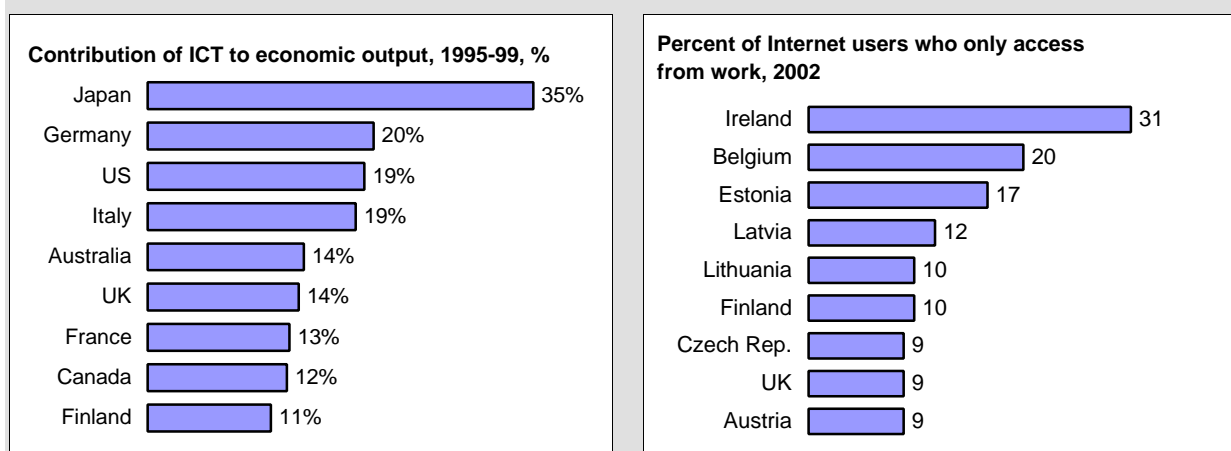
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What to measure

The availability of ICT in the business sector has several economic and social implications. Investment in ICT by business contributes to economic growth by making firms more productive (Figure 1, left).¹ ICT makes firms more competitive, network ready and able to exploit new trading opportunities such as electronic commerce. ICT in enterprises also helps spread Internet access for those who have no place else to log on (Figure 1, right).

Figure 1: Importance of ICT in business



Source: ITU adapted from OECD, SIBIS.

Given the importance of ICT for business, techniques for measuring the penetration of equipment and services such as computers and Internet access are needed. Most countries have a large number of companies so a census of all of them would be impractical. The standard approach is to survey a sample of enterprises that are representative of all the businesses in the country. Business surveys are common in many countries and typically carried out by national statistical offices on the basis of company registers. However these surveys have not traditionally included ICT questions and for many developing nations, guidance is needed in this area.²

Unsurprisingly much of work in the domain of ICT in the business sector has been carried out by developed nations and inter-governmental organizations whose members represent advanced economies. Model questionnaires have been designed by the organizations in order to enhance international comparability.³ The type of information collected can be classified into four areas:

¹ A nine country survey found: "Over the past two decades, ICT contributed between 0.2 and 0.5 percentage points per year to economic growth, depending on the country. During the second half of the 1990s, this contribution rose to 0.3 to 0.9 percentage points per year." See *ICT Investment and Economic Growth in the 1990s: Is the United States a Unique Case? A Comparative Study of Nine OECD Countries*. [http://www.oalis.oecd.org/oalis/2001doc.nsf/linkto/dsti-doc\(2001\)7](http://www.oalis.oecd.org/oalis/2001doc.nsf/linkto/dsti-doc(2001)7)

² One consideration is whether ICT should be included in existing business surveys or be a separate survey.

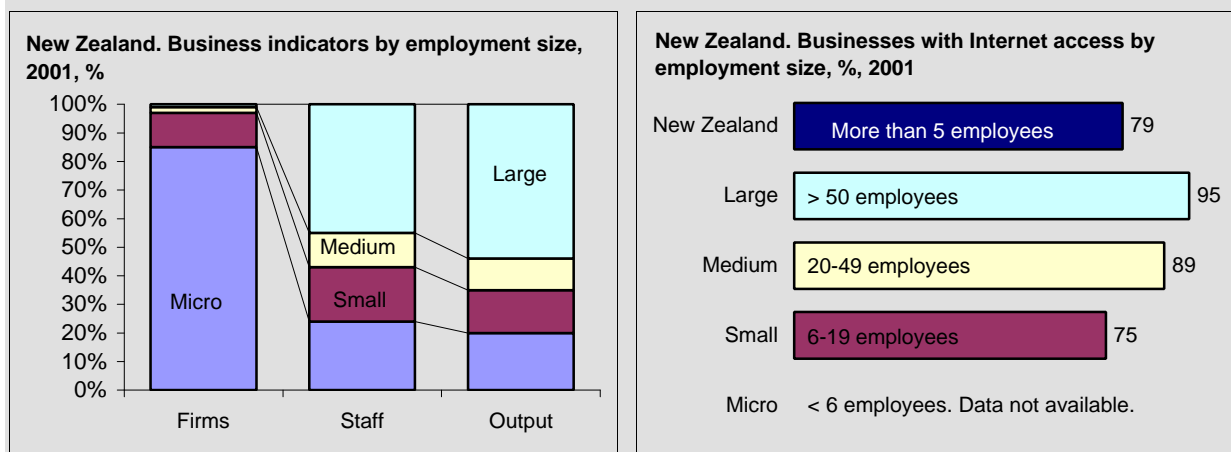
³ For example see the description of the "OECD Model Questionnaire on ICT Usage and Electronic Commerce in Enterprises" in OECD. *Measuring the Information Economy 2002* <http://www.oecd.org/dataoecd/34/15/2771167.pdf>. A copy of the questionnaire is available here:

1. Access such as whether firms use computers or the Internet.
2. Usage such as what type of connection is used to access the Internet and whether a firm has a web page.
3. Electronic commerce such as Internet sales and purchases.
4. Benefits and barriers related to ICT usage.

Raw data from surveys are compiled into indicators such as the percentage of firms with a computer or Internet access to facilitate analysis and comparability. Just as Internet user surveys are disaggregated by variables such as age, gender and educational attainment, statistics on the use of ICT in business are typically disaggregated by firm size (e.g., in terms of number of employees) and classification (e.g., primary, manufacturing, services).

Few countries actually provide a complete picture of business ICT usage. In many surveys, primary-producing industries such as agriculture are omitted. Furthermore, many countries do not include micro or small business enterprises in surveys and international comparisons typically only show usage for firms with 10 or more employees. This can give a misleading impression of the extent of business ICT penetration and points to the danger of blindly comparing data between countries without carefully reading definitions. In practically every country, the number of micro and small enterprises far exceeds the number of larger establishments. Though they tend to have a lesser impact on employment and output, omitting micro and small enterprises presents an analytical challenge. Because smaller establishments tend to have fewer ICT, excluding them distorts the true level of business ICT usage. Take New Zealand where micro enterprises (less than 5 employees) comprise 85 per cent of all firms. These firms are not included in business use of information technology surveys (Figure 2).

Figure 2: ICTs and firm size



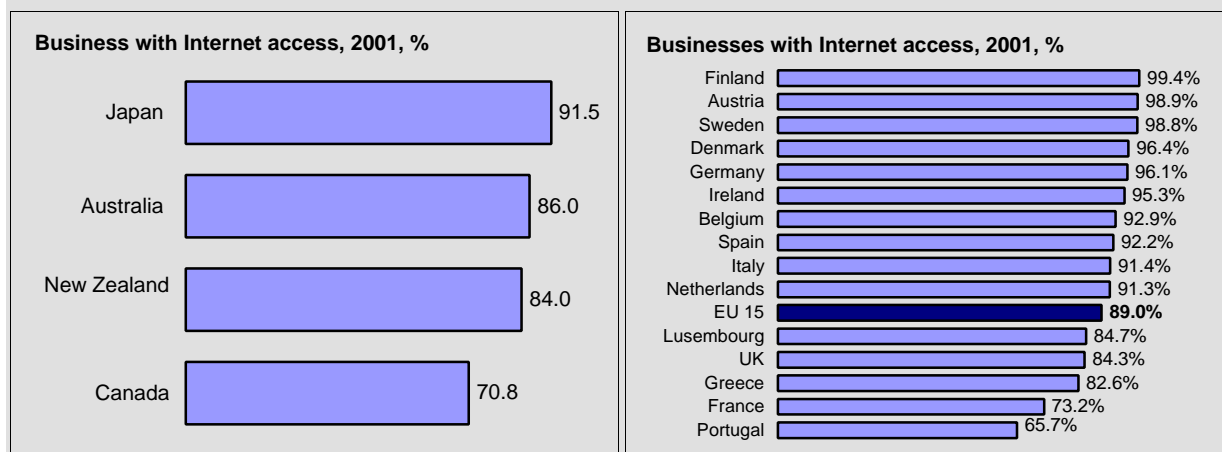
Source: ITU adapted from Ministry of Economic Development (New Zealand), Statistics New Zealand.

As the focus of this report is to examine access to ICT, the primary concentration is the availability of ICT in enterprises. This is fundamental since measuring the level of business access to ICT is a precursor for analyzing the use to which it is put, the adoption of electronic commerce as well as barriers and benefits.

Indicators in action

The Organization for Economic Cooperation and Development (OECD) has disseminated results based on its model questionnaire (Figure 3, left).⁴ The European Union (EU) has published indicators on business use of ICT in its member countries (Figure 3, right).⁵ It has identified business indicators as part of its eEurope benchmarking exercise and proposes an e-business index based on a composite of various indicators (see Table 1). Surveys will be carried out in 2003 (and thereafter on an annual basis) by national statistical institutes based on questionnaire developed by Eurostat.

Figure 3: Business with Internet access in the OECD and EU



Source: ITU adapted from OECD, EU.

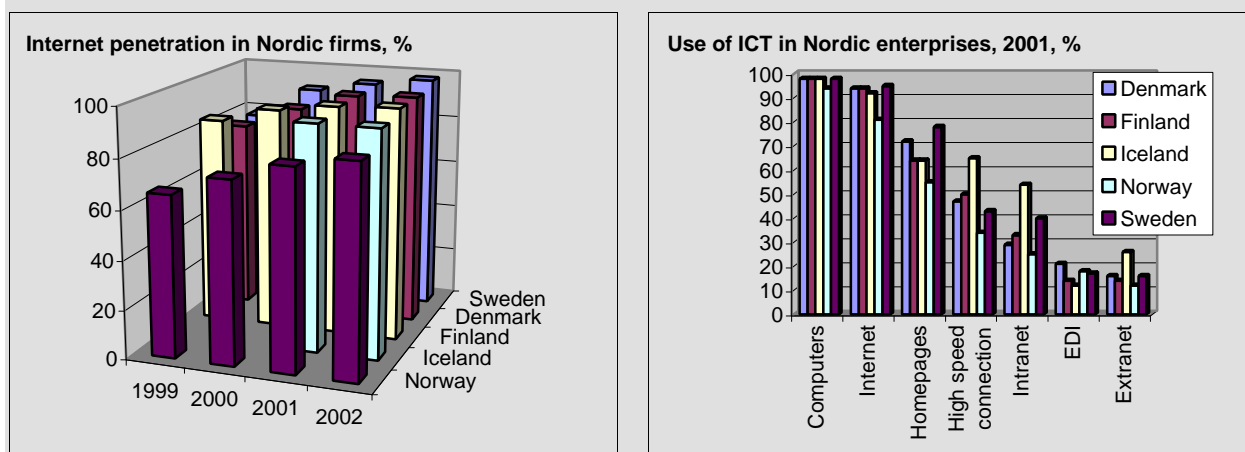
The Nordic countries have been publishing data on business adoption of ICT since 1999 enhancing the analysis of development over time (Figure 4, left).⁶ The region is highly technological with almost all firms possessing a computer and close to 90 per cent having Internet access in almost all of the Nordic nations. As penetration approaches the limit for traditional ICT such as computers, more sophisticated services are being measured such as high-speed Internet access and Intranets.

⁴ See data available under “Measuring the Information Economy: Access to and use of Information Technologies” on the OECD web site at www.oecd.org/document/62/0,2340,en_2649_34449_2766782_1_1_1_1,00.html. [Accessed 1/9/03].

⁵ « E-COMMERCE ». Flash Eurobarometre 116. Realised by EOS Gallup Europe upon request of the European Commission. February 2002. europa.eu.int/information_society/europe/benchmarking/list/source_data_pdf/ecommerce_rep_en.doc. [Accessed 1/9/03].

⁶ See *Nordic Information Society Statistics 2002*. Available at http://www.stat.fi/tk/yr/tietoyhteiskunta/index_en.html

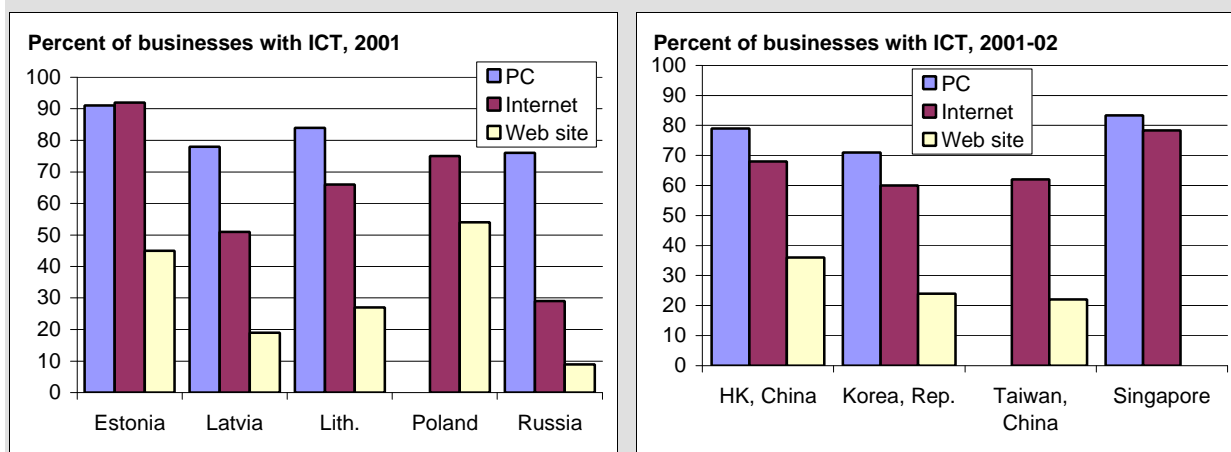
Figure 4: ICT penetration in Nordic firms
 Proportion of enterprises with at least more than 10 employees



Source: Nordic Information Society Statistics 2002.

As a result of these efforts, a core set of reasonably comparable indicators on basic ICT penetration in firms is available for most developed nations.⁷ Due to links with Western European statistical agencies, data for some countries in Central and Eastern Europe is also available. For example, Nordic statistical agencies have extended their expertise to cooperation with the Baltic region with data on ICT penetration in firms available for Estonia, Latvia, Lithuania, Poland and Russia (Figure 5, left).⁸ The Asian Tigers⁹ also regularly compile data on use of ICT in firms (Figure 5, right).

Figure 5: Business ICT in emerging economies



Source: ITU adapted from FIND 2002 (Taiwan, China), IDA 2002 (Singapore), C&SD 2002 (Hong Kong China), NCA 2001 (Korea, Rep.) & Baltic Information Society Statistics (right chart).

This is not the situation in most other developing nations where the availability of statistics is scarce. One result is that the few developing nations that have the data cannot compare to their

⁷ A noticeable exception is the United States. The US Bureau of Census publishes regular data on the value of e-commerce transactions. However, except for the manufacturing sector, there is no official data on the availability of ICT in firms. A private organization carries out surveys on the level of ICTs in SMEs.

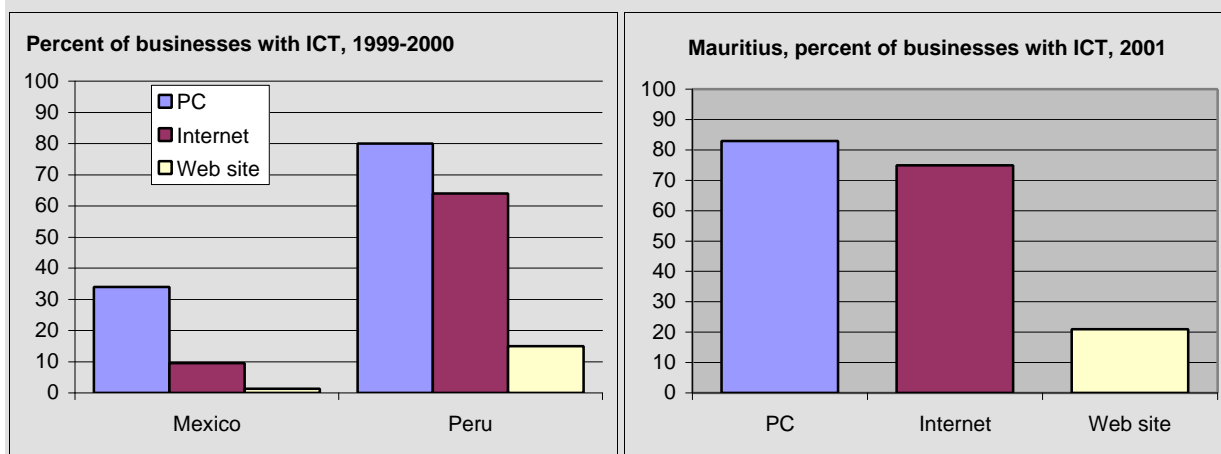
⁸ *Indicators for the Information Society in the Baltic Region*. <http://www.ssb.no/english/magazine/art-2003-07-14-01-en.html>

⁹ Hong Kong, China; Korea (Rep.); Singapore and Taiwan, China.

peers and are left with the frustration of measuring themselves against the high levels already achieved by developed nations. Another consequence is that though developing nations are targeted as one of the main beneficiaries of new possibilities posed by electronic trade, almost nothing is known about their businesses potential to exploit the opportunity.

Peru is one of the few developing nations where the national statistical office has not only compiled enterprise ICT statistics but has also put forth a framework document aimed at encouraging other developing nations to collect information society indicators.¹⁰ Chile and Mexico have also carried out enterprise ICT surveys (Figure 6, left). There are limitations with the Latin American data in terms of comparability, completeness and timeliness. The only other developing nation known to have carried out an official survey on business ICT use is Mauritius (Figure 6, right).¹¹

Figure 6: Business ICT in developing nations



Source: ITU adapted from OECD, INEGI (Mexico, 1999, all firm sizes) and INEI (Peru, 2000, 5+ employees) & NCB (Mauritius, 2001, 10+ employees).

There is unofficial data available for other developing countries, particularly for SMEs that seem to be a special focus of attention. Though the data do not allow for international comparability they give some indication of possible trends in developing nations. In East Africa, a survey was carried out among 300 Small and Medium sized Enterprises in Kenya and Tanzania in early 2000 (Figure 7, left).¹² It is interesting to note that measurement priorities differ in developing nations with the survey compiling data on the availability of a basic ICT such as telephones and fax machines. SME surveys have also been carried out in Costa Rica and several Asian nations including Indonesia, the Philippines, Sri Lanka and Thailand (Figure 7, right).¹³

¹⁰ The enterprise survey is *Indicadores de Tecnologías de Información y Comunicación en las Empresas*. The proposal on information society indicators is *Propuesta de Indicadores de Tecnologías de Información y Comunicaciones para países conformantes de la CEA*. Both are available on the Instituto Nacional de Estadística y Informática (INEI) web site at <http://www.inei.gob.pe/biblioinei.htm>

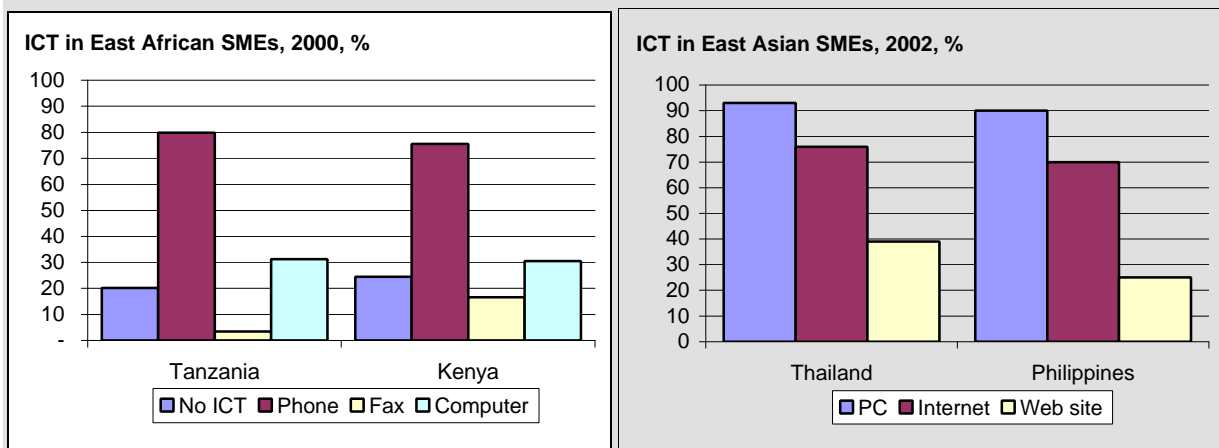
¹¹ See National Computer Board, *ICT Usage Survey 2001*. Available at: <http://ncb.intnet.mu/ncb/survey/ict2001.htm> [Accessed 1/9/03].

¹² Zentrum für Entwicklungsforschung (Center for Development Research), *The Role of ICT for the Performance of SMEs in East Africa*, <www.zef.de/publications/publ_zef_dp.htm - 42>. [Accessed 1/9/03].

¹³ For example see The Asia Foundation, "Regional Survey of SMEs' use of eCommerce in Indonesia, the Philippines, Sri Lanka, and Thailand" at <http://www.asiafoundation.org/programs/prog-glob-sme-ecommerce-ict.htm>

Figure 7: ICT in SMEs

Penetration of ICT in selected East Africa and East Asia countries



Source: ITU adapted from ZEF, "The Role of ICT for the Performance of SMEs in East Africa" & The Asia Foundation, "Regional Survey of SMEs' use of eCommerce."

The experience of the ITU illustrates the difficulty of obtaining enterprise statistics from developing nations. Its Internet Case Study project has analyzed ICT markets in 20 emerging economies since 2000. In support of the project, the ITU developed a simple questionnaire to obtain data about the use of ICT in different sectors of the economy and followed this up with a field visit. The results were not encouraging. Only five economies were able to provide data on enterprise use of ICT, all higher income. This suggests that the statistical divide is strongly economic in its roots. Attempts were made to fall back on surrogate measures. This included a proxy indicator for the number of firms with a web site by using the number of domain names that were registered as commercial (i.e., .COM) in the country. This proved to be an unsatisfactory indicator since not all registered domain names may be associated with active web sites and enterprises may be using domain names outside the country. It is also a leap ahead to attempt to measure companies with a web site before knowing how many have computer and Internet access. Another proxy for enterprises with Internet access could be the number of business Internet subscriptions but most ISPs do not disaggregate let alone provide the data and most telecom regulators do not collect it.

The ITU also circulated the questionnaire to all its statistical contacts in 2003. However few were returned completed, most likely because the information does not exist, or the correspondents (mainly governmental telecommunication organizations) have little if any contact with their national statistical offices.

Conclusions

Business adoption of ICT is crucial for the evolution to an information society. ICT raises productivity, helping to boost economic development. The ability to process electronic transactions are dependent on the level of ICT infrastructure in enterprises. The availability of ICT in business also has a social dimension with many workers developing ICT skills and access to the Internet through their workplace.

These factors make the compilation of business ICT indicators crucial. While most developed nations now compile internationally comparable indicators on the extent of ICT availability in the business sector, few developing nations regularly compile or readily disseminate such statistics. Though there are a variety of indicators to measure business ICT penetration, there is a need to compile a minimum set which would include:

- ?? Percentage of businesses with personal computers
- ?? Percentage of businesses with Internet access
- ?? Percentage of business with a web site

These indicators should additionally be available in a disaggregated form by company size and industry classification. They are a precursor to developing a more comprehensive statistical system for measuring electronic transactions. Surveys should be conducted on a regular basis and at least annually. There are standard modules developed by the OECD and EUROSTAT that could be adapted by developing nations and incorporated into on-going business surveys. Countries should endeavor to provide at least the three indicators listed above by the next World Summit of the Information Society in 2005. In that respect, developed nations might consider assisting developing nations by providing technical assistance in statistical techniques as well as resources so that a comprehensive survey of the level of business ICT adoption can be measured on a global level.

There is also a need to make existing surveys more visible. There are a number of statistical publications on ICT in enterprises, as well as official national surveys and special studies. These can be difficult to locate, as there is no single repository. One idea would be to create an Internet library of this information including links to model questionnaires and other methodological information. An example is provided as Table 2 to this report.

Box 1: Digital divide in enterprises?

If the digital divide in enterprises is understood simply as differences in the prevalence of various information and communication technologies used in separate groups of enterprises, some differences can certainly be pointed out. It must be noted, however, that in many enterprises some forms of ICT can be unnecessary and therefore not in use. It does not mean that these enterprises are behind the times or marginalised. It is obvious that enterprises in different industries and of different sizes need different ICT solutions. With these reservations the clearest differences between the enterprises inside all Nordic Countries are that the smaller enterprises use ICT less often than the larger enterprises. For instance, in Sweden 69 per cent of the enterprises with 10 to 19 employees have homepages while 94 per cent of the enterprises with at least 100 employees have them. The same pattern applies to all countries. A similar pattern can also be seen regarding Internet access. There are also differences between the industries, but the general pattern is not as clear as there is variation between the countries. Generally it can be said, however, that enterprises in the construction sector often seem to be using less ICT and that business services enterprises often appear to use ICT more than other industries.

Source: Nordic Information Society Statistics 2002

Table 1: eEurope e-business readiness indicators

Definition: A mathematical function (to be defined in 2003) combining a number of key internal and external business processes, which enterprises in Member States conduct using integrated digital means.

Source: Eurostat/NSI enterprise survey

Frequency: Pilot study to be carried out in 2003, if satisfactory, annually thereafter with as reference period 1st quarter.

Components of Index:

Adoption of ICT by business

a1. Percentage of enterprises that use Internet

a2. Percentage of enterprises that have a web site / home page

a3. Percentage of enterprises that use at least two security facilities at the time of the survey

a4. Percentage of total number of persons employed using computers in their normal work routine (at least once a week)

a5. Percentage of enterprises having a broadband connection to the Internet

a6. Percentage of enterprises with a LAN and using an Intranet or Extranet

Use of ICT by business

b1. Percentage of enterprises that have purchased products / services' via the internet, EDI or any other computer mediated network where these are >1% of total purchases

b2. Percentage of enterprises that have received orders via the internet, EDI or any other computer mediated network where these are >1% of total turnover

b3. Percentage of enterprises whose IT systems for managing orders or purchases are linked automatically with other internal IT systems

b4. Percentage enterprises whose IT systems are linked automatically to IT systems of suppliers or customers outside their enterprise group

b5. Percentage of enterprises with Internet access using the internet for banking and financial services

b6. Percentage of enterprises that have sold products to other enterprises via a presence on specialised internet market places

Source: European Commission. *eEurope 2005: Benchmarking Indicators*. November 2002.

<europa.eu.int/information_society/europe/news_library/documents/index_en.htm>

[Accessed 1/9/03]

Table 2: ICT in Business

	Source	Year	Firms with (%)			Note
			PC	Inter- net	Web site	
EU						
Austria	ES	2000/01	92	84	54	Businesses with 10 or more employees.
Belgium	EB	2001		93	61	Businesses with 10 or more employees.
Denmark	ES	2000/01	95	91	67	Businesses with 10 or more employees.
Finland	ES	2000/01	98	94	64	Businesses with 10 or more employees.
France	EB	2001		73	59	Businesses with 10 or more employees.
Germany	ES	2000/01	96	88	66	Businesses with 10 or more employees.
Greece	ES	2000/01	85	54	29	Businesses with 10 or more employees.
Ireland						
Italy	ES	2000/01	86	72	9	Businesses with 10 or more employees.
Luxembourg	ES	2000/01	91	55	41	Businesses with 10 or more employees.
Netherlands	ES	2000/01	88	79	47	Businesses with 10 or more employees.
Portugal	ES	2000/01	89	71.78	30.26	Businesses with 10 or more employees.
Spain	ES	2000/01	91	67.04	6.93	Businesses with 10 or more employees.
Sweden	ES	2000/01	97	89.89	67.67	Businesses with 10 or more employees.
United Kingdom	ES	2000/01	92	63.37	49.85	Businesses with 10 or more employees.
Other W. Europe						
Iceland	NIS	2001	98	92	64	Businesses with 10 or more employees.
Norway	NIS	2001	94	81	55	Businesses with 10 or more employees.
Switzerland	NSO	2000	94	78	55	Businesses with at least 5 employees.
C&E Europe & Baltics						
Estonia	BIS	2001	91	92	45	Per cent of enterprises using computers
Hungary	OGS	2001		70	39	Not stated
Latvia	BIS	2001	78	51	19	Not stated
Lithuania	BIS	2001	84	66	27	Not including NACE 45 and 92.
Poland	BIS	2001		75	54	50+, selected industries.
Russia	BIS	2001	76	29	9	
Advanced Asia-Pacific						
Australia	NSO	2001	93	79	38	5+ employees
Hong Kong, China	NSO	2002	79	68	36	10+ employees.
Japan	OGS	2001		68		All businesses.
Korea, Rep.	OGS	2001	71	60	24	15+
Macao, China	OGS	2001	30	16		All businesses.
New Zealand	NSO	2001	88	79	36	> 5 employees
Singapore	OGS	2002	83	78		All businesses.
Taiwan, China	OGS	2002		62	23	All business.
N. America						
Canada	NSO	2002		76	32	All businesses.
USA	NSO	2000		75		Manufacturing only.

	Source	Year	Firms with (%)			Note
			PC	Inter- net	Web site	
Developing						
Mexico	NSO	1999	34	10	1	All businesses.
Mauritius	OGS	2001	83	75	21	10+ employees.
Peru	NSO	2000	80	64	15	5+ employees.
SMEs						
Chile	NSO	2001		22		Including micro. Based on revenue.
Costa Rica	CAATEC	2002	40			1-100 employees.
Indonesia	AF	2001		67	26	12 cities. 5-300 employees.
Kenya	ZEF	2000	30			Food processing, textile and tourism.
Malaysia	NECC	1999	90	55	17	<150 employees.
Philippines	AF	2002	90	70	25	3 cities.
Sri Lanka	AF	2001		83	43	Major business cities.
Tanzania	ZEF	2000	31			Food processing, textile and tourism.
Thailand	AF	2001	93	76	39	5 regions. 5-200 employees.
USA	DB	2002	85	71		Small business.

Note: AF = Asia Foundation
 BIS = Baltic Information Society
 CAATEC = La Fundación Comisión Asesora en Alta Tecnología de Costa Rica
 DB =Dunn & Bradstreet
 EB = Eurobarometer
 ES = Eurostat,
 NECC = National E-Commerce Committee
 NIS = Nordic Information Society
 NSO = National Statistical Office
 OGS = Other official government source.
 ZEF = Zentrum für Entwicklungsforschung (Center for Development Research)

Source: ITU adapted from sources shown above.