Measuring e-Business in Developing Countries

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Reliable and comparable data on how companies use ICTs in their business processes, and the impact this may have on firm productivity and competitiveness, are scarce in developing countries. Currently, few statistical offices measure e-business, for example, through enterprise surveys, and only at a very basic level. Therefore, several international agencies working on the subject matter have joined forces to advance ICT measurement in developing countries. As a first step, a set of core ICT indicators has been developed and adopted internationally, as a basis for data collection and harmonization, and database development. But much more needs to be done, in particular concerning the training of practitioners in developing countries to develop their e-measurement programmes and tools.

- measuring ICT
- ICT indicators
- e-business
- developing countries

1 Introduction

While the global economy is said to undergo profound changes as a result of impressive technological developments, in particular in the area of information and communication technologies (ICTs), little is know about the actual use of ICTs in businesses and their impact on productivity, firm competitiveness, trade and economic development, in particular in less developed countries. As the information society gains momentum, there is an urgent need for reliable data on ICTs and their application in business.

In the late 1990s, most data on ICTs came from a number of private data providers, given the absence of any statistical sources. This has led to far-fetched growth forecasts on the development of, for example, global e-commerce, leading to sweeping statements about the future of the ICT sector and its "revolutionary" impact on the global economy. Following the Nasdaq crash, these forecasts were sharply readjusted and few global estimates on the growth of e-commerce have appeared since then.

This does not mean that e-commerce and the use of ICTs in enterprises has not grown since the beginning of the Millennium. By contrast, ICTs and their application in business play an ever greater role in the global economy. But how can we measure the use and impact of ICTs, and e-business in particular? How can we obtain reliable data that are comparable across industries, countries, and time periods?

Partly based on the attention the so-called "new economy" received as a result of the spectacular growth forecasts in the late 1990s, policy makers in some developed countries demanded more reliable and internationally comparable data. Consequently, a number of national statistical offices (NSOs) started to collect data on e-business, and, more generally, the use of ICT and the Internet. These offices have the advantage of guaranteeing confidentiality of the collected data, having a more neutral position when it comes to collecting and interpreting the data and being able to use their existing methodologies and infrastructure for data collection, processing and analysis. Some countries are already benefiting from the results: they are now in a position to benchmark their economies with competitors internationally; they are able to identify the number of qualified people needed to advance their country's information economy or to calculate the amount of investments needed to provide businesses with access to the Internet; and they have measured the contribution of ICTs to labour productivity growth in firms [1, 2, 3].

One drawback of statistical sources is that the data collection process is slow and the figures are outdated by the time they are published, in particular from the point of view of a business manager. Therefore, today a mix of data can be found. Apart from the official statistics, there are private companies which publish e-business related data based on a variety of sources, aiming at identifying the latest trends, and often focusing on particular sectors or applications.

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The article is based on the results of a number of activities that were carried out jointly by members of the global "Partnership on Measuring ICT for Development", which include Eurostat, the ITU, OECD, UNCTAD, the UNESCO Institute for Statistics, the UN Regional Commissions (ECA, ECLAC, ESCAP and ESCWA), the UN ICT Task Force and the World Bank. The opinions expressed in this article are the author's own and should not be attributed to UNCTAD.

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These data are normally limited in geographical scope and time frame and thus are not suitable for providing a basis for an internationally comparable database on ICT and e-business.

This paper is concerned with increasing the availability of internationally comparable data on e-business, in particular in developing countries. It argues that, as ICTs become key elements of national development strategies in many countries, there is an increasing need by policy makers and other stakeholders for reliable data and indicators on the information society. Such data help them formulate strategies for ICT-driven growth and monitor and evaluate economic and social developments related to ICT; they also help companies take informed business and investment decisions. In summary, being able to measure the Information Society is a precondition for:

- Formulating and assessing ICT policies and strategies
- Monitoring the digital divide
- Evaluating and benchmarking Information Society developments, and
- Documenting the impact of the Information Society on the implementation of internationally agreed development goals (e.g. the Millennium Development Goals) and measuring progress in the use of ICTs to achieve those goals.

The lack of comparable data not only hampers the ability of policy makers and business people to take strategic decisions; it also severely restricts the empirical analysis on trends of ICTs in the context of the information economy, making it difficult to assess the impact of ICT on economic growth, trade, investment and employment. Current research is limited to the use of data on basic ICT infrastructure, such as the number of telephone lines, computers or Internet hosts available in countries (these data are currently compiled by the International Telecommunications Union (ITU); for further information see **www.itu.int**). However, cross-sectoral studies on the economic impact of ICT would require firm-level data on investments in, and use of, ICTs; the enabling resources that have led to the effective use of ICTs; the performance of these enterprises; productivity growth in the ICT-producing sector; changes in the patterns of occupations and skill requirements demanded of the labour force; and general data on the shifts of employment patterns related to changes in production processes resulting from ICTs.

The following section will briefly describe currently available statistics on e-business in both developed and developing countries. It will then present work under way at the national, regional and global level to improve the measurement of ICT, and in particular e-business. The paper ends with a few suggestions on how to move forward.

2 Current availability of e-business data —international data gap

At the country level, e-business related data are primarily collected in more advanced and some emerging economies. Much of this is linked to the methodological work carried out by organizations such as the OECD and Eurostat. For example, since 1997, the OECD Working Party on Indicators for the Information Society (WPIIS) annually brings together statisticians from its member countries to agree on definitions, methodologies and model questions for the collection of ICT data. As a result, a set of comparable ICT indicators is now available for many of the OECD member countries. Similarly, Eurostat works closely with its member countries to produce annual ICT surveys, in response to the eEurope Action Plans, which specify the need for indicators to track progress made in the Information Society. Both organizations compile and maintain databases for their member countries.

In developing countries, the work has just begun. At the national level, some countries have started to collect official ICT business statistics, even if only for a small number of indicators. An assessment of the current data collections of ICT business indicators provides further insights into the availability of such data in developing countries. Based on a metadata survey carried out by the UN Regional Commissions and UNCTAD, with 179 countries in Africa, Asia-Pacific, Central Asia and Central and Eastern Europe (CEE), Latin America and the Caribbean and Western Asia, the following was revealed [4]:

- The overall level of demand for such indicators at the national level is "high" or "very high" (combined 52.5% of those that responded to the question)
- 65 countries (out of 85 countries which responded) do collect some type of ICT business statistics
- Most of the data is about basic access to ICT (such as presence of telephones, computers and the Internet in enterprises)
- The information frequently is collected through manufacturing and services establishment surveys, which most NSOs already have in place (rather than new surveys)
- All regions, except for Western Asia, also collect a limited number of more advanced ICT access and usage indicators (such as presence of website or local network, or modes of Internet access); indicators referring to the type of Internet activities and e-commerce are rarely collected
- The least collected data are about destination of e-commerce sales and barriers to ICT
- More advanced type of data are frequently surveyed through specific ICT business surveys; however, these surveys tend not to be carried out on a regular basis (unlike other types of enterprise or labour force surveys)
- Asia-Pacific and Central Asia and CEE are the regions with the highest number of countries collecting ICT business statistics. In Africa, where 13 out of the 19 respondents were least developed countries (LDCs), few NSOs collect e-business data and many have no defined plans to collect any in the near future. However, since the indicated demand for this region was on average high, it can be assumed that the collection of ICT business statistics is on the agenda but will be implemented over a time frame longer than three years.

Table 1 shows the responses by countries to each of the 20 business indicators. The figures refer to a total of 65 non-OECD members which responded to this section of the survey. The table also shows the responses of 30 OECD countries, to which a shorter version of the questionnaire was sent. In the OECD countries, ICT data collection is considerably more advanced and the planning process largely completed (see low figures in "planning" column). Most countries have been collecting a large number of ICT business statistics for the past few years.

Table 1. Number of countries collecting e-business statistics

	Collecting		Planning to collect		No plan to collect	
	non-OECD countries	OECD countries	non-OECD countries	OECD countries	non-OECD countries	OECD countries
Presence of fixed telephone	40	1	9	0	16	27
Presence of mobile devices	34	3	11	1	18	24
Presence of computer	28	25	11	2	20	1
Number of computer	22	1	14	1	25	26
Presence of Internet access	38	25	10	2	16	0
Modes of Internet access/bandwidth	20	24	12	3	28	0
Presence of local network	19	23	15	1	28	3
Presence of website	26	25	13	2	25	0
Recent ICT Investment	18	5	14	0	29	23
Share of employees using PCs	16	22	18	2	27	4
Share of employees using Internet	11	22	21	2	29	4
Services/activities the Internet is used for	16	22	19	3	27	2
Value of Internet purchases	11	17	15	8	35	2
Value of Internet sales	13	24	15	4	33	0
Customer groups/destination of sales	7	20	15	5	37	3
ICT training for employees	10	18	18	5	32	5
Barriers to PC use	11	0	18	0	31	28
Barriers to Internet use	11	1	19	1	31	26
Barriers to e-commerce	8	21	19	2	32	5
Geographic location of Internet sales	5	17	16	7	38	4

2.1 Data collection at the international level

The above provides a glimpse of the kind of e-business statistics currently collected and by how many countries. What the table doesn't show is that in many developing countries, previous collections of ICT business statistics may have been a one-time survey only, but may not be part of a continuous exercise. In most developed countries, by contrast, ICT enterprise statistics are now collected regularly (annually or biannually) through ICT enterprise surveys. As mentioned before, for these countries, data are compiled by the OECD and Eurostat.

Data compilation at the global level (i.e. outside the OECD countries) is in its initial stage. In 2004, UNCTAD launched what turned into an annual e-business survey, contacting a selected number of NSOs in developing countries to request data on a set of indicators about the use of ICTs in enterprises. The results are published in its annual Information Economy Report (previously called E-Commerce and Development Report) [5].

For the time being, no other global agency compiles e-business-related data based on official statistics. ICT-related enterprise surveys are also carried out by, for example, the World Bank or the World Economic Forum, among others. While the data are not usually publicly available, some of the results are presented in the organizations' publications [6].

3 Producing e-business statistics in developing countries —What needs to be done

Efforts to compile statistics on e-business in developing countries do not only reveal the very limited data available in developing countries, but also many problems with data comparability. For example, size cut-offs of enterprises vary considerably. As a result, one would have to compare the use of ICTs in companies of less than 10 employees in one country with those of more than 200 employees in another. A similar case occurs for sectors – one survey may cover the education sector, another all of manufacturing, yet another the tourism sector. Another major problem, less technical and more of a policy nature, is the lack of internal coordination within a country's statistical system. Due to the cross-cutting nature of ICTs, coupled with their rather recent appearance, ICT-related surveys are carried out by a variety of offices, ranging from statistical units in the Ministries of Economics or Science and Technology to the national telecom regulators, which traditionally collect basic telecommunications data, in addition to the NSO.

3.1 Issues for international cooperation

An important lesson learned from the work carried out in developed countries is the need for cooperation among NSOs in order to harmonize the data and thus ensure comparability. Equally important is the need for cooperation and coordination among agencies (regional and global) working with developing countries on the subject of ICT indicators. Given the cross-cutting nature of ICTs, there are many agencies with ICT-related work programmes and they are increasingly addressing the subject of e-measurement.

Therefore, during the past year, a major effort was made by a number of organizations to coordinate their work in a more organized manner. They recognized that coordination was indispensable for reaching global harmonization of ICT indicators and created a global "Partnership on Measuring ICT for Development". Current partners include Eurostat, the ITU, OECD, UNCTAD, the UNESCO Institute for Statistics, four UN Regional Commissions (ECA, ECLAC, ESCAP, ESCWA), the UN ICT Task Force and the World Bank. The Partnership provides an open framework for coordinating ongoing and future activities in the area of Information Society measurements, and for developing a coherent and structured approach to advancing the development of ICT indicators globally, and in particular in the developing countries. The Partnership was officially launched at the occasion of the UNCTAD XI conference, which was held in Brazil in June 2004.

The Partnership has three main objectives: first, to achieve a common set of core ICT indicators, to be harmonized and agreed upon internationally, which will constitute the basis for a database on ICT statistics. Second, to enhance the capacities of NSOs in developing countries

to develop their compilation of statistics on the Information Society based on internationally agreed upon indicators. Third, to develop a global database on ICT indicators and to make it available on the Internet. NSOs from statistically advanced countries, as well as other experts, are invited to contribute to the Partnership activities and provide expertise and advice to NSOs from developing countries, and transfer knowledge in areas such as methodologies and survey programmes.

Since its launch, the members of the Partnership have engaged in a number of joint activities, including the organization of regional and global events on measuring the information society, discussions and agreements on methodologies and core indicators, planning of capacity building activities in developing countries, preparing of conceptual and analytical papers, fund raising, and coordination of inputs into the WSIS and other relevant international forums (For further information, see **measuring-ict.unctad.org**). Figure 1 provides information on how e-measurement is featured in the WSIS process.

Figure 1. ICT indicators and the WSIS

The WSIS Geneva Plan of Action (par. 28) calls for "a realistic international performance evaluation and benchmarking (both qualitative and quantitative), through comparable statistical indicators and research results…" and that "all countries and regions should develop tools so as to provide statistical information on the Information Society, with basic indicators and analysis of its key dimensions. Priority should be given to setting up coherent and internationally comparable indicator systems, taking into account different levels of development."

During the Tunis phase of the Summit, further progress was made at both the political as well as substantive level:

1. The WSIS Thematic Meeting on Measuring the Information Society (Geneva, 7-9 February 2005) addressed two main statistical issues: improving ICT statistics, and, the next steps for developing a broader set of statistical indicators for the information society. The meeting adopted a core set of ICT indicators that could be collected by all countries.
2. Several regional WSIS conferences addressed the subject of ICT indicators: the WSIS Africa Regional Preparatory Conference (Accra, 31 January to 1 February 2005); the Pan-Arab regional conference WSIS-Phase II (Cairo, 8-10 May 2005); and the Regional Preparatory Ministerial Conference of Latin America and the Caribbean for WSIS II (Rio de Janeiro, 8-10 June 2005) and its regional action plan eLAC 2007.

The subject of ICT indicators thus became an important element of the WSIS process. The current draft text of the final Tunis document makes reference to the subject of indicators (chapter 1 of the operational part). More specifically, the text "applauds the initiatives" taken in this area, "including by those key stakeholders involved in the statistical measurement of ICTs who have joined forces to create a global Partnership on "Measuring ICT for Development".

4 What to measure—A core set of indicators

An important starting point for measuring e-business - and ICTs more generally - in developing countries, is to identify a clear set of well-defined, measurable indicators that could be compared across countries.

This is also one of the key objectives of "Partnership on Measuring ICT for Development" mentioned earlier. During the past year, the members of the Partnership engaged actively in a process to advance work on agreeing on a common core set of ICT indicators internationally. Following a broad consultation process between the Partners and NSOs in all countries, a proposal for a core list of indicators was prepared as an input to the WSIS Thematic Meeting on Measuring the Information Society (Box 1). The proposal contained three sets of indicators: basic ICT infrastructure indicators, ICT access and usage by households and individuals, and ICT access and usage by enterprises. The list of core indicators was accepted as an agreed outcome of the meeting [7]. It will be accompanied by a methodological annex explaining and defining each indicator, and will be disseminated as widely as possible, in particular in the developing world.

The core list contains 12 business indicators (Table 2). The criteria for selecting these indicators were the following:

- they cover basic, policy-relevant information on access and use of ICTs in enterprises
- they are well defined (reflecting an international consensus)
- they have been tested for several years and are understood to be collected easily (model questions are available)
- they include basic usage indicators (such as, activities carried out over the Internet)

A distinction was made between "basic core" indicators (for countries in the initial stages of ICT data collection), and "extended core" indicators (for countries with more advanced ICT data collections). Not all countries may have well developed statistical systems or sufficient resources to measure e-business. They may also have different data needs. For example, countries with little or no ICT infrastructure may decide not to collect ICT indicators in the near future. Countries with growing investment in ICT may want to monitor this growth by starting to measure ICT using the basic core; others, with higher levels of ICT investment, may want to go further (extended core) or even add indicators.

The set of core indicators can be used as a starting point for countries planning to collect ICT indicators. They also constitute the basis for developing internationally comparable statistics on the information society, once the information becomes available. There is plenty of scope for further developing and refining the core list, which can be amended or expanded to add new policy-relevant statistical indicators as experience is gained. The members of the Partnership are actively engaged to advance this process and will present further progress at the occasion of WSIS Tunis (16-18 November 2005).

Table 2. Core ICT businesses indicators

Basic core	
B-1	Proportion of businesses using computers
B-2	Proportion of employees using computers
B-3	Proportion of businesses using the Internet
B-4	Proportion of employees using the Internet
B-5	Proportion of businesses with a website (or web presence where the business has control over the content)
B-6	Proportion of businesses with an intranet
B-7	Proportion of businesses receiving orders over the Internet
B-8	Proportion of businesses placing orders over the Internet
Extended core	
B-9	Proportion of businesses accessing the Internet by modes of access Response categories should allow an aggregation to narrowband and broadband, where broadband will exclude slower speed technologies, such as dial-up modem, ISDN and most 2G mobile phone access, and which will usually result in a speed of at least 256 kbit/s.
B-10	Proportion of businesses with a Local Area Network (LAN)
B-11	Proportion of businesses with an extranet Proportion of businesses using the Internet by type of activity
B-12	Response categories: • Internet e-mail • Getting information – About goods or services – From government organisations/public authorities via websites or e-mail – Other information searches or research activities • Performing Internet banking or accessing other financial services • Dealing with government organisations/public authorities • Providing customer services Delivering products online

5 What next—Future steps

While there is an apparent shortage of comparable ICT-related data, in particular on the adoption of ICT by enterprises, there are also clear signs that an increasing number of developing countries pay attention to the development of ICT statistics, recognizing the need for monitoring their information societies and taking informed decisions concerning ICT policies for development.

The development of comparable data, and the creation of the necessary statistical tools, is a long-term process. Therefore, even countries with relatively less advanced information societies should start the process early on in order to have at least some basic initial data in the medium term.

To advance the process of measuring e-business in developing countries, action needs to taken in the following areas:

First, at the policy level, there is an urgent need for awareness building both at the political and technical level. In some cases, ICT-driven Ministries are keen on ICT data for monitoring and benchmarking their programmes, while statistical offices have not been involved. In other

cases, statistical offices are willing to include ICT measurement in their statistical compilation programmes but lack the resources and related political mandates to further develop them. Hence, there is a need for linking the national ICT policy agenda with the e-measurement agenda requiring effective cooperation between policy makers and national statistical offices.

Second, considerable attention needs to be paid to improve methodological work at national, regional and international levels, (i) to ensure harmonization and comparability of the data; (ii) to further develop the list of core indicators; (iii) to agree on common standards, definitions and model questions; and (iv) to develop common approaches to the collection of e-business data.

Third, and most importantly, statistical capacity building in developing countries is essential to the production of ICT data and to the success and sustainability of e-measurement efforts. This will involve in-depth training on ICT-related issues to improve the understanding of the particularities of measuring the information society; the development and testing of training material; conducting training workshops for local staff involved and policy makers; and assisting NSOs in ICT data collection, database development and data dissemination.

The Partnership on Measuring ICT for Development can make an important contribution in this regard. During the first phase of the Partnership, much emphasis has been put on establishing a core list of ICT indicators, as a starting point for the collection of internationally comparable data on ICT. In the next phase, Partners will put more emphasis on the building of capacity in developing countries' statistical systems. For this purpose, they prepared a broad framework for ICT statistical capacity building in developing countries and several of the Partners are now starting the implementation process.

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