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INFORMATION SOCIETY INDICATORS

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ABBREVIATIONS AND EXPLANATORY NOTES

ADSL	Asymmetric digital subscriber line
ASEAN	Association of Southeast Asian Nations
DAI	Digital Access Index
DSL	digital subscriber line
ECA	Economic Commission for Africa
ECLAC	Economic Commission for Latin America and the Caribbean
EIS	European information society
ESCAP	Economic and Social Commission for Asia and the Pacific
FDI	foreign direct investment
GDP	gross domestic product
GNI	gross national income
HDI	Human Development Index
IAOS	International Association for Official Statistics
ICDL	International computer driving license
ICT	Information and communications technology
ISC	Internet Systems Consortium
ISDN	Integrated services digital network
ISP	Internet service provider
ITU	International Telecommunication Union
MDGs	Millennium Development Goals
MEDSTAT	Regional Programme for Cooperation of Euro-Mediterranean Statistical Institutes
NGOs	non-governmental organizations
NRI	Networked Readiness Index
NSOs	national statistics offices
OECD	Organization for Economic Cooperation and Development
PC	personal computer
R&D	research and development
UIS	UNESCO Institute for Statistics
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAP	wireless application protocol
WPIIS	Working Party on Indicators for the Information Society
WSIS	World Summit on the Information Society

Notes: References to dollars (\$) are to United States dollars, unless otherwise stated.

Introduction

Statistics underpin policies, and therefore, reliable statistical data and indicators regarding societal e-readiness, and the use and impact of information and communications technology (ICT), help policy makers to formulate strategies related to ICT-driven economic growth and social development. To this end, various heads of State and Government approved a Plan of Action during the first phase of the World Summit on the Information Society (WSIS), which was held in Geneva from 10 to 12 December 2003. Among other things, the Plan of Action requested that all countries and regions develop tools to provide statistical information capable of measuring progress made towards the information societies. In addition, the Plan stipulated that priority be given to establishing coherent and internationally comparable indicator systems, taking into account different levels of development.

In recognition of the need for improved data and indicators on the information society, a global initiative entitled Partnership on Measuring ICT for Development, was launched during the eleventh United Nations Conference on Trade and Development (UNCTAD XI) which was held in Sao Paulo, Brazil, from 13 to 18 June 2004.¹ The objective of the Partnership, in which the Economic and Social Commission for Western Asia (ESCWA) and other United Nations regional commissions play a key role, is to enable stakeholders interested in the statistical measurement of ICT to join forces to close the data gap at the international level, particularly in developing countries. More specifically, the partnership has three basic objectives, which include the need to do the following:

- (a) Develop core sets of common ICT indicators and indices that are relevant to various stakeholders;
- (b) Enhance the capacities of national statistics offices (NSOs) in developing countries and build competence to develop statistical compilation programmes on the information society;
- (c) Develop a global database on ICT indicators and make it available on the Internet.

The objectives of the partnership are interlinked, and are aimed at devising appropriate variables, enhanced measuring mechanisms and supporting instruments to evaluate and monitor the evolution of the information society regionally, and in relation to other countries and regions.

The United Nations regional commissions have taken several steps towards fulfilling the objectives of the Partnership. National statistics offices of ESCWA member countries adopted a core set of ICT indicators during a Roundtable on Information Society Indicators and Profiles in Western Asia, which was held in Beirut from 4 to 5 October 2004. The United Nations Economic Commission for Africa (ECA) adopted a set of core ICT indicators that were adapted to that region, while the Economic Commission for Latin America and the Caribbean (ECLAC) proposed a set of core questions to be included in household and business surveys. The lists of core ICT indicators of all organizations involved in ICT indicator-building in all regions of the world will be submitted to the WSIS Thematic Meeting on Measuring the Information Society, which is scheduled to be held in Geneva from 7 to 9 February 2005, where they will be harmonized; eventually a global set of core indicators will be presented for adoption. The global list is expected to constitute the basis for an institutional database on ICT statistics.

This study is an important contribution in fulfilling the above-mentioned goals. Chapter I discusses the necessity of indicators in terms of facilitating evidence-based policy-making aimed at building an information society in the ESCWA region and provides definitions and background information. By

¹ The Partnership comprises the following: International Telecommunication Union (ITU), Organization for Economic Cooperation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD), United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute of Statistics (UIS), Economic Commission for Africa (ECA), Economic Commission for Latin America and the Caribbean (ECLAC), Economic and Social Commission for Western Asia (ESCWA), Economic and Social Commission for Asia and the Pacific (ESCAP), World Bank, United Nations ICT Task Force and national statistics offices (NSOs). A memorandum of understanding among all partners, specifying the contribution of each body, is envisaged.

examining the role of indicators in helping to formulate policy, this study illustrates that an adequate set of accurate indicators must be developed.

Chapter II touches on the issue of defining and using indicators, while chapter III provides several examples of ICT-based indicator development exercises, with the aim of showing how other countries and regions have carried out similar exercises in recent years. These examples highlight the benefits of such exercises, particularly for mapping the progress of the information society in a regional context.

Chapter IV reviews suggested indicators for the ESCWA region, focusing on readiness/enabling environment indicators, for example, infrastructure and policies, and intensity of use indicators in various sectors, including business, government and education. Indicators that measure more advanced aspects of the information society, namely, the impact of intense use are not covered in this study.

Lists of core ICT indicators proposed by ESCWA and ECA are illustrated in chapter V.

The results of a questionnaire that was sent to NSOs in ESCWA member country are analysed in chapter VI. This questionnaire is presented in the annex.

I. THE CONTEXT AND ROLE OF INDICATORS IN THE INFORMATION SOCIETY

Moving towards an information society requires a great deal of effort. However, countries and individuals that wish to venture into an era where knowledge and information have themselves become commodities must be willing to exert that effort. Indeed, certain activities, including banking, have now become inconceivable without the use of ICTs.

With this in mind, the process of monitoring and evaluating progress in achieving the goals of an information society is crucial in actually realizing such a society. Without some indication of how all elements of society are adapting to the installation and application of ICTs, there can be no way of understanding whether the shift towards an information society is actually taking place, or indeed, working in positive ways. Furthermore, there can be no understanding of future policy steps without reference to the current status of ICT implementation and application procedures.

The use of indicators to monitor these objectives is critically important, particularly in the developing world, where the digital divide is a prominent political issue. Indicators provide feedback with regard to national policy-making and investment, and also in terms of external participation in projects and investments.

This digital divide is not only one-dimensional; it operates upon many levels and affects many issues. Moreover, it operates internationally—that is, among countries—and nationally, within a single country; it is reflected in gender and education levels and also in differences related to infrastructure and use. However, appropriate measures aimed at tackling the digital divide, including implementing policies to eradicate or at least minimize the deleterious impact of new technologies, have the potential to enable less developed countries to contribute to forging a global information society.

In order for all this to happen, an understanding of where each country currently stands vis-à-vis the information society must be achieved. At the same time, the status of each country must be analysed to encourage movement towards a future, more advanced information society that caters for the specific needs of its participants whilst at the same time working towards commonly held objectives.

In this context, indicators, which provide concrete and factual statements about the current state of development in a given area, are necessary to encourage debate about how policies must be formulated and how visions must be implemented. Such real information can add substance to the visions of Governments and heads of State, and can also be used to inform policy makers on achievements in terms of strategies and visions related to the information society.

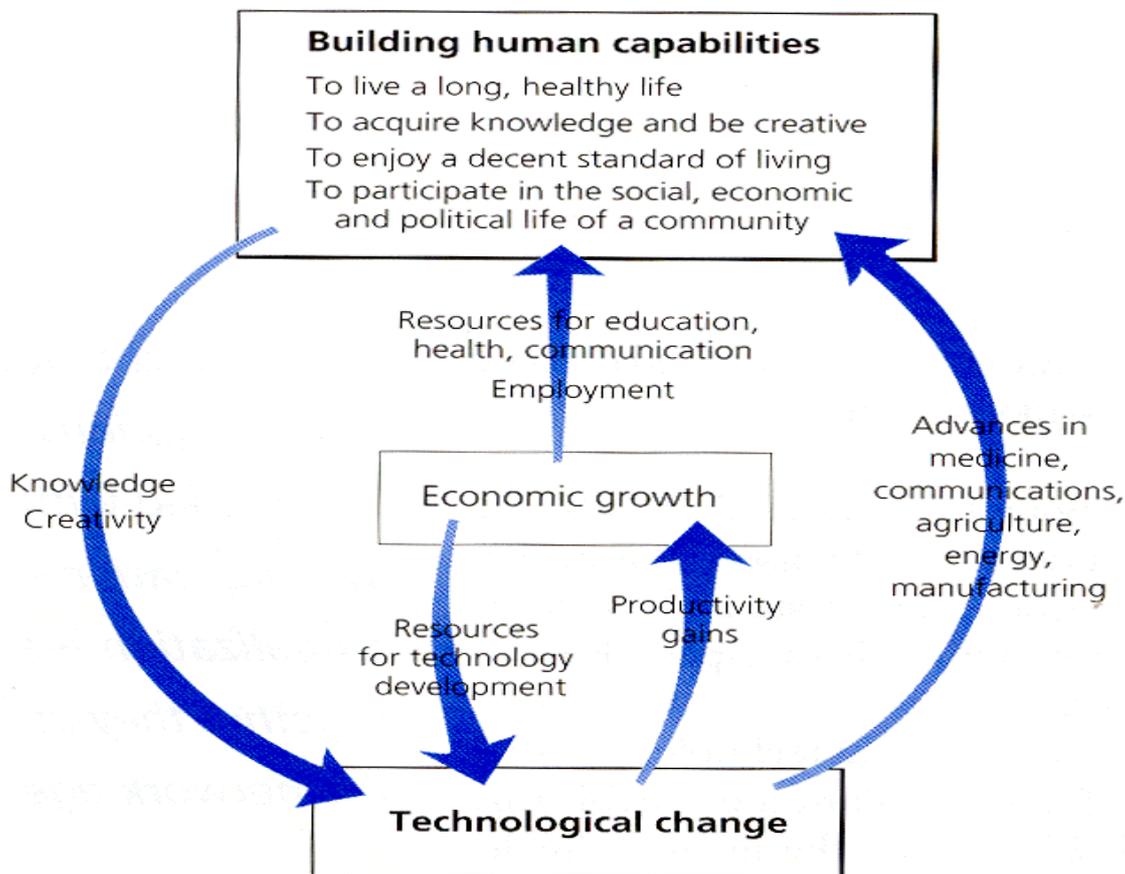
It is worth noting that many sectors in the developed world have been using indicators for some time, at both the national and regional level to improve policies and identify areas where policies need to be developed. In international organizations, including the United Nations, indicators are becoming increasingly popular to help to measure progress in countries in terms of moving from developing to developed economies.

In the developing world, ICT indicators can be useful for many reasons. There is a relationship between investment in ICT and economic and social development. The fact that this relationship is not linear is the result of a plethora of interlinking factors that influence development. Still, many experts recognize that the link between ICT and growth is basically contextual and development-level dependent,² and that econometrics do not provide a clear answer as to the strength of this link. For instance, the usefulness of the Internet is highly correlated to a combination of factors, including literacy, local content, and economic and social activities.

² Dan M. Grigorovici, Jorge Reina Schement and Richard D. Taylor, “Weighing the intangible: towards a framework for Information Society indices”, an E-business Research Centre working paper, (Pennsylvania State University, August 2002).

The link between technology and development is suggested in figure I, which shows the relationship between human development and technological development. It emphasizes the fact that innovation is an expression of people potential. In order to move into an information society, all the above-mentioned factors must be introduced into policy equations.

Figure I. Links between technology and human development



Source: United Nations Development Programme (UNDP), *Human Development Report 2001: Making New Technologies Work for Development*, (New York and Oxford, Oxford University Press, 2001).

Consequently, investing in ICT infrastructure is a necessary, albeit insufficient condition for building the information society, and such investment must be accompanied by developing a fundamental consideration of human empowerment.

It must also be noted that many countries continue to face serious challenges, namely, poverty, lack of basic necessities, illiteracy and low ratio of enrolment in education. These challenges are targeted by the Millennium Development Goals (MDGs), which United Nations member States have pledged to meet by 2015, and which reflect the urgent need to develop and improve various sectors (see box 1 below). It may seem inadequate at this point, therefore, to call for investment in ICTs and the building of the information society. However, in many developing countries, the use of ICTs highlights the positive role that technology can play in economic and social development, particularly when it is combined with positive policies and strategies.³ The efficient use of ICTs to accelerate progress in critical sectors, for example, education, health and public administration, is a positive means of ensuring development in those sectors and also a return on investments made towards that end. This use must be systematically monitored and analysed to enable policy and decision makers to apply appropriate measures regarding investment in such technology.

³ Examples are presented in the “United Nations Global E-government Survey 2003”. Available at: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan016066.pdf>.

In this context, the cornerstone in the shift toward the information society is the construction and empowerment of human capabilities for effective participation in social, economic and political spheres. Ensuring that such participation is real and efficient can be achieved by encouraging developing countries to do the following:

(a) Implement institutional and societal reforms that target the effectiveness and efficiency of such participation;

(b) Cultivate and reinforce critical thinking, information literacy,⁴ information culture⁵ and lifelong learning within the education process, in whatever form that takes.

Information-related human development must be considered a prerequisite for the development of an information society. Accordingly, information society indicators must contain ICT-related indicators, while also taking into account such factors as human and technological readiness. This study, however, focuses on ICT-related aspects of the information society for the determination of indicators for the ESCWA region, which are reviewed in chapter IV.

It is worth noting that indicators must not be seen as fixed, or rigid in nature. Some will lose their relevance as the achievements towards an information society are realized. Subsequently, more detailed indicators will be required. Initially, there is a focus on readiness and use, and the intensity of such use, and then assessment of impact. In addition, other indicators will become necessary for appropriate benchmarking as technology—and its use—is further developed. According to a 1999 report, information society indicators evolve across four interdependent stages: readiness, intensity, impact and outcome, which are explained below (see figure II).⁶

(a) Readiness is related to technical, technological and social infrastructures. It is a prerequisite in supporting the development of an information society. Readiness indicators reflect the potential of a society in terms of moving towards an information society, in that they gauge whether a society is ready to benefit from ICTs;

(b) Intensity reflects the state of use of ICT applications within a society. Intensity indicators show the actual use and applications of ICT and describe, for example, the extent of ICT use, and the purpose of that use, for different sectors and groups; these are fundamental indicators in an information society and provide the main basis for benchmarking the progress achieved by a given society in building their information society. The digital divide can be analysed by examining readiness and intensity indicators;

(c) Impact refers to the results of ICT usage in terms of management re-engineering and value added creation of new sources of wealth. In general, impact indicators relate to changes at the organizational level, namely, business, government and civil society, and describe the following:

- (i) New ways of organizing work in terms of relationships between individuals and organizations;
- (ii) New ways of organizing production in terms of intra- and inter-organizational relations;
- (iii) Human investments and human capital in terms of the development of knowledge bases;
- (iv) Mobility of competence;
- (v) Innovation and research and development (R&D) as an essential basis for the future.

⁴ This focuses on knowing how to access, understand and evaluate, synthesize and communicate information. The key to information literacy is developing the ability to place information in a context and cultivating awareness of information access issues, for example, copyright and privacy.

⁵ This is characterized by a set of behaviours and values, including transparency, integrity, sharing and proactiveness in the process of creating data and generating information.

⁶ OECD, Working Party on Indicators for the Information Society (WPIIS), “Defining and measuring e-commerce: A status report”, (DSTI/ICCP/IIS(99)4/FINAL), (October 1999).

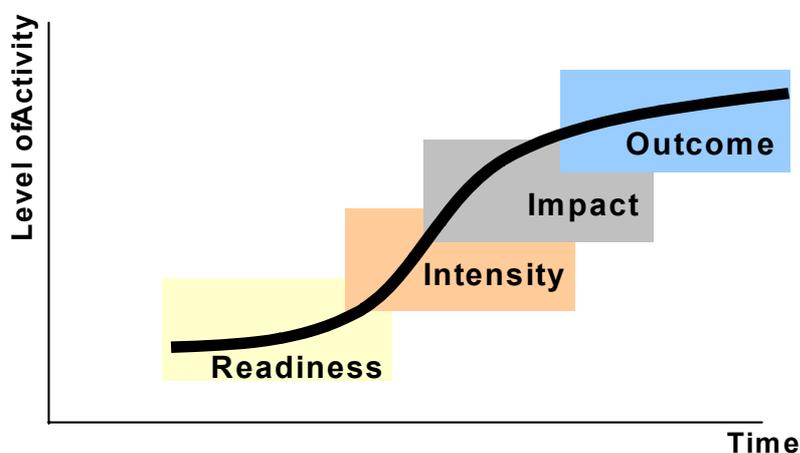
(d) The outcome is the final result of what happens on the enterprise level in terms of productivity and social impact. In general, outcome indicators relate to the societal level and describe the following:

- (i) Productivity and competitiveness;
- (ii) Employment and the labour market;
- (iii) Social inclusion and cohesion.

Given that this study is aimed at proposing a set of indicators to gauge the progress achieved by ESCWA member countries in building their information societies, it focuses on readiness indicators, particularly enabling indicators, and intensity indicators rather than on impact and outcome indicators, which are expected to be the subject of a subsequent study.

The evolution of indicators in terms of the progression of the information society is illustrated in figure II below. Box 1 highlights MDGs and targets, and mentions related indicators, highlighting the importance of such indicators in measuring progress made towards targets.

Figure II. Evolution of indicators



Source: Adapted from OECD, Working Party on Indicators for the Information Society (WPIIS), “Defining and measuring e-commerce: A status report”, (DSTI/ICCP/IIS(99)4/FINAL), (October 1999).

Box 1. United Nations Millennium Development Goals and targets

The Millennium Development Goals (MDGs) and their respective targets were adopted by the largest ever gathering of heads of State at the fifty-fifth session of the General Assembly of the United Nations, which was held in New York in September 2000. These goals, which United Nations member States have pledged to meet by 2015 are set forth below:

(a) *Goal 1: Eradicate extreme poverty and hunger*

- (i) Target 1: Reduce by half the proportion of people living on less than a dollar a day;
- (ii) Target 2: Reduce by half the proportion of people who suffer from hunger.

(b) *Goal 2: Achieve universal primary education*

Target 3: Ensure that all boys and girls will be able to complete a full course of primary schooling.

(c) *Goal 3: Promote gender equality and empower women*

Target 4: Eliminate gender disparity in primary and secondary education, preferably by 2005 and at all levels of education by 2015.

Box 1 (continued)

(d) *Goal 4: Reduce child mortality*

Target 5: Reduce the mortality rate among children under five years old by two thirds.

(e) *Goal 5: Improve maternal health*

Target 6: Reduce the maternal mortality ratio by three quarters.

(f) *Goal 6: Combat HIV/AIDS, malaria and other diseases*

- (i) Target 7: Halt and begin to reverse the spread of HIV/AIDS;
- (ii) Target 8: Halt and begin to reverse the incidence of malaria and other major diseases.

(g) *Goal 7: Ensure environmental sustainability*

- (i) Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources;
- (ii) Target 10: Reduce by half the proportion of people without sustainable access to safe drinking water;
- (iii) Target 11: Achieve significant improvement in the lives of at least 100 million slum dwellers, by 2020.

(h) *Goal 8: Develop a global partnership for development*

- (i) Target 12: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system. This includes a commitment to good governance, development and poverty reduction—both nationally and internationally;
- (ii) Target 13: Address the special needs of the least developed countries. This includes tariff- and quota-free access for exports, enhanced debt relief for heavily indebted poor countries; cancellation of official bilateral debt; and more generous official development assistance for countries committed to poverty reduction;
- (iii) Target 14: Address the special needs of landlocked countries and small island developing States;
- (iv) Target 15: Deal comprehensively with the debt problems of developing countries through national and international measures to make debt sustainable in the long term;
- (v) Target 16: In cooperation with developing countries, develop and implement strategies for decent and productive work for youth;
- (vi) Target 17: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries;
- (vii) Target 18: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies.

In total, 48 indicators are used to identify how these targets are being achieved. Of these, indicators 47 and 48 relate to target 18; they deal with telephone lines and cellular subscribers per 100 inhabitants, and personal computers in use per 100 inhabitants and Internet users per 100 inhabitants, respectively. Other indicators relate to the use of ICT. It is worth noting that ICTs can play a role in achieving certain goals, particularly in education, gender equality, improvement of health care and development of a global partnership for development.

Source: United Nations Development Programme, *Human Development Report 2003; Millennium Development Goals: A Compact Among Nations to Reduce Human Poverty*, (New York and Oxford, Oxford University Press, 2003).

II. DEFINING AND USING INDICATORS

This chapter provides a basic level of information regarding the necessary steps to be taken to ensure that ICT-based indicators are coherently and successfully determined, collected, collated and evaluated. It focuses on the need to build capacity in NSOs in ESCWA member countries.

Indicators are based upon the idea that statistical data provides evidence for the evaluation of current policies and future policy-making. Their effectiveness, therefore, lies in the way they support the policy-making process, both by providing an impulse for, and evaluation of, policies.

Indicators require input from, and collaboration with, many sections of society. In the context of policy-making or monitoring, they require a governmental or private sector agency that is willing to determine, define and justify their set of indicators. Once adopted, an organization must collect and collate these indicators. These values must be collected from a predefined population sample that can include consumers, citizens, non-governmental organizations (NGOs), and also government bodies, or groups from society. Finally, a body must evaluate the results and provide feedback to the policy-making and monitoring arm of the respective Government.

This study shows that indicators generally consist of statistical data that have been collected to test or evaluate a certain issue. Indicators have different functions, which are essentially manipulations of the same data that have been collected for various purposes. From the perspective of the governmental agency responsible for collecting the statistics that will be used in the indicators, a substantial amount of work must be done to ensure appropriateness, accuracy and timeliness of the production of indicators.

An information society indicator is a value that shows change and performance related to a quantifiable aspect of the information society, for example, ICT affordability or literacy. The indicator can be a function of multiple variables related to one aspect of the information society, which describes it at a given instant.

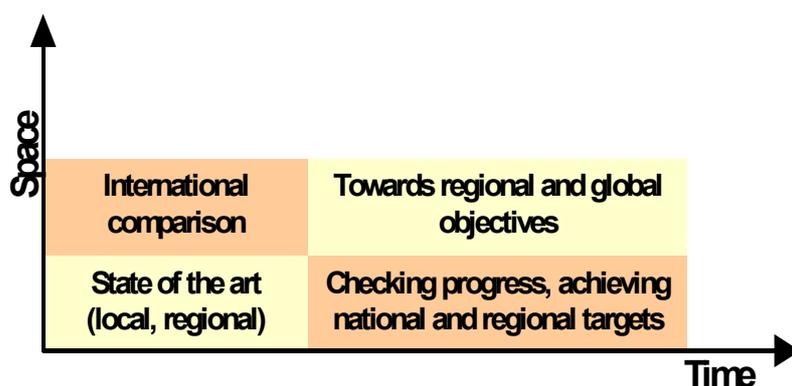
When the value of the indicator is related to a referential value designated by a 'goalpost', it becomes a benchmark. Benchmarks can be useful in encouraging action on the part of Governments and other societal actors aimed at attempting to attain certain levels of achievement in the progression towards an information society.

An index expresses a quantity or a position on a scale of qualitative multi-faceted aspects, for example, a digital access index, which is relevant to the information society. An index can be a combination of independent indicators, or the average of an accumulation of selected indicators. Indices can be useful in representing a specific concept, for example, readiness, or highlighting an issue in a specific sector, namely, government (public administration) or education. Indeed, indices are more robust than a single indicator and are variable, particularly with regard to measuring qualitative data, based on the fact that they can join variables that are implicitly interdependent. Hence, a minor error in certain variables will not disturb the index value and thus alter the ranking suggested by the index.

Indices, however, are unlikely to provide the necessary depth of understanding, which is a prerequisite for measuring tools related to the information society, for policy decision-making. This is based on the fact that they rarely comprise comprehensive and uncorrelated indicators that permit the interpretation of observed temporal changes with respect to relevant variables of a policy.

Indeed, indicators can be used as comparative tools across both space and time. Moreover, there are four areas in which indicators play a role (see figure III). In the first place, they can be used to compare countries and regions; secondly, they can be useful in examining the latest, or state-of-the-art developments at the country or regional level. Thirdly, they can help to achieve regional and global objectives, and finally they can be used to check progress in an individual country or region, and allow quantitative measures to be taken in terms of where and how support should be offered.

Figure III. Indicators and their use



Source: Compiled by ESCWA, from various sources.

A. DATA COLLECTION

The variables that are reviewed in chapters IV and V must be obtained through NSOs or specialized services in various institutions. Some of these variables can only be obtained by surveys. Conducting a survey is not always a simple task, particularly in the case of large population that includes heterogeneous groups. Given that a survey is not a census, where the whole population is involved, the surveyed sample must be carefully defined. A sample survey is broader than a census in that a survey can find out more about the same population by asking a greater variety of questions and can study the same population in greater depth.

However, the potential advantages of sample surveys cannot be realized unless the sample survey is correctly defined and organized. With this in mind, the following points are crucial when designing a sample survey:

- (a) Clarity of the objectives of the survey;
- (b) Definition of the targeted population;
- (c) Definition of the relevant data (primary or secondary) to be collected;
- (d) Definition of the measurement instruments: observation, interview and questionnaire;
- (e) Definition of the sample frame,⁷ the sample size and the sampling method, and then selection of the sample.

Generating a sample is a crucial step in the survey process. Mistakes in this operation will compromise the entire survey. Moreover, the selected sample, its size and the sampling method are critical to the success of the survey. If the selection is wrongly defined the sample will not be representative of the targeted population. A mistaken selection could contain too few, too many, or the wrong individuals.

B. DEVELOPMENT OF THE SURVEY

As highlighted above, the success of a survey relies on the clarity of its objectives, which should lead to the design of the right questions. Surveys can be conducted in a variety of ways, including direct observation, diary system for longitudinal surveys, face-to-face interviews, and mail, telephone and online surveys. Each of these techniques has its advantages and disadvantages; the choice is based on the subject and context. For instance, the interview method is widely used in social surveys; it can be performed in an impromptu or scheduled manner; it demands a greater mobility on the part of interviewers and is thus more

⁷ The sample frame is the list of individuals who meet the requirements that enable them to qualify as a member of the targeted population.

costly. Interviewers must be highly qualified to avoid the risk of biased results that arise because questions have either been posed in such a way as to elicit a particular response or erroneously presented. While mail surveys avoid this type of problem, the rate of respondents can be lower, and there could be a certain degree of confusion on the part of interviewees regarding some questions. The issue of the response rate is a determining factor when deciding which form of survey to use. The face-to-face survey produces the best results in this regard.

With the advent of the Internet, online surveying has become an additional method to face-to-face, telephone and postal surveys. Online surveying, similarly to scientific polls, attempts to gauge public opinion, but that is where the similarity ends. Scientific polls are based on a random selection of people to ensure a broad representation of the population at large. In contrast, while live voting through online surveys can reflect the views of a greater number of individuals, such polls are not necessarily representative of the general population. That is, there is no guarantee that votes will reflect anything close to a statistical sample. In addition, while live voting templates are designed to allow only one vote per user, single individuals can cast multiple votes by simply using another computer or another Internet account. Live voting must therefore be considered as part of an ongoing dialogue, or as a means of sharing views on current or important events. Nevertheless, Internet-based polling systems with checks and balances that allow the Internet to be used to obtain survey results that are comparable to those produced by more traditional methods, do exist. On the positive side, online data collection has the advantage of speed in terms of how fast surveys can be distributed, completed and collated. In addition, the Internet and the Web offer new types of data collection using, for example, logfile analysis, which is essentially a census of activity on a web site. This can be useful for more detailed indicators concerning impact and outcome.

Important steps in the preparation of a survey include the design of the questionnaire and the testing of the survey. Testing can be achieved by means of a pilot survey. Its major function is adapting and tuning the survey to obtain a higher response rate and to provide reliable and relevant data. Data processing and presentation are technical tasks and a specialized team is usually formed for this purpose.

Box 2 highlights selected sampling methods.

Box 2. Sampling methods

The aim of sampling methods is to create a representative sample of the targeted population. This process involves creating a sample frame for the targeted population by dividing it into homogenous sample units, then creating a finite list of sampling units that make up the targeted population.

There are two main groups of methods in terms of defining sample units. The first includes probability sampling methods, while the second incorporates non-probability sampling methods. In the first group, all sampling units have a definable probability (often the same) of being chosen. The second group is based on such criteria as accessibility, voluntary participation, economic reasons and payment of participants. The second group of methods are considered to be less reliable than the probability sampling methods.

The basis of the probability methods is the selection of sampling units. Simple random sampling leads to the selection of units from a population of a certain size, so that every combination of units has an equal chance of being chosen. Stratified sampling can be used when the target population is known to consist of separate sub-populations, each displaying different values of the studied properties.

A third method is quota sampling, which is based on defining the distribution of characteristics that are required in the sample, and selecting respondents until a quota has been filled. A fourth sampling method is spatial sampling, which is used when the studied phenomenon has a spatial distribution, namely, the object in the sample frame has a specific location in two- or three-dimensional space.

The size of the sample is a determining factor in the credibility of a survey. A minimum sample size is required to provide estimates with an acceptable level of precision. A larger size does not lead to better results.

Note: For further information on this subject, see: Deakin University, "Data collection and analysis". Available at: <http://www.deakin.edu.au/~agoodman/sci101/index.php>.

C. CAPACITY BUILDING OF NATIONAL STATISTICS OFFICES FOR MEASURING ICT INDICATORS

Economies and social development have been transformed by globalization and connectivity, and rapid changes in these areas have accelerated the need for updated indicator values, the creation of new indicators and also for new techniques and technology to carry out data collection and processing. For example, the progress achieved with regard to United Nations MDGs is monitored according to 48 indicators. Furthermore, NSOs are mandated to measure the growth and pervasiveness of the information society in their countries and region. In this context, measurements must be carried out on a core set of ICT indicators with an internationally agreed upon global core and a regional supplement (see chapter V).

These new types of statistics are by nature conceptually and operationally difficult to collect and collate, let alone interpret and rationalize. Carrying out such measurements is not a straightforward task; it requires skilled people and a rejuvenated process. Compatibility with international standards is a serious aspect of the benchmarking operation. Many NSOs in developing countries are not in a position to deal with these issues effectively or efficiently. These new challenges, therefore, require a programme of capacity-building that covers the whole statistical process. A successful capacity-building strategy for NSOs must do the following:

- (a) Address national, regional and international needs with regard to statistics and data;
- (b) Form an integral part of the development strategy of a country;
- (c) Promote better data quality by following international standards;
- (d) Learn from success stories in developed and developing countries.

International and regional capacity-building programmes are currently in operation, including an international programme for the establishment of capacity-building facilities, the Trust Fund for Statistical Capacity Building, which was established by the Development Data Group of the World Bank.⁸ It is aimed at strengthening the capacity of statistical systems in developing countries and provides a global facility that invests at the national, regional and global levels to improve the collection, processing, analysis, storage, dissemination and use of statistics that are timely and of a high quality, to support economic and social development.

Another such endeavour, the Regional Programme for Cooperation of Euro-Mediterranean Statistical Institutes known as MEDSTAT,⁹ which was established within the framework of the European Mediterranean Cooperation, is aimed at developing information systems and improving the quality of existing services provided by the statistical systems of the European Union's 12 Mediterranean partners. This can be achieved through cooperation in the form of technical assistance, including training, statistical development, information technology and organization of seminars and conferences.

Furthermore, a global initiative entitled Partnership on Measuring ICT for Development was launched during UNCTAD XI, which was held in Sao Paulo, Brazil, from 13 to 18 June 2004. The mandate of the initiative, in which ESCWA and other United Nations regional commissions play a key role, is to bring together various stakeholders interested in the statistical measurement of ICT to endeavour to close the data gap at the international level, particularly in developing countries. A basic objective of the Partnership is to enhance the capacities of NSOs in developing countries and to build competence in developing statistical compilation programmes on the information society. The goal of the Partnership is to identify the technical assistance needs of NSOs with regard to the compilation of ICT indicators, in the run-up to the second stage of WSIS, which is scheduled to be held in Tunis in from 16 to 18 November 2005. After the second WSIS, the focus is expected to be on further developing the capacity-building activities of the initial phase of the Partnership, including extending training programmes to new beneficiary countries.

⁸ See World Bank, "Trust Fund for Statistical Capacity Building (TFSCB): Guidelines and Procedures". Available at: <http://www.worldbank.org/wbi/publicfinance/documents/statistics/trustfund.pdf>.

⁹ See European Union, *Eurostat*. Available at: <http://europa.eu.int/comm/eurostat/>.

To help with ongoing capacity-building efforts, United Nations regional commissions prepared a questionnaire concerning the status of information society statistics in their regions. The responses of NSOs in ESCWA member countries are reviewed in chapter VI. The questionnaire is reproduced in the annex to this study.

III. ICT-BASED INDICATOR EXERCISES

Selected examples of ICT-based indicator exercises are detailed in this chapter, with the aim of illustrating how various countries and regions have carried out similar exercises in recent years, and to inspire ESCWA member countries with regard to devising their own exercises. Such exercises highlight the benefits of indicators, particularly for mapping the progress of the information society in a particular region. While best practices are shown to be enlightening, the necessity for a specific (regional) solution to the problem of developing information society indicators is emphasized.

This chapter also illustrates that many indicator-based models for improving the use of ICT have political—and practical—aims. It is important to recognize that the context in which indicators are created must be closely related to the environment in which they are to be used. It is therefore crucial to agree explicitly upon a common set of aims within a region before developing indicators.

The examples in this chapter relate to global and regional indicators, and are also relevant at the national level. Given that one of the major tasks of this study is to propose the construction of indicators for national use that will be filtered up to the global level from the regional level, it is important to gain a greater understanding of what can be done at each level. In addition, bearing in mind the large number of benchmarking, indicator- and index-based schemes that are in use, particularly in the telecommunications sector, it is important to focus upon the specific needs of the ESCWA region, whilst also attempting to factor in the broader issues of measuring ICT for development.

Furthermore, the type of indicator and the stage the indicator reflects are noted. The type of indicator is important in that it is either essentially political or statistical; moreover, an indicator can be used for comparison across time and/or as a comparison across space. The stages that an indicator reflects are readiness, intensity, impact and outcome, which have been highlighted above. Examples related to readiness and intensity are reviewed below.

Such stages incorporate specific sectors or themes, known as application areas, which is where readiness to use ICT and intensity, and also ICT use are measured. The comparison of examples below intends to highlight where relevant benchmarks have been carried out in other parts of the world, and the results are presented in the concluding section of this chapter.

The methodology that is generally used in this chapter attempts to find and describe the following information for each indicator set surveyed:

- (a) Data collected;
- (b) Stakeholders involved;
- (c) Data collection process;
- (d) Framework into which the indicators fit.

The aim of using such methodology is to generate a greater understanding of previous applications of indicator exercises, which can be utilized in developing ESCWA indicators.

One example that is highlighted below falls under the umbrella of the European Union, which began using indicators related to the information society in the mid-1990s, culminating in the eEurope: An Information Society For All (eEurope) initiative, which was launched in 1999. This initiative is particularly relevant in that it reveals how intrinsic indicators are to decision-making and policy-making in terms of developing a European information society. The European Union is also a useful example in that it is a regional body and therefore its experiences in developing indicators are relevant to the ESCWA region. Given the advanced level of development in the information society in Europe, however, other examples are also reviewed.

A framework for measuring ICT development is presented in table 1, which is a combination of different perspectives on social and economic development. This table shows how different perspectives

require different indicators to measure the same item. Moreover, while some indicators included in the table may seem redundant, it is important to bear in mind that stakeholders have a wide range of interests.

TABLE 1. FRAMEWORK FOR MEASURING ICT DEVELOPMENT

Index	UNCTAD (2002)	Mosaic Group (1998)	Mosaic Group (1996)	McConnell International (2001, 2000)	Economist EIU (2001, 2000)	Harvard University Guidelines (2000)	ITU (2001)
Perspective	Technological development	IT development	Defence	Commercial	Commercial	Sociological	Telecoms
Item measured	ICT development	Global diffusion of Internet	IT capability	E-readiness	E-readiness	Networked readiness	Internet access
1. Connectivity (physical capacity; infrastructure)	Internet hosts; telephone mainlines; PCs; mobile subscribers	Pervasiveness; connectivity infrastructure		Connectivity; infrastructure pricing	Connectivity (30%) fixed and mobile, narrow band/broadband	Information infrastructure; software and hardware	Hosts; servers; telephones; PCs
2. Access (wider determinants of access)	Internet users; literacy; average revenue; all costs	Pervasiveness; geographical dispersion	Pervasiveness	Access	Cost of access; availability; affordability	Availability; affordability	Users; subscribers
3. Policy environment	Competition: local loop, long distance, ISP markets; Internet exchange	Organizational infrastructure	Depth of development	E-leadership; E-business climate	Legal and regulatory environment (15%); Business environment (20%)	Legal environment: Telecom and trade policy	ISPs; prices; traffic
4. Usage	Telecom traffic: incoming; outgoing	Sectoral absorption; sophistication of use	Sophistication of usage	Information security	E-commerce (20%); consumer business use; E-services (10%)	Content B2B; education B2C; E-commerce	
Other			Proximity to technological frontier; indigenization	Human capital	Social and cultural infrastructure (5%) Education/literacy	IT sector; ICT training	

Source: United Nations Conference on Trade and Development, *Information and Communication Technology Development Indices*, (New York and Geneva, United Nations, 2003), (UNCTAD/ITE/IPC/2003/1).

A. eEUROPE: A NEW INFORMATION SOCIETY POLICY TOOL IN EUROPE

1. Basic framework

The European Commission launched the eEurope initiative in December 1999. It was adopted during the extraordinary European Council on Employment, Economic Reform and Social Cohesion Towards a Europe of Innovation and Knowledge, which was held in Lisbon in March 2000 and further developed during a special ministerial conference on the Information Society in Lisbon a month later.¹⁰

eEurope was established at a time when the European Commission understood that there was a need to revamp the policy-making process, and was encouraged to take such action by a number of coinciding factors, including a general shift towards a global market economy, the continuing presence of unemployment in the European Union and the need to enhance economic growth. Policy makers felt that ICTs had the potential to deal with such politically pressing issues as unemployment and economic growth. In this context, therefore, it can be noted that while such an initiative has technological goals, it is also aimed at increasing and enhancing the economic development of Europe.

eEurope attracted a great deal of political attention at the time because of the belief that the Internet, specifically, was a magic tool for economic development. Comparisons were made with the United States of

¹⁰ European Union, "eEurope: An introduction". See: http://www.europa.eu.int/ISPO/basics/i_europe.html.

America, which encouraged European policy makers to try to emulate American growth in a European context. The eEurope Action Plan, which was conceived within the framework of eEurope 2002, was designed to make Europe the strongest knowledge-based economy in the world by 2010. Indicators developed through eEurope were designed to monitor progress in that direction. The shift in European information society (EIS) policy perspective over the past two decades is highlighted in table 2 below.

Ironically, while the emergence of the eEurope policy initiative coincided with the increasing popularity of the Internet, it was not considered to be an innovation by its authors. Nevertheless, the tools used to apply the policy were innovative. In addition, coordination among various actors, mutual learning and sharing best practices were considered to be the most important methods of achieving progress towards an information society.

Overall, the eEurope initiative aimed to make a difference through a variety of means, including consensus building, policy transfer and policy learning. It operates, in a sense, above the regulatory and legislative environment in that it provides an overriding vision, and an alternative manner of achieving policy objectives. Furthermore, eEurope made policy makers aware of possible challenges and opportunities with regard to Europe.

The eEurope initiative has 11 key areas, which are presented in table 3. These set out to make European strategy matter; to make European action count; to reduce inequalities among member States in terms of access and utilization of the Internet; and to ensure that there is European added value in developing common approaches to problems.¹¹

TABLE 2. CHANGES IN EUROPEAN INFORMATION SOCIETY POLICY OUTPUT, 1979, 1993 AND 1999

1979	1993	1999
Economic challenges to business	Political challenge of unemployment	Desire to become the most competitive knowledge-based economy
Context of skepticism regarding Europe	Context of optimism following the Treaty on the European Union (1992)	Context of skepticism regarding European Commission
Technologies were not widely used	Technologies becoming widely used	Technology use was lagging behind the United States
Global environment was not conducive	Global environment 'forced' integration	Participation in globalization is necessary and positive
Technology is the problem	Technology is the solution	Technology is the tool

Source: Compiled by ESCWA from various sources.

TABLE 3. ACTION LINES AND KEY AREAS IN THE eEUROPE 2002 INITIATIVE

Cheaper, faster and safer Internet	Investing in people and skills	Stimulating the use of the Internet
Cheaper Internet access	European youth into the digital age	Accelerating e-commerce
Faster Internet for researchers and students	Jobs in the knowledge-based economy	Government online
Smart cards and secure electronic access	e-Participation for the disabled	Health online
		Intelligent transport systems
		European digital content

Source: eEurope, "The eEurope action lines". Available at: http://www.e-europestandards.org/action_lines.htm#2002.

¹¹ European Commission, "eEurope – Communication on a Commission Initiative for the Special European Council of Lisbon". Available at: <http://www.cimu.gov.mt/htdocs/content.asp?c=333>.

2. Indicators and methodology

The European Commission chose to follow a certain process, which meant that instead of focusing on the creation of legislation, it would announce benchmark targets and monitor the adherence of member States to them. Subsequently, feedback on achievements has been given to member States at every regular European Council to date. This has been provided by the Commission itself, and also through commissioned reports by private research institutes, which have produced lengthy documents outlining the position of each country in each target area.

The European Commission proposed a set of indicators to help to guide its member States towards achieving the goal of becoming knowledge-based economies. The indicators suggested by the eEurope 2002 Action Plan were stimulated by a very basic motivation: to get Europe onto the Internet en masse. This was based on the realization that to become full participants in the knowledge-based economy, there was a need to change patterns of interaction in economic, social and political activities.

For the purposes of benchmarking, that is, comparison amongst member States with regard to an ideal target, several indicators were chosen. These indicators focused upon such issues as connectivity and use of Internet. Further indicators were related to application areas. The data collected was simply categorized, and the number of indicators is much lower than those of similar exercises.

Various stakeholders were involved in the eEurope benchmarking exercise, including in the development of the Action Plan, which outlined the chosen variables. Data were also collected by NSOs in collaboration with the Statistical Office of the European Communities, more commonly known as Eurostat. Collated and compiled data have been used by national Governments to encourage increased development in weak areas, and have also been used by the European Commission to present the situation in Europe to the global community, in addition to facilitating dialogue within the European Union on certain pertinent issues.

Indicator exercises were determined by the Open Method of Coordination, which outlined the following: guidelines to achieve predetermined goals; indicators to check that goals have been established; targets and measures within the framework of national policy to achieve these goals. The Commission monitored the entire process and provided reports to the European Councils on a regular basis.

3. Impact of eEurope

The impact of eEurope 2002 was twofold: firstly, it affected the uptake of the Internet in member States, and managed to achieve many of the original goals and targets. Secondly, it managed, albeit in a limited manner, to change the way in which EIS policy was determined and carried out in the European Union, enabling the Commission to play a different role to the one it had previously assumed in the field of the information society.

eEurope was seen as a major breakthrough in the use of benchmarking. In this regard, European added value was noted in international or regional, comparisons and benchmarking. The interesting aspects of the eEurope case, as in other benchmarking and indicator exercises, are not the indicators or the benchmarks, rather how these were converted into changing or developing results. The eEurope benchmarking process has been widely disseminated across the globe, with various countries, for example, Japan, adopting the process. Similarly, the Organization for Economic Cooperation and Development (OECD) has been working with the European Commission to benefit from the experiences of the European Union in indicator-building exercises.

eEurope 2005 was slightly different in the way that it developed indicators and benchmarks. Its predecessor had been successful in terms of connectivity, but not necessarily in terms of usage, and the growth in e-commerce was not as fast as had been hoped. eEurope 2005 seeks to encourage the development of a business environment, and many of the indicators of the previous exercise were changed in response to a shift in priorities. eEurope 2002 simply focused on accessibility of services; eEurope 2005, however, also sets out to find ways in which the public sector could take advantage of the Internet. This has meant a shift in focus from infrastructure to content in the indicators.

B. READINESS INDICATORS¹²

1. *Global*

Several indicator-based mechanisms for measuring readiness with regard to ICT and the information society at the global level are reviewed below. Selected regional endeavours are also reviewed. Relevant aspects of these examples have been taken into consideration in the suggested measurement systems for the indicators provided in this study. This comparative analysis highlights the features and characteristics of different indication systems, including in most cases the broad approach of the institution managing the indicator-collection process; the target audience of the indicators; the actors involved in collecting the data; and the manner in which that activity was carried out.

(a) *The Global Information Technology Report 2000-2002: Readiness for the Networked World*¹³

While this report draws on data that was collected from a range of countries, it is not comprehensive in coverage. It develops a Networked Readiness Index (NRI), which comprises a number of variables. Networked readiness is defined as “the degree to which a community is prepared to participate in the networked world”.¹⁴ This index distinguishes between use of networks and so-called ‘enabling factors’. Network use is calculated according to five individual variables that are related to the quantity and quality of ICT use. Enabling factors take into consideration over 12 variables, which cover network access, network policy, networked society and networked economy.

The NRI is designed to be considered within the general framework of ICT and development issues and does not explicitly constitute a guide for development in itself. The developers and maintainers of NRI have insisted that it must be viewed as complimentary to other forms of policy- and decision-making. However, NRI implicitly encourages countries to work towards certain policies that will enhance networked readiness.

(b) *World Telecommunication Development Report: Access Indicators for the Development Society 2003*¹⁵

This report was prepared within the framework of the World Telecommunication Development Conference, which was held in Istanbul from 18 to 27 March 2002, in relation to Resolution 8: Collection and dissemination of information, and was coordinated by the Telecommunication Development Bureau of ITU. The report advocates the need for both access and usage indicators disaggregated by such socio-economic categories as age, gender, income and location. It lists possible stakeholders as NSOs, and also policy makers, the private sector, civil society, multilateral organizations and others involved in ICT sector. The report suggests a number of indicators for measuring access to ICT, including universal access, universal service and Internet usage indicators for household, business, education and Government. It also suggests five fundamental categories that reveal a country’s ability to access ICTs and that could be measured via the

¹² Information in this section was largely based on papers published for the joint United Nations Economic Commission for Europe (UNECE)/UNCTAD/UNESCO/ITU/OECD/Eurostat Statistical Workshop entitled Monitoring the Information Society: Data, Measurement and Methods, (Geneva, 8-9 December 2003), which was an event related to the World Summit on the Information Society. See UNECE web site, available at: <http://www.unece.org/stats/documents/2003.12.wsis.htm>. In general, papers incorporate the viewpoints of regional, international and global organizations, including ITU, UNCTAD, OECD, the World Bank and Eurostat, and also highlight national experiences in developed and developing countries. Another major source of information was the International Association for Official Statistics (IAOS) Satellite Meeting on Statistics for the Information Society, (Tokyo, 30-31 August 2001).

¹³ Centre for International Development at Harvard University and World Economic Forum, *The Global Information Technology Report 2001-2002: Readiness for the Networked World*, Oxford University Press, 2002.

¹⁴ Information Technologies Group, Centre for International Development at Harvard University, “Readiness for a networked world: A guide for developing countries”. Available at: <http://cyber.law.harvard.edu/readinessguide/>.

¹⁵ ITU, “Executive summary”, *World Telecommunication Development Report 2003: Access Indicators for the Information Society*, ITU, 2003.

Digital Access Index (DAI) created by ITU.¹⁶ These categories are infrastructure, affordability, knowledge, quality and usage. The report suggests eight variables to cover the five categories. Each variable is divided by a goalpost—the maximum value established for that variable—and summed up to obtain an overall index score for the region or country concerned. The report also suggests potential sources for analysis of ICT data, including administrative records and survey data.

2. Regional

This section provides various regional examples that may be of benefit to NSOs in the ESCWA region regarding ways of approaching the topic of building indicators. Within this context, endeavours of two United Nations regional commissions are reviewed below, and an Association of Southeast Asian Nations (ASEAN) initiative is noted.

(a) *Economic Commission for Africa*¹⁷

A baseline study entitled *African Media and ICT4D: Documentary Evidence* was carried out by ECA on the state of media reporting on ICT and information society issues in Africa in 2003.¹⁸ This study developed a series of indicators, based on media content that referred to ICTs, and was broad in its use of the term ICT. It covered the status of ICT policy, and incorporated a survey of print and broadcast media and an analysis of Internet content. However, it focuses solely on the content, and not on the infrastructure of ICTs. Furthermore, content analysis is limited to mentioning ICTs in the region over a two-month period, March-April 2003.

The data was collected and maintained by a group of monitors, two from each country, who tracked media content in selected publications. This was designed to fit into a framework of tracking the status of ICT on the African continent.

In October 2003, ECA also published a report on the SCAN-ICT initiative.¹⁹ This details the activities of the initiative, and presents data, which was collected using a common methodology, on several countries within the region, namely, Ethiopia, Ghana, Morocco, Mozambique, Senegal and Uganda. The data focused on figures for indicators and benchmarks, policy issues, human resources and applications of ICT in the region. The target audience of the SCAN-ICT report was a variety of stakeholders, including entrepreneurs and communities, and also policy and decision makers.

The SCAN-ICT report fits into the framework of the African Information Society Initiative, and elaborates upon the “kind of opportunities available to build the capacity for Africa to influence ICT investments, to increase their impact, and to encourage development of ‘made in Africa’ solutions, applications and content”.²⁰

(b) *Economic and Social Commission for Western Asia*

The *Regional Profile of the Information Society in Western Asia*, which was produced by ESCWA, comprehensively describes the status of the information society in ESCWA member countries.²¹ It also runs a comparative analysis of maturity levels in member countries, based on a set of metrics and indicators.

¹⁶ ITU News, “Gauging ICT potential around the world: ITU releases the first global Digital Access Index”, (October 2003). Available at: http://www.itu.int/ITU-D/ict/dai/material/DAI_ITUNews_e.pdf.

¹⁷ Based on Clement K. Dzidonu, “Suitable indicators for measuring the impact of the ICT for development (ICT4D) process”, (CES/SEM.52/14), a paper prepared for the joint UNECE/UNCTAD/UNESCO/ITU/OECD/Eurostat Statistical Workshop: Monitoring the Information Society: Data, Measurement and Methods (Geneva, 8-9 December 2003).

¹⁸ Available at: <http://www.uneca.org/aisi/docs/MediaStudy.pdf>.

¹⁹ ECA, *SCAN-ICT: Indicators of Information and Communications Technologies*, (Addis Ababa, ECA, October 2003), (E/ECA/DISD/CODI.3/15).

²⁰ Ibid, p. 2.

²¹ (E/ESCWA/ICTD/2003/11).

ESCWA collected data from public sources in the following areas: infrastructure; policies and strategies; capacity building; and the legal and regulatory environment. Whilst these are not indicators in the formal sense, the characteristics of the statistics provided within the report are of great use in the construction of an indicator set.

(c) *Association of Southeast Asian Nations*²²

The Government of Thailand proposed a set of indicators for the regional group ASEAN. This was endorsed by the e-ASEAN Working Group and Task Force in October 2002. The framework focuses on the measurement of readiness, which is relevant to this study, usage and impact of ICT. In terms of e-readiness, the e-ASEAN group focused on five specific framework goals, or application areas: e-society, e-commerce, e-Government, infrastructure, liberalizing trade in ICT goods and services. Each of these application areas has a specific set of categories attached to it, and it is in these category areas where the measurement takes place. The work of the Task Force has been completed and the web site established for the activity is no longer active.

C. INTENSITY INDICATORS

Relevant information from a selection of studies on indicators that measure intensity or ICT use is reviewed below.

1. *Education*²³

The joint UNECE/UNCTAD/UNESCO/ITU/OECD/Eurostat Statistical Workshop: Monitoring the Information Society: Data, Measurement and Methods, which was held in Geneva from 8 to 9 December 2003 covered, in the form of a paper, the topic "Performance indicators on ICT for education matrix".²⁴ In preparation for the meeting, a matrix of variables was proposed along the following lines:

- (a) ICT-based policy and strategy (10 variables);
- (b) ICT infrastructure and access (13 variables);
- (c) Curriculum/text books (7 variables);
- (d) Teaching professionals use (of ICT) and teaching (8 variables);
- (e) Student use (of ICT) and learning (8 variables).

These variables were intended to provide both a qualitative and quantitative indication of the development of ICT in the sphere of education. The set of indicators proposed covered policy and strategy, infrastructure, accessibility, and the application of the Internet and ICT in education, from the teaching and learning perspectives.

The above-mentioned paper was produced within the framework of an UNESCO project. As part of this project, a survey was carried out, which highlighted the following key points:

- (a) In more than half of the 17 countries surveyed, data were collected by national Governments; UNESCO collected data for one of the exercises;

²² Based on Thaweesak Koanantakool, "Understanding changes in the information society: Working towards the internationally harmonized views", (CES/SEM.52/8/Rev.1), a paper prepared for the joint UNECE/UNCTAD/UNESCO/ITU/OECD/Eurostat Statistical Workshop: Monitoring the Information Society: Data, Measurement and Methods (Geneva, 8-9 December 2003).

²³ Based on Carmelita Villanueva, "Measuring ICT use in education in Asia and the Pacific through performance indicators", (CES/SEM.52/6), a paper prepared for the joint UNECE/UNCTAD/UNESCO/ITU/OECD/Eurostat Statistical Workshop: Monitoring the Information Society: Data, Measurement and Methods (Geneva, 8-9 December 2003). For a broader survey of indicators of ICT use in education, see UNESCO: <http://www.unescobkk.org/education/ict/v2/info.asp?id=13256>.

²⁴ (CES/SEM.52/WP.1).

(b) Indicators and variables varied across the whole spectrum of education, which included lifelong learning;

(c) Many of the indicators outlined were more similar to a benchmarking exercise, where standards were laid out, and the task of the indicator was to show whether the standard had been achieved or not, by means of a simple yes or no answer.

2. *Business*

With regard to business, a WPIIS report on measuring ICT usage and electronic commerce suggests a building block approach as the basis for a model questionnaire comprising the following core modules:²⁵

(a) Module A: Household access to computers and the Internet. This focuses on computer and Internet access in households, the type of device used for connecting to the Internet and the speed of the connection;

(b) Module B: Household barriers to the Internet. This focuses on uncovering the perceived barriers to using the Internet. The indicators on these barriers can help to monitor the issues of the digital divide, potential bottlenecks related to technology or the lack of appropriate skills, and such e-commerce-related issues as security and logistics concerns;

(c) Modules C and D: These are related to individuals. Module C relates to the location and frequency of use of the Internet, whether at home, at work or in other locations. Module D refers to the types of activities carried out by individuals while using the Internet. These activities relate only to information and communication intensive activities, as opposed to the action of carrying out transactions over the Internet, which is covered in other modules;

(d) Module E: Internet commerce and barriers to Internet purchases. This module focuses on the location and frequency of individual purchases for personal use, the types of goods purchased and whether persons have paid for those transactions online. This module also addresses the potential barriers or concerns preventing individuals from purchasing over the Internet, for example, privacy, security and concerns related to returning or receiving goods.

The report contains model questionnaires for the above modules, and also contains guidelines on a methodology for the design and conduct of a survey.

It must be noted that at the time of going to print, this was still at the proposal stage and is not yet in existence. However, as a model for consideration, it is worthy of attention.

D. OUTCOMES OF THE REVIEW: KEY ISSUES RAISED IN INDICATOR EXERCISES

The brief review above shows that many different organizations have attempted to build indicators of ICT and development. Many of these have been carried out within the framework of WSIS. There are areas of divergence, and convergence among these exercises.

With regard to readiness indicators, several different types of exercise can be carried out. In general terms, these can be global, regional or national. Each type of exercise serves a different purpose, for example, comparison; and while comparison among states of a country does not take place in national exercises, there has been a case where a comparison exercise took place within a State: the National Bureau of Statistics of China used a methodology that compared regions within China, and thus acted as a comparative indicator exercise. Another purpose of exercises is to compare developments within one, or a

²⁵ OECD, WPIIS, "Measuring ICT usage and electronic commerce in households/by individuals: A model questionnaire", (OECD, Paris, 5-6 May 2003), (DSTI/ICCP/IIS(2002)1/REV2).

group of countries, over time. Aside from whether the indicator series is comparative or not, other differences can be noted from the review above. These relate to the structure of the exercise, the intended audience of the indicators and the intended outcomes.

In terms of indicator exercises at the regional level, eEurope is the one most subject to political scrutiny owing to the emphasis it places on achieving positive results. Moreover, it is not simply a monitoring exercise.

The ESCWA dataset is the most relevant to the region. While the 'profiles' of the ESCWA study contain much non-statistical data, they are important as reference points for further collection of data, based on the fact that data already collected provides an insight into the current state of play, which enables a basis for the construction of core indicators. It is also worth noting that the ESCWA data above is collated from publicly available information and NSOs were not directly or formally involved in the production of the indicators to any degree, which inevitably leads to inconsistencies in data.

There are various differences in all aspects of the methodology used above, and these are detailed as follows:

(a) While the type and sort of data collected varies across all indicator exercises, there appears to be a common core of certain variables. However, it was not possible to ascertain whether the same methodology was applied to the collection of these common variables;

(b) The number and type of stakeholders involved in the collection and use of the indicators seems to vary remarkably. In some exercises, the collection of data is carried out by NSOs, and used solely for policy and decision makers. Other indicator exercises are used in a much broader way, and are intended to be viewed by all stakeholders, including NGOs and the business community, in addition to foreign affiliates;

(c) Some data is collected by specific, often Government-approved, task forces, established solely for the purpose of measuring ICT developments. Others are collected by NSOs and compiled by international organizations. Some of these are compiled in a coordinated manner, for example, with interaction between an NSO and the international organization involved, others are simply drawn from public documents published by NSOs;

(d) The framework within which these indicators are designed varies according to the exercise. In some cases, the indicator exercise is determined by a regional framework or even a global one. In others, the national component is considered far more important as the exercise is intended to build upon national characteristics that will facilitate and encourage growth in a globally competitive environment. It is also important to note that within one single indicator exercise, there can be many different purposes with regard to assembling variables and indices. Some of the variables and indices can be used to compile aggregate data at the global level; others can be useful for national policy and decision makers.

IV. ICT INDICATORS FOR THE ESCWA REGION

This chapter discusses suggested indicators for the ESCWA region, focusing on the following two areas:

- (a) Readiness/enabling, in reference to infrastructure and policies;
- (b) Intensity of use in various sectors, namely, business, Government and education.

As mentioned above, this study aims to present a list of indicators that can be used by NSOs in the ESCWA region to determine their own activities with regard to developing indicators. With this in mind, an inventory of information society indicators is presented below. While the stakeholders interested in such indicators span a rather broad spectrum, they all need this type of information to form their own assessment of actions that need to be taken, either for monitoring the progress achieved in building the information society or for the development of that society.

The objective of these indicators is to monitor and gauge the readiness and the intensity stages in the process of building the information society. Owing to the fact that the information society is time-dependent, a certain degree of overlap can be observed between readiness and intensity stages, and also between intensity and impact stages. Some of these indicators must be measured annually, and these are indicated by the star symbol (*); others must be measured periodically, with the regularity of that measurement to be fixed by interested stakeholders according to the dynamism of the building process. Other indicators, indicated by the symbol (‡) must be processed at the regional level.

The aim of this inventory is not to be exhaustive, but to act as a guide; and in this sense, some indicators below are broad and deserve to be complemented by in-depth indicators. However, the indicators proposed here do maintain compatibility with indicators proposed or accepted internationally, for example, UNDP indicators related to education and also DAI. At the same time, the proposed indicators are designed to reflect the status of the information society in the ESCWA region.

It is important to stress that each country can have its own weighting system, which would be capable of assessing and benchmarking all the proposed indicators below. The indicators and weighting system adopted by a country must be able to measure the level of achievement of goals that have been targetted by the strategies of that country. Benchmarking at the international level, however, requires an international consensus on core indicators and indices. International organizations, including UNDP and ITU have constructed indices that are meeting increasing acceptance worldwide. This study, and its expected results are contributions towards that process, and will culminate in a list of core indicators that will be applicable internationally.

A. ENABLING-READINESS INDICATORS

Enabling indicators cover a wide range of ICT-oriented indicators related to human and technological infrastructures. Policy indicators related to ICTs and their development are a decisive component of enabling indicators, and are essential for building the information society, particularly in developing countries where various problems and issues must be tackled, ranging from capacity building to structural changes in the ICT sector.

In fact, use of ICTs cannot be maximized without an adequate ICT infrastructure; full exploitation of ICTs; and a proper set of policies and visions. These are all necessary conditions for the sustainable development of ICTs in the context of an information society. In this sense, readiness is a necessary precursor for the successful use of ICTs, and therefore the indicators listed below form an essential part of any policy-making process.

The ultimate benefit of ICTs, for the ESCWA region at least, is to raise productivity, improve development of certain specific sectors, including tourism, and enable the dormant potential in many areas in the region. Indeed, while the effectiveness of the productivity increase that has been attributed to the use of ICTs has been debated, it is important to recognize that it is increasingly difficult for many sectors to be

operational, let alone competitive, without technology. Some sectors, for example, banking, can no longer operate without the intensive use of ICT. In addition, two of the most powerful contemporary forces are globalization and connectivity, which are intertwined and interrelated, and have considerable social and economic implications. This has led policy makers and their industrial partners to recognize the importance that must be afforded to the enabling power of ICT.

Therefore, policy makers must carefully scrutinize the ICT profile of a given country through an adequate set of indicators that reflect the availability, affordability and sustainability of technology. Sustainability refers to capacity building, investment in ICT infrastructure, ICT as a sector, and the legal and regulatory environment that enables the growth of this sector. Digital content is also an important component of an ICT indicator set. These indicators are vital in promoting a culture of evidence-based policy design.

Enabling indicators must be complemented by basic indicators, generally provided by NSOs, which serve as prerequisites in terms of even starting to attempt to build a society with information and knowledge at its core. Population and population growth rate combined with the gross national income (GNI)/gross domestic product (GDP) per capita and also literacy can form a valuable index that is capable of determining the level of economic development in a country.²⁶ Such an index could be considered as a primary indicator of the aptitude of a country in terms of dealing with, for example, the Internet and its potential market. Furthermore, the values below could be combined with more specifically ICT-related ones to provide indices similar to e-readiness indices described above. In fact, these indicators are components of many indices, for example, the Education Index and the Human Development Index (HDI) of UNDP.²⁷

Sets of variables considered representative of ICT penetration in a given society are reviewed below. It is possible to combine subsets of these variables to form specific indicators, which must be related to the objectives that must be achieved in each aspect of ICT penetration. For example, connectivity can be considered as an indicator in the readiness stage of building the information society. This indicator could incorporate a cluster of variables,²⁸ including per capita fixed and mobile line, with 3G and wireless application protocol (WAP), and the number of personal computers (PCs) per capita. Some organizations, for example, OECD, add the variable of Internet hosts per capita to three other variables to form a connectivity indicator. To some extent, some of the auxiliary variables presented below could fall within the framework of impact variables, in which case it is preferable to integrate them in present and near-future indicators. It is noteworthy that a correlation between HDI and the number of Internet hosts per 1,000 inhabitants can be established.²⁹

Enabling indicators are divided into infrastructure indicators and readiness indicators. Infrastructure encompasses basic telecommunications, media, and Internet access. Some of these indicators, when combined with basic national basic indicators could form indices similar to DAI. Readiness covers readiness of households and individuals, ICT sector workforce skills, policies and strategies, the ICT sector/trade and local digital content.

The percentage of Internet users per language and the share of each language group in the world economy as of March 2004 is highlighted in figure IV, which indicates an almost perfect correlation between

²⁶ Gross national income (GNI) is equal to GDP less taxes (less subsidies) on production and imports, compensation of employees and property income payable to the rest of the world plus the corresponding items receivable from the rest of the world. Thus GNI at market prices is the sum of gross primary incomes receivable by resident institutional units/sectors. It is commonly denominated gross national product (GNP). In contrast to GDP, GNI is not a concept of value added, but a concept of income. Definition from United Nations Statistics Division web site. Available at: http://millenniumindicators.un.org/unsd/mi/mi_dict_xrxx.asp?def_code=326.

²⁷ The Human Development Index measures the average achievements in a country according to three basic dimensions of human development: life expectancy, education and gross domestic product (GDP) See UNDP, *Human Development Report 2001: Making New Technologies Work for Human Development*, (New York and Oxford, Oxford University Press, 2001).

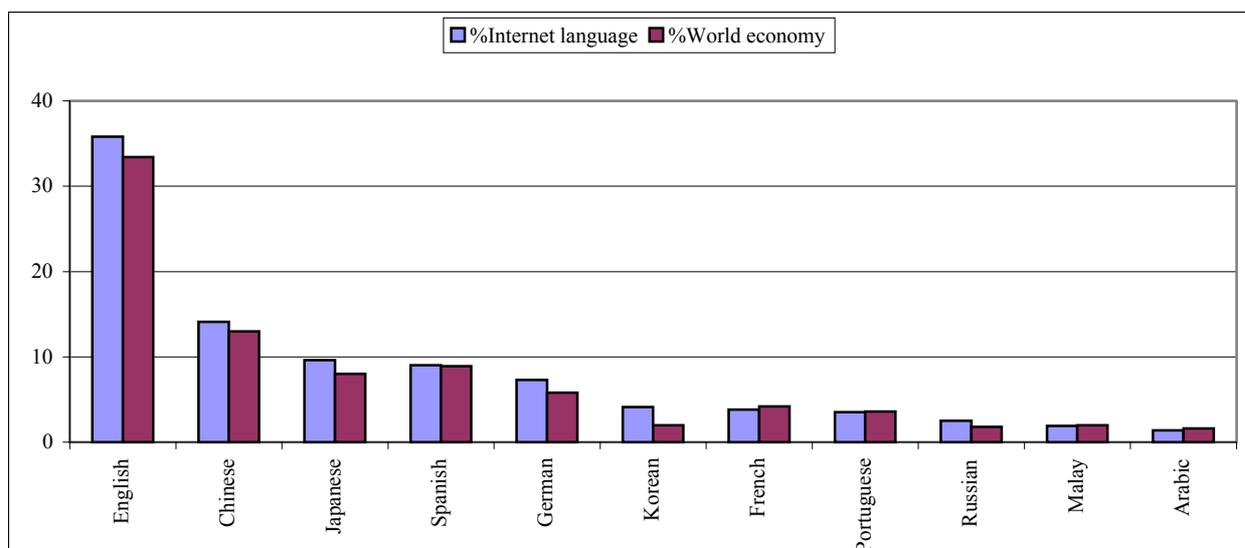
²⁸ This indicator is commonly expressed as a simple weighted sum of its constituent variables.

²⁹ See Dan M. Grigorovici, Jorge Reina Schement and Richard D. Taylor, "Weighing the intangible: Towards a framework for information society indices", an E-business Research Centre working paper, Pennsylvania State University, August 2002. Available at: http://www.smeal.psu.edu/ebrc/publications/res_papers/2002_14.pdf.

language groups of Internet users and their share in the world economy, as shown by a correlation coefficient of approximately 1, or 0.997.

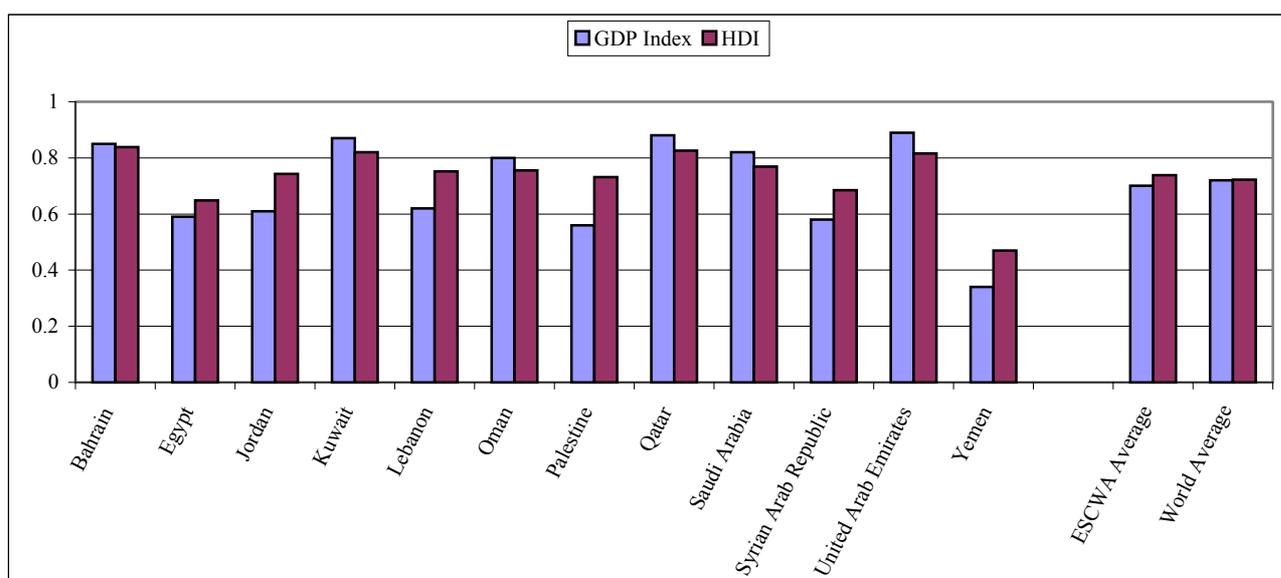
Human development and GDP indices of ESCWA member countries for 2001 are presented in figure V, which shows that it is also possible to utilize ICTs to enhance the position of a country in terms of HDI. In this context, the ESCWA HDI average for 2001, which did not include Iraq, was encouraging, and reflects that advances are possible. Basic enabling indicators are presented in table 4.

Figure IV. Percentage of Internet users per language and as a share in the world economy, March 2004



Source: Global Reach, “Global Internet statistics (by language)”, March 2004. Available at: <http://www.global-reach.biz/globstats/index.php3>.

Figure V. Human development and GDP indices of ESCWA member countries, 2001



Source: Compiled by ESCWA from UNDP, *Human Development Report 2003: Millennium Development Goals: A Compact Among Nations to End Human Poverty*, (New York and Oxford, Oxford University Press, 2003).

TABLE 4. BASIC ENABLING INDICATORS

Indicator	Auxiliary variables	Variable type	Source
*Population		Number	NSO
	Gender	Percentage	NSO
	Population growth rate/gender	Percentage	NSO
	Urban population/gender	Percentage	NSO
*Illiteracy rate		Percentage	NSO
	Gender	Percentage	NSO
*GNI/GDP per capita (in purchasing power parity)		Number (\$)	NSO
	GNI per capita annual growth rate	Percentage	NSO
*GNI/GDP Agriculture Industry Services: Trade; Transport; Tourism; Building; Others		Number (\$)	NSO
		Percentage	NSO
*Literacy (15 years and over)		Percentage	NSO
*Combined primary, secondary and tertiary gross enrolment ratio ^{a/}		Percentage	NSO
	Gender	Percentage	NSO
*Life expectancy at birth	Gender	Number (years)	NSO

Source: Compiled by ESCWA from various sources.

a/ The number of students enrolled in a level of education, regardless of age, as a percentage of the population of official school age for that level. The gross enrolment ratio can be greater than 100 per cent as a result of grade repetition and entry at ages younger or older than the typical age at that grade level. Definition from UNDP web site. Available at: http://www.undp.org/hdr2003/indicator/indic_3_1_1.html.

1. Telecommunications infrastructure

Table 5 presents basic indicator variables in the telecommunications sector. These deal with the dissemination of telecommunication facilities in urban and rural areas in a given society and their affordability. They implicitly reflect the quality of services in terms of the existence of more than one operator and the deregulated market. One of the indicators below highlights payphones per 1,000 population.³⁰ In addition, the last indicator could possibly represent a stimulus for further ICT market development. However, it is worth bearing in mind that according to OECD, countries that liberalized telecommunications at an early stage have much lower communication costs and wider diffusion of ICT than countries that were late to take action. In addition, OECD recommended that increasing competition in telecommunications would facilitate the diffusion of ICT.³¹

³⁰ Payphones in particular, could be a valuable form of infrastructure in ESCWA member countries. Indeed, fixed line per capita, payphone and voice-ver-Internet communications could form a universal telecommunications index.

³¹ OECD, "The new economy: Beyond the hype: Final report on the OECD Growth Project", prepared for the Meeting of the OECD Council at Ministerial Level, 2001.

TABLE 5. TELECOMMUNICATIONS INFRASTRUCTURE INDICATORS

Indicators	Auxiliary variables	Variable type	Source
*Fixed telephone lines per 100 population	Fixed telephone lines per 100 population in rural areas	Number Number	NTAR ^{a/}
*Total telephone subscribers per 100 population	Telephone subscribers per 100 population in rural areas	Number Number	NTAR
*Mobile phone subscribers per 100 population	Waiting list (total number) Waiting time (average in months)	Number Number Number	NTAR
Number of payphones per 1000 population		Number	NTAR
*Annual subscription cost: Fixed Mobile	*Cost of local, regional, international call	Number (\$) Number (\$ per 3 minutes)	NTAR/ TOs ^{b/}
Number of fixed line operators		Number	NTAR/ TOs
Number of mobile operators		Number	NTAR/ TOs
*Outgoing/ingoing traffic		Minutes per subscriber	NTAR/ TOs
Market deregulation: Fixed line Mobile		Binary Binary	NTAR/ TOs

Source: Compiled by ESCWA, from various sources.

a/ National telecommunications annual reports;

b/ Telecommunications operators.

2. Media infrastructure

While most households have a radio, the same is not always true for television and satellite receivers, which are capable of supplying a great diversity of information. Moreover, the existence of private radio and television broadcasting has the ability to reflect, similarly to other media, freedom of expression and the availability of information. It is possible that concerns regarding media infrastructure indicators for the ESCWA region are fully justified given the fact that television is the main source of information in this region. This can be attributed to the high rate of illiteracy, which amounted to 37.9 per cent of adults aged over 15 according to a study published in 2003.³² These media, which continue to be under exploited in the development process, can play a key role in the shift toward an information society. Media infrastructure indicators are illustrated in table 6.

TABLE 6. MEDIA INFRASTRUCTURE INDICATORS

Indicator	Auxiliary variables	Variable type	Source
Radios per 100 population		Number	NSO
Number of national (private and public) radio stations	Number of public radio stations	Number Number	NSO
*Television per 100 population		Number	NSO/ Survey
*Ratio of households having a television		Percentage	NSO/ Survey
*Number of national television channels	Number of public television stations	Number Number	NSO NSO
*Number of satellite receivers per 100 population		Number	NSO

Source: Compiled by ESCWA, from various sources.

³² ESCWA, *Statistical Abstract of the ESCWA Region*, twenty-third issue, (E/ESCWA/SDD/2003/29).

3. Access to the Internet

Within the framework of this study, access to the Internet is considered a function of multiple variables. Variables include access to equipment and affordability of access and these must be measured in both urban and rural areas. One component of access indicators is related to a country's access to the world and the ratio of local web sites per capita.

The number of Internet users is usually used to measure the level of access to the Internet and to compare use of the Internet in countries. However, this measure does not reflect intensity of use. Figures produced by ITU reveal that the telecommunications divide is present in subscriber numbers and also in outgoing traffic per capita.

It is possible that the number of Internet users could be much higher in one community compared to another, where more time is spent using the Internet than in the first owing to a number of factors. It is therefore very difficult to measure the number of Internet users, particularly in developing countries where a single subscription is used by many people, and where community centres and Internet cafés are flourishing. It is perhaps better to consider the normalized average number of hours per capita, taking dial-up interconnection modes as a data reference, as a basis for Internet access. This can be achieved by investigating the total number of normalized hours consumed by subscribers across all national Internet service providers (ISPs) in every country. Access to the Internet indicators are presented in table 7.

TABLE 7. ACCESS TO THE INTERNET INDICATORS

Indicator	Auxiliary variables	Variable type	Source
*Number of PCs per 100 population (configuration may vary)	Number of PCs per 100 population in rural areas	Number Number	Trade office/NSO/ Survey ^{a/}
*Number of PC users	Ratio of PC users according to gender, age, education and income	Number Percentage	Survey Survey
*Number of Internet subscribers per 100 population	Ratio of Internet users according to gender, age, education and income Number of Internet users in rural areas	Number Percentage Percentage	ISPs ^{b/} ISPs/ Survey
*Cost of PCs		Number (\$)	ICT distributors
*Internet subscription cost		Number (\$)	ISPs
*Internet access cost per hour		Number (\$)	ISPs
*Number of individuals (aged 10 and over) accessing the Internet	Ratio of accessing the Internet from home, work, place of education, community centre or Internet café	Number Percentage	Survey Survey
Number of public access points to the Internet (including public libraries, community centres and Internet cafés)		Number	ISPs
Number of service providers		Number	ISPs
Modes of Internet access: Number of: Dial-up: ^{c/} DSL, ASDL, ISDN, frame relay, and T1 and E1 connections ^{d/}	Initial cost, monthly charge, and per hour cost for each mode of Internet access	Number Number Number (\$)	ISPs ISPs ISPs

TABLE 7 (continued)

Indicator	Auxiliary variables	Variable type	Source
*Full capacity of backbone system of data transmission	Connectivity type: Satellite; Regional fibre optic; International fibre optic	Number	ISPs
Internet bandwidth per capita		Number	ISPs
Presence of Internet exchange ^{e/}		Binary	ISPs
*Number of Internet hosts		Number	Regional registrar
*Number of local/native web sites per 1000 population		Number	Survey
*Number of secure servers per 1 million population		Number	Survey

Source: Compiled by ESCWA, from various sources.

a/ Survey of a representative sample of the population is perhaps the best way of measuring this variable based on the fact that, particularly in the case of developing countries, some PCs are obtained from outside the country, from the 'grey market' or from unregistered local assembly facilities;

b/ Internet service provider;

c/ Mobile connectivity will become increasingly important with the widespread introduction of 3G and wireless application protocols;

d/ DSL: digital subscriber line; ASDSL: asymmetric digital subscriber line; and ISDN: Integrated services digital network;

e/ Internet exchange points or network access points or metropolitan area exchanges are third party operators playing the role of facilitator of traffic exchange between ISPs permitting domestic exchange of within-country traffic without using valuable international bandwidth.

4. Readiness of households and individuals for the information society

Indicators in this section are aimed at gauging ICT penetration in households and the type of use of such technology in that setting (see table 8). The percentage of households with access to the Internet is a major factor in establishing certain types of services offered on the Web, including e-Government or e-learning. Variables presented below deal with ICT equipment possession and also type of use and barriers hindering the use of PCs or the Internet.

TABLE 8. READINESS OF HOUSEHOLD INDICATORS

Indicator	Auxiliary variables	Variable type	Source
*Percentage of households with a PC	*‡Cost of PC relative to average individual income; PC use: Accessing Internet; Digital content; Personal; Others	Percentage Percentage Percentage	Survey Survey Survey
*Percentage of households with access to the Internet	Barriers hindering access and use of the Internet, for example, cost, content and utility	Percentage Percentage	Survey Survey

TABLE 8 (continued)

Indicator	Auxiliary variables	Variable type	Source
Proportion of Internet users (categorized by age) for the following: Email; Chat room; Locating information on goods and services; Getting information from or interacting with Government; Seeking health-related information; Finding documents or news; Games; Downloading music, software; Using financial services; Purchasing or ordering; Learning; Others	Gender	Percentage Percentage	Survey Survey

Source: Compiled by ESCWA, from various sources.

5. Skills in the ICT sector

The breadth and depth of ICT skills of a national work force reflects national readiness in terms of evolving into an information society. The level of these skills is a determining factor in the development of the ICT sector and also the information society. In fact, one economic growth factor is the ratio of the population that has completed high school, which is based on the fact that educated people are able to deal with and absorb new technologies.³³

It is not possible to measure skills in a direct way, and therefore, proxy variables are often used to capture observable characteristics, for example, education attainment. The variables in table 9 reflect the capacity of a country to adopt and adapt ICT.

6. Policies and strategies

Policy and strategy indicators reflect the importance afforded, or that could be afforded to the information society (see table 10). With this in mind, it is worth noting that the digital divide (see box 3) cannot be bridged at the national and regional levels without an articulated strategy aimed at the pervasiveness of access to information, particularly in societies that do not have established or accumulated traditions in the field of information and ICTs.

The existence of a plan of action and also a national body to follow up on the implementation of strategies is necessary in the early stages of the readiness phase to bridge the digital divide. Regulatory and legal issues dealing with all aspects related to the use of ICTs are fundamental to the development of the ICT sector and consequently the information society.

³³ Robert Barro, "Education and economic growth", no date. Available at: <http://www.oecd.org/dataoecd/5/49/1825455.pdf>.

TABLE 9. ICT SECTOR WORKFORCE SKILLS INDICATORS

Indicator	Auxiliary variables	Variable type	Source
*Number of people who have completed secondary school	Gender	Number Number	NSO NSO
*Number of students in or graduated from vocational secondary school specializing in ICT	Gender	Number Number	MoEd
*Number of people who have completed tertiary education	Gender	Number Number	NSO NSO
*Number of students in higher education in an ICT field or ICT-dominated field, namely, management or information systems	Gender/discipline	Number Number	MoEd/HEd ^{a/}
*Number of graduates in higher education in an ICT field or ICT-dominated field	Number of bachelors and engineers graduated/gender; Number of annual graduates from vocational institutes/gender	Number Number Number	MoEd/HEd
Number of certified ICT professionals	Gender	Number Number	MoEd
*Proportion of population that has followed basic training in ICT, for example, ICDL ^{b/}	Gender	Percentage Percentage	NTCs/ ^{c/} regional UNESCO offices
Number of training centres, both basic and professional	Training centre capacity, namely, maximum number of trainees per year; Number of ICT training programmes specifically designed for communities	Number Number Number	NTCs/ Computer societies

Source: Compiled by ESCWA, from various sources.

a/ Ministry of Education/Higher Education;

b/ International computer driving license;

c/ National training centres.

TABLE 10. POLICY AND STRATEGY INDICATORS

Indicator	Auxiliary variables	Variable type	Source
Existence of ICT strategy or ICT vision on the part of a national Government		Binary	Government
Existence of ICT plan of action or national/regional initiatives	Existence of national body following the implementation of an action plan and initiatives	Binary Binary	Government
Existence of regulatory body		Binary	MoT ^{a/}
Existence of patent law	Adoption of Patent Law Treaty ^{b/}	Binary Binary	Government
*Existence of law related to IPR ^{c/}	Enforcement of IPR, as gauged by the number of measures supporting IPR protection and piracy rate: Piracy rate; ^{d/} Copyright law	Binary Percentage Binary	Government
*Presence of online privacy law		Binary	MoT
*Public ICT expenditure as percentage of GDP		Number (\$)	Government

Source: Compiled by ESCWA, from various sources.

a/ Ministry of Telecommunications;

b/ World Intellectual Property Organization, Geneva 2000;

c/ Intellectual property rights;

d/ The piracy rate reflects the size or extent of unauthorized distribution of pirated and unlicensed software deployed in a country.

Box 3. Bridging the digital divide

The term digital divide refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels in terms of access and use of ICT. The widening of this gap reinforces disparities among citizens of the same country and among countries, which leads to increasing exclusiveness in both cases.

According to the Organization for Economic Cooperation and Development (OECD), the digital divide can be measured according to the availability of telecommunications infrastructure, computer and Internet access. In the case of households, and also countries, some reasons for the digital divide appear to be the level of education and level of income, which is reflected in the United Nations Development Programme's Human Development Index. In 2001, OECD countries and developing countries scored 0.905 and 0.655 on this index, respectively. In the same year the averages for fixed line, mobile and access to the Internet were, respectively, 523, 539, and 332 per 1,000 inhabitants in OECD countries; and 87, 75 and 26.5 per 1,000 inhabitants in developing countries. The figures show a real gap between developing and OECD countries, which is widening over time.^{a/}

The most crucial issue is how to overcome this widening digital divide, and in this regard, the role of policies is fundamental. The economic and social benefits associated with the diffusion and use of ICT must be targeted by these policies, and necessary regulatory reforms to ensure low-cost access must be implemented.

Accurate and relevant measurements related to the digital divide are necessary to specify the scope of that divide—in terms of citizens, countries or regions—as a prerequisite for the effective formulation of policy- and decision-making. Variables are different in each case, and with regard to citizens, could include age, gender, income and education. In addition, it is necessary to select a digital divide indicator. This could be information access as reflected by Internet usage, or access to a telephone in the home in the case of developing countries. The Digital Access Index is an effective basic measurement of the digital divide between or among countries and regions. The United Nations Conference on Trade and Development (UNCTAD) measurements of the digital divide between or among countries are also worth noting, particularly the following:^{b/}

- (a) Absolute measures: These measure the absolute gap between the most advanced country with the highest hardware concentrations and the country with the lowest;
- (b) Relative measures: These measure whether distribution as a whole is becoming more or less convergent over time;
- (c) Categorical measures: These measure whether the group of low-income countries is converging with (relatively) the group of high-income countries.

^{a/} OECD, *Understanding the Digital Divide*, (Paris, OECD 2001).

^{b/} UNCTAD, *Information and Communication Technology Development Indices*, (UNCTAD/ITE/IPC/2003/1).

7. ICT sector/trade

The ICT-production industry, which is a combination of manufacturing and services,³⁴ can be boosted in many developing countries by providing a suitable environment, which is not the case with other types of technologies that require a more sophisticated or expensive infrastructure and highly qualified skills. Thus, every society could a priori benefit from the positive effects of ICT on economic growth. In fact, there is no immediate reason why a country, even those with a small or non-existent ICT industry, should not benefit from the positive effects related to the growth of new information technologies. In this context, the cases of India, Ireland and Hungary must be noted for their hosting of foreign affiliates (see box 4) and for the economic growth they have achieved as a result of the ICT sector. Table 11 lists trade indicators.

³⁴ This includes the acquisition, transmission and display of data and information electronically, for example, by means of computing equipment, communication and networking equipment, computer and telecommunication services, and also such electronic media as television and radio.

TABLE 11. TRADE INDICATORS

Indicator	Auxiliary variables	Variable type	Source
*Expenditure on research and development (R&D) on ICT infrastructure and application	Number of R&D projects related to ICT; Number of researchers working in ICT; Number of incubators or similar facilities capable of supporting new businesses that are just getting started; Number of already incubated projects in ICT; Number of launched incubated businesses; Growth of incubated projects	Number (\$) Number Number Number Number Percentage	TA ^{a/} and MoEd ^{b/}
*Number of companies working in the ICT sector	Number of PCs locally assembled; Ratio of PCs locally assembled to total PCs; Growth rate of ICT import; Growth rate of ICT export;	Number Number Number Percentage Percentage	C/MoI ^{c/}
	ICT import as a percentage of total imports; ICT exports as a percentage of total exports; Share of ICT industry as an economical sector; Share of foreign investment in the ICT industry (see box 4)	Percentage Percentage Percentage Percentage	
*Number of employees in the ICT sector	Gender; Growth of employment in ICT sector and gender	Number Number Percentage	C/MoI
*Contribution of production value in the ICT sector to total business sector production value	Growth of production value in the ICT sector	Percentage	C/MoI, Survey
*Endorsement of the Paris Convention ^{d/}		Binary	C/MoI
*Number of patents related to ICT ^{e/}		Number	C/MoI, Patent agency

Source: Compiled by ESCWA, from various sources.

^{a/} Telecommunications authorities;

^{b/} Ministry of Education;

^{c/} Chamber or Ministry of Industry;

^{d/} Paris Convention for the Protection of Industrial Property. See http://www.wipo.int/treaties/en/ip/paris/trtdocs_wo020.html;

^{e/} This indicator has a certain degree of weakness in that most inventions are not patented, and not all patents have the same commercial value or even application.

Box 4. Foreign affiliates in the ICT sector, 1998^{a/}

Since the mid-1980s and increasing globalization, foreign direct investment (FDI) has been central to industrial restructuring. Most firms have found the establishment of an affiliate to be a particularly effective way of penetrating markets. Given that data on FDI do not capture this phenomenon directly, indicators on the activities of foreign affiliates provide important complementary information.

The role of foreign affiliates varies considerably in the ICT sector, depending on the part of the sector concerned. Virtually all production in computer manufacturing in Hungary and Ireland can be attributed to foreign affiliates, while in Germany and the United States of America only a small share of such production is attributable to foreign affiliates.

Foreign affiliates also make a strong contribution to the manufacturing of electronic equipment, accounting for 90 per cent of the share of this activity in Hungary and Ireland. The United Kingdom of Great Britain and Northern Ireland also has a very high share of foreign multinationals. In Finland, the Netherlands and Sweden, foreign affiliates accounted for only a small share of the production of electronic equipment, possibly as a result of the strong position of domestic firms in these markets.

In the telecommunications sector, foreign affiliates played a minor role in almost all Organization for Economic Cooperation and Development (OECD) countries; Hungary and Portugal were exceptions, with shares of more than 60 per cent and 30 per cent respectively. Shares were very low in other European countries. This partially reflects the degree of liberalization of telecommunications markets, for example, the limits that were imposed, until recently, by many countries on foreign investment.

In the other major ICT service sector, namely, computer services, foreign affiliates played a more substantial role. The share of foreign affiliates was relatively high in Belgium, Norway and the United Kingdom, but very low in Turkey and the United States.

With regard to manufacturing segments of the ICT sector, there is a close link between the shares of foreign affiliates in employment and in production. In most cases, the share of production was slightly higher, which is an indication that, on average, the labour productivity of foreign affiliates has been somewhat higher than that of domestic firms.

Foreign affiliates also accounted for a considerable share of research and development (R&D) in the ICT sector, particularly in Ireland. In large OECD countries, namely, France and the United Kingdom, a considerable share of R&D in ICT manufacturing can be attributed to foreign affiliates, a sign that many firms have been establishing R&D laboratories outside their home countries.

Source: OECD, *Measuring the Information Economy 2002*, (Paris, OECD, 2002).

^{a/} The term foreign affiliate is restricted to majority-owned foreign affiliates. Accordingly, the geographical origin of a foreign affiliate is defined as the country of the parent company if it holds, directly or indirectly, more than 50 per cent of the voting shares of the affiliate.

8. Local digital content

Access to the Internet is still very low in Arab countries. Indeed, while Arab citizens accounted for more than 5 per cent of the population of the world, Arab Internet users did not exceed 1.4 per cent in 2004.³⁵ One of the problems hindering stronger access is the lack of valuable and attractive content. The Internet is a means of supporting social and economic development, and Arab countries must seize this opportunity by developing an ambitious content industry aimed at the achievement of various strategic goals. Without a substantial improvement in Arabic digital content,³⁶ the number of Arab internet users will remain low. This is why the suggested indicators in table 12 mention the existence of a specific content strategy and aim to measure progress achieved in terms of developing a content industry. They also aim to gauge the contribution of cultural institutions in enriching such content.

Indicators related indirectly to the local content issue must be considered for inclusion in an indicator set, including the following:

³⁵ Global Reach, "Global Internet statistics (by language)". Available at: <http://www.greach.com/globstats/>.

³⁶ Digital content is anything created by humans that can be represented in digital format including text, images, sound and videos.

- (a) The number of national libraries and the number of books contained in such libraries;
- (b) The number of books, written or translated, in a local language on an annual basis at the national and regional levels and the average number of distributed copies per book;
- (c) The number of dictionaries and encyclopaedias in a local language;
- (d) The number of daily newspapers published in a national language, which are publicly accessible;
- (e) The number of weekly magazines published in the national language, which are publicly accessible;
- (f) The number of monthly or periodical reviews published in a national language, which are publicly accessible;
- (g) The number of cinematographic films produced on an annual basis, including documentary, television series and movies;
- (h) The number of musical pieces produced on an annual basis.

These variables reflect to some extent the actual production of content that can be transformed into a digital content.

TABLE 12. LOCAL DIGITAL CONTENT INDICATORS

Indicator	Auxiliary variables	Variable type	Source
Existence of strategy or initiative to develop local digital content		Binary	Government
*Ratio of digital content industry to ICT related industry		Percentage	C/MoI, ^{a/} Survey
Rate of growth of digital content industry		Percentage	C/MoI, Survey
*Number of web sites with content in local language		Number	Survey
‡Number of web sites visited per category, namely, info-media, entertainment, educational and e-commerce		Percentage	Survey
‡Number of CDs/DVDs produced in local language per year		Number	Main multimedia distributors
‡Expenditure on research and development in machine translation tools		Number (\$)	Research council, MoHE ^{b/}
*Amount of software distributed in local language		Number	Main software distributors
‡Number of programmes or initiatives to promote and facilitate the use of local language		Number	MoT ^{c/} and MoC ^{d/}
*‡Number of cultural institutions with web sites		Number	MoC
*‡Number of cultural institutions providing online services		Percentage	MoC
*Number of digital archives		Number	National information centres
‡Number of libraries with Internet access		Number	MoC, ISPs
‡Number of libraries with web sites		Number	MoC
Number of libraries using ICT to provide services		Number	MoC
Number of libraries with digitization activities		Number	MoC

Source: Compiled by ESCWA, from various sources.

a/ Chambers or Ministry of Industry;

b/ Ministry of Higher Education;

c/ Ministry of Telecommunications;

d/ Ministry of Culture.

B. INTENSITY INDICATORS

Intensity indicators, which are outlined below, primarily aim to reflect the level of ICT applications within a society or a nation. In this regard, this section focuses on government, business and commerce, and education indicators, for the reason that it is possible to carry out measurements in these areas, which are where the benefits of the information society are most evident at an early stage. These areas also provide a solid foundation for subsequent developments in that the scope of these indicators can be extended, during later phases, to form a broader set, which will take into consideration other uses of ICTs. Other important components of the broader indicator set could include R&D and innovation as these activities generate information and knowledge, which are the pillars of the information society. This study restricts itself to such fundamental areas because its focus is on the building of the information society in the ESCWA region, where some member countries are at embryonic or emerging stages of an information society.³⁷ The scope of indicators can be enlarged when the region attains a more mature stage in terms of building the information society.

1. Government

The role and effectiveness of public administrations has been significantly altered by the use of ICT tools to deliver some of their functions and services. In this context, the adoption of ICT tools has led to the reorganization of public administrations and has enabled various improvements, including facilitating interactive communication with the public, immediate information exchange within and among public administration networks, best practices related to information management systems and transparent administrative transactions.

Interactivity, through the use of ICT tools, among administrations, businesses and citizens is essential to the development of an inclusive national network, and is capable of boosting social and economic cohesion and development. Thus, the growing connection between administrations and other national stakeholders is a major indicator that reflects the efficient and effective use of ICT and convergence towards the information society.

Effectiveness of e-Government implies a widespread use of ICT for both citizens and organizations. However, the absence of such widespread use must not be considered an obstacle in the application of an appropriate e-Government model that fits with the development of a given society, and which is related to its infrastructure and human resource endowments.

This list of variables presented below can be complemented by useful information related to state employees and independent state agencies, including the number of state employees, and measures of their technological competence.

Table 13 lists indicators that measure the use of ICT in Government, touching on readiness, effective use and improving the efficiency of operations. Box 5 details information related to the United Nations Global e-Government Survey 2003, and also presents e-Government readiness and e-participation indices for ESCWA member countries, excluding Iraq and Palestine, which are illustrated by means of figures.

TABLE 13. GOVERNMENT INDICATORS

Variables	Auxiliary variables	Variable type	Source
Existence of national strategy or vision related to the use of the ICT in government		Binary	Government
Existence of master plan		Binary	Government
Existence of dedicated budget		Binary	Government
Existence of organizational structure for implementing the master plan		Binary	Government

³⁷ ESCWA, *Regional Profile of the Information Society in Western Asia*, (E/ESCWA/ICTD/2003/11).

TABLE 13 (continued)

Variables	Auxiliary variables	Variable type	Source
Existence of monitoring and evaluation mechanism		Binary	Government
Number of PCs in government agencies		Number	Government/ NSO/Survey
*Number of state employees with basic ICT skills		Number	Government/ NSO/Survey
Existence of ICT maintenance service in each agency		Binary	Government/ NSO/Survey
Percentage of agencies with internal networks		Percentage	Government/ NSO/Survey
*Percentage of agencies linked by networks		Percentage	Government/ NSO/Survey
*Percentage of government agencies with web sites		Percentage	ISPs
*Percentage of government agencies with online services	Information services; Advanced services, namely, applications, e-payment or e- procurement	Percentage Percentage Percentage	Government/ NSO/Survey
*Amount of government-related information available online, by pages or megabytes		Number	Government/ NSO/Survey
Percentage of government services that are linked to other agencies		Percentage	Government/ NSO/Survey
*Percentage of citizens using online government services		Percentage	Survey
*Number of government portals		Number	ISPs or Survey
*Intensity of government e-procurement		Percentage	Government/ NSO/Survey
*Ratio of government agencies using electronic payment		Percentage	Government/ NSO/Survey

Source: Compiled by ESCWA, from various sources.

Box 5. United Nations Global e-Government Survey 2003

E-Government comprises various types of electronic interactions: Government to Government (G2G); Government to business (G2B); and Government to citizen (G2C) and its reverse: citizen to Government (C2G). This survey adopts a people-centric approach to e-Government, namely, G2C and C2G relationships.

The survey aims to do the following:

- (a) Present a global snapshot of the state of comparative e-Government readiness;
- (b) Provide an appraisal of the use of e-Government as a tool in the delivery of services to the consumer;
- (c) Provide a comparative assessment of the willingness and ability of Governments to involve the public in e-participation;
- (d) Provide a benchmarking tool for monitoring the progress of countries as they move towards higher levels of digital public service delivery.

This survey is based on two primary indicators:

Box 5 (continued)

(a) The state of e-Government readiness: This refers to the capability of the public sector to use ICT to provide public services;

(b) The extent of e-participation: This reflects the willingness of a Government to use ICT to provide high quality information and communication tools for the specific purpose of empowering people with regard to participation in consultations and the decision-making process.

The e-Government readiness index comprises the following three indices:

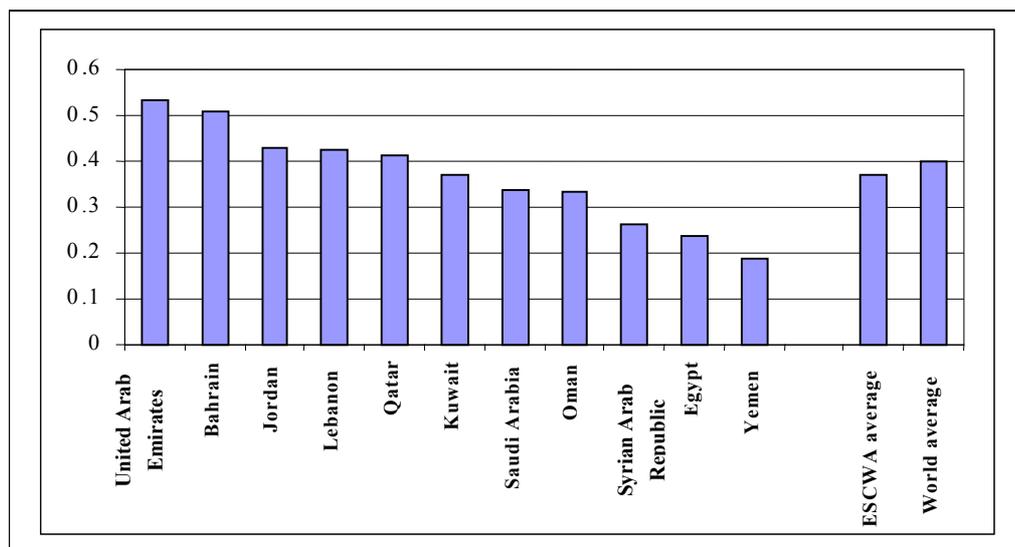
(a) The Web Measure Index: This is a quantitative index based upon a theoretical Web presence measurement five-stage model. As countries progress through the following five stages, they are ranked higher in the model:

- (i) Emerging Presence: This refers to the presence of limited and basic information in the form of a web site or sites and also the presence of links to certain Ministries, for example, Ministries of Education or Health;
- (ii) Enhanced Presence: This refers to the provision, by a Government, of sources of current and archived information, including policies, budgets, laws and regulations, reports and downloadable databases;
- (iii) Interactive Presence: This highlights the existence of downloadable forms for the purposes of tax payment or license renewal, incorporating the ability to send the renewed item back to the concerned party, through the postal system;
- (iv) Transactional Presence: This refers to possible 24 hours a day, 7 days a week, interaction between citizens and Government. E-procurement facilities fall within this framework.
- (v) Networked Presence: This refers to the highest mode of e-Government where all types of interaction are possible, namely, G2G, G2B, G2C and their reverses, and where two-way dialogue involving a Government and its citizens is available;

(b) The Telecommunication Infrastructure Index: This is built upon six primary indicators, namely, number of PCs, Internet users, telephone lines, online population, mobile phones and televisions, all per 1,000 population;

(c) The Human Capital Index: This relies on the United Nations Development Programme education index.

Box figure I. E-readiness index for ESCWA member countries



Source: "United Nations Global E-government Survey 2003". Available at: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan016066.pdf>.

Box 5 (continued)

E-participation, which is a qualitative measure, employs proxy indicators that measure the following:

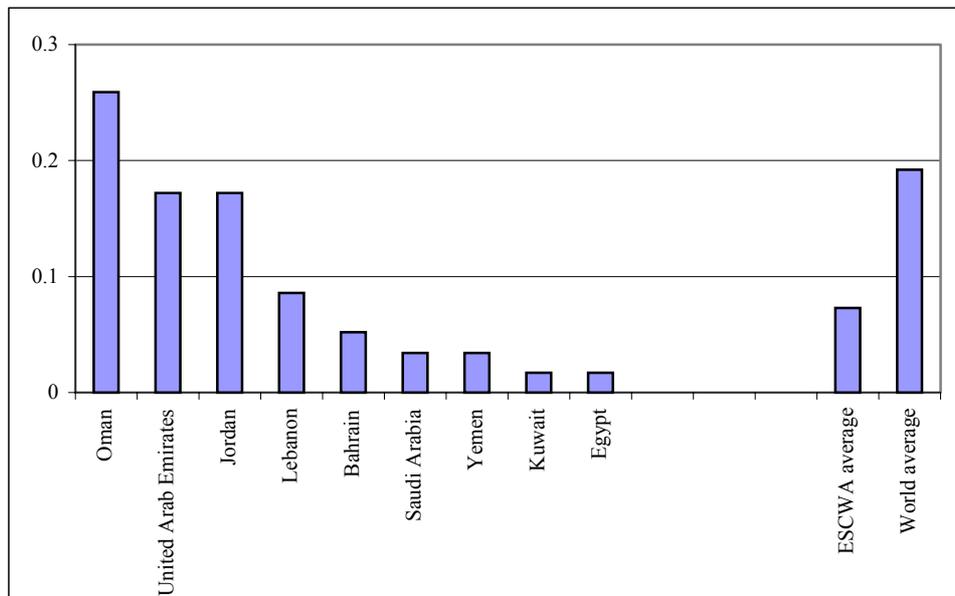
- (a) Quality of services offered on web sites in terms of e-participation;
- (b) Relevance of information and services provided by web sites;
- (c) Usefulness to users of web sites;

(d) Willingness (if any) of a Government to provide relevant information and services, and to encourage the public to be active in promoting deliberative, participatory decision-making in public policy matters.

Caution must be exercised in interpreting e-participation data owing to the qualitative nature of the proxy indicators and dependency on the political and economic context of a country.

The box figures illustrate the e-Government readiness index and the e-participation index in ESCWA member countries. No ESCWA member countries are in the top 25 countries as rated by the e-Government readiness index; moreover, the average for the ESCWA region is below the global average. Box figure II highlights the fact that ESCWA member countries have not fared well in terms of e-participation, which is the case of many developing countries in other regions. Only countries that have reported data have been considered in these figures.

Box figure II. E-Participation index for ESCWA member countries



Source: "United Nations Global E-government Survey 2003". Available at: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan016066.pdf>.

2. Education

Economic and social development is strongly related to the development of human capital, which is related to education. The movement towards an information, or knowledge-based economy places new requirements on education and training, and in such an economy, lifelong learning is a core component of human resource development. Indeed, given that one of the main features of a market economy is competitiveness, which implies the ability to be continuously adaptable, a workforce must be able to learn and relearn.

In order to face up to the challenges of competitiveness and employability, the following factors must be in place:

(a) An education system that is capable of adapting to the social, economic and technological environment;

(b) Educational facilities that allow lifelong learning.

To survive in the fast-paced world of economic and environmental changes, adaptability is essential. Many employers now require workers who have been educated up to the tertiary level, and who have multidisciplinary and technical skills. In addition, ICT has an important role to play in on-site training and the acquisition of skills. In this context, the Internet and other media are playing a central role in higher education, which is the case, for example, in China³⁸ and South Africa,³⁹ where combined television and virtual universities are key levers in the promotion of higher education and lifelong learning.

In conclusion, not only is the integration of ICT in education an important means of tackling the above-mentioned issues of competitiveness and employability, it also compliments classical education, which reinforces the fact that use of ICT in education is strongly linked to the issue of building the information society.

Indicators related to education are split into three groups, which focus on the use of ICT at the primary and secondary levels, the tertiary level, and also during lifelong learning. The sum of these could form an education indicator. The variables of the indicators below cover a number of factors, including the existence of adequate infrastructure and types of use of ICT in education.

3. Primary and secondary education

Given that ICT is uniquely capable of enhancing education levels in developing countries and combatting illiteracy, which is still very high in many Arab countries, proper national strategies for the use and implementation of ICT in education must be devised.

The indicators in table 14 reflect the e-readiness of schools, in terms of equipment and skills, their contribution towards building the information society. The importance of virtual school libraries in the ESCWA region is detailed in box 6, which includes a table on school libraries in selected Arab countries.

TABLE 14. PRIMARY AND SECONDARY EDUCATION INDICATORS

Indicators	Auxiliary variables	Variable type	Source
Existence of national strategy or vision for ICT and education		Binary	MoEd
Existence of master plan		Binary	MoEd
Existence of dedicated budget		Binary	MoEd
*Percentage of education budgets allocated to ICT		Percentage	MoEd
Existence of organizational structure for implementing the master plan		Binary	MoEd
Existence of monitoring and evaluation mechanism		Binary	MoEd
*Number of schools and learning centres		Number	MoEd
*Number of students and learners	Gender	Number	MoEd
*Number of teachers	Gender	Number	MoEd
*Number of school libraries		Number	MoEd
*Average number of books per school		Number	MoEd

³⁸ China Central Radio and TV University. Available at: <http://www.edu.cn/20010101/21803.shtml>.

³⁹ Accenture, Markle Foundation and UNDP, "Appendix 3 National ICT approaches: Selected case studies: South Africa", *Creating a Development Dynamic: Final Report of the Digital Opportunity Initiative*, (July 2001). Available at: <http://www.opt-init.org/framework/onepage/onepage.html#appendix3Case6-html>.

TABLE 14 (continued)

Indicators	Auxiliary variables	Variable type	Source
*Schools with access to electricity and basic communication facilities		Percentage	MoEd
*Schools with a computer lab		Percentage	MoEd
*Schools with access to the Internet		Percentage	MoEd
Type of school connection to the Internet, namely, Dial-up, DSL or ISDN	*Computers in schools with high speed connection	Percentage Percentage	MoEd
*Percentage of schools with technical support for repairs and advice for users		Percentage	MoEd
*Percentage of schools using ICT for management		Percentage	MoEd
*Number of computers per 100 students/learners		Number	MoEd
Existence of special teacher training on the use of ICT in education	Ratio of trained teachers in this field	Binary Percentage	MoEd
Number of hours allocated to teaching ICT in schools		Number	MoEd
*Average hours (per week) a teacher uses computers in classroom teaching	In primary schools; In secondary schools	Number Number Number	MoEd
*Percentage of teachers with an email address		Percentage	MoEd or Survey
*Average hours (per week) student use computers in schools		Number	MoEd
*Average hours (per week) a student accesses the Internet in school		Number	MoEd
Favourite uses of computer: Entertainment; Information search; Homework; Accessing Internet; Emailing; Chatting		Percentage	Survey
*Schools with web sites		Percentage	MoEd
Online services		Percentage	MoEd
*Existence of online courses		Binary	MoEd
Use of ICT, for example, television, as part of the learning process		Number (average hours per day)	MoEd

Source: Compiled by ESCWA, from various sources.

a/ Ministry of Education

b/ Digital subscriber line; and integrated services digital network.

Box 6. Virtual school libraries and their potential in the ESCWA region

Building the information society means building an information society culture, and cultivating a systematic approach to using information to observe, act and influence the environment. Building such a culture must be done in parallel with building and installing information tools, training individuals and designing and implementing information projects.

In this regard, libraries are an invaluable and essential source of information. They could play a crucial role in the creation of a future information society. Libraries must be utilized at an early stage of the active life of individuals and this must preferably be at the start of school through reading and information search exercises.

Box 6 (continued)

However, information concerning the availability of school libraries, and their level of activity and resources is scarce. According to the International Federation of Library Associations and Institutions/United Nations Educational, Scientific and Cultural Organization (IFLA/UNESCO) School Library Manifesto,^{a/} libraries are essential for a number of reasons, including the fact that they offer opportunities for creating and using information for knowledge, understanding, imagination and enjoyment; support all students in learning and practising skills for evaluating and using information, regardless of form, format or medium, including sensitivity to the modes of communication within the community; and provide access to local, regional, national and global resources and opportunities.

It is worth noting that a detailed reading of the final report of the workshop on school libraries and their future role in the fields of education and culture in Arab countries, which was held from 11 to 14 September 1998, seems to indicate that funding, availability of space and the qualifications of librarians range between fair to poor in some countries and between poor to very poor in others.

The table below describes the status of the school library in many Arab countries, and shows that libraries exist in only half of all schools in these countries, as indicated by an average covering ratio of less than 50 per cent. Most of these libraries suffer from a lack of qualified librarians, and in some cases, school directors play the role of librarian as libraries are part of their offices. Libraries in almost all countries in the region face problems of funding, availability of space and flexible access to documents and publications.

Virtual libraries became a reality with the development of telecommunication networks, particularly the Internet. The virtual library emulates the traditional library and offers, at the very least, the same functions as print-based libraries, in addition to providing ICT capabilities with regard to information gathering, processing, transmission, retrieving and searching.

An important attribute of a virtual library is that it can interact with other libraries or information resources in terms of sharing electronic documents and information.

The idea of enabling all schools in the ESCWA region to access a virtual school library is attractive for the following two basic reasons:

(a) Lower costs: taking into account the high costs of traditional school libraries in the ESCWA region, which encompass basic funds, management, upgrading and related expenses;

(b) Greater usability: Such libraries are open 24 hours a day and are accessible from anywhere; they also provide easy access to all levels of material; and are open to all individuals, including students, teachers and citizens.

TABLE. SCHOOL LIBRARIES IN SOME ARAB COUNTRIES *

Country	Ratio (percentage)	Human resources/Library
Egypt	53	0.74
Iraq	78	1
Jordan	100	0.68
Kuwait	94	1.5
Libyan Arab Jamahiriya	12	2.18
Morocco	19	0.67
Oman	47 ^{a/}	0.66
Palestine	23.3	-
Qatar	101	1.17
Saudi Arabia	60 ^{b/}	1
Syrian Arab Republic	70	0.4
Tunisia	15.4	1
Yemen	38.4 ^{c/}	1.9

Source: Arab League Educational Cultural and Scientific Organization, Final report of the workshop on school libraries and their future role in the fields of education and culture in the Arab countries, 11-14 September 1998.

Note: A hyphen (-) indicates that the item is not applicable.

* Data included in this table dates to the late 1990s.

a/ Data covers intermediate and secondary schools only.

b/ Data covers boys' schools only.

c/ Data covers Sana'a only.

4. Tertiary education

The variables suggested for tertiary education concern the use of ICT in higher education and its share in building the information society (see table 15).

TABLE 15. TERTIARY EDUCATION INDICATORS

Indicators	Auxiliary variables	Variable type	Source
Existence of national strategy or vision		Binary	MoHEd ^{a/}
Existence of master plan		Binary	MoHEd
Existence of dedicated budget		Binary	MoHEd
Existence of organizational structure for implementing the master plan		Binary	MoHEd
Existence of monitoring and evaluation mechanism		Binary	MoHEd
*Number of tertiary establishments		Number	MoHEd
*Number of professors in tertiary education		Number	MoHEd
*Number of students in tertiary education		Number	MoHEd
*Number of universities and colleges		Number	MoHEd
*Total number of faculties		Number	MoHEd
*Number of books in universities libraries		Number	MoHEd
*Number of periodic reviews in universities libraries		Number	MoHEd
*Percentage of education budgets allocated to ICT per faculty		Percentage	MoHEd
Number of PCs per 100 students		Number	MoHEd
*Number of PCs connected to the Internet per 100 students		Number	MoHEd
*Faculties with web sites		Percentage	MoHEd
Professors with email addresses		Percentage	MoHEd
*Students with email addresses		Percentage	MoHEd
*Online services at faculty level		Percentage	MoHEd
*Online courses		Percentage	MoHEd
*ICT-based curricula for distance learning		Percentage	MoHEd
*Virtual universities/faculties		Number	MoHEd
*Faculties with links to international programmes		Number	MoHEd

Source: Compiled by ESCWA, from various sources.

a/ Ministry of Higher Education.

5. Lifelong learning

Despite the existence of fragmented and scattered activities that could be described as types of lifelong learning, including courses offered by a minority of universities under the label ‘continuous education’, the notion of lifelong learning has not been established within institutions in the ESCWA region. The variables presented below relate to the existence of lifelong learning in a country and also to the initiatives of organizations that are aimed at improving the skills of their employees.

Lifelong learning is often considered to be an irrelevant factor in the development of ICTs, which is perhaps the case in developed countries. This study, however, considers lifelong learning to be an important factor in the development of an information society and knowledge-based economy in the ESCWA region, where enrolment in tertiary education is still much lower than in developed countries.

Lifelong learning indicators are presented in table 16, and lifelong learning is examined in box 7, which also includes a figure highlighting the education index for ESCWA member countries.

TABLE 16. LIFELONG LEARNING INDICATORS

Indicator	Auxiliary variables	Variable type	Source
Existence of national strategy or vision for the development of lifelong learning		Binary	Government
*Budget dedicated by a Government to lifelong learning		Number	Government
*Percentage of workforce with ICT skills		Percentage	NSO or Survey
*Number of lifelong learning institutions per capita	Average number of students annually subscribed in these institutions	Number Number	MoEd/HD ^{a/}
Enterprises offering on-site training		Percentage	Survey
*Higher education establishments that offer continuous education and short or tailor-made courses		Percentage	Survey
*‡Enterprises producing lifelong learning materials, for example, CDs or online courses.		Number	
*Citizens enrolled in eradication of illiteracy programmes	Gender	Number Percentage	MoD/MoC ^{b/}

Source: Compiled by ESCWA, from various sources.

a/ Ministry of Education or Higher Education;

b/ Ministry of Culture.

Box 7. Lifelong learning

The main goal of lifelong learning is to promote active citizenship and employability, thereby promoting the idea of an inclusive society that offers opportunities of quality learning for people at various stages of life.

This goal is valid in both developed and developing countries, even if the motivating factors in each case are not the same. Developed countries now exist in a permanent technological context that requires a workforce that is capable of rapidly adapting its skills as necessary, which can be achieved through continuous education and training. This type of learning is vital for developing countries, enabling them to develop, update, extend and enhance their human resources and also to absorb and assimilate new technologies.

While developed countries tend to focus on new skills, developing countries must focus more on basic and new skills. In both cases, lifelong learning is an opportunity for human development and for bridging the knowledge divide within a society. It guarantees continuing access to learning and thus a sustained participation in information and knowledge societies.

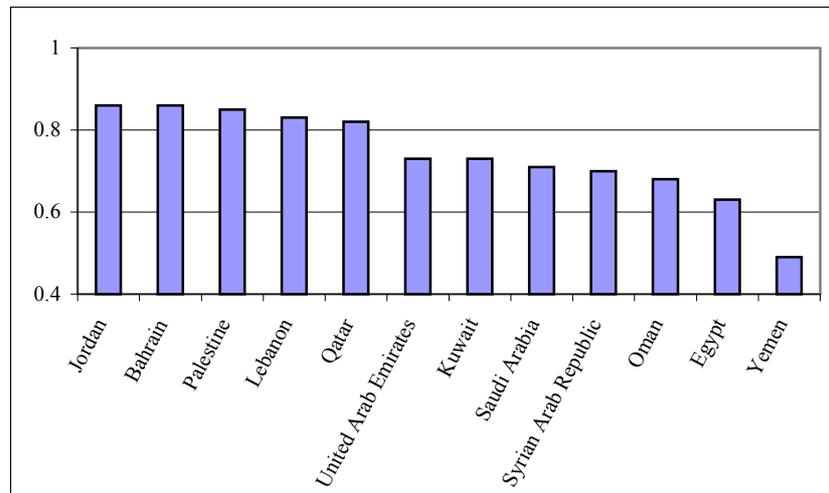
Technology, namely, ICTs, networks, PCs and classical media, offers developing countries in particular, valuable opportunities to enhance the potential of their labour force. This tool also overcomes the problems of distance, time and availability of trainers and teachers. The China Central Radio and TV University is a useful example in this regard, and must be noted by developing countries, particularly ESCWA member countries (see above).

Lifelong learning is not only useful for the labour force, it is also equally viable for other segments of society. It can be formal, non-formal—meaning any organized educational activity outside the formal system that is intended to serve an identifiable learning clientele and learning objectives, or informal, which relates to acquiring attitudes, values, skills and knowledge from daily experiences.

Box 7 (continued)

The figure below highlights values related to the education index for ESCWA members, excluding Iraq, as calculated according to the United Nations Development Programme education index for 2001, which is a combination of adult literacy and gross primary, secondary and tertiary enrolment, with a two-thirds weighting accorded to literacy and one-third to enrolment. Only five countries in the ESCWA region are above the world average, which is 0.75; the total average of ESCWA member countries, 0.73, is slightly less than the world average.

Box figure. The education index for ESCWA members, 2001



Source: United Nations Development Programme (UNDP), Human Development Report 2003; Millennium Development Goals: A Compact Among Nations to Reduce Human Poverty, (New York and Oxford, Oxford University Press, 2003).

6. Business

Since the widespread use of the Internet in the mid-1990s, business and commerce has become the power engine for the development of ICT. In fact, commercial and financial transactions, and in-border and cross-border exchange of business information represent the main use of digital networks.

The business sectors that rely on an information economy range from low value, for example, agricultural, to high value industries, namely, those providing financial services. The degree of penetration of ICT varies according to the profile of the sector.

Most experts agree that the appropriate use of ICT stimulates economic and social development. Recent studies, conducted on a disparate sample of enterprises, demonstrate that ICT, when appropriately applied, leads to a substantial gain in competitive advantage as a result of innovation and value creation, which can then be translated into socio-economic progress. Here again, indicators related to the use of ICT in business can be very useful to decision makers in formulating policies aimed at eradicating obstacles that hinder the dissemination of ICT in the business world.

The indicators highlighted in table 17 range from readiness to the uses of ICTs in business. While the values of such indicators in certain ESCWA member countries can be insignificant, particularly value chain indicators,⁴⁰ owing to low connectivity in some countries, for example in Iraq, the Syrian Arab Republic and

⁴⁰ An ICT value chain is a subset of enterprise activities that pertain to ICT operations, both to add value directly for external customers and to add indirect value by supporting other enterprise operations.

Yemen, they can be very significant in others, namely, the United Arab Emirates.⁴¹ Bearing this in mind, value chain indicators must be emphasized to encourage countries that have not yet carried out e-business activities. The indicators below are also designed to measure the pervasiveness of e-commerce in economic sectors.

TABLE 17. BUSINESS INDICATORS

Indicators	Auxiliary variables	Variable type	Source
Businesses with PCs	Type of PC usage: Administration, management or design	Percentage Percentage	Survey Survey
Businesses with internal computer networks	Networks per size of business	Percentage Percentage	Survey
Employees using PCs for work purposes		Percentage	Survey
Computers equipped with a security device, for example, smart card readers or security software		Percentage	Survey
*Businesses with Internet access	Proportion of business accessing the Internet by the following modes of access: Dial-up; ISDN; ^{a/} DSL/ADSL; ^{b/} Frame relay; T1 and E1 lines; Other	Percentage Percentage	Survey
*Employees using the Internet	Type of Internet use: work, information searching, marketing or transactions	Number Percentage	
Employees with an email address		Percentage	Survey
*Businesses with a web site		Percentage	Survey
Businesses with in-house ICT training		Percentage	Survey
Average expenditure of businesses on ICT		Number (\$)	Survey
*Businesses receiving orders over the Internet	Orders received over the Internet from business-to-business; Obstacles	Percentage Percentage	Survey Survey
*Value of orders received over the Internet	Geographic distribution of received orders	Percentage Percentage	Survey Survey
*Businesses placing orders over the Internet	Reluctance about using the Internet to place orders, for the following reasons: technical, cost, legal and security	Percentage Percentage	Survey Survey
Portal sites for local business		Number	ISPs
Existence of digital signature legislation		Binary	Government
Existence of online privacy law ^{c/}		Binary	Government

⁴¹ Electronic transactions in Gulf Cooperation Council States, namely, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates were expected to amount to \$11 billion by 2005 according to a survey conducted by Ernst & Young in mid-2003 on e-commerce in the Gulf States. See Paul Budde, *Telecoms & Broadband in the Middle East*. Available at: <http://www.budde.com.au>.

TABLE 17 (continued)

Indicators	Auxiliary variables	Variable type	Source
*Commercial web sites with privacy policy statement		Number	ISPs or Survey
*Secure Web servers		Number	ISPs or Survey
Presence of anti-spam policy		Binary	Government
Businesses with on-site training courses incorporating ICT		Percentage	Survey
Enterprise use of ICT per sector		Percentage	Survey
Enterprise use of ICT per size, for example, large enterprise or small and medium-sized enterprises		Percentage	Survey
E-commerce per e-activity, namely, e-procurement or e-sales		Percentage	Survey

Source: Compiled by ESCWA, from various sources.

- a/ Integrated services digital network;
- b/ Digital subscriber line and asymmetric digital subscriber line;
- c/ This prohibits the capturing or storing of information about individuals accessing a web site.

7. Concluding remarks

While some of the indicators and variables presented in this chapter may seem redundant, it is important to note that such indicators and variables are multi-purpose in nature, and capable of responding to various perspectives. Countries must select indicators and variables that are most relevant to their respective needs, to measure their degree of achievement in building an information society. At the same time, these indicators and variables are compatible with most internationally accepted indicators and indices.

The main problem in developing such indicators is the relatively significant number of values that are necessary. Seeking out values for these variables is a tremendous task, in terms of time and funding, and this could be beyond the means of some NSOs. A shorter list of indicators and variables is therefore reviewed in the following chapter, which could represent an initial list of indicators.

V. CORE INDICATORS FOR ESCWA AND THE REST OF THE WORLD

This chapter introduces a list of common indicators that are aimed at helping to gauge the advances achieved in building the information society. The indicators and variables presented below are essentially dedicated to highlighting emerging trends in the information society, and are not intended to provide insights with regard to factors hindering the development of certain related issues, for example, ICT and gender, which are highlighted in the previous chapter.

These indicators were developed within the framework of the global initiative entitled Partnership on Measuring ICT for Development that was launched during UNCTAD XI, which was held in Sao Paulo, Brazil from 13 to 18 June 2004, with the aim of bringing together various stakeholders in the statistical measurement of ICT. This partnership aims to do the following:

- (a) Develop core sets of common ICT indicators and indices that are relevant to various stakeholders;
- (b) Enhance the capacities of NSOs in developing countries and build competence with regard to developing statistical compilation programmes on the information society;
- (c) Develop a global database on ICT indicators and make it available on the Internet.

The lists of core ICT indicators of all organizations involved in ICT indicator-building in various regions of the world will be submitted to the WSIS Thematic Meeting on Measuring the Information Society, which is scheduled to be held in Geneva from 7 to 9 February 2005, where it will be harmonized. Eventually a global set of indicators for each country will be adopted. This agreed global list will constitute the basis for a database on ICT statistics.

It is therefore important that any set of indicators that is chosen must have a global core that is compatible with international efforts and allows the ESCWA region to contribute to global indicator lists. At the same time, these indicators must have a regional supplement that addresses the specific needs of the region, and with the assistance of NSOs, provides information that will contribute to the development of an information society in the ESCWA region.

The NSOs of ESCWA member countries adopted a core set of ICT indicators during the Roundtable on Information Society Indicators and Profiles for Western Asia, which was held in Beirut from 4 to 5 October 2004. Core ICT indicators for the ESCWA region are presented in table 18. The OECD list is included in the table for reference. The list comprises a global core and a regional supplement, each covering readiness and intensity indicators. The regional supplement favours indicators that are specific to policy and regulatory frameworks, digital local content and government. It also includes an auxiliary indicator in the set of readiness of households and individuals, namely, the cost of a PC relative to average individual income. This list must be complemented by national lists that include indicators of interest to ESCWA member countries.

During the roundtable, ECA also proposed its own set of core ICT indicators, which are significant in that ECA includes 10 Arab member countries (see table 19). In addition, ECLAC proposed a set of core questions for household and business surveys.

TABLE 18. CORE ICT INDICATORS FOR THE ESCWA REGION

(a) *Global*

	ESCWA list	OECD list	Available	Possible sources	
READINESS	Basic infrastructure and access				
	The core infrastructure indicators reflect the overall network status and its potential development. They deal with basic telecommunications dissemination of ICT devices, access to the Internet, and the readiness of the population to use ICT tools. Television and satellite are included because they also provide, aside from the Internet, another means of disseminating information.				
	1	Main fixed telephone lines per 100 population	✓	ITU ^{a/}	
	2	Mobile telephone subscribers per 100 population	✓	ITU	
	3	Residential fixed line telephone monthly subscription costs	✓	ITU	
	4	Local fixed line call costs for three minutes		ITU	
	5	Business telephone monthly subscription costs	✓	ITU	
	6	Mobile telephone subscription costs	✓	ITU	
	7	Local mobile call costs for three minutes		ITU	
	8	Televisions per 100 population		ITU/UIS ^{b/}	
	9	Number of PCs per 100 population	✓	ITU	
	10	Internet hosts per 10,000 population	✓	ITU/ISC ^{c/}	
	11	Number of Internet subscribers per 100 population	✓		ISP surveys
12	International bandwidth per capita		ITU		
13	Broadband Internet subscribers per 1,000 population		ITU		
	ICT sector				
	The ICT sector can be treated either as a readiness/enabling indicator, or as an indicator of intensity. Here, it is used as a readiness indicator based on the fact that it is the role of the ICT in providing an enabling factor in other activities that may not be sector specific that needs to be measured.				
	14	Percentage of total workforce involved in ICT sector, by gender	✓		Business surveys
	15	ICT imports and exports as a percentage of total imports and exports	✓	Trade databases: UN Comtrade ^{d/}	
16		Value added in the ICT sector (as a percentage of total value added)		Business surveys	
	The core indicators below intend to measure the relationship between the implementation of infrastructure and the use of infrastructure. Measuring the intensity of use of ICT in the information society reflects the degree of transformation towards that objective in a given country. The core list of indicators relates to the direct impact of ICT on society, business and commerce. Thereafter, indicators relating to indirect impacts, for example, education and government are listed. These sectors are chosen as starting points in that it is possible that initial actions can be taken in these areas. More detailed indicators can be introduced in other sectors at a later stage.				
INTENSITY (USAGE)	Household				
	17	Household Internet access cost per month	✓	ITU	
	18	Percentage of households with Internet access	✓		Household surveys/ census
	19		Households with a PC		Household surveys/ census

TABLE 18 (continued)

ESCWA list		OECD list	Available	Possible sources
20		Individuals accessing the Internet by primary access point, by age and gender		Household surveys/ census
21		Individuals using the Internet by activity		Household surveys/ census
Business				
22	Percentage of businesses with PCs	✓		Business surveys
23	Percentage of businesses with Internet access	✓		Business surveys
24	Percentage of businesses with a web site	✓		Business surveys
25		Percentage of employees using PCs		Business surveys
26		Percentage of employees using the Internet		Business surveys
27		Percentage of businesses receiving orders over Internet		Business surveys
28		Percentage of businesses placing orders over the Internet		Business surveys
29		Percentage of businesses with an intranet		Business surveys
30	Value of orders received over the Internet (as a percentage of the total value of orders)			Business surveys
Education				
31	Enrolled student to PC ratio in primary and secondary schools			Ministry of Education
32	Percentage of primary and secondary schools with Internet access for students for study purposes			Ministry of Education
33	Percentage of students enrolled in tertiary education in an ICT field or an ICT-dominated field (of the total number of students), by gender		UIS database	Ministry of Higher Education
34	Percentage of ICT-qualified teachers in primary and secondary schools (of the total number of teachers)			Ministry of Education
35	Percentage of tertiary education institutions with e-learning courses (of the total number of tertiary education institutions)			Ministry of Higher Education

a/ International Telecommunication Union.

b/ UNESCO Institute for Statistics.

c/ Internet Systems Consortium.

d/ United Nations Commodity Trade Statistics Database.

TABLE 18 (continued)

(b) Regional

	ESCWA list	OECD list	Available	Possible sources
	Household			
READINESS	1	Cost of PC relative to average individual income		Household/Business surveys
	Policies/regulatory frameworks			
	Policy and strategy indicators reflect the importance accorded to the information society. The digital divide cannot be bridged at national and regional levels without an articulated strategy aimed at improving access to information, particularly in the case of societies that do not have established or accumulated traditions in the field of ICT.			
	2	Existence of official ICT policy and related strategies in one or more sectors		Government surveys
	3	Number of active or completed Government-sponsored initiatives in ICT with national scope		Government surveys
	Local content			
INTENSITY	Without local content, which must be in Arabic in the ESCWA region, achieving the goal of becoming an information society will not be easy. Users will only venture online if there is a reason to do so. One way of achieving this goal is to encourage public institutions to develop local content that users will find useful. The following set of core indicators will help monitor this progress.			
	4	Number of Arabized software applications written locally		Business surveys
	5	Volume of local data available online (number of web pages)		Business and Government surveys
	Government			
	6	Percentage of government agencies with online (interactive) services		Government surveys
	7	Volume of governmental information available online (in megabytes)		Government surveys
	8	Percentage of online government services (of a total number of services)		Government surveys

TABLE 19. PROPOSED LIST OF CORE ICT INDICATORS FOR THE ECA REGION

Basic infrastructure and access	
1	Main telephone lines per 100 population
2	Mobile cellular subscribers per 100 population
3	Radio per 100 population
4	Television sets per 100 population
5	Number of PCs per 100 population
6	Number of Internet subscribers per 100 population
7	International Internet bandwidth per population
8	Broadband Internet subscribers per 100 population
9	Internet access tariff (20 hours per month) as a percentage of per capita income
10	Percentage of localities with public Internet access centres (PIACs) by population (rural/urban)
11	Percentage of population with access to PIACs by type of PIAC (governmental/private)
12	Percentage of population covered by mobile telephony
ICT sector	
13	Percentage of total workforce involved in ICT sector (by gender)
14	ICT imports and exports as percentage of total imports and exports
15	Value added in the ICT sector (as a percentage of total value added)
Households	
16	Percentage of households with radio
17	Percentage of households with a television
18	Percentage of households with a telephone (Fixed, mobile, and fixed and mobile)
19	Percentage of households with a PC
20	Percentage of households with Internet access (from the home)
21	Percentage of population that use a computer
22	Percentage of population with access to the Internet (by type of access, purpose and location of use)
Business	
23	Percentage of businesses with computers
24	Percentage of businesses with Internet access
25	Percentage of businesses with a web site
26	Percentage of employees using PCs
27	Percentage of employees using the Internet
28	Percentage of businesses receiving orders over the Internet
29	Percentage of businesses placing orders over the Internet
30	Percentage of businesses with an intranet
31	Value of orders received over the Internet (as a percentage of total value of orders)
Education	
32	Percentage of primary and secondary schools with Internet access for students for study purposes
33	Percentage of students enrolled in tertiary education with Internet access for students for study purposes
34	Enrolled Student to PC ratio (in primary, secondary schools and tertiary education)
35	Percentage of students enrolled in tertiary education in an ICT field or an ICT-dominated field (of the total number of students), by gender
36	Percentage of ICT-qualified teachers in primary and secondary schools (of the total number of teachers)
37	Percentage of tertiary education institutions with e-learning courses (of the total number of tertiary education institutions)
38	Purpose of student/teacher use (as a percentage for email, research, employment opportunities and software applications)

TABLE 19 (continued)

Government	
39	Ratio of availability of PCs to number of staff
40	Percentage of government offices with Internet access
41	Percentage of government offices and agencies with a web site
42	Percentage of government employees with Internet access from the office
43	Percentage of government workers that use ICTs
44	Purpose of use (as a percentage for email, research, database work, geomatics and software applications)
Agriculture	
45	Percentage of agricultural population and extension workers involved in the exploitation and deployment of ICTs to the sector
46	Typology of usage of ICTs in the agricultural sector (as a percentage for R&D, business, weather and prices)
47	Number of local web sites and databases with agricultural information and content
Health	
48	Percentage of health institutions using ICTs (by type of health institution: private clinic, government, university hospital or pharmacy)
49	Geographic distribution of health institutions with computers, telephone and Internet connectivity
50	Percentage of health professionals using ICTs for medical purposes
51	Purpose of use (as a percentage for telemedicine, email, research, health information, continuing medical education or distance learning, health promotion (including health information systems), database and software applications)
52	Percentage of local web sites and databases with medical information
Supplementary indicators	
53	Total resident population
54	Total number of households
55	Percentage of households with electricity
56	Total number of sub-regional and regional backbones and exchange points to which the country has access
ICT investment and expenditures	
57	Percentage of ICT investments and expenditures (as a percentage vis-à-vis GDP and general Government expenditures)
Content issues and local languages	
58	Percentage of software developed in local language
59	Percentage of web sites developed in local languages
Security issues	
60	Percentage of networks and web sites which are attacked, and nature of attacks
National information and communication infrastructure plans and legislation	
61	Existence of national or sectoral ICT policies and strategies and their implementation status
62	Existence of national ICT legislations and regulatory frameworks and their effective implementation.

VI. MEASURING THE INFORMATION SOCIETY IN THE ESCWA REGION

This chapter analyses the results of a questionnaire that was sent to NSOs in ESCWA member countries and member countries of other regional commissions. This questionnaire sought metadata on the gathering of statistics for ICT indicators to assess necessary action in the region with regard to matching global action to local activity, and also capacity building of participating NSOs.

The questionnaire, which is presented in the annex to this study, was prepared by the regional commissions within the mandate of the Partnership on Measuring ICT for Development. It aimed to do the following:

(a) Collect metadata on ICT statistics: Taking inventory of existing and planned indicators, questionnaires and methods of collecting statistics concerning ICT and the information society;

(b) Standardize core indicators: Moving toward standardized definitions and a set of commonly accepted ICT core indicators;

(c) Prepare technical assistance and facilitate knowledge exchange: Identifying NSOs and other bodies with best practices with regard to developing information society statistics.

In essence, the questionnaire, which was translated into Arabic for ESCWA member countries, aimed to discover the state of play in NSOs in the region with regard to measuring progress being made towards achieving information societies. Responses, results and conclusions of the questionnaire were presented to the Roundtable on Information Society Profiles and Indicators in Western Asia, which was held in Beirut from 4 to 5 October 2004.

The results highlight certain facts regarding the status of information statistics in ESCWA member countries, and are perhaps a reflection on the status of the information society in the region. National ICT definition for ESCWA member countries is highlighted in figure VI, while level of demand for ICT statistics in member countries is illustrated in figure VII.

The number of ICT statistics collected for ESCWA member countries is examined in figure VIII.

The status of collection of household statistics in ESCWA member countries is highlighted in figure IX, while the status of collection of ICT business statistics in ESCWA member countries is illustrated in figure X. This shows that, apart from Egypt, no other country collected more than two business readiness indicators, while seven countries indicated no collection of data for these indicators. Minimal effort was exerted in collecting usage indicators for household statistics, and practically no effort was exerted in collecting usage indicators for business indicators. However, NSOs must carry on with, and in some cases, augment, their planned collection of data for both household and business ICT indicators.

Finally, two countries with credible ICT profiles, United Arab Emirates and Bahrain, the first and second ranked Arab countries with DAIs of 0.64 and 0.58 in 2002, respectively, did not respond to the questionnaire.⁴² While it is most likely that their responses would have improved the overall picture, they may not have altered the conclusions drawn above.

⁴² See ITU, "ITU Digital Access Index: World's first global ICT ranking". Available at: http://www.itu.int/newsarchive/press_releases/2003/30.html.

Figure VI. National ICT definition for ESCWA member countries

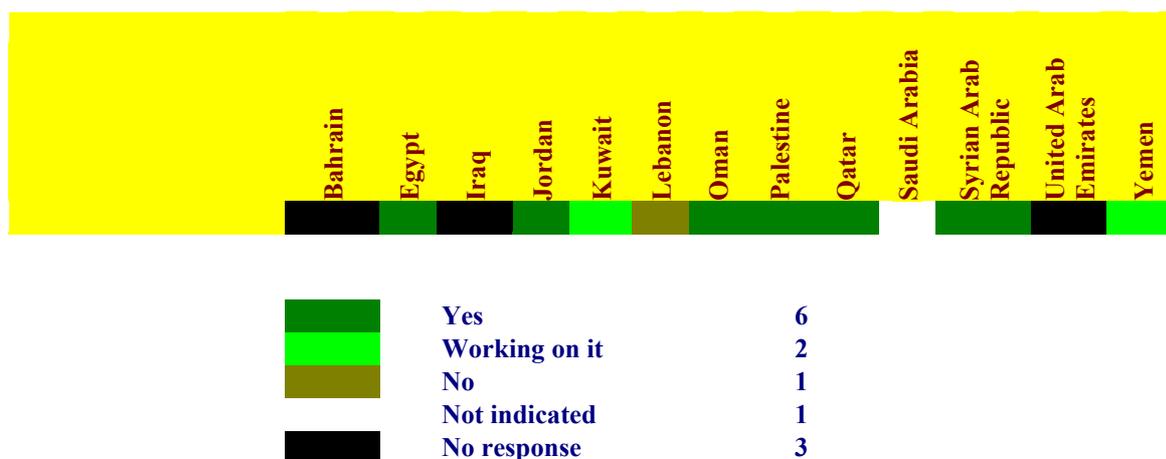
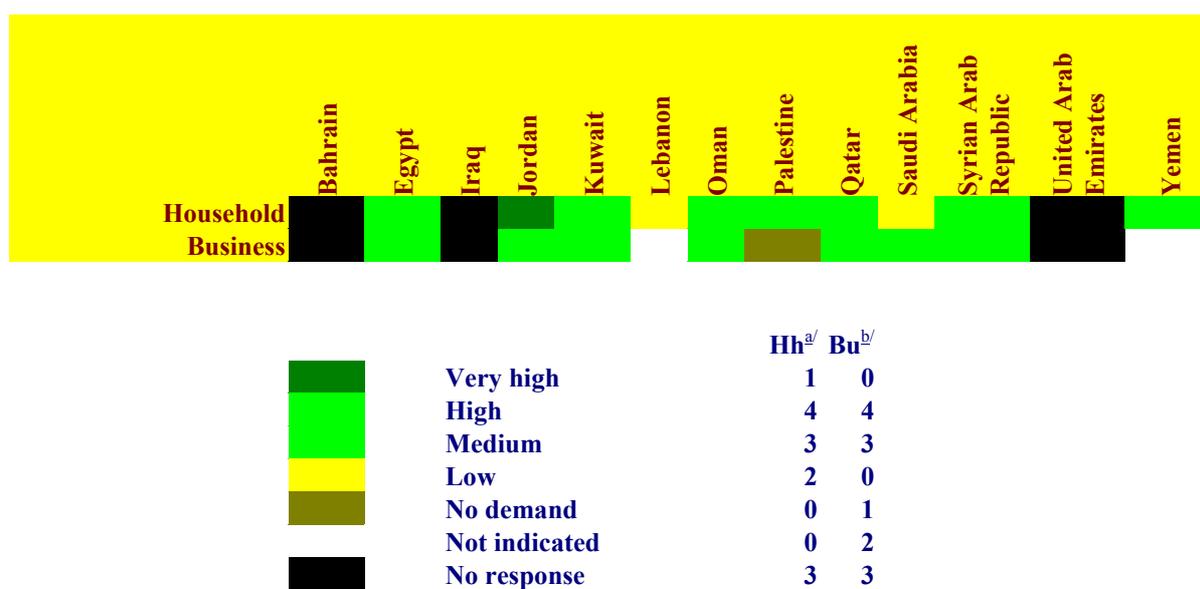


Figure VII. Level of demand for ICT statistics in ESCWA member countries



a/ Household.

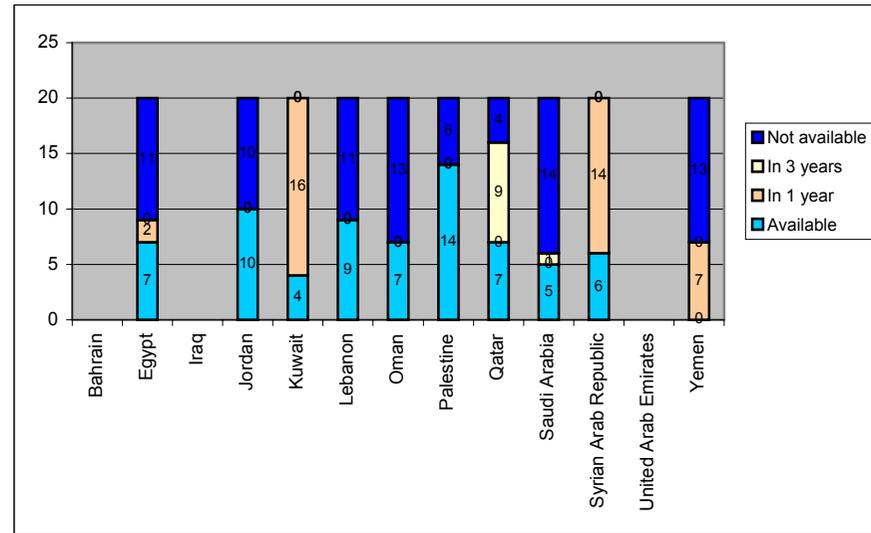
b/ Business.

Figure VIII. Number of ICT statistics collected in ESCWA member countries

Number of ICT Indicators in Household Statistics per Country

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Palestine	Qatar	Saudi Arabia	Syrian Arab Republic	United Arab Emirates	Yemen
Available		7		10	4	9	7	14	7	5	6		0
In 1 year		2		0	16	0	0	0	0	0	14		7
In 3 years		0		0	0	0	0	0	9	1	0		0
Not available		11		10	0	11	13	6	4	14	0		13

No Response



Number of ICT Indicators in Business Statistics per Country

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Palestine	Qatar	Saudi Arabia	Syrian Arab Republic	United Arab Emirates	Yemen
Available		5		0	1	0	3	0	1	0	0		0
In 1 year		14		0	14	0	0	0	0	0	20		0
In 3 years		0		0	5	0	0	20	4	0	0		0
Not available		1		20	0	20	17	0	15	20	0		20

No Response

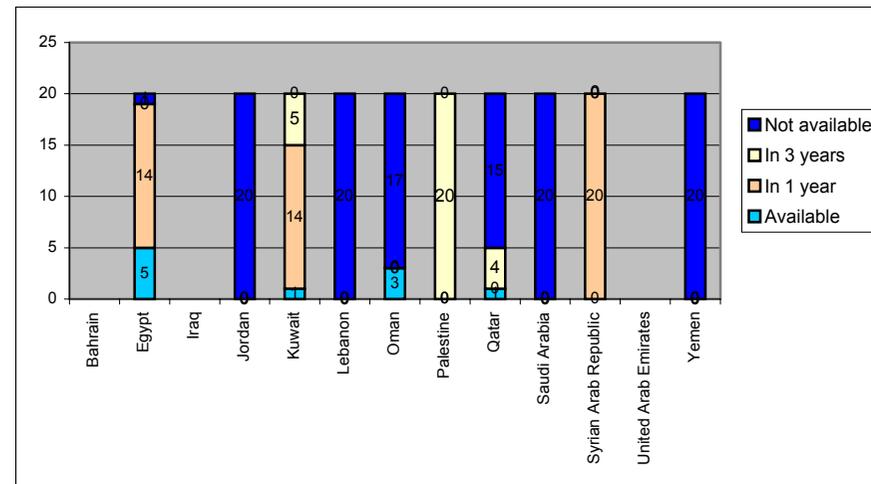


Figure IX. Status of collection of ICT household statistics ESCWA member countries

	Presence of electricity	Presence of radio	Presence of fixed line telephone	Presence of mobile phone	Presence of television	Presence of a computer	Presence of Internet access	Methods of access/bandwidth	Location of the most frequent use of the Internet	Frequency of Internet use	Purposes of PC use	Purposes of Internet use	Concrete Internet services/activities	Language of Internet sites	Types of Internet-purchased products/services	Value of Internet-purchased goods/services	Barriers to PC usage	Barriers to Internet usage	Barriers to purchasing over the Internet	Geographic location of Internet purchases
Available	9	8	9	7	8	8	6	1	0	2	3	4	2	0	0	0	1	1	0	0
In 1 year	1	1	1	2	2	2	3	3	3	2	2	1	2	2	2	2	2	2	2	2
In 3 years	0	0	0	1	0	0	0	1	1	1	1	1	1	1	0	0	1	1	0	0
Not available	0	1	0	0	0	0	1	5	6	5	4	4	5	7	8	8	6	6	8	8

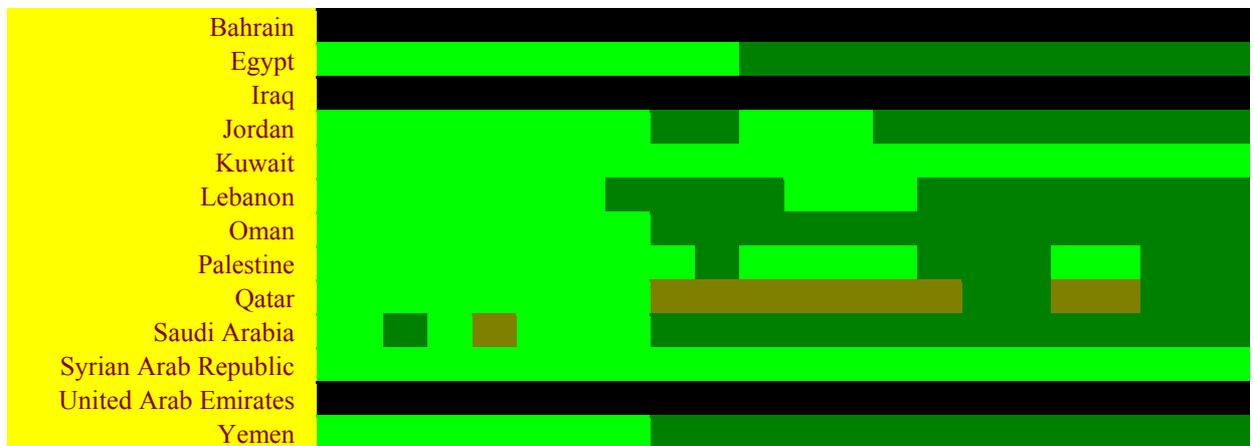
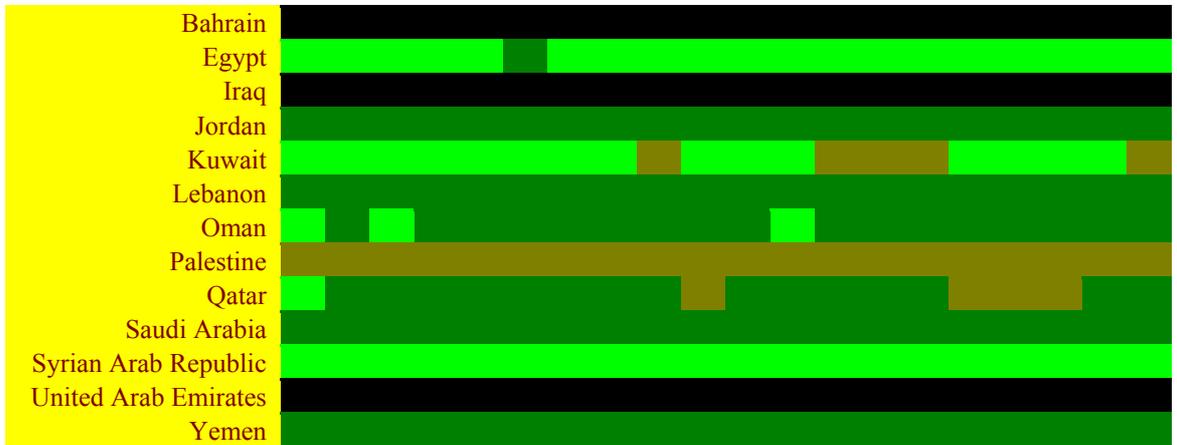


Figure X. Status of collection of ICT business statistics ESCWA member countries

	Presence of fixed line telephone	Presence of mobile devices	Presence of computers	Number of present computers	Presence of Internet access	Methods of access/bandwidth	Presence of local network	Presence of web site	Recent ICT investment	Ratio of employees using a PC in work	Ratio of employees using a networked PC in work	Concrete Internet services/activities	Value of Internet purchases	Value of Internet sales	Customer groups/destinations of Internet sales	ICT training/formation of employees	Barriers to PC usage	Barriers to Internet usage	Barriers to e-commerce	Geographic location of Internet purchases
Available	4	1	2	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
In 1 year	1	2	2	2	2	2	3	3	2	3	3	3	2	2	2	3	3	3	3	2
In 3 years	1	1	1	1	1	1	1	1	2	2	1	1	2	2	2	2	2	2	1	2
Not available	4	6	5	6	6	7	6	6	6	5	6	5	6	6	6	5	5	5	6	6



Annex

**QUESTIONNAIRE ON THE STATUS OF INFORMATION SOCIETY STATISTICS
IN NATIONAL STATISTICS OFFICES**

Please complete:	
Name of institution:	
Country:	
Name of responsible: Position of responsible:	
Web site of institution:	Telephone:
E-Mail(s):	Date:

A. GENERAL SECTION

<p>A.1 Does your institution work with some sort of ICT definition?</p> <p><input type="checkbox"/> Yes. In this case, please add the relevant document(s) used by your institution as electronic attachment(s) and/or printed document(s).</p> <p><input type="checkbox"/> No, but we are developing one. In this case, please add any document(s) you consider relevant as electronic attachment(s) and/or printed document(s).</p> <p><input type="checkbox"/> No, we have not considered this issue yet.</p>
<p>A.2 Please indicate how your institution finances the collection of ICT data and indicators. Please check all corresponding alternatives.</p> <p><input type="checkbox"/> Regular budget</p> <p><input type="checkbox"/> National cooperation Please identify partner(s) _____ Please specify amount of received financial assistance in US\$ _____</p> <p><input type="checkbox"/> International cooperation Please identify partner(s) _____ Please specify amount of received financial assistance in US\$ _____</p> <p><input type="checkbox"/> Other(s), please explain _____</p> <p><input type="checkbox"/> No financing available</p>
<p>A.3 Has your institution published any documents or reports with ICT statistics?</p> <p><input type="checkbox"/> Yes. In this case, please indicate relevant Web-pages and/or add relevant document(s) published by your institution as electronic attachment(s) and/or printed document(s).</p> <p><u>http://</u> _____</p> <p><u>http://</u> _____</p> <p><u>http://</u> _____</p> <p><input type="checkbox"/> No, but we are planning to do so. In this case, please add any document(s) you consider relevant as electronic attachment(s) and/or printed document(s).</p> <p><input type="checkbox"/> No, we have not published any document or report on the issue.</p>

B. ICT HOUSEHOLD STATISTICS

This section aims at collecting information on ICT statistics in household collections, including census, labour survey(s), other household survey(s) and specific ICT household collection(s). Please use the ICT definitions you have referred to in question A.1.

B.1 Please detail the following characteristics of ICT-relevant household collection(s):				
<i>Please add an additional page if necessary</i>	Collection 1	Collection 2	Collection 3	Collection 4
Name of the collection				
Observed ICT related Unit (e.g. individual, household)				
List the main classifications of the observed unit (e.g. age, education, profession, gender, income, ethnic origin, geographic location, etc.)				
Total number of variables collected in the collection				
Number of ICT related variables collected in the collection				
Universe/scope				
Sample size				
Response rate (estimation in %)				
Data collection method (check all relevant)				
Personal interviewer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traditional mail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telephone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electronic (Webform and email)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please identify:				
Please identify the month and year of the (max.) 5 most recent collection(s) with ICT-related indicators	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)
Please identify a contact person for this collection Name: Tel.: e-mail: web address:				
B.2 Please add the relevant questionnaire(s) and manual(s) used by your institution as an electronic attachment(s) and/or printed document(s).				
B.3 From your institution's perspective, please indicate the level of demand for ICT household indicators. Check only one 1= no demand, 2= low demand, 3= medium demand, 4= high demand, 5= very high demand <div style="display: flex; justify-content: space-around; align-items: center;"> <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 </div>				

B.4 Please indicate if the following ICT household indicators are available from official statistics sources in your country. If you mark “Yes”, please identify the relevant source (institution and collection) for each indicator. If you mark “No”, but the indicator is planned to be produced in the near future, please indicate when.						
<i>Please recognize that the focus of this question is on the possible availability of each indicator from official statistics sources in your country, regardless of the specific response options each indicator might have in your country.</i>	Yes	If yes, please indicate source:		No	If no, but planned, please indicate when:	
		Responsible institution(s)	Relevant collection(s)		During next year	During next three years
1) Presence of electricity in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) Presence of radio in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) Presence of fixed line telephone in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) Presence of mobile phone in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) Presence of TV (terrestrial/cable/satellite) in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Presence of a computer (PC, Mac, laptop) in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Presence of Internet access in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) Methods of access/bandwidth for Internet access in household	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) Location of the most frequent use of Internet	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) Frequency of Internet use (i.e. times a week, days per month, etc.)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) Purposes of PC use (i.e. work, education, entertainment)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12) Purposes of Internet use (i.e. work, education, entertainment)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13) Concrete services/activities the Internet is used for (i.e. reading news, purchasing products, etc.)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14) Languages of visited Internet sites	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15) Types of products/services purchase over the Internet	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16) Value of purchased goods/services over the Internet	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17) Barriers to PC usage	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18) Barriers to Internet usage	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19) Barriers to purchase over the Internet	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20) Geographic location where Internet goods are purchased (domestic or foreign retailer, etc.)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B.5 In addition to the sources mentioned in B4, are other institutions or administrative registries producing official ICT statistics for the household sector in your country? Please consider public institutions, as well as academic research centers and private sources.

Yes, please identify
 Ministry of _____
 Ministry of _____
 International Institutions _____
 Other, please identify _____

No
 Do not know

C. ICT BUSINESS STATISTICS

This section aims at collecting information on ICT statistics in the business sector, including collections of enterprises and/or establishments of any economic activity and size. Please use the ICT definition you referred to in question A.1.

C.1 Please detail the following characteristics of ICT-relevant business collection(s):				
<i>Please add an additional page if necessary</i>	Collection 1	Collection 2	Collection 3	Collection 4
Name of the collection				
Observed ICT related Unit (e.g. enterprise, establishment)				
List the main classifications of the observed unit (e.g. employees, sales, geographic location, etc.)				
Total number of variables collected in the collection				
Number of ICT related variables collected in the collection				
Universe / scope				
Sample size				
Response rate (estimation in %)				
Data collection method (check all relevant)				
Personal interviewer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traditional mail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telephone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electronic (Webform and email)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please identify:				
Please identify the month and year of the (max.) 5 most recent collection(s) with ICT-related indicators	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)

Please identify a contact person for this collection Name: Tel.: e-mail: web address:				
C.2 Please add the relevant questionnaire(s) and manual(s) used by your institution as an electronic attachment(s) and/or printed document(s).				
C.3 From your institution's perspective, please indicate the level of demand for ICT business indicators. Check only one 1= no demand, 2= low demand, 3= medium demand, 4= high demand, 5= very high demand <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5				

C.4 Please indicate if the following ICT business indicators are available from official statistics sources in your country. If you mark "Yes", please identify the relevant source (institution and collection) for each indicator. If you mark "No", but the indicator is planned to be produced, please indicate when.

<i>Please recognize that the focus of this question is on the possible availability of each indicator from official statistics sources in your country, regardless of the specific response options each indicator might have in your country.</i>	Yes	If yes, please indicate source:		No	If no, but planned, please indicate when:	
		Responsible institution(s)	Relevant collection(s)		During next year	During next three years
1) Presence of fixed line telephone	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) Presence of mobile devices	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) Presence of computer (PC, Mac, laptop)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) Number of computers (PCs, Mac, laptop)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) Presence of Internet access	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Methods of access/bandwidth used for Internet access	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Presence of local network	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) Presence of web site	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) Recent ICT investments	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) Share of the total number of employees using a PC in their normal work routine	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) Share of the total number of employees using PC connected to the Internet in normal work routine	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12) Concrete services/activities the Internet is used for	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13) Value of Internet purchases	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14) Value of Internet sales	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15) Customer groups/ destination of Internet sales	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16) Training/formation in ICT use for employees concerning ICT usage	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17) Barriers to PC use	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18) Barriers to Internet use	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19) Barriers to e-commerce	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20) Geographic location where Internet goods are sold (domestic, foreign, etc.)	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<p>C.5 In addition to the sources mentioned in C4, are other institutions or administrative registries producing official ICT statistics for the business sector in your country? Please consider public institutions, as well as academic research centres and private sources.</p> <p><input type="checkbox"/> Yes, please identify Ministry of _____ Ministry of _____ International Institutions _____ Other, please identify _____ _____ _____ _____</p> <p><input type="checkbox"/> No <input type="checkbox"/> Do not know</p>
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D. OTHER AREAS OF ICT STATISTICS

This section aims at collecting information on ICT statistics in other areas of the economy and society. Besides households and businesses, there are many other sectors and issues where ICT development and measurement is important. For example, ICT measurement could be undertaken in the following areas (non-exhaustive list):

- Supply, demand and trade in ICT products
- Skills, occupations and qualifications in the information society
- Information on enterprises active in industries belonging to the ICT sector
- ICT prices and deflators
- Infrastructure for the information society
- ICT in education
- ICT in government
- ICT related patents
- ICT and health
- ICT content products
- ICT content industries
- ICT investments

D.1 In case your institution collects ICT statistics in such, or similar areas, please indicate the details of the related collection(s) in the following table.							
<i>Please add an additional page if necessary</i>	Collection 1	Collection 2	Collection 3	Collection 4	Collection 5	Collection 6	Collection 7
Identification of area surveyed							
Name of the collection							
Observed ICT related Unit (e.g. individual, enterprise, Web-Page, monetary unit, goods and services, etc.)							
List the main classifications of the observed unit (e.g. gender, income, geographic location, etc.)							
Total number of variables collected in the collection							
Number of ICT related variables collected in the collection							
Please identify the month and year of the (max.) 5 most recent collection(s) with ICT-related indicators							
Please identify a contact person for this collection (Name, Tel., email, web address)							
D.2 Please add the relevant questionnaire(s) and manual(s) used by your institution as an electronic attachment(s) and/or printed document(s).							

D.3 In case other institutions or administrative registries produce official ICT statistics for areas other than household and business, please indicate the name of the collection and its latest date. Identify the relevant institution and state if your office is cooperating with this institution for the production and diffusion of these statistics. Please consider public institutions, as well as academic research centers and private sources.

	Name of collection	Most recent date of collection	Responsible institution and web address	Contact Person (Name, Tel., email)	Cooperation	
					Yes	No
1					<input type="checkbox"/>	<input type="checkbox"/>
2					<input type="checkbox"/>	<input type="checkbox"/>
3					<input type="checkbox"/>	<input type="checkbox"/>
4					<input type="checkbox"/>	<input type="checkbox"/>
5					<input type="checkbox"/>	<input type="checkbox"/>
6					<input type="checkbox"/>	<input type="checkbox"/>
7					<input type="checkbox"/>	<input type="checkbox"/>
8					<input type="checkbox"/>	<input type="checkbox"/>