Information Society Measurement:

Building a Common Benchmarking Model for the ESCWA Region

ESCWA

United Nations Economic and Social Commission for Western Asia

ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA (ESCWA)

INFORMATION SOCIETY MEASUREMENT: BUILDING A COMMON BENCHMARKING MODEL FOR THE ESCWA REGION

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ABBREVIATIONS

3G	Third generation of mobile phone standards and technology
4G	Fourth generation of mobile phone standards and technology
ADCCI	Abu Dhabi Chamber of Commerce and Industry
ADSL	Asymmetric Digital Subscriber Line
CAGR	Compound annual growth rate
CAPMAS	Central Agency for Public Mobilization and Statistics
CAS	Central Administration of Statistics
CBS	Central Bureau of Statistics
CDSI	Central Department of Statistics and Information
CIO	Central Informatics Organisation
CITC	Communications Information Technology Commission
CNNIC	China Internet Network Information Center
COSIT	Central Organization for Statistics and Information Technology
CSO	Central Statistical Organisation
DAI	Digital Access Index
DESA	Department of Economic and Social Affairs
DOI	Digital Opportunity Index
DOS	Department of Statistics
DSL	Digital Subscriber Line
ESIS	ESCWA Statistical Information System
G2C	Government-to-citizen
GDP	Gross domestic product
GER	Gross enrolment ratio
GITR	Global Information Technology Report
GNI	Gross national income
HDR	Human Development Report
ICT	Information and communication technology
ICT-OI	ICT Opportunity Index
ictQATAR	Supreme Council of Information and Communications Technology
IDI	ICT Development Index
IMF	International Monetary Fund
INSEAD	Institut Européen d'Administration des Affaires (European Institute for Business Administration)
ISCED	International Standard Classification of Education
ITU	International Telecommunication Union

ABBREVIATIONS (*continued*)

kbps	Kilobit per second
LAN	Local Area Network
MCIT	Ministry of Communications and Information Technology
NBS	National Bureau of Statistics
NGOs	Non-governmental organizations
NITC	National Information Technology Center
NRI	Networked Readiness Index
NSOs	National statistical offices
NTRA	National Telecommunication Regulatory Authority
OECD	Organisation for Economic Co-operation and Development
PACI	The Public Authority for Civil Information
PC	Personal computer
PCBS	Palestinian Central Bureau of Statistics
PIAC	Public Internet access centre
QSA	Qatar Statistics Authority
SMEs	Small and medium enterprises
TGEG	Task Group on e-Government Indicators
TRA	Telecommunication Regulatory Authority
UIS	UNESCO Institute for Statistics
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNPD	United Nations Population Division
UNSC	United Nations Statistical Commission
VIP	Very important person
WEF	World Economic Forum
WPIIS	Working Party on Indicators for the Information Society
WSIS	World Summit on the Information Society

Introduction

Closing the digital divide and bringing home the benefits of the information society are important concerns of member countries of the Economic and Social Commission of Western Asia (ESCWA). For policymakers to accurately determine which developmental strategies will be the most effective, comparability and clarity of a measurement model is vital. Key indicators need to be defined and statistical models must be developed that are able to assess the current status of the information society, measure its many facets and monitor progress towards its realization. Determining which key performance indicators will be of greatest value is a difficult exercise, combining many points of data into actionable information. In order to be maximally effective, standardized indicators must be relevant to a wide variety of national circumstances and cultural contexts.

Using data-driven mechanisms for policymaking is a very powerful tool for social and economic change. In order to be useful, it is necessary to collect reliable, internationally comparable data. Drawing upon this data, benchmarking models can then help make complex systems more easily understood. While all models inevitably have drawbacks, certain models are quite useful in decision-making. This study explores the interplay between the value of evidence-based decision-making, the limitations of available data, evaluation of existing models and various diverse regional contexts. Recommendations for data collection, model refinement and effective decision-making are presented.

Proper data collection requires such factors as availability across a useful time series, cost-justified collection strategies and internationally standardized definitions. In the case of measurement models for information technology issues, the fast-paced nature of market changes makes it difficult to select data which are insightful and available over a long enough time period to be useful. The criteria for indicator selection and data availability, together with their impact on the usefulness of the resulting models are examined in this study.

There are currently several internationally accepted models for benchmarking in the information society, each with a different focus, advantages and limitations. Among others, the information and communication technology (ICT) Development Index and the Networked Readiness Index are discussed. In particular, the impact of data comparability, correlation of indicator change to desired ultimate result and opportunities for improvement are identified and analysed. As even the most useful composite indicator is applied across a wide variety of local contexts, decision makers must take this underlying complexity into account when considering the results of those measurement methodologies. For example, such factors as average family size and immigration flows can significantly impact measurement models in ways that high-level metrics do not reveal.

In light of these issues, this study concludes with recommendations for the adjustment and refinement of available measurement methodologies and benchmarking models, empowering decision makers in public and private sectors with more useful information.

I. CHALLENGES OF MEASURING THE INFORMATION SOCIETY

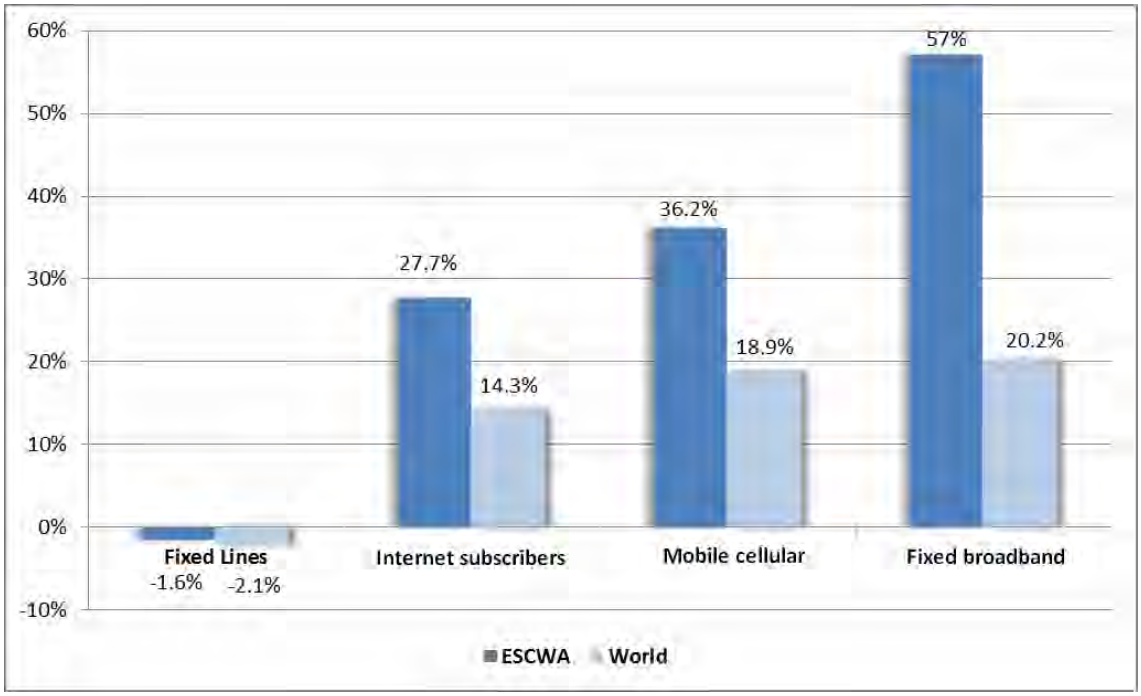
A. AN OVERVIEW OF THE INFORMATION SOCIETY IN THE ESCWA REGION

The spread and adoption of information and communication technology (ICT) throughout the world has been phenomenal during the past decade. More people than ever before are using fixed and mobile phones and accessing the Internet, tapping the wealth of information and applications it provides.

Mobile phone technology has revolutionized the global communication landscape and is by far the fastest growing ICT today. From penetration rates of close to zero in the mid-1990s to an estimated penetration rate of around 76 per cent by the end of 2010, over 5.3 billion mobile phone users worldwide are communicating every day. Some even have access to the Internet via advanced mobile services made possible by the availability of third and fourth generations of mobile phone standards and technology (3G and 4G) networks. At the end of 2010, almost 30 per cent of the world population was using the Internet; out of these 2 billion Internet users, 555 million were using fixed broadband technologies.[1]

The Economic and Social Commission for Western Asia (ESCWA) region has taken significant steps towards bridging the digital divide and building the information society. The prominence of ICTs throughout the region has grown significantly. By the end of 2009, mobile phone use reached penetration rates of 73 per cent while the 52 million Internet users registered a penetration rate of 21 per cent.[2] Figure I depicts the compound annual growth rate (CAGR) of the ESCWA region in ICTs per 100 inhabitants between 2005 and 2009.

Figure I. Compound annual growth rate of information and communication technologies per 100 inhabitants of the ESCWA region, 2005-2009
(*Percentage*)



Source: International Telecommunications Union (ITU) database of Information and Communication Technology (ICT) Indicators, 2009.

[1] International Telecommunication Union (ITU) estimates provided in *The World in 2010: ICT Facts and Figures* (2010b).

[2] ITU database of Information and Communication Technology Indicators, 2009.

In view of such remarkable progress, it is perhaps no surprise that one of the targets set by the World Summit on the Information Society (WSIS), namely "to ensure that more than half of the world's inhabitants have access to ICTs within their reach"[3] has been reached years ahead of its 2015 target date.

The diffusion and adoption of technology throughout the world has established ICTs as long-term drivers for economic growth, capable of positively impacting the socio-economic development of communities and countries alike. As such, Governments have been investing heavily in ICT-based development projects and initiatives with the aim of achieving ubiquitous access to ICTs and reaping their promised benefits.

The links between ICTs and development are not always clear and well-established, thus international calls for benchmarking and monitoring progress have increased, driven by Governments, international organizations, donors, non-governmental organizations (NGOs) and the private sector, all of which wish to assess the impact of their investments.

Despite high penetration and increased growth rates of ICTs, major differences are seen between developed and developing countries; the global digital divide remains significant and the question of how to best assess and measure the information society is continuously under development.

B. GLOBAL INFORMATION AND COMMUNICATION TECHNOLOGY MEASUREMENT EFFORTS

Significant differences exist in the capacity of countries to adapt to changes in technology and knowledge. Particularly in view of the expanding digital divide with developed countries, developing countries are increasingly vulnerable to reduction in productivity and economic capacity.

In this context, WSIS was established under the patronage of the Secretary-General of the United Nations to reduce the digital divide by increasing awareness regarding the benefits of the information society and by presenting mechanisms to help developing countries advance towards it within the context of a global knowledge-based economy.

The WSIS was divided into two phases. Phase I was held in Geneva in December 2003 and produced a Declaration of Principles and a Plan of Action which specifically called for realistic international performance evaluation and benchmarking methodology for measuring the information society through comparable statistical indicators and research results.[4] The second phase, held in Tunis in November 2005, focused on the implementation of the Plan of Action, recognized that the development of ICT indicators is important for measuring the digital divide, called for periodic evaluation, stressed that indicators must take into account different levels of development and national circumstances and must be developed in a collaborative, cost-effective and non-duplicative fashion.

In line with the commitments of the first phase of WSIS, serious work spearheaded by international and regional organizations[5] was carried out to develop a methodology for measuring the digital divide, ICT and the information society. In this regard, a global Partnership on Measuring ICT for Development launched in Brazil in 2004, proposed a common set of core ICT indicators. During the second phase of WSIS, two composite indices were launched: the ICT Opportunity Index (ICT-OI) and the Digital Opportunity Index (DOI), based on indicators proposed earlier by the Partnership. Continuous work on information society measurement during the past five years has led to the development and adoption of additional measurement models and indices, most notably, the ICT Development Index (IDI) developed by the International Telecommunication Union (ITU).

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[3] World Summit on the Information Society (WSIS) Plan of Action (2003), paragraph 6. j.

[4] WSIS Plan of Action (2003), paragraph 28.

[5] Most notable are the efforts of ITU, the United Nations Conference on Trade and Development (UNCTAD) and the Organisation for Economic Co-operation and Development (OECD).

The first significant measurement effort was developed by ITU in 2003 and presented at the first phase of WSIS. The Digital Access Index (DAI),[6] as it was called, was developed to measure the overall ability of individuals in a country to access and use ICTs. In a parallel effort, an international network that links communication leaders from academic, media, corporate and Government circles (Orbicom), developed the Infostate Index which is a conceptual framework used for measuring the digital divide. In 2005, ITU and Orbicom decided to merge DAI and the Infostate Index.[7] The resulting ICT-OI,[8] which unites the expertise of several international and research organizations based on a selected methodology and list of indicators, is an excellent example of successful international cooperation and partnership work, as called for in the WSIS Plan of Action in 2003.[9]

In 2005, ITU, along with other international and national agencies, also developed DOI,[10] which measured the potential of countries to benefit from access to ICTs. Unlike ICT-OI, DOI includes tariffs and covers such advanced services as mobile broadband. The preliminary version of this Index was launched at the second phase of WSIS, in November 2005 and the two full releases (covering 180 and 181 countries) were published in 2006 and 2007 in the World Information Society Report.[11]

In the light of the availability of multiple efforts and indices, various international summits on ICTs called for these efforts to be streamlined into a single index. Accordingly, ITU developed a new index, the IDI, which represents a synthesis of its previous indices.

C. Analysis of selected global information society measurement models

Measuring the progress a country makes in building the information society requires not only selecting a standard set of specific indicators but also consistent collection methods in order to provide results comparable over time and against other regions and countries. The measurement exercise also requires accurate calculation methods to determine the value of the total composite index and related indicators.

The task of measuring the information society requires agreeing on appropriate indicators, developing accurate definitions for the indicators and persuading countries with different levels of development to begin collecting necessary data using international standard methodologies. International organizations taking on the challenge include United Nations organizations, ITU and the World Economic Forum (WEF).

Given the global status and extensive knowledge of ITU in measuring and collecting telecom and ICT indicators, the indices it developed during the past decade and amended several times due to rapid ICT development are considered to be the most prominent.

The past decade also witnessed the development of several global information society measurement models aimed at measuring the information society or specific parts of it. In this study, the following international efforts will be analysed:

- Core ICT Indicators 2010 (Partnership on Measuring ICT for Development);
- Measuring the Information Society 2010 – ICT Development Index (ITU);
- The Global Information Technology Report 2009-2010 – Networked Readiness Index (WEF);
- United Nations Department of Economic and Social Affairs (DESA) e-Government Survey.

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6 http://www.itu.int/ITU-D/ict/dai/index.html.

7 Also called Digital Divide Index, available at: http://www.orbicom.uqam.ca/projects/ddi2002.

8 http://www.itu.int/ITU-D/ict/publications/ict-oi/2007/index.html.

9 WSIS (2003), Plan of Action, paragraph 28.

10 http://www.itu.int/ITU-D/ict/doi/index.html.

11 http://www.itu.int/osg/spu/publications/worldinformationsociety/2007/.

1. *The Partnership on Measuring ICT for Development*

The Partnership on Measuring ICT for Development is one of the most comprehensive initiatives dedicated to developing, collecting and disseminating globally relevant indicators to measure the information society. Launched in June 2004, following the first phase of WSIS, it exemplifies the success of international and multi-stakeholder partnerships by providing an open framework for coordinating ongoing and future activities and for developing a coherent and structured approach to the development of ICT indicators. It includes a number of such international and United Nations organizations as ITU, United Nations Conference on Trade and Development (UNCTAD), the Organisation for Economic Co-operation and Development (OECD), United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS), DESA, the World Bank, Eurostat and four United Nations Regional Commissions (including ESCWA). The Partnership serves as an indispensable channel for exchanging expertise and advice between national statistical offices (NSOs) from developed and developing countries. Box 1 provides more information on the Partnership, including its objectives.

Box 1. Partnership on Measuring ICT for Development

Launched

June 2004 at United Nations Conference on Trade and Development (UNCTAD) XI (São Paulo, Brazil).

Current members

International Telecommunication Union (ITU), Organisation for Economic Co-operation and Development (OECD), UNCTAD, United Nations Department of Economic and Social Affairs (DESA), United Nations Educational, Scientific and Cultural Organization Institute for Statistics (UIS), World Bank, Economic Commission for Africa (ECA), Economic Commission for Latin America and the Caribbean (ECLAC), Economic and Social Commission for Asia and the Pacific (ESCAP), Economic and Social Commission for Western Asia (ESCWA) and Eurostat.

Objectives

To achieve a common set of core information and communication technology (ICT) indicators, to be internationally harmonized and agreed upon, which will constitute the basis for a database on ICT statistics; to enhance the capacities of national statistical offices in developing economies and to build competence in developing statistical compilation programmes on the information society based on internationally agreed indicators; to develop a global database of ICT indicators and to make it available via the Internet.

Structure

A steering committee consisting of ITU, UNCTAD and ECLAC, plus six task groups on ICT in education, e-Government, measuring impact, measuring World Summit on the Information Society (WSIS) targets, capacity-building and database development.

Major achievements

One of the key achievements of the Partnership has been the identification of a core list of 48 ICT indicators. This list, which was agreed upon through a consultation process involving Governments and international organizations, covers basic infrastructure and access indicators as well as ICTs in households, businesses, the ICT sector and education. The list, which is revised regularly, was compiled to help guide countries in measuring the information society.

More information is available at the Partnership's website at: http://www.itu.int/ITU-D/ict/partnership.

The most notable achievement of the Partnership over the past five years was the development, adoption and revision of a common list of core ICT indicators covering five main aspects of the information society: ICT infrastructure and access; access to and use of ICT by households and individuals; use of ICT by businesses; the ICT sector and international trade in ICT goods and ICT in education. An additional set of e-Government indicators has been developed and proposed by the Task Group on e-Government

Indicators (TGEG) and is expected to be officially endorsed by the United Nations Statistical Commission (UNSC) in its upcoming forty-third session to be held at beginning of 2012. Table 1 provides additional details on the list of core ICT indicators.

TABLE 1. LIST OF CORE ICT INDICATORS OF THE PARTNERSHIP

Core ICT indicators	Number of indicators	Description
ICT infrastructure and access	10	Data have been collected by International Telecommunications Union (ITU) (from official regulatory agencies and ministries) for many years and are largely available for the majority of countries. Indicators include fixed telephone lines, mobile cellular subscribers, Internet and broadband subscribers (fixed and mobile), international Internet bandwidth and tariff indicators.
Access to and use of ICTs by households and individuals	13	Data have been collected by ITU (from non-governmental organizations) since 2005 but are scarce. While most countries have information on basic ICT equipment in households (televisions and fixed lines), data on such new technologies as use of and access to mobile phones, Internet and computers are lacking. Indicators include households with a radio, a TV, a fixed telephone line, a mobile cellular telephone and a personal computer (PC). Indicators on location, type and purpose of Internet use are also included.
Use of ICT by businesses	12	Data are collected by United Nations Conference on Trade and Development (UNCTAD) and include indicators on businesses and employees using PCs, the Internet and e-commerce activities. Indicators on location, type and purpose of Internet use are also included.
ICT sector and trade in ICT goods	4	Data have been collected by UNCTAD since 2004 and include indicators on ICT goods, imports and exports and the value-added of the ICT sector.
ICT in education	9	Data are collected by United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS) and include indicators on ICT infrastructure, usage and skills in schools.

Source: Partnership on Measuring ICT for Development (2010).

A closer look at the core ICT indicators reveals that the Partnership clearly distinguished between measuring readiness (indicators related to ICT infrastructure) and intensity (indicators related to the use of ICT by households, individuals and businesses) while no specific indicators were dedicated to measuring impact. However, the 2010 revised set of core ICT indicators did measure ICT skills through some of its indicators on the ICT sector and ICT in education.

In addition to the newly developed e-Government indicators shown in table 2, the Partnership has recently been discussing including a number of new indicators addressing barriers to ICT use and ICT security and trust. Such additions to the core list will only be possible after ample statistical work has been accomplished by the international community.

TABLE 2. PROPOSED LIST OF E-GOVERNMENT INDICATORS OF THE PARTNERSHIP

Indicator code	Description
EG1	Proportion of persons employed in central Government institutions routinely using computers
EG2	Proportion of persons employed in central Government institutions routinely using the Internet
EG3	Proportion of central Government institutions with a Local Area Network (LAN) connecting at least two computers
EG4	Proportion of central Government institutions with an intranet
EG5	Proportion of central Government institutions with Internet access by type of access (narrowband, broadband)
EG6	Proportion of central Government institutions with a Web presence
EG7	Proportion of central Government institutions offering data services targeted to mobile phone users
EG8	Proportion of central Government institutions offering online services by level of sophistication of service

Source: Partnership on Measuring ICT for Development (2011).

Notable aspects of the work of the Partnership are its global approach to identifying ICT indicators, establishing clear definitions and devising uniform processes for collecting data. This has been a consistent and continuous process expected to proceed beyond the 2015 developmental target set by WSIS.

The following 5 tables illustrate the main areas of the information society covered by the list of core ICT indicators of the Partnership; these areas are: ICT infrastructure and access; access to and use of ICT by households and individuals; use of ICT by businesses; the ICT sector and international trade in ICT goods and ICT in education.

(a) *ICT infrastructure and access*

TABLE 3. CORE INDICATORS OF ICT INFRASTRUCTURE AND ACCESS

Indicator code	Description
A1	Fixed telephone lines per 100 inhabitants
A2	Mobile cellular telephone subscriptions per 100 inhabitants
A3	Fixed Internet subscribers per 100 inhabitants
A4	Fixed broadband Internet subscribers per 100 inhabitants
A5	Mobile broadband subscriptions per 100 inhabitants
A6	International Internet bandwidth per inhabitant (bits/second/inhabitant)
A7	Percentage of the population covered by a mobile cellular telephone network
A8	Fixed broadband Internet access tariffs per month: In US$ As a percentage of monthly per capita income
A9	Mobile cellular telephone prepaid tariffs per month: In US$ As a percentage of monthly per capita income
A10	Percentage of localities with public Internet access centres (PIACs)

Source: Partnership on Measuring ICT for Development (2010).

(b) *Access to and use of ICT by households and individuals*

TABLE 4. CORE INDICATORS ON ACCESS TO AND USE OF ICT BY HOUSEHOLDS AND INDIVIDUALS

Indicator code	Description
HH1	Proportion of households with a radio
HH2	Proportion of households with a television
HH3	Proportion of households with a telephone
HH4	Proportion of households with a computer
HH5	Proportion of individuals who used a computer in the last 12 months
HH6	Proportion of households with Internet access
HH7	Proportion of individuals who used the Internet in the last 12 months
HH8	Location of individual use of the Internet in the last 12 months
HH9	Internet activities undertaken by individuals in the last 12 months
HH10	Proportion of individuals who used a mobile cellular telephone in the last 12 months
HH11	Proportion of households with access to the Internet by type of access
HH12	Frequency of individual use of the Internet in the last 12 months
HHR1	Proportion of households with electricity18

Source: Partnership on Measuring ICT for Development (2010).

The above two groups of ICT indicators listed in tables 3 and 4 are quite useful, but do not sufficiently serve the needs of ESCWA member countries, especially Gulf Cooperation Council (GCC) countries which have large expatriate populations, including a considerable number of transient manual workers.

It is recommended that ESCWA member countries should try to break down some of the above-mentioned indicators into sub-indicators to be able to provide three views covering: (a) nationals only; (b) nationals and expatriates, but excluding the transient labour force; (c) the entire population including the transient labour force. It is also recommended to break down each Use of ICT by Individuals Indicator (table 4) into two sub-indicators to reflect gender and age.

(c) *Use of ICT by businesses*

TABLE 5. CORE INDICATORS ON USE OF ICT BY BUSINESSES

Indicator code	Description
B1	Proportion of businesses using computers
B2	Proportion of persons employed routinely using computers
B3	Proportion of businesses using the Internet
B4	Proportion of persons employed routinely using the Internet
B5	Proportion of businesses with a Web presence
B6	Proportion of businesses with an intranet
B7	Proportion of businesses receiving orders over the Internet
B8	Proportion of businesses placing orders over the Internet
B9	Proportion of businesses using the Internet by type of access
B10	Proportion of businesses with LAN
B11	Proportion of businesses with an extranet
B12	Proportion of businesses using the Internet by type of activity

Source: Partnership on Measuring ICT for Development (2010).

Regarding core indicators on the use of ICT by businesses, ESCWA member countries should try to break down each indicator into four other indicators to measure the different business sizes (micro, small, medium and large). Additionally, it is recommended for countries in the region to adopt new indicators if they wish to get a detailed understanding of the maturity of ICT business use. Examples of such indicators are: proportion of employees who received ICT training during the past 12 months and proportion of employees specialized in information technology (IT).

(d) *The ICT sector and international trade in ICT goods*

TABLE 6. CORE INDICATORS ON THE ICT SECTOR AND INTERNATIONAL TRADE IN ICT GOODS

Indicator code	Description
ICT1	Proportion of total business sector workforce involved in the ICT sector
ICT2	ICT sector share of gross value added
ICT3	ICT goods imports as a percentage of total imports
ICT4	ICT goods exports as a percentage of total exports

Source: Partnership on Measuring ICT for Development (2010).

(e) *ICT in education*

TABLE 7. CORE INDICATORS ON ICT IN EDUCATION

Indicator code	Description
ED1	Proportion of schools with a radio used for educational purposes
ED2	Proportion of schools with a television used for educational purposes
ED3	Proportion of schools with a telephone communication facility
ED4	Learners-to-computer ratio in schools with computer-assisted instruction
ED5	Proportion of schools with Internet access by type of access
ED6	Proportion of learners who have access to the Internet at school
ED7	Proportion of learners enrolled at the post-secondary level in ICT-related fields
ED8	Proportion of ICT-qualified teachers in schools
EDR1	Proportion of schools with electricity

Source: Partnership on Measuring ICT for Development (2010).

The indicators on ICT in education in the above list are not adequate to measure the level of development of ICT in an education system. It is recommended for countries in the region to adopt new indicators if they wish to get a detailed understanding of the level of maturity of ICT use. Examples of such indicators are: proportion of schools with a website and proportion of schools which use computers for education in libraries.

2. *International Telecommunication Union ICT Development Index*

Following the development of the DOI and ICT-OI by ITU, stakeholders in the information society called on ITU to further develop and improve its benchmarking efforts and move towards a single index, especially since statistical analysis had shown that both indicators were correlated.[12] The IDI[13] was then developed in 2009 as a merger of the DOI and the ICT-OI.

The IDI is a global index which measures the digital divide, tracks ICT progress over time and captures ICT development potential. From DOI it takes indicators related to households and broadband as well as its simple methodology and presentation, whilst from ICT-OI it adopts the indicators related to skills, its normalization method and its analysis of the digital divide and methodology.

(a) *Conceptual framework*

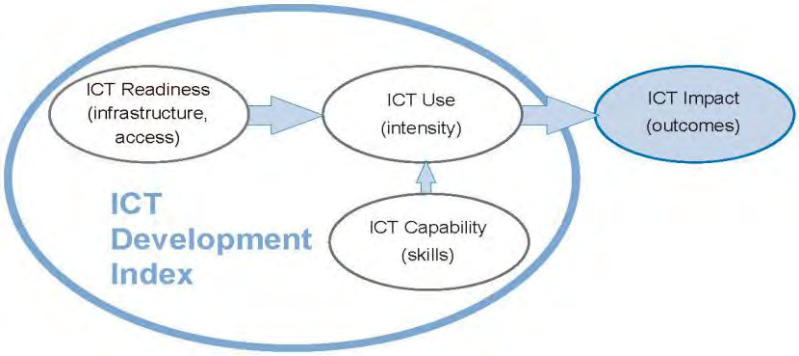
In addition, a new conceptual framework was adopted, which, for the first time, veered away from the basic assumption that ICTs are potential development enablers. Instead, the framework considers ICTs as critical for countries that are moving towards establishing knowledge-based societies; consequently, it assesses and tracks the extent of development reached by countries in their transformation towards information and knowledge-based societies.

The conceptual framework is based on a basic three-stage information society model:

- Stage 1: ICT readiness, reflecting the level of networked infrastructure and access to ICT;
- Stage 2: ICT intensity, reflecting the level of use of ICTs in the society;
- Stage 3: ICT impact, reflecting the result of efficient and effective ICT use.

This three-stage model has been adopted by several stakeholders involved with measuring the information society. The OECD Working Party on Indicators for the Information Society (WPIIS) has used it for measuring the level of development of e-commerce activities in a given country. It was later expanded to describe the level of development of ICT-related activities and is frequently used by other organizations such as the Partnership on Measuring ICT for Development.

Figure II. The three-stage information society model adopted by ICT Development Index



Source: ITU (2010a).

[12] Abuqayyas and Audin (2008).

[13] http://www.itu.int/newsroom/press_releases/2009/07.html.

The IDI was developed as a composite index reflecting the sequence described by the three-stage model (readiness, intensity, impact). Each stage was denoted by a sub-index composed of several related indicators. The indicators dedicated to stage three do not, however, measure impact per se, but assess the evolution towards the final stages of the information society (impact stage) by capturing ICT skills. An important consequence of this index is its ability to raise awareness among policy and decision makers about specific areas requiring attention or further development.

The index covered 154 economies and was first published in 2009 in Measuring the Information Society: The ICT Development Index, 2009.[14] An updated version was also published in 2010 and covered 159 countries worldwide.[15]

(b) *ICT Development Index composition*

The index is composed of 11 indicators grouped by the three sub-indices: ICT Access, ICT Use and ICT Skills. Table 8 shows the structure of the index, its components and the ideal values and weights used by ITU. It should be noted that the Index can be considered self-tuning in the sense that the idea values are relativistic. For example, mobile broadband subscriptions per 100 inhabitants target shifts to a target two standard deviations above the mean value of the indicator. In this way, the ideal value adjusts as the adoption rate increases. Arguably, this feature of the index can be seen as problematic, as there will never be a threshold which is considered high enough. The target will simply continue to an infinitely high number, tracking the high end of the mean value.

While this is a largely theoretical consideration, it does serve to effectively illustrate that this index is designed to track how similar countries are relative to each other, not how close they are to achieving a specific standard. If a country with a healthy information society features a certain indicator threshold, then to achieve an information society, a similar density is desirable. This is true only if the indicator is causally linked to the result, a presumption which has not been proven for several of these indicators. A famous example of this effect is South Korea, which has a thriving information society, despite having a comparatively low level of international bandwidth per Internet user when compared to similar benchmark countries.

TABLE 8. ICT DEVELOPMENT INDEX – REFERENCE VALUES, INDICATORS AND WEIGHTS

Indicator	Reference value*	Weights (indicators)	Weights (sub-index)
ICT access			
Fixed telephone lines per 100 inhabitants	60	0.2	0.40
Mobile cellular telephone subscriptions per 100 inhabitants	170	0.2	
International Internet bandwidth per Internet user	100 000	0.2	
Proportion of households with a computer	100	0.2	
Proportion of households with Internet access at home	100	0.2	
ICT use			
Internet users per 100 inhabitants	100	0.33	0.40
Fixed broadband Internet subscribers per 100 inhabitants	60	0.33	
Mobile broadband subscriptions per 100 inhabitants	100	0.33	
ICT skills			
Adult literacy rate	100	0.33	0.20
Secondary gross enrolment ratio	100	0.33	
Tertiary gross enrolment ratio	100	0.33	

Source: ITU (2010a).

* The ideal value was computed by adding two standard deviations to the mean value of the indicator.

[14] http://www.itu.int/ITU-D/ict/publications/idi/2009/index.html.

[15] http://www.itu.int/ITU-D/ict/publications/idi/2010/index.html.

(c) *Impact of demography on selected indicators*

The demographic complexity of certain GCC countries is not adequately reflected in the context of the ICT skills indicator on Tertiary gross enrolment ratio.

In some GCC countries, such as Qatar, expatriates constitute 87 per cent of the total population (estimates rate 60 per cent of those to be transient manual workers). A total of 139,389 people fall within the tertiary age group; in this case, the total includes a large percentage of such workers. Certain analysts have questioned whether or not these individual should be counted as a valid component of the national denominator, arguing that because these individuals are migrant workers, they should not be considered part of the social fabric of the country and ought to be excluded from the computations.

At present, statistical methods applied by the United Nations Population Division (UNPD) use two systems to count population, de facto and de jure.[16] Legality of immigration status and its transitionary nature are not considered as criteria in determining whether or not a person should be counted in a total population under either of these standards. Furthermore, in the event that it was seen as desirable to exclude these people from the national denominator, to be excluded from their host country populations, where then, would they most appropriately be counted?

The intuitive answer would seem to be in the denominator of the country of their birth. However, this solution would involve significant costs and complexities for labour exporting countries to reintegrate these numbers into their national totals. Furthermore, labour-exporting countries would object to the notion that they should be held responsible to provide telecommunications access and tertiary education as they are often thousands of miles away and not reasonably able to deliver such services to expatriate citizens. In this context, it would appear most appropriate to include these individuals in the statistical processes of the host country as established by either de jure or de facto census methodologies.

However, in order to emphasize the degree of impact that these issues have on statistical processes, recompilation of these data excluding the expatriate populations is included below for illustration.

TABLE 9. TERTIARY AGE POPULATION IN SELECTED GCC COUNTRIES, 2009

Country	Total population	Tertiary age (18-22)	Percentage of population
Qatar (end 2009)	1 699 435	139 389	8.20
Bahrain (April 2010)	1 234 596	96 526	7.82

Source: Madar Research.

(d) *ICT price basket*

The ICT price basket is part of the report of ITU on Measuring the Information Society 2010, compiled to help countries identify where they stand globally in relation to the cost of ICTs. It also encourages devising policies geared towards lowering prices of these three major ICT services (fixed telephone, mobile cellular and fixed broadband Internet) that are considered vital in allowing citizens to access the information society. Such measures could include reviewing the efficiency of an operator, strengthening competition or revisiting tariff policies.

As stated earlier, the ICT price basket is used as a broad measure to compare the cost of ICT in a given country. It uses various price components along with varying usage levels to estimate the average price of

[16] De facto refers to the population present and de jure to the usual resident. For more information refer to: http://unstats.un.org/unsd/demographic/products/vitstats/serANotes.pdf.

the sum of three main ICT services: fixed telephone, mobile cellular and fixed broadband Internet.[17] For cross-country comparison, each sub-basket is calculated as follows:

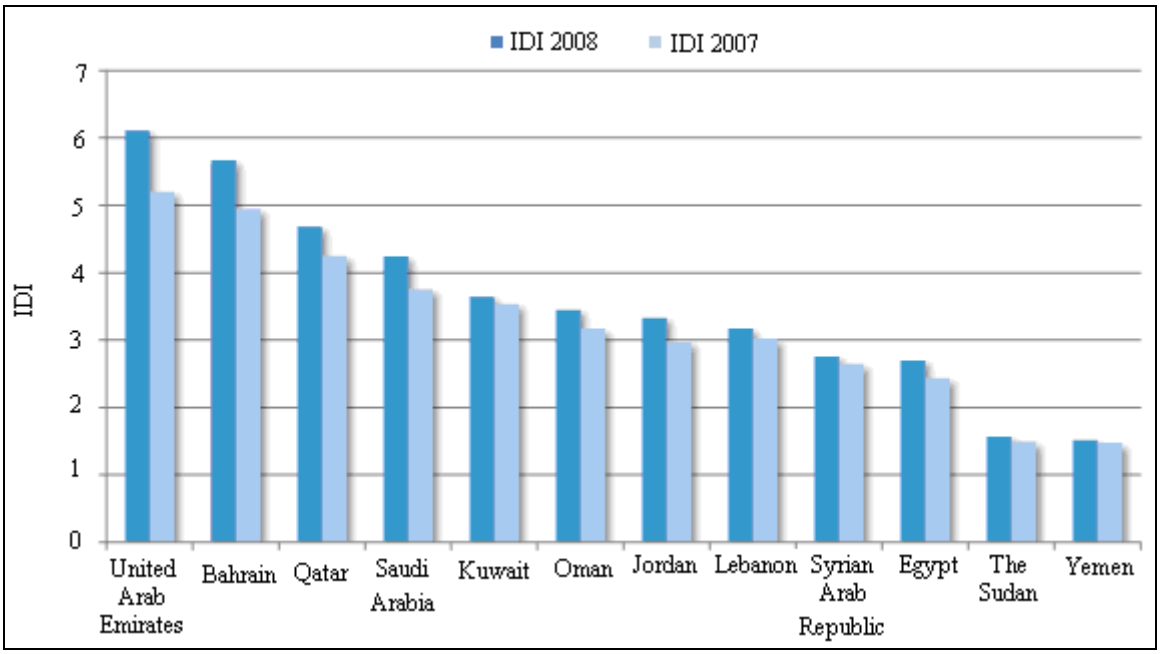
(i) As a percentage of the 2008 monthly gross national income (GNI) per capita of a country;[18]
(ii) In US$ (using the United Nations operational exchange rate);
(iii) In current international dollars, using purchasing power parity conversion factors.

Although the overall index value is a good starting point of reference, each sub-basket value should also be evaluated independently as the prices of ICT services vary considerably between services and countries. Prices of ICT services were gathered from various sources such as the Organisation for Economic Co-operation and Development (OECD) and ITU. For calculation of the prices of various ICTs, the index uses the GNI per capita, but not the average monthly income of middle and low income people. In this regards, inaccurate GNI per capita (inaccurate population figures) used by the ICT price basket for some GCC countries led to inaccurate comparisons.

(e) *Benchmarking ESCWA member countries using the ICT Development Index*

Figure III displays and compares the IDI scores of ESCWA member countries for the years 2007 and 2008, reflecting differences in economic development. Gulf Cooperation Council countries with higher income levels have taken the lead in IDI scores for both 2007 and 2008 data. The United Arab Emirates was the highest ranked country in the region in 2008, ranked at 29 globally with an IDI score of 6.11, followed by Bahrain and Qatar which ranked thirty-third and forty-fifth respectively. The leading positions of all GCC countries was mainly driven by their high mobile cellular penetration rates; for instance, by the end of 2008, mobile penetration rates passed the 200 per cent mark in the United Arab Emirates and the 100 per cent mark in Bahrain, Oman, Qatar and Saudi Arabia.

Figure III. ICT Development Index scores of ESCWA member countries,* 2007-2008



Source: ITU (2010a).

* IDI scores of both Iraq and Palestine were not calculated by the latest IDI report.

[17] For detailed information on calculating the ICT price basket, refer to ITU (2010a), p. 54.

[18] World Bank (2008).

(f) *ICT Development Index Assessment*

The IDI is intended to measure how well the information society is developing in a country in question. Taking into consideration that the nature of the information society is very difficult to define and quantify, this composite indicator functions under the presumption that whatever the information society is, there must be connectivity as a precondition for its existence. These metrics seek to analyse the degree to which citizens are able to access communications. However, countries with comparable access, use and skills may have rather different levels of development in their information societies. For example, the rate at which social media applications, like Facebook, have been adopted around the world suggests a significant difference in the nature and maturity of the relative information societies despite similar IDI scores. With this in mind, the creation of a measurement mechanism which would reflect these differences would be significantly more complicated than the existing IDI and very likely to fundamentally change as technologies evolve. For these reasons, focusing the IDI on access methodologies represents a balance between measuring enabling factors for the development of the information society and measuring the existence and nature of the information society itself.

No doubt, the IDI is a useful measurement model. Future refinements which offer improved integration of new ICT, particularly within the context of developing countries would be very useful. In this regard, making adjustments to ideal target values is an interesting area of inquiry, namely the present values for fixed telephone lines per 100 inhabitants (at 60), mobile cellular telephone subscriptions per 100 inhabitants (at 170) and fixed Internet subscribers per 100 inhabitants (at 60).

3. *The Global Information Technology Report – Networked Readiness Index*

Besides its flagship publication the Global Competitiveness Report, WEF together with the Institut Européen d'Administration des Affaires (INSEAD) produces regional and sector-specific reports, among which features the Global Information Technology Report (GITR) series. This series was launched in collaboration with INSEAD in 2002 and is being published annually, allowing for meaningful comparisons over time.

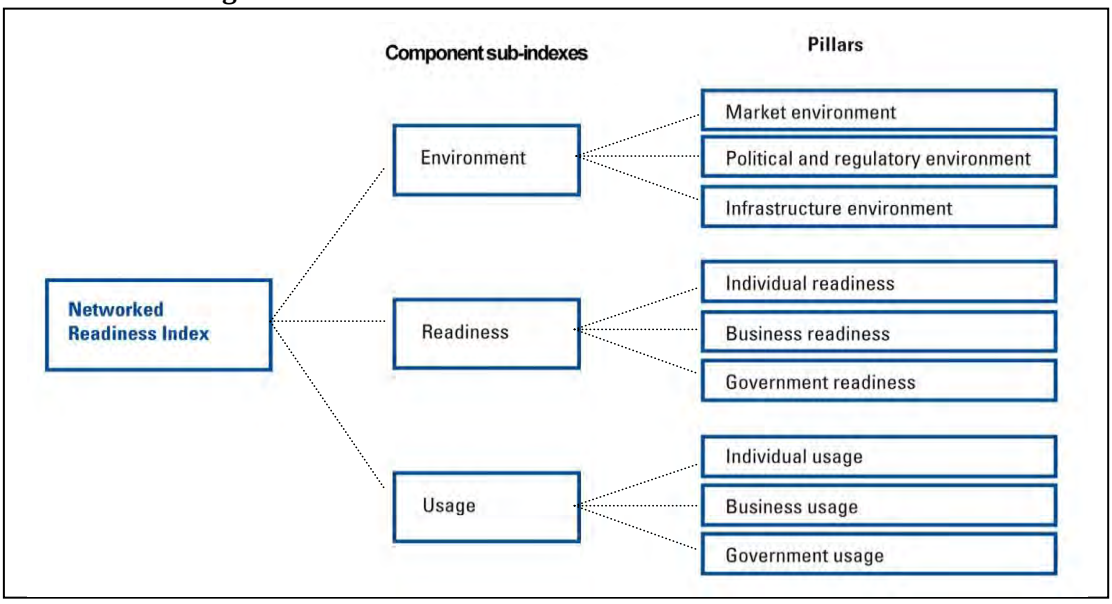
The GITR is a powerful tool for business leaders and policy makers in understanding the enabling factors of ICT advancement. It makes use of a conceptual framework for benchmarking the ICT progress of countries and societies called the Networked Readiness Index (NRI). NRI measures the propensity of countries to exploit the opportunities offered by ICT and establishes a broad international framework mapping out the enabling factors of such capacity.

(a) *NRI framework and composition*

The NRI is composed of three sub-indices: the environment for ICT offered by a given country; the readiness of the key stakeholders in a community (individuals, businesses and Governments) to use ICT; and the usage of ICT amongst these stakeholders (individuals, businesses and Governments). Figure IV illustrates the NRI framework.

Each sub-index is divided into three pillars. The 68 variables (or indicators) used in the computation of the NRI are then distributed among the nine pillars. The data sources for these 68 indicators use a mixture of hard data and soft data. Hard data consists of publicly available information extracted from sources such as the ITU, the World Bank, UNESCO and various United Nations divisions; while soft data are survey-based data provided by conducting an Executive Opinion Survey which records the perspectives of business leaders around the world covering a selected number of dimensions.

Figure IV. Framework of the Networked Readiness Index



Source: World Economic Forum (WEF), (2010).

The mixture of hard and soft data allows the index to capture dimensions important for national networked readiness for which there is no quantitative data available, such as the quality of the education system in a given country. Survey-based data is also indispensable, particularly for variables where no reliable hard data sources exist.

The Executive Opinion Survey is a major component of the Index. The 2009-2010 edition of the GITR included 68 individual indicators (table 10), 39 of which relied on soft data or the opinion of business and Government executives, while 29 (43 per cent) relied on hard data represented by statistical indicators. Hard data indicators used in the NRI are normalized on a 1-to-7 scale in order to align them with the results of the Executive Opinion Survey.

In 2009, over 13,000 business leaders from 134 countries responded to the survey which included 130 questions based on their own experiences in the country in which they were based. Moreover, this survey provides a useful platform for dialogue between the Government and the private sector.

The final NRI score is a simple average of the three composing sub-index scores; each sub-index score is a simple average of those of the composing pillars. The assumption being that all index components give a similar contribution to national networked readiness.

(b) *Networked Readiness Index Assessment*

In cases where subjective data is being sought as a corollary to a physical process, it is less reliable than directly observing the process itself. For example, collecting opinions about the penetration of mobile subscriptions is less useful than counting the subscriptions directly in determining the penetration rate. However, when the subjective opinions are themselves the data in question, this data is just as robust as so-called hard data (as long as it is properly collected).

Collecting soft data requires significantly more mature statistical processes. Because this data is collected through sampling (a portion of the people) instead of aggregation (counting every mobile subscription) the selection of the sample group is vital. Best practice for collecting and interpreting this data is out of the scope of this study, but is widely available elsewhere. It should be noted that third-party independent research has, at times, demonstrated significant variance in the outcome of the subjective indicators of NRI based on the selection of the sample group. Details on this research are found in chapter II. These results underscore the vital importance of implementing best practice in data collection methodologies, to ensure that the collected data is robust, comparable and fair.

TABLE 10. THE 68 INDICATORS OF THE NETWORKED READINESS INDEX, 2009-2010

Environment sub-index	**Readiness sub-index**	**Usage sub-index**
Market environment	Individual readiness	Individual usage
Venture capital availability	Quality of math and science education	Mobile telephone subscriptions (hard data)
Financial market sophistication	Quality of the education system	Personal computers (hard data)
Availability of latest technologies	Buyer sophistication	Broadband Internet subscribers (hard data)
State of cluster development	Residential telephone connection charge (hard data)	Internet users (hard data)
Burden of Government regulation	Residential monthly telephone subscription (hard data)	Internet access in schools
Extent and effect of taxation	Fixed broadband tariffs (hard data)	**Business usage**
Total tax rate (hard data)	Mobile cellular tariffs (hard data)	Prevalence of foreign technology licensing
Time required to start a business (hard data)	Fixed telephone tariffs (hard data)	Firm-level technology absorption
Number of procedures required to start a business (hard data)	**Business readiness**	Capacity for innovation
Intensity of local competition	Extent of staff training	Extent of business Internet use
Freedom of the press	Local availability of specialized research and training services	Creative industries exports (hard data)
Political and regulatory environment	Quality of management schools	Utility patents (hard data)
Effectiveness of law-making bodies	Company spending on research and development (R & D)	High tech exports (hard data)
Laws relating to ICT	University/industry collaboration in R & D	**Government usage**
Judicial independence	Business telephone connection charge (hard data)	Government success in ICT promotion
Intellectual property protection	Business monthly telephone subscription (hard data)	Government Online Service Index (hard data)
Efficiency of legal framework in settling disputes	Local supplier quality	ICT use and Government efficiency
Efficiency of legal framework in challenging regulations	Computer, communications and other services imports (hard data)	Presence of ICT in Government agencies
Property rights	Availability of new telephone lines	E-Participation Index (hard data)
Number of procedures to enforce a contract (hard data)	**Government readiness**	
Time to enforce a contract (hard data)	Government prioritization of ICT	
Level of competition index (hard data)	Government procurement of advanced technology products	
Infrastructure environment	Importance of ICT to Government vision of the future	
Number of telephone lines (hard data)		
Secure Internet servers (hard data)		
Electricity production (hard data)		
Availability of scientists and engineers		
Quality of scientific research institutions		
Tertiary education enrolment (hard data)		
Education expenditure (hard data)		
Accessibility of digital content		
Internet bandwidth (hard data)		

Source: WEF (2010).

In terms of NRI, it should be noted that the subjective views themselves constitute the desired data, and all things being equal, can be considered as reliable as other more easily collected and quantified indicators. This index delivers real value in that it represents an integration of both easily collected data and the subjective views of the participants in the information society. By virtue of this mechanism, the Index provides data on the circumstances of the country, as well as the effects these circumstances have on the perceptions of the citizens.

4. *United Nations Department of Economic and Social Affairs e-Government Development Index*

The United Nations Department of Economic and Social Affairs (DESA) has been publishing the United Nations e-Government Survey on a biannual basis since 2003. For its survey methodology, DESA defines the United Nations e-Government Development Index (EGDI) as "a comprehensive scoring of the willingness and capacity of national administrations to use online and mobile technology in the execution of Government functions".[19] Although EGDI is not intended to measure the information society, some of its sub-indices are based on related ICT indicators. It was included in this study since population figures and statistical irregularities influence the values of the underlying sub-indices of this composite index.

(a) *EGDI composition*

The United Nations e-Government Survey is based on a comprehensive survey of the online presence of 192 United Nations Member States. It consists of the EGDI complemented by the e-Participation Index. The evolving EGDI relies on three sub-indices, namely the Online Services Index (formerly, Web Measurement Index), the Telecommunication Infrastructure Index and the Human Capital Index. Mathematically, the EDGI is a weighted average of the normalized scores of these three sub-indices. Moreover, each of these sets of indices is itself a composite measure that can be extracted and analysed independently.

(b) *Online Services Index*

This sub-index provides a comparative ranking of the ability of a Member State to deliver online services to citizens or residents. In keeping with the conceptual framework for human development, services assessed were those that belonged to the national website and the ministries or departments of health, education, social welfare, labour and finance. These ministries or departments are also deemed to have the greatest number of Government-to-citizen (G2C) services and interaction.

Online services are assessed through a survey which has four sections corresponding to the four stages of e-Government development. The first set of questions focuses on the kind of characteristics which are typical of an emerging online presence, the second set relates to an enhanced presence, the third to a transactional presence and the fourth to a connected presence.

The vast majority of questions in the online services survey require a binary response × with "yes" given one point and "no" zero points. Otherwise, a small number of questions is designed to capture data on the number of forms of e-services available. These are worth up to ten points each.

Table 11 provides a list of related survey indicators structured into several categories about the characteristics of online services.

[19] United Nations Department of Economic and Social Affairs (DESA), (2010).

TABLE 11. SURVEY INDICATORS/QUESTIONS COVERING E-GOVERNMENT SERVICES

Categories	Related survey indicators
Characteristics of an emerging online presence	• What's new? • Frequently asked questions • Archived information
Site maps and linkages from national portals	• Site map is available • Links between national home pages and ministries/departments • Links between national home pages and public sector services
Website design features: really simple syndication (RSS), audio, video, language	• Site meets/provides at least minimal level of web content accessibility • Site supports audio and/or video content • Site provides RSS • Site offers content in more than one language
Support of mobile access	• Site supports wireless application protocol/general packet radio service access • Site offers service to send alert messages to mobile phones • User can apply for registration or application by mobile phone • Users can pay registration fees and fines by mobile phone
Online payment	• Taxes • Registrations • Permits, certificates, identification cards • Fines • Utilities
Online submissions	• Online forms • Online transactions • Application for Government benefits • Acknowledgement of receipt
Connected presence	• Single sign-on • Electronic identity management and authentication • One-stop shopping • Information in machine-readable format • Interaction with head of State
Connecting to citizens	• Citizens can request personal information about themselves • Users can tag, assess and rank content • Users can initiate proposals • Users can personalize the website • Government has committed to incorporating e-participation outcome in decision-making

Source: United Nations Department of Economic and Social Affairs (DESA) (2010a).

(c) *Telecommunication Infrastructure Index*

This Index is a composite of five indicators using equal weightings: number of personal computers per 100 inhabitants, number of Internet users per 100 inhabitants, number of main fixed telephone lines per 100 inhabitants, number of mobile cellular subscriptions per 100 inhabitants and number of fixed broadband subscribers per 100 inhabitants. Country data is taken primarily from the database of ITU.

(d) *Human Capital Index*

This is a composite Index which measures the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratio, with two thirds weight given to the adult literacy rate and one third to the gross enrolment ratio. It relies primarily on the UNESCO database, supplemented with data from the Human Development Report (HDR) published by the United Nations Development Programme.

Adult literacy is defined by UNESCO as "The percentage of population aged 15 years and over who can both read and write with understanding a short simple statement on his/her everyday life".[20] While combined primary, secondary and tertiary gross enrolment ratio is defined by UNESCO as the total number of students enrolled at the primary, secondary and tertiary level, regardless of age, as a percentage of the population of school age for that level.[21]

(e) *E-Participation Index*

The e-Government Development Index is complemented by an e-Participation Index. This Index brings more relevance to the measurement of e-governance by incorporating three factors in citizen engagement: electronic information dissemination, electronic consultation and electronic participation in decision-making.

The assessments are based on a survey questionnaire which allocates a binary value "yes", "no" to indicators related to e-participation such as the ones depicted by table 12.

TABLE 12. SURVEY INDICATORS/QUESTIONS COVERING E-PARTICIPATION

Categories	Related survey indicators
Information about e-inclusiveness and e-participation	• Site provides information about inclusiveness in e-Government • Site provides information about e-participation
Interaction with citizens	• Citizen charter or service level statement • Facility for citizen feedback • Information about employment opportunities
Interactive tools used by Governments	• Online polls • Online surveys or feedback forms • Chat rooms or instant messaging • Web logs • List services or newsgroups • Other interactive tools
Citizen engagement in economic crisis response	• Commitment of public funds to addressing the financial and economic crisis • Government website provides information on financial and budgetary measures linked to the crisis • Government website gives citizens a say on how funds are spent using online tools
Web 2.0 tools used in e-decision-making	• Online discussion forums • Archive of past discussion forums • Government officials respond to citizen input • Government officials moderate e-consultations • Online petitions • Online voting

Source: DESA (2010a).

(f) *EGDI assessment*

The Online Services Index mainly covers supply side indicators through website assessments, while the demand side for e-Government services is not covered. In other words, the Index gauges offerings made available by Governments, but fails to balance this with assessment from the user or citizen. Also, the DESA e-Government Survey report states that "each site was reviewed by at least two researchers, one or more of whom had multiple years' experience in assessing online services of the public sector".[22] So, the Index is

[20] United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics Glossary. Available at: http://glossary.uis.unesco.org/glossary/en/home.

[21] Ibid.

[22] United Nations Department of Social Affairs (DESA), (2010), p. 110.

largely dependent on the experience of reviewers, which may lead to inaccurate comparisons between ESCWA member countries, as well as with other countries.

D. CONCLUSION

The information society is a concept designed to enable and further drive the socio-economic development of both developed and developing countries. At the core of this society, the implementation of ICT initiatives has been the focus of Government strategies. As the formulation of effective strategies and policies requires sound assessment, special efforts were directed towards developing measurement and evaluation tools. These tools provide decision makers with valuable information in order to update and fine-tune their ICT strategies and implementation plans.

While using measurement as a basis for evaluating and modifying strategies and policies is a sound approach, the relevance and accuracy of the selected tools remain questionable. The challenges of measuring such a multidimensional concept as the information society render this task very complex, requiring a tested framework, statistical methods, surveys, data collection, monitoring and evaluation.

As opposed to measuring economic activities, the complexity of measuring the information society stems from the inability to assess and measure intangible activities and outputs. Cause and effect relationships are not clearly visible; for instance, high ICT penetration rates do not directly translate into improved economic benefits for a given society.

Earlier approaches to measuring ICT and the information society were confined to simply aggregating a variety of data on selected indicators, adjusting the weight of some factors and applying statistical tools. These approaches lacked theory and validation.

While measuring the ever-changing ICT landscape might seem to be enough, some studies have shown that societies are not exclusively driven by technology; thus, measuring the number of connected computers tells us very little about the actual state of a society. In fact, assessing the information society must go beyond measuring ICT diffusion and investigate the socio-economic context within which these developments are taking place.[23]

[23] Pruulmann-Vengerfeldt (2006).

II. IDENTIFYING SHORTCOMINGS IN EXISTING INFORMATION SOCIETY MEASUREMENT MODELS

All measurement models have inherent limitations, but effective models can still deliver significant value. Creating a data-driven process for understanding complex systems, like the information society, is a very challenging exercise. Detail is often lost, particularly when such models must then be applied to a wide variety of circumstances. In order to gain useful knowledge from data-based indicators, a correct understanding of the contextual issues must be developed. These circumstances include:

- Time reference;
- Hard data versus soft data;
- Definition of indicators;
- Frequency of measurement;
- Surveys and sampling;
- Population figures and related issues.

In this chapter, these conceptual issues will be discussed, together with specific examples and case studies from ESCWA member countries. This analysis should not be considered an all-encompassing survey. Instead, it illustrates a sub-set of particular issues.

Generally speaking, the evaluation of information society measurement models must be made in the context of their usefulness in driving the policy decisions they are intended to illuminate. Further, a useful model would be presumed to be causatively linked to the outcomes it is intended to measure. That is to say, positive movement in the indicators of the model should be at least correlated and at best causational to positive change in real world circumstances. Failure to observe such a connection would leave policy makers questioning why they should rely upon the model to inform their data-based decision making in promoting the growth of the information society.

Several of the models evaluated in this chapter distil a wide variety of criteria into a single composite indicator. The results of this analysis are then stack ranked and positions assigned to the countries examined. While these metrics provide a single measure to assess comparative national status and have proven very popular with journalists and some policymakers, stack ranking has a number of conceptual limitations which should be considered.

First, as noted above, distilling a broad basket of measures into a single representative indicator must necessarily factor out a large degree of detail and context. Whenever compound indicators attempt to accomplish this, they inevitably sacrifice some measure of robustness for simplicity. Understanding the inherent limitations and benefits of this approach is necessary to avoid the overly simplistic analysis which sometimes follows the results of these stack ranking exercises.

Second, in the absence of benchmarks and targets, it is not possible to determine whether or not the performance of a country at the composite index level represents either a good or bad result. Countries with limited resources, who nevertheless utilize their assets extremely effectively, may only improve very marginally in either their ranking or absolute score. Despite this, the amount of progress achieved may be considered quite reasonable under the circumstances.

When examining whether or not either the comparative ranking or absolute score represents a desirable result, measurement efforts should consider shifting from a stack rank model to a benchmarking process that is sensitive to maturity level, which would produce a scorecard-style result. While this mechanism would be necessarily more complex in that it would consider additional factors, the needed methodologies are affordable and would provide significantly greater value in determining which countries were doing well, and which need improvement. Details of this proposed model enhancement and discussion of the cost/benefit issues can be found in later chapters of this publication.

A. Observations on issues affecting multiple models

Some issues affect entire models generally, while other issues are smaller in scope and affect only individual indicators. For the purpose of this analysis, issues impacting entire models will be explored first.

1. *Time reference*

There are two time references for indicators based on the population figures:

(a) End-of-year reference: Since data related to the numbers of subscribers in fixed-line and mobile telephones, as well as the Internet, usually refer to the end of the year, penetration indicators should also be based on the end-of-year population figure;

(b) Mid-year reference: Indicators such as gross domestic product (GDP) per capita or gross national product (GNP) require the use of the mid-year population figure.

All reports use a single time reference for calculating indicators, which is generally the mid-year population reference. Population growth over a period of six months is marginal in countries with less fast-paced population migration, where the error resulting from the use of one time reference in calculating penetration indicators is less insignificant. The situation in GCC countries, however, is quite different, since certain years witness very high population growth while others see marginal growth, as was the case in 2010. Population growth rate in certain GCC countries exceeded 16 per cent annually over the years 2003-2008 due to an increased inflow of expatriate labour, meaning that the population might have increased by 8 per cent or more during a six-month period. As a consequence, the use of the mid-year population figure in a high-growth year in the GCC would lead to significant errors in penetration indicators for the year in question.

As an example, the number of mobile phone subscribers in Qatar was 946,343 by the end of 2008, when the population of the total country was set at 1,553,729, rising from 1,448,446 in mid-2008, according to figures from the Qatar Statistics Authority. When using the mid-year population figure for calculation, mobile phone penetration would be 134 per cent. However, the indicator would drop to 125 per cent when year-end population is used, leading to Qatar shedding seven ranks globally.

TABLE 13. QATAR POPULATION 2005-2010

Period	End 2004	End 2005	End 2006	End 2007	End 2008	End 2009	End 2010
Population	824 699	965 092	1 133 972	1 337 329	1 553 729	1 631 728	1 637 443
Percentage change		17.02	17.50	17.93	16.18	5.02	0.35

Source: Qatar Statistics Authority and the Planning Council.

2. *Hard data versus soft data*

The NRI presents an interesting case for consideration because it integrates both observed quantifiable data and the data gathered on the opinions of individuals. This is a laudable and important statistical exercise. In cases such as these, where cross-cultural issues can affect the context of the collected data, it is important to consider the circumstances at the national level. For example, questions about taxation have different significance when the country in question does not have a national tax structure, such as is often the case in GCC countries.

In addition, ensuring a representative sample is vital when collecting information on the views of citizens. To illustrate this case, an independent research group conducted parallel analysis using a different group of individuals. In this case, a selected group of business and academic leaders as well as high profile

Government officials were consulted. In this exercise it was determined that the value of our indicators scored less than those published by WEF by approximately 8 per cent. This resulted in a shift in the rating of a country by 12 positions.

The following tables show the differences in terms of selected indicators between the survey results published in the Global Information Technology Report and the result of the independent survey conducted on behalf of Qatar.

TABLE 14. NETWORKED READINESS INDEX ENVIRONMENT SUB-INDEX
(*1-7*)

Pillar	Independent survey 2008		GITR 2007-2008	
Market environment	Score	Rank	Score	Rank
Venture capital availability	3.92	34	3.95	33
Financial market sophistication	4.04	70	4.60	46
State of cluster development	3.61	57	3.90	42
Burden of Government regulation	3.52	40	4.19	12
Freedom of the press	4.56	87	4.67	83
Accessibility of digital content	4.73	58	5.52	29
Political and regulatory environment				
Judicial independence	5.06	37	5.50	22
Intellectual property protection	4.30	43	5.02	27
Efficiency of legal framework	4.63	39	5.13	24
Infrastructure environment				
Availability of scientists and engineers	3.69	99	4.33	66
Quality of scientific research institutions	3.83	62	4.14	45

Source: WEF (2009).

TABLE 15. NETWORKED READINESS INDEX READINESS SUB-INDEX
(*1-7*)

Pillar	Independent survey 2008		GITR 2007-2008	
Individual readiness	Score	Rank	Score	Rank
Quality of math and science education	4.19	61	5.07	24
Quality of the education system	4.00	45	4.87	24
Buyer sophistication	3.30	88	4.25	44
Business readiness				
Local availability of specialized research and training services	3.12	105	4.07	55
Quality of management schools	3.29	105	4.73	37
Company spending on research and development	2.75	97	3.61	40
University/industry research collaboration	2.69	90	3.54	41
Local supplier quality	3.38	117	4.27	73
Government readiness				
Government prioritization of ICT	5.28	23	5.75	10
Importance of ICT to the vision the Government has of the future	4.49	35	5.46	8

Source: WEF (2009).

TABLE 16. NETWORKED READINESS INDEX USAGE SUB-INDEX
(*1-7*)

Pillar	Independent survey 2008		GITR 2007-2008	
Business usage	Score	Rank	Score	Rank
Firm-level technology absorption	4.54	75	5.30	33
Capacity for innovation	2.61	103	2.86	88
Government usage				
Government success in ICT promotion	4.19	65	5.36	11
Availability of online services	5.26	20	5.17	23
Presence of ICT in Government offices	5.00	38	5.26	26

Source: WEF (2009).

Among the respondents to the independently conducted Executive Opinion Survey were top executives, business and community leaders, including the owners or chief executive officers, chief operating officers, chief technology officers, chairpersons and other top executives in the largest or leading enterprises. Respondents also included senior Government officials and community leaders.

In the absence of a national reference for very important persons (VIPs) in businesses and communities of the surveyed country, the sample was drawn from several sources to create a database of over 300 respondents with a response rate of about 35 per cent. The following lists were compiled:

(a) Largest/leading enterprises (listed and unlisted);

(b) Secondary research: respondents were selected from a variety of economic sectors such as the following broad sectors (based on OECD standard sectors):

- Finance;
- Construction and real estate;
- Professional and technical services;
- Retail and wholesale trades;
- Accommodation, recreation and food services;
- Energy and utilities;
- Health care and social services.

B. STATISTICAL ISSUES PERTAINING TO SPECIFIC MEASUREMENTS

1. *Definitions of indicators*

In several instances, indicator definitions are not consistently applied throughout the region. This section highlights several specific examples of this effect and briefly describes the impact.

(a) *Internet users*

The definition of Internet user differs from one country to another. The Communications Information Technology Commission (CITC) in Saudi Arabia defines an Internet user as a person who accessed the Internet in the last two weeks, which includes nearly one third (30.5 per cent) of the Saudi population.[24] The China Internet Network Information Center (CNNIC), a quasi Government organization, defines an Internet user as someone over the age of six who uses the Internet at least one hour per week on average.

[24] Communications Information Technology Commission (CITC), (2009), p. 17.

The ITU HH7 indicator refers to Internet use in the previous 12 months from any location by in-scope individuals. This illustrates the difference in methodology being applied between these approaches. In order to enhance international comparability, these matters should be harmonized.

(b) *Broadband*

Such ESCWA member countries as Lebanon and Saudi Arabia consider all types of DSL as broadband connections, while the ITU definition states that DSL at speeds below 256 kilobit per second (kbps), are classified as narrowband.[25]

In 2010, the Lebanese Telecommunication Regulatory Authority (TRA) released a report in which they stated that "Broadband refers to ADSL subscriptions, since it constitutes on average more than 95% of Broadband services".[26] Clearly, the TRA classifies all types of ADSL as broadband, regardless of whether the speed is higher than (or equal to) 256 kbps.

Table 17 shows how the TRA[27] of Oman calculated the number of Internet subscribers by adding all types of DSL subscriptions to leased lines.

TABLE 17. CLASSIFICATION OF BROADBAND SERVICES IN OMAN

Type of service	As of September 2010	As of June 2010	Percentage of change
2. Internet broadband subscribers (2.1+2.2)	44 989	44 111	1.99
2.1 DSL	44 546	43 678	1.99
2.2 Internet leased line	443	433	2.31

Source: Telecommunications Regulatory Authority (TRA) - Oman, (2010).

In this case, classifying all types of DSL as broadband appears to be a reasonable approach in Oman since the entry-level DSL service in the country offers a downstream data speed of 512 kbps.

(c) *Business classification*

Certain ESCWA member countries, Bahrain, Egypt, Saudi Arabia and the United Arab Emirates, do not use the international business classification as stated in the Core ICT Indicators 2010 report:

> The size classification for businesses is defined in terms of persons employed and is: 1-9, 10-49, 50-249 and 250 or more persons employed. While the minimum recommended scope is 10 or more employees, many countries will want to collect data for smaller businesses. Therefore a range of 1-9 persons employed was added to the size classification during the 2008 revision of core indicators. Countries are encouraged to expand the scope to include very small businesses and to tabulate data on that basis. The recommended size categories are less detailed than UNSD size recommendations (UNSD, 2008c).[28]

Utilizing desegregation brackets that diverge from the standard definition has a serious impact on the comparability of the resulting data. Unless methods can be found to normalize the results, the usefulness of the data is limited.

[25] ITU, 2010c.

[26] Lebanese Telecommunications Regulatory Authority (TRA), (2010), p. 7.

[27] http://www.tra.gov.om.

[28] Partnership on Measuring ICT for Development (2010), p. 46. The 2008c publication cited here is the Draft International Recommendations for Industrial Statistics of the United Nations Statistics Division.

(d) *Gross enrolment ratio*

To compute the gross enrolment ratio (GER) in a standardized, comparable way, countries must apply a specific definition and collection methodology. At the tertiary level, it appears that data are being collected in an inconsistent way by certain ESCWA member countries. Specific aspects of this indicator are discussed later in this chapter, while the definition is provided here for clarity.

Total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school year. For the tertiary level, the population used is that of the five-year age group following on from the secondary school leaving.[29]

2. *Frequency of measurement*

Most ESCWA member countries publish annual market indicator reports (certain countries publish quarterly reports) that cover such ICT indicators as Internet, mobile and fixed line penetration rates. Only a few conduct comprehensive ICT field surveys, not all of which are updated annually.

The following table lists the most comprehensive ICT survey-based reports published in ESCWA member countries in the past five years. Improving the frequency of measurement exercises would increase the actionability of the data.

TABLE 18. POPULATION SURVEY REFERENCES IN ESCWA MEMBER COUNTRIES

Country	Survey-based reports	Organizations/agency in charge
Bahrain	Understanding Telecom Usage in Bahrain - Residential Module Finding × TRA 2007 Understanding Telecom Usage in Bahrain - Business Module Finding × TRA 2007	Telecommunications Regulatory Authority (TRA) www.tra.org.bh
Egypt	The Future of the Internet Economy in Egypt, A Statistical Profile, 2009, MCIT	Ministry of Communications and Information Technology (MCIT) www.mcit.gov.eg
Iraq	-	Communications and Media Commission (CMC) www.cmc.iq
Jordan	Information Technology Use at Homes Survey 2007, 2008, 2009	Telecommunications Regulatory Commission (TRC) www.trc.gov.jo
Kuwait	-	Ministry of Communications www.moc.kw
Lebanon	Telecommunications Usage Patterns and Satisfaction in Lebanon 2008	Telecommunications Regulatory Authority (TRA) www.tra.gov.lb
Oman	-	Telecommunications Regulatory Authority (TRA) www.tra.gov.om
Palestine	Business Survey on ICT, 2007 - Analysis of ICT-Access and Usage of Enterprises in the Palestinian Territory	Palestinian Central Bureau of Statistics (PCBS) www.pcbs.gov.ps
Qatar	Qatar ICT Landscape 2009: Assessment of Information & Communication Technology in Qatar	Supreme Council of Information & Communication Technology (ictQATAR) www.ict.gov.qa

[29] UNESCO, op. cit.

TABLE 18 (*continued*)

Country	Survey-based reports	Organizations/agency in charge
Saudi Arabia	Computer and Internet Usage in the Kingdom of Saudi Arabia (2007-2009) (CITC) × 2009	Communication and Information Technology Commission (CITC) www.citc.gov.sa
Syrian Arab Republic	-	Ministry of Communications and Technology (MoCT) www.moct.gov.sy
The Sudan	-	National Telecommunication Corporation (NTC) www.ntc.gov.sd
United Arab Emirates	UAE ICT Survey, Access and Use of Information and Communications Technology in the UAE. ICT in the UAE Household Survey, 2010 (Household)	Telecommunications Regulatory Authority (TRA) www.tra.gov.ae
Yemen	-	Ministry of Telecommunications and Information Technology (MTIT) www.mtit.gov.ye

Source: Compiled by ESCWA.

3. *Surveys and sampling*

Field surveys in the ICT domain remain scarce in ESCWA countries. In the past few years, certain GCC countries have begun conducting field surveys at an increasing rate. However, there are some issues which complicate international comparisons of these results. Household surveys have been conducted in Bahrain, Jordan, Palestine, Qatar, Saudi Arabia and the United Arab Emirates. Unfortunately, surveys are infrequent and have been conducted in different years, thus making benchmarking difficult. In addition, the surveys do not incorporate stratified random sampling, which is particularly necessary when obtaining soft data on the opinions of the population.

Survey content is often not standardized, making comparisons more problematic. In addition, only a few surveys covered the gender gap in ICT usage. Comprehensive surveys that use several parameters such as gender, income, education level and type of usage are not yet consistently executed in the ESCWA region.

(a) *Saudi Arabia*

In 2007, the Saudi Arabian CITC initiated a study entitled Computer and Internet Usage in the Kingdom of Saudi Arabia. Upon examination of the study, methodological problems were present. For example, companies were divided into 3 categories: small (less than 50 employees), medium (51 to 300 employees) and large (more than 300 employees). Because this categorization is not employed by most countries around the world, comparisons between Saudi Arabia and other countries are very difficult.

Standardization of the definition and data collection would avoid these comparability issues. The European standard classifies companies into 4 categories: micro (less than 10 employees), small (10 to 49 employees), medium (50 to 249 employees) and large (more than 250 employees).

In addition, the selected sample did not correlate with the actual percentage of companies in reality; 68 per cent of the selected companies were small (50 employees or less), when in fact, according to the Saudi Central Department of Statistics and Information (CDSI) 98.8 per cent of companies in Saudi Arabia are small. The remaining sample was divided into medium-sized companies (22 per cent) and large-sized companies (10 per cent).

Since the results were not adjusted, or weighted, to match the actual percentage of small, medium and large companies in Saudi Arabia, the selected sample could not be directly compared with other data sets.

This issue is of particular significance because indicators such as the number of companies with at least one PC and the number of companies with Internet connections are disaggregated by company size.

(b) *The United Arab Emirates*

In 2009, the United Arab Emirates-TRA conducted an ICT Survey report entitled Access and Use of Information and Communications Technology in the UAE.[30]

The survey-based report classified companies into three categories: small, with 10 to 49 employees (constituting 36 per cent of all businesses), medium, with 50 to 249 employees (28 per cent of all businesses) and large, with 250 or more employees (36 per cent of all businesses).

Two aspects of this study deserve consideration:

(i) There was no category for microbusinesses of one to nine employees. Because developing economies tend to have a large number of small enterprises, not including this segment of the data disproportionally affects the results. The table below, which is based on an analysis of the Abu Dhabi Chamber of Commerce and Industry (ADCCI)[31] database, highlights the significance of microenterprises, as they constituted 77 per cent of all business establishments in the United Arab Emirates in 2008. With such a significant presence, microenterprises are an important part of the total statistical picture;

TABLE 19. COMPANY SIZES IN THE UNITED ARAB EMIRATES: MICRO LISTED SEPARATELY

Company size	Category share (*percentage*)
Large (250+ employees)	1.5
Medium (50-249 employees)	4.5
Small (10-49 employees)	17
Micro (1-9 employees)	77
Total	100

Source: Madar Research, based on Abu Dhabi Chamber of Commerce and Industry (ADCCI) data.

(ii) The breakdown of the sample size for each category was incongruous with the database of the Chamber of Commerce and Industry. In addition, the survey results were not adjusted (weighted) to match the actual percentage of small, medium and large companies in the United Arab Emirates. Thus, the survey findings were distorted. The following table shows the actual percentage of each category versus the percentage used by the survey. The issue of the missing microenterprises is not addressed.

TABLE 20. COMPANY SIZES BY SOURCE IN THE UNITED ARAB EMIRATES

Company size	Category share as per ADCCI database* (*percentage*)	Category share as per the survey (*percentage*)
Large (250+ employees)	6	32
Medium (50-249 employees)	18	28
Small (10-49 employees)	76	32
Total	100	100

Source: Madar Research.

* Microbusiness is excluded from the database to match the full population of the survey (the sum of small, medium and large businesses only).

30 http://www.tra.gov.ae/download.php?filename=UAE_ICT_Survey_en.pdf.

31 http://www.abudhabichamber.ae.

(c) *Egypt*

In March 2009, the Ministry of Communications and Information Technology (MCIT) in Egypt published a report entitled The Future of the Internet Economy in Egypt. The Ministry classified companies into three categories similar to the classification used by TRA in the United Arab Emirates.

(d) *Palestine*

In 2009, the Palestinian Central Bureau of Statistics published a report entitled Analysis of ICT - Access and Usage of Enterprises in the Palestinian Territory, based on an ICT business survey conducted in 2007. The report classified the companies into three categories according to the number of employees: zero to four, five to nine and 10+ employees per company. The report stated that its "results were weighted against a weighting factor which is estimated based on the percentage of elements in accordance to their actual representation."[32] Independent analysis has failed to duplicate these numbers.

(e) *Bahrain*

In 2007, TRA-Bahrain also conducted a study entitled Understanding Telecom Usage in Bahrain - Business Module. Companies were classified into three categories: small (less than 20 employees), medium (20 to 99 employees) and large (more than 100 employees). This further highlights the importance of synchronizing the breakdown of classifications as these types of disparities make comparisons between Bahrain and other countries problematic.

TABLE 21. BAHRAIN COMPANY SIZES: MICRO INCLUDED WITH SMALL SIZE

Company size	Category share (*percentage*)
Less than 20 employees (small)	40
20 to 99 employees (medium)	42
100+ employees (large)	18
Total	100

(f) *Qatar*

In 2008 ictQATAR conducted a field survey to measure ICT use by the business sector, realizing that the previous classification of companies by size (in terms of number of employees) did not follow the international standards and made comparisons very difficult between enterprises of various sizes and their international counterparts. Benchmarking of the indicators of Qatar against other countries is extremely useful to fully understand where Qatar stands in relation to world leaders in ICT adoption.

TABLE 22. CLASSIFICATION OF ENTERPRISE SIZE (BY NUMBER OF EMPLOYEES)* BY QATAR

Enterprise size	Micro		Small		Medium	Large	Super large
Number of employees	1-4	5-9	10-24	25-49	50-99	100-499	500+

Source: ictQatar (2008).

* The size categories are the standard used by Qatar Statistics Authority,[33] but in the absence of a label for each category, the nomenclature is assigned by Madar Research to facilitate identification.

[32] Palestinian Central Bureau of Statistics (2009), p. 27.

[33] http://www.qsa.gov.qa.

TABLE 23. INTERNATIONAL CLASSIFICATION OF ENTERPRISE SIZE (BY NUMBER OF EMPLOYEES)

Enterprise size	Micro	Small	Medium	Large
Number of employees	1-9	10-49	50-249	250+

The companies in the sample were regrouped by ictQatar to fit the international size benchmark, while keeping the original sample classification for internal purposes in Qatar. Additionally, weighting of data was carried out on two levels to give a more realistic picture about the business sector in Qatar:

(a) By number of companies in each size category. The weight factor for each category was calculated by dividing the total number of companies in the category by the total number of companies in Qatar;

(b) By number of employees in each size category. The weight factor for each category was calculated by dividing the total number of employees of the company in the category by the total number of employees of the company in Qatar.

The total sample size used for the four categories was 532. The next survey exercise will attempt to increase this sample size in order to enhance the accuracy of the results. Application of standardized categories and implementation of weighting factors is very helpful in creating measurements which can be used for regional and transnational comparisons.

4. *Population figures and related issues*

The population of a country is a figure of significant importance for a nation in so many ways, since it is the basis for calculating numerous key indicators including per capita gross national product, tertiary enrolment ratio, ICT penetration, or the number of physicians per 1,000 inhabitants. While such indicators are vital for Governments to draw upon in creating their development strategies and adjusting their policies, they are also important for international organizations to benchmark the performance of the countries of the world against each other in various areas of development in order to assess the effect of policies in terms of real world results. Additionally, such indicators are invaluable for business planning and development. If a population estimate significantly deviates from reality, indicators would be skewed or distorted and business decisions based on them may be less than optimal. A census, if carried out properly, will provide the most accurate figure for the population in a given year, while a growth rate is used to provide a reasonable population estimate for successive years. Unless there is a dramatic change brought about by war or natural disaster, a population figure usually follows a more or less steady and consistent pattern based on new births, mortality, emigration and immigration.

The six GCC countries represent population cases whose growth rate and peculiar demographics have diverged from the norms and have led to a misunderstanding of their populations and distortion of the numerous indicators that depend on them.

Unlike most countries of the world, the GCC countries have, for the past four or five decades, been relying on a large expatriate workforce to fuel one of the largest and fastest construction and development booms in the world. By the end of 2009, this workforce, reflecting the entire demographic spectrum from unskilled labour to highly qualified professionals, had grown to constitute anywhere from between 28 per cent and 87 per cent of the population of an individual GCC country.

Censuses carried out in individual GCC country provided the first nationally supplied population figures to be used nationally and internationally, regardless of their varying degrees of reliability. Reliability suffered most when population breakdown was considered, especially in GCC countries with the highest expatriate populations.

NSOs are typically responsible for providing accurate population figures. UNPD usually uses the latest census figure available for a country (in some cases, there can be significant delay in updating

population estimates after the results of a national census are available) and then adds an annual growth rate as per world norms. In countries with sparse data, small populations and high immigration rates, the divergence of these estimates may have significant impact. Year after year and until the next census, the gap between the actual population figure and the estimate becomes wider. These figures are often copied by other organizations and used for calculating various indicators, leading to a wider dissemination of this assessment of the performance of a country in comparison to the rest of the world, where population growth is more predictable.

The following table shows the most accurate population figures in ESCWA countries, collected from national sources and alternative estimates in each country.

TABLE 24. 2009 POPULATION OF ESCWA MEMBER COUNTRIES (ALTERNATIVE SOURCES)

Country	2009 population*	National source	URL	Comment
Bahrain	1 200 000	Central Informatics Organisation (CIO)	www.cio.gov.bh	1 234 596 as of 27 April 2010
Kuwait	3 484 881	The Public Authority for Civil Information (PACI)	www.paci.gov.kw	
Oman	2 640 535	Oman Census Administration	www.omancensus.net	2 694 094 as of mid December 2010
Qatar	1 631 728	Qatar Statistics Authority (QSA)	www.qsa.gov.qa	
Saudi Arabia	26 775 151	Central Department of Statistics and Information (CDSI)	www.cdsi.gov.sa	27 136 979 as of 27 April 2010
United Arab Emirates	8 199 996	National Bureau of Statistics (NBS)	www.uaestatistics.gov.ae	
Total GCC	44 395 336			
Egypt	77 775 247	Central Agency for Public Mobilization and Statistics (CAPMAS)	www.capmas.gov.eg	
Iraq	32 427 000	Central Organization for Statistics and Information Technology (COSIT)	cosit.gov.iq	32 104 988 as of mid 2009
Jordan	5 980 000	Department of Statistics (DOS)	www.dos.gov.jo	
Lebanon	4 112 780	Central Administration of Statistics (CAS)	www.cas.gov.lb	
Palestine	3 991 826	Palestinian Central Bureau of Statistics (PCBS)	www.pcbs.gov.ps	3 935 249 as of mid 2009 and 4 048 403 as of mid 2010
Syrian Arab Republic	20 367 000	Central Bureau of Statistics (CBS)	www.cbssyr.org	
Total Levant	144 653 853			
The Sudan	40 410 000	Central Bureau of Statistics (CBS)	www.cbs.gov.sd	Based on the 2008 figures (39 154 000)
Yemen	22 823 000	Central Statistical Organisation (CSO)	www.cso-yemen.org	22 492 000 as of mid 2009
Total the Sudan and Yemen	63 233 000			
Total ESCWA	252 282 189			

* Population figures used in this table are for year-end or adjusted to year-end by Madar Research.

Table 25 below details the population figures used by ITU in each ESCWA country. As shown, these figures can vary greatly from the figures supplied by NSOs. They can be lower by as much as 44 per cent than the national figures, as is the case with the United Arab Emirates, or higher by almost 8 per cent as in the case of Oman. Beside the United Arab Emirates, three countries were affected by a two-digit per cent variance; Bahrain (34.17 per cent), Kuwait (14.20 per cent) and Qatar (13.59 per cent). When taken collectively, the population of the six GCC countries shows a variance of 12.68 per cent, with the Levant countries showing a 4 per cent variance.

TABLE 25. 2009 POPULATION OF ESCWA MEMBER COUNTRIES (UNPD VERSUS NATIONAL FIGURES)

Country	National sources	As per ITU*	Difference	Difference (percentage)
Bahrain	1 200 000	790 000	410 000	34.17
Kuwait	3 484 881	2 990 000	494 881	14.20
Oman	2 640 535	2 850 000	-209 465	-7.93
Qatar	1 631 728	1 410 000	221 728	13.59
Saudi Arabia	26 775 151	25 720 000	1 055 151	3.94
United Arab Emirates	8 199 996	4 600 000	3 599 996	43.90
GCC, total	43 932 291	38 360 000	5 572 291	12.68
Egypt	77 775 247	83 000 000	-5 224 753	-6.72
Iraq	32 427 000	30 750 000	1 677 000	5.17
Jordan	5 980 000	6 320 000	-340 000	-5.69
Lebanon	4 112 780	4 220 000	-107 220	-2.61
Palestine	3 991 826	4 280 000	-288 174	-7.22
Syrian Arab Republic	20 367 000	21 910 000	-1 543 000	-7.58
Levant, total	144 653 853	150 480 000	-5 826 147	-4.03
The Sudan	40 410 000	42 270 000	-1 860 000	-4.60
Yemen	22 823 000	23 580 000	-757 000	-3.32
The Sudan and Yemen, total	63 233 000	65 850 000	-2 617 000	-4.14
Total	251 819 144	254 690 000	-2 870 856	-1.14

* Cited by ITU, sourced from UNPD.

Besides the negative impact that inaccurate indicators have on strategic planning in the private sector and on the efforts of decision makers in ESCWA member countries who rely on this information, they affect the values of key performance indicators and, consequently, their global rankings.

The use of generally lower population figures than those provided by national estimates in the GCC and higher figures in the Levant has led to significant differences of these two regions in the world map of the information society. These figures resulted in higher global rankings for GCC countries and lower rankings for Levant countries, creating the appearance of a wider information gap than other data sources would suggest for the two ESCWA regions.

C. IMPACT OF ALTERNATIVE STATISTICAL FIGURES ON SELECTED INDICATORS

1. *Impact on mobile phone penetration and ranking*

According to the ITU[34] website (ICT Statistics Section), the United Arab Emirates ranked first worldwide in terms of mobile penetration, with 232 subscriptions per 100 inhabitants by end of 2009. The ITU used 4.6 million as the population figure, while the nationally supplied figure is 8.2 million. When using

[34] http://www.itu.int/ITU-D/icteye/Reporting/ShowReport.aspx?ReportFormat=Excel&ReportName=/WTI/CellularSubscribersPublic&RP_intYear=2009&RP_intLanguageID=1&RP_bitLiveData=False.

the nationally supplied figure, the United Arab Emirates moves to thirty-third position worldwide, with a revised penetration rate of 130 per cent, yielding the top position to Estonia, which has a 203 per cent penetration rate.

Jordan is the best performing country in mobile penetration in the Levant by both ITU calculations and alternative estimation methods. However, the gap in ranking between Jordan and the least performing country in the GCC, Kuwait, is a difference of nine positions, with Kuwait ranking seventy-eighth and Jordan eighty-seventh. According to alternative calculations by ITU using the nationally supplied figures, Jordan is actually the only Levant country which has broken the barrier between the Levant and GCC, outperforming Kuwait and ranking seventy-fifth worldwide, ahead of the 110th place landed by Kuwait. In terms of penetration rates, Jordan registered 100 per cent (compared to 95 per cent as calculated bu ITU) and Kuwait 83 per cent (compared to 100 per cent).

TABLE 26. MOBILE PHONE PENETRATION AND GLOBAL RANKING OF ESCWA MEMBER COUNTRIES, UNPD POPULATION ESTIMATES VERSUS NATIONAL POPULATION ESTIMATES

	2009 ITU figures* for both subscription and population		2009 ITU figures* for subscriptions divided by the population as per national sources			
Country	Penetration rate (*percentage*)	World rank	Penetration rate (*percentage*)	World rank	Variance (*penetration*)	Variance world rank
Saudi Arabia	174.43	7	167.56	5	6.87	2
Qatar	175.4	6	151.50	11	23.9	-5
Oman	139.54	25	150.37	14	-10.83	11
Bahrain	199.38	3	131.50	30	67.88	-27
United Arab Emirates	232.07	1	130.15	33	101.92	-32
Jordan	95.22	87	100.58	75	-5.36	12
Kuwait	99.59	78	83.42	110	16.17	-32
Egypt	66.69	131	71.17	124	-4.48	7
Iraq	64.14	136	60.82	139	3.32	-3
Syrian Arab Republic	44.27	158	47.61	156	-3.34	2
The Sudan	36.29	169	37.96	165	-1.67	4
Lebanon	36.13	170	37.10	168	-0.97	2
Palestine	28.62	182	30.66	178	-2.04	4
Yemen	16.29	193	16.83	193	-0.54	0

Source: Madar Research.

* Cited by ITU, sourced from UNPD.

The use of these population figures, even in countries whose population varied little between national sources and those of ITU, still made a difference of a few positions in world ranking, such as in the cases of the Syrian Arab Republic (ITU, 158; alternate 156), Lebanon (ITU, 170; alternate, 168), or even a difference of seven positions such as in Egypt (ITU, 131; alternate, 124). While the United Arab Emirates shows the largest shift in mobile phone penetration (as well as in all its population-based indicators) similar problems were found in other Arab countries, particularly in the GCC countries where variance rates in population figures were higher. Bahrain, for example, came third worldwide in mobile phone penetraion in the ITU ranking, while it ranks thirtieth according to recalculations based on alternative population figures.

Saudi Arabia, which trailed behind the United Arab Emirates, Bahrain and Qatar, as per ITU in mobile ranking, actually outranked all three countries, taking top Arab ranking and occupying fifth position worldwide, according to the revised population figures.

TABLE 27. TOP 11 COUNTRIES IN MOBILE PHONE PENETRATION AS PER INTERNATIONAL TELECOMMUNICATION UNION, 2009

Rank	Country	Mobile penetration (*percentage*)
1	United Arab Emirates	232.07
2	Estonia	202.99
3	Bahrain	199.38
4	Macao, China	192.83
5	Anguilla	178.16
6	Qatar	175.40
7	Saudi Arabia	174.43
8	Hong Kong, China	173.84
9	Panama	164.37
10	Russia	163.62
11	Saint Kitts and Nevis	160.50

Source: ITU database of Information and Communication Technology Indicators, 2009.

TABLE 28. TOP 11 COUNTRIES IN MOBILE PHONE PENETRATION AS PER MADAR RESEARCH, 2009

Rank	Country	Mobile penetration (*percentage*)
1	Estonia	202.99
2	Macao, China	192.83
3	Anguilla	178.16
4	Hong Kong, China	173.84
5	Saudi Arabia	167.56
6	Panama	164.37
7	Russia	163.62
8	Saint Kitts and Nevis	160.50
9	Dominica	159.08
10	Antigua and Barbuda	154.02
11	Qatar	151.50

Source: Madar Research.

2. *Impact on Internet user penetration and ranking*

Similarly and as per the statistics section of ITU website, ITU ranking in Internet user penetration placed the United Arab Emirates in thirteenth position worldwide followed by Bahrain in fourteenth place, while penetration based on nationally supplied population figures brings the United Arab Emirates down to sixty-second place (a shift of 49 positions) and makes Bahrain outrank it by one slot, as detailed in the table 29. This followed Internet penetration in the United Arab Emirates recalculated at 46 per cent instead of 82 per cent, with the rate in Bahrain standing at 54 per cent, down from 82 per cent.

As in other hypothetical simulations, the performance gap between the GCC and Levant blocs is significantly affected by underlying population growth modeling. The leading country in the Levant for Internet penetration, Jordan, trailed the worst GCC performer, Qatar, by three positions (Qatar, 111th; Jordan, 108th). Calculations based on nationally supplied population figures, however, show that Jordan obtains a higher rank than Qatar by 14 positions globally (Qatar, 116th; Jordan, 102nd). Recalculated values of Internet penetration raise the ranking of all Levant countries by a few to several points, while they lower the ranking of GCC countries by anything between two and 49 global positions, thus narrowing the gap and reflecting a significantly different assessment.

TABLE 29. INTERNET PENETRATION AND GLOBAL RANKING OF ESCWA MEMBER COUNTRIES CURRENT POPULATION VERSUS ALTERNATIVE POPULATION FIGURES

Country	2009 original figures for both users and population		2009 original figures for users divided by alternative population estimates		Variance (*penetration*)	Variance (*world rank*)
	Penetration rate (*percentage*)	World rank	Penetration rate (*percentage*)	World rank		
Bahrain	82.04	14	54.11	52	27.93	-38
Oman	43.46	68	46.84	61	-3.38	7
United Arab Emirates	82.15	13	46.07	62	36.08	-49
Saudi Arabia	38.10	80	36.60	82	1.50	-2
Kuwait	36.85	83	31.56	95	5.29	-12
Jordan	27.58	111	29.13	102	-1.55	9
Qatar	28.31	108	24.45	116	3.86	-8
Lebanon	23.68	121	24.31	118	-0.63	3
Egypt	20.04	126	21.39	124	-1.35	2
Syrian Arab Republic	17.96	128	19.32	126	-1.36	2
The Sudan	9.94	147	10.39	145	-0.45	2
Palestine	8.32	154	8.92	151	-0.60	3
Yemen	1.78	196	1.84	196	-0.06	0
Iraq	1.06	203	1.00	203	0.06	0

Source: Madar Research.

3. *Impact of population figures on ICT Development Index*

The latest edition of Measuring the Information Society Report features the ITU IDI. Although the report was released in 2010, IDI was based on 2008 figures. To measure the impact of divergent population figures on IDI, the Index was recalculated for three selected ESCWA member countries, namly the United Arab Emirates, Bahrain and Jordan.

TABLE 30. 2008 POPULATION FIGURES (ITU VERSUS NATIONAL SOURCES)

Country	Population 2008 (ITU)	Population 2008 (national sources)
United Arab Emirates	4 480 000	8 073 626
Bahrain	770 000	1 135 600
Jordan	6 140 000	5 850 000

Source: ESCWA calculations.

The results showed a drop in the global ranking of the United Arab Emirates and Bahrain. The United Arab Emirates moved from twenty-ninth to forty-third place and Bahrain from thirty-third to forty-fourth place. On the other hand, the global ranking of Jordan moved up one place from seventy-fourth to seventy-third.

The ideal values of the following two indicators were not changed (for instance from 60 to 30):

(a) Fixed telephone lines per 100 inhabitants;

(b) Fixed broadband Internet subscribers per 100 inhabitants.

TABLE 31. RECALCULATED 2008 ICT DEVELOPMENT INDEX
USING NATIONALLY SUPPLIED POPULATION FIGURES

Country	United Arab Emirates		Bahrain		Jordan	
ICT access	ITU	Adjusted	ITU	Adjusted	ITU	Adjusted
Fixed telephone lines per 100 inhabitants	33.60	18.64	28.40	19.26	8.50	8.92
Mobile cellular telephone subscriptions per 100 inhabitants	208.60	115.75	185.80	125.98	86.60	90.89
International Internet bandwidth per Internet user	13 333	13 333	11 020	11 020	2 893	2 893
Proportion of households with a computer	74.00	74.00	87.00	87.00	39.30	39.30
Proportion of households with Internet access at home	66.40	66.40	48.00	48.00	13.20	13.20
ICT use						
Internet users per 100 inhabitants	65.20	36.18	51.90	35.19	26.00	27.29
Fixed broadband Internet subscribers per 100 inhabitants	12.40	6.88	14.20	9.63	2.20	2.31
Mobile broadband subscriptions per 100 inhabitants	40.30	22.36	25.20	17.09	0.00	0.00
ICT skills						
Adult literacy rate	90.00	90.00	88.80	88.80	91.90	91.90
Secondary gross enrolment ratio	97.70	97.70	96.30	96.30	86.20	86.20
Tertiary gross enrolment ratio	22.90	22.90	28.50	28.50	39.50	39.50
World rank	29	43	33	44	74	73

Source: ESCWA calculations.

4. *Impact of population figures on United Nations E-Government Survey 2010*

Generally speaking it appears that the measurement models discussed in this publication, such as the Telecom Infrastructure Index (used in the United Nations e-Government Survey 2010) tend to use models which estimated slower-paced growth rates. Particularly within the context of rapid increases in imported labour, total populations appear to have increased much more quickly than previous trends predicted. In this case, interim population estimates will result in temporary variances in population levels. Under normal circumstances, these situations will be resolved during census periods and when updated data are provided. Alterations to index scores and rankings would then be retroactively applied. To test how the use of updated figures might impact the index score of a country, the Telecommunication Infrastructure Index for two GCC countries with high population growth rates was recalculated.

TABLE 32. TELECOMMUNICATION INFRASTRUCTURE INDEX (RECALCULATED VALUES)

Country	Index value for Internet users	Index value for main fixed telephone lines	Index value for mobile subscribers	Index value for personal computers	Index value for total fixed broadband	Recalculated index value
United Arab Emirates	0.529	0.210	0.729	0.357	0.182	0.401
Bahrain	0.436	0.179	0.666	0.373	0.240	0.379

Source: Madar Research.

A major shift in the ranking order was observed based on the recalculated index scores. Bahrain shifted from the nineteenth rank in 2008 to forty-seventh. Thus, the ranking of the country as calculated by the original figures was 28 points higher than the one calculated using revised data from NSOs. The global ranking of the United Arab Emirates also dropped by 19 points, from twenty-fifth position to forty-fourth, but was higher than Bahrain.

TABLE 33. CHANGE IN GLOBAL RANKING FOR TELECOMMUNICATION INFRASTRUCTURE INDEX

Country	Rank		Variance
	Original	Recalculated	
United Arab Emirates	25	44	-19
Bahrain	19	47	-28

Source: Madar Research.

These changes highlight how different population figures can affect the ranking of a country in global surveys, an issue which has also affected other countries in the ESCWA region. The gravity of this problem can be better understood when considering the large number of key performance indicators (KPIs), whether in the field of ICT, socio-economics or other areas which are similarly affected. It is imperative for international organizations which monitor KPIs to ensure that accurate data is used to avoid publishing erroneous results which may have significant national and international consqeuences.

Box 2. The United Arab Emirates Telecommunications Sector Developments and Indicators, 2007-2009

Even within countries, there can be competing statistical views. A case in point is a report entitled UAE Telecommunications Sector Developments and Indicators, 2007-2009, released in May 2010 by the United Arab Emirates Telecommunications Regulatory Authority (TRA).

The population figures used by TRA were lower than the population figures released by the National Bureau of Statistics; they subsequently led to higher penetration rates, such as the number of mobile subscriptions per 100 inhabitants, among others. Obviously, an understated population figure makes the performance of a country for a given indicator look better than it really is.

TABLE 34. UNITED ARAB EMIRATES MOBILE PENETRATION: TELECOMMUNICATIONS REGULATORY AUTHORITY POPULATION FIGURES VERSUS NATIONAL BUREAU OF STATISTICS FIGURES

Source	2009 Population	Mobile subscriptions	Mobile penetration (*percentage*)
TRA	5 066 000	10 671 878	210.66
National Bureau of Statistics	8 199 996	10 671 878	130.14

Source: United Arab Emirates Telecommunications Regulatory Authority (TRA) and National Bureau of Statistics.

5. *Impact of expatriate population on ICT indicators in Gulf Cooperation Council countries*

The ratio of nationals to expatriates ranges from 72:28 in Oman to as low as 13:87 in the United Arab Emirates, as shown in table 35. While in most countries around the world, part or most of those expatriate populations who stayed for several years would turn into permanent residents and eventually be naturalized, GCC countries have very restricted naturalization laws allowing for only a trickle of expatriate residents to gain local nationalities and be absorbed into the rest of the population.

TABLE 35. POPULATION BREAKDOWN IN GCC COUNTRIES, 2009

Country	Population of nationals (*percentage*)	Population of expatriates (*percentage*)
United Arab Emirates	13	87
Qatar	14	86
Kuwait	32	68
Bahrain	46	54
Saudi Arabia	69	31
Oman	73	28

Source: Gulf Cooperation Council (GCC) Government websites.

The presence of such large ratios of expatriates to nationals affects national performance indicators in so many ways and in such a dynamic manner from year to year. What adds complexity and confusion to performance indicators is the presence among expatriates of a large transient population of unskilled or poorly skilled labourers. In 2010, these labourers, which tend to immigrate from Southern and South-East Asia, constituted an estimated 30 to 50 per cent of the total population in the United Arab Emirates and Qatar and lower percentages in each of Kuwait and Bahrain, followed by Oman and Saudi Arabia.

6. *ICT penetration: household versus user*

A transient labour population will also impact other indicators. Internet penetration among households and Internet penetration among the population are two indicators that usually differ marginally in value. In the European Union, for instance, household Internet penetration was 60 per cent and Internet user penetration per 100 inhabitants was 56 per cent in 2008, registering a marginal difference of four percentage points between the two indicators. In Qatar, on the other hand, household Internet penetration stood at 63 per cent while Internet user penetration was estimated at 38 per cent, a difference of 25 percentage points. The reason for such a large difference is that Internet user penetration loses value under the weight of one third of the population living outside traditional households most of whom are non-Internet users. Meanwhile, since these people are not defined as being part of households, they are excluded from household surveys and accordingly household Internet penetration becomes much higher and more representative of the mainstream population of Qatar. The United Arab Emirates shows similar discrepancy, but to a lesser degree.

TABLE 36. INTERNET PENETRATION (HOUSEHOLDS VERSUS USERS) IN SELECTED COUNTRIES/REGIONS

Country/region	Household Internet penetration (*percentage*)	Internet users per 100 inhabitants (*percentage*)	Difference (*percentage*)
European Union (27 countries)	60	56	4
European Union (25 countries)	61	58	3
European Union (15 countries)	64	60	4
Norway	91	86	5
Iceland	87	88	-1
United Kingdom	70	70	0
Qatar (2008)	63	38	25
United Arab Emirates (2008)	66	46	20
Jordan (2008)	13	22	-9

Sources: Eurostat (2008), ictQATAR, TRA-United Arab Emirates for Households and Madar Research for Users and TRA-Jordan.

In non-GCC ESCWA member countries the situation is reversed. For instance, Internet user penetration in Jordan is much higher than household Internet penetration, since large numbers of people use PIACs, schools, universities and business offices to access the Internet even if they do not have Internet access at home.

This data can be explained as illustrating the digital divide between GCC (oil-rich) and non-GCC ESCWA member countries which are more reliant on PIACs to enable rural and low-income citizens to gain access to the Internet.

7. *Impact of household size on ICT Development Index*

According to IDI, the ideal value for fixed telephone lines per 100 inhabitants and fixed broadband subscribers per 100 inhabitants is 60 each.

Since the average household size in ESCWA member countries is larger (more than double) when compared to developed countries, an alternative ideal value of 30 (saturation level) should be considered.

This will lead to significant improvement in the IDI value of all ESCWA member countries, as shown in the following table.

TABLE 37. RECALCULATED 2008 ICT DEVELOPMENT INDEX USING NEW IDEAL VALUES FOR FIXED TELEPHONE LINES PER 100 INHABITANTS AND FIXED BROADBAND INTERNET SUBSCRIBERS PER 100 INHABITANTS

Country	United Arab Emirates		Bahrain		Jordan	
	ITU	Adjusted	ITU	Adjusted	ITU	Adjusted
World Rank	29	13	33	22	74	67

Source: ESCWA calculations.

Notes: The numbers above utilize unadjusted population figures. These recalculations only consider the changed ideal value from 60 to 30.

8. *Impact of definitions and methodologies on Gross Tertiary Enrolment Indicators*

This single indicator is used by various indexes, most notably NRI and IDI.

UNESCO has developed several education-specific indicators, including the gross enrolment ratio (GER), which is defined by UNESCO Institute for Statistics as:

> "Total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school year. For the tertiary level, the population used is that of the five-year age group following on from the secondary school leaving".[35]

Calculating this indicator requires referring to the International Standard Classification of Education (ISCED 1997), which is developed by UNESCO and divides post secondary education into two levels, following three school levels; level 4, post-secondary non-tertiary education; and level 5, first stage of tertiary education (not leading directly to an advanced research qualification).

Upon close review, several ESCWA member countries use figures which correspond to post secondary students (levels 4 and 5) to calculate this index, when in fact they should not use level 4. Moreover, some countries do not use the standard methodology to calculate the number of individuals with ages falling within the official range for tertiary education as set by UNESCO, which should be the five-year age group following on from the secondary school leaving. The Syrian Central Bureau of Statistics, for example, uses an age group totalling six years instead of the standard five, and states in the Higher Education Report (1994-2005) that the gross tertiary enrolment ratio refers to the percentage of university students from the total population in the age group 18-23.[36]

Statistical reverse-engineering suggests that the calculations carried out by the Syrian Central Bureau of Statistics and forwarded to UNESCO are comprised of a six-year age group (18, 19, 20, 21, 22 and 23). If this is the case, application of the UNESCO standards, which describes utilizing a five-year age group following departure from secondary school, would result in a devaluation of the indicator performance and international ranking of the Syrian Arab Republic.

The following table shows the gross tertiary enrolment rate for selected ESCWA member countries:

[35] UNESCO, op. cit.

[36] Central Bureau of Statistics (CBS), Syrian Arab Republic. 2007, p. 32.

TABLE 38. PERCENTAGE OF THE POPULATION OF TERTIARY AGE THAT ARE IN TERTIARY EDUCATION IN SELECTED ESCWA MEMBER COUNTRIES, 2008

Country	Percentage of population (*percentage*)
Lebanon	52
Jordan	41
Saudi Arabia	32
Egypt	28
Oman	27
United Arab Emirates	25
Qatar	11

Source: UNESCO Institute for Statistics website.

The above table shows that the United Arab Emirates and Qatar fall behind other ESCWA member countries in gross tertiary enrolment. As in other cases, national level indicators such as this inevitably inherit the impact of the population bulge caused by large numbers of foreign workers. If these individuals were handled differently, including potentially excluding them from the denominator, the indicator would be significantly impacted. Such an approach would be a significant departure from current methodologies and is subject to the complex issues discussed elsewhere in this chapter. Whether or not this is ultimately an appropriate adjustment to normalize the population in light of the nature of the labour force has not been addressed.

In order to illustrate the effects of these demographic issues, the differences between the rankings of the United Arab Emirates and Qatar are a useful case in point. Featuring about the same percentage of transient manual workers falling in the tertiary age group, Qatar and the United Arab Emirates would have comparable values for the indicator if these individuals were not included in the denominator. For instance, when the gross tertiary enrolment ratio for Qatar is recalculated, using the same reference year, the result was 22 per cent.

Box 3. Gross tertiary enrolment ratio for Qatar (hypothetical recalculation example)

The total tertiary enrolment regardless of age was 11,352 for the academic year 2007-2008 (this figure was gathered directly from the Supreme Education Council by Madar Research).

According to the Qatar Statistics Authority (QSA), the population of the age group (15 to 19) = 50,523 and the population of the age group (20 to 24) = 139,285 (as of October 2007).

Calculation:

The population of the age group that corresponds to the tertiary education level (18, 19, 20, 21, and 22) = (50,523*(2/5)) + (139,285*(3/5)) = 103,780.

There is no exact figure about how many transient manual workers are in the 18 to 22 age group, but since such workers constitute over 50 per cent of total population,[*] we can estimate that the population that should be included in the calculation is: 103,780/2 = 51,890 and consequently, the gross tertiary enrolment ratio for Qatar = (11,352/51,890) * 100 = 22.

NB: Please note that the gross tertiary enrolment ratio for Qatar should be much higher, since a significant proportion of the expatriate population within the tertiary education age group working in Qatar are classified as transient manual workers.

[*] Qatar Statistics Authority.

The following table shows the impact of the ideal value of the tertiary gross enrolment ratio indicator on IDI.

TABLE 39. RECALCULATED 2008 ICT DEVELOPMENT INDEX USING NEW IDEAL VALUE FOR TERTIARY GROSS ENROLMENT RATIO

	United Arab Emirates		Bahrain	
Country	ITU	Adjusted	ITU	Adjusted
World rank	29	22	33	31

Please note that in this particular example, the population figures and the ideal values of previously mentioned indicators (fixed telephone lines per 100 inhabitants and fixed broadband Internet subscribers per 100 inhabitants) were not altered. Only the ideal value of the tertiary gross enrolment ratio indicator from 100 to 75 for the United Arab Emirates and from 100 to 80 for Bahrain was changed. This was done to simulate the effect of excluding transient manual workers from the tertiary age group in the calculation. Whether or not this would be an appropriate normalization under these circumstances is less clear.

The new ideal values provided for this indicator need further investigation.

D. CONCLUSION

While issues with measurement standardization and comparability exist, clear solutions are present. Because of the comparatively low cost and ease of implementation, harmonizing the definitions of indicators and policies surrounding time series comparisons should be addressed in the short term. In the longer term, the creation of models which can integrate sensitivity to local contextual issues such as significant population growth in short periods of time should be contemplated. Overarching these issues is the most difficult question of how useful these models are in enabling data-driven policymaking. Later chapters will explore potential solutions to this issue including recommendations for cost-effective measurement models which drive development.

III. TOWARDS A COMMON BENCHMARKING MODEL FOR THE ESCWA REGION

A. COMPARATIVE ANALYSIS WITHIN THE ESCWA REGION AND WITH DEVELOPED COUNTRIES

A combination of economic and economically driven changes in demography has, over the past four decades, set the six GCC countries[37] apart from the rest of the ESCWA member countries in many socio-economic areas. These changes, which were triggered by the discovery of oil and the consequent economic boom and extensive development, have led to stark differences between GCC and non-GCC ESCWA countries in many key indicators that measure the performance and development of the information society and the knowledge-based economy as a whole.

Unfortunately, the extent and implications of these changes in terms of creating a unique and demographic structure unprecedented in any other region in the world were not acknowledged or recognized by international organizations in charge of setting standards and definitions relating to population figures and developing indicators. Also, they were at times completely ignored by the concerned GCC Governments for political or other reasons, regardless of whether they reflected positively or negatively on the value of national performance indicators.

The accuracy of demographic indicators and consequently, that of performance indicators built on them, rests on whether the population figure is recent or accurately updated. Most of all it depends on whether the substantial-to-large populations of transient unskilled (or poorly skilled) labour present in the GCC countries are accounted for. This has not always been the case.

With respect to economic and demographic differences between ESCWA member countries and for the purpose of this study, the region can be generally divided into two subregions: the GCC as a labour-receiving subregion and non-GCC as a labour-sending subregion. Analysis based on this classification highlights meaningful differences and sometimes similarities between the two subregions, as well as between these regions and developed countries.

Table 40 provides a comparison of GCC countries, non-GCC ESCWA member countries and developed countries in selected demographic, socio-economic and ICT-related areas.

TABLE 40. COMPARISON OF ESCWA VERSUS DEVELOPED COUNTRIES IN SELECTED AREAS

	GCC	Non-GCC	Developed countries
GDP per capita	High	Low to moderate	High
Family size	Large	Large	Small
Expatriates	Large	Small[a/]	Small[b/]
Digital divide	Moderate to low	Moderate to high	Low
Adult illiteracy rate	Low to moderate	Low to high	Low to zero

a/ Syrian Arab Republic and Jordan have large temporary communities of Iraqis.

b/ Expatriates in developed countries may become citizens after a few years of residency × unlike the case in GCC countries.

1. *Demographic characteristics of the ESCWA region*

As a labour-receiving region, except for Saudi Arabia and Oman, each GCC country hosts large populations of expatriates which exceed its local population (table 41). Meanwhile, non-GCC ESCWA member countries (namely the countries in the Levant, in addition to Yemen and the Sudan) have long been a source for human resources, from poorly-skilled labour up to highly-qualified professionals, serving GCC

[37] Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

needs as well as other countries overseas. By contrast, non-GCC countries have traditionally hosted small numbers of expatriate workers, but not exceeding a few or several percentage points of their total population. However, the situations in two conflict-affected areas of the ESCWA region, namely Palestine and Iraq, have strongly impacted the population make-up in the neighbouring countries of Lebanon, Jordan and the Syrian Arab Republic.

Latest figures put the estimated number of Iraqi refugees living in the Syrian Arab Republic at 1.5 million while an additional 750,000 live in Jordan; these refugees have fled Iraq prior to, during and after its invasion in 2003.[38] While some Iraqis have been either returning home or migrating to the West, the majority remain in host countries where, regardless of their individual status as refugees, business people, or those granted residency and work permits, they will remain part of the population of the host countries for a long time. Although both types[39] of the United Nations adopted population counts include all persons residing within the boundaries of a country, the Iraqi population is not accounted for, despite their active role in the GDP and countless indicators that depend on the population figure such as mobile and Internet user penetration rates.

TABLE 41. DEMOGRAPHIC CHARACTERISTICS: EXPATRIATE WORKERS IN GCC COUNTRIES

Country	Percentage of locals[a/]	Percentage of expatriates[a/]	Percentage of household expatriates[b/]	Percentage of workers in construction site facilities/group quarters[b/]
Unites Arab Emirates	13	87	57	30
Qatar	14	86	46	40
Kuwait	32	68	55	13
Bahrain	46	54	42	12
Saudi Arabia	69	31	23	8
Oman	72	28	23	5

a/ Based on nationally supplied figures.

b/ Rough estimate by Madar Research.

As for Lebanon, it hosts about half a million Palestinians,[40] most of them living in refugee camps. This Palestinian population is reflected in the population figure of the country, whereas the tens of thousands of poorly-skilled Syrian labourers present at any given time are not. Lebanon is not purely a workforce-sending country, since beside Syrian labourers it also has a substantial community of predominantly Asian domestic helpers.[41] The Syrian Arab Republic also has a large number of Palestinian refugees who fled their homeland decades ago, awaiting a just and lasting resolution of their plight.

Iraq has for long been left out of most global indicators due to a lack of reliable statistics and the present political and security turmoil. This situation has, over the past few years, kept Iraqis across the border reluctant to go back home, while it continues to fuel migration, especially from minority communities. So, the Iraqi population may change substantially over a period of a few months and can thus render any given indicator off the mark when published.

The large numbers of transient manual workers in the GCC countries have created a dilemma for survey planners and statisticians alike, this in addition to the issue of their inclusion or exclusion from total

[38] United Nations Children's Fund (UNICEF), 2008.

[39] See footnote 15.

[40] Office of the United Nations High Commissioner for Refugees (UNHCR). Available at: http://www.unhcr.org/print/4c232c906.html.

[41] Estimated at 300,000 in Human Rights Watch, 2010.

population figures. As a consequence, all indicators related to measuring ICT adoption and use in households or at the family level become skewed, showing a clear contradiction at times when compared with individual ICT use. This is caused by the fact that the transient manual workers reside in construction site facilities. The population of the group quarters, especially those housing hundreds or thousands of workers, sometimes in a bunker or dormitory-style, introduces a peculiar phenomenon to GCC countries, especially when considering their ratio to the total population. The problem is more pronounced in countries with the largest ratio of transient manual workers to total population, namely in the United Arab Emirates and Qatar. By definition, group quarters do not qualify as household units and their inclusion obviously distorts all indicators related to a household sample, such as indicators measuring PC or Internet penetration per household. On the other hand, it may be inaccurate to exclude those labourers, many of whom lack formal education, from the total population when considering Internet user penetration in the country. One proposed solution for such an indicator as the Internet user penetration is to provide two values for the same indicator × each serving a purpose within a different context.

2. *GDP per capita in the ESCWA region*

Having an accurate GDP per capita figure is crucial in examining the correlation between ICT uptake and GDP per capita values. Population figures used by the International Monetary Fund (IMF) to calculate the 2010 GDP per capita (current prices) figures for ESCWA member countries were close to those published by national sources, except for the United Arab Emirates which continues to publish conflicting official population figures.[42] An explanation for this discrepancy may be that for most cases, official population figure updates for the year 2010 were published after the closing date of the IMF for gathering population data.

Table 42 depicts the variance in GDP per capita (current prices) using population figures from IMF versus official population figures released by GCC countries for the same period. Other than the United Arab Emirates, the effect of the inaccurate population figures from IMF on GDP per capita caused a relatively small difference in global ranking; from one to four ranks. However, the inaccurate population figure used by IMF for the United Arab Emirates distorts the relative ranking within GCC itself. When the accurate population figure is used, Kuwait outranks the United Arab Emirates in GDP per capita by three positions instead of trailing it by 15 positions.

TABLE 42. MACROECONOMIC CHARACTERISTICS: GDP PER CAPITA (CURRENT PRICES) IN GCC COUNTRIES, 2010*

	In US$ (*population as per IMF*)	World rank (*population as per IMF*)	In US$ (*population as per national sources*)	World rank (*population as per national sources*)
Qatar	74 422	3	76 678	3
United Arab Emirates	47 406	8	29 226	25
Kuwait	32 530	23	33 519	22
Bahrain	19 641	34	18 111	37
Oman	18 040	38	20 143	34
Saudi Arabia	16 641	39	15 972	40

Source: International Monetary Fund (IMF) and Madar Research.

* The population figures used by IMF for GCC countries were close to those published by national sources except for the United Arab Emirates.

The gap between GCC and non-GCC ESCWA countries in GDP per capita is a substantial one. According to IMF, the richest non-GCC ESCWA country, Lebanon, is US$6,000 poorer in GDP per capita than the lowest-performing GCC country, Saudi Arabia.

[42] The most recent official population figure released by its National Bureau of Statistics (NBS) was used. Available at: www.uaestatistics.gov.ae.

TABLE 43. MACROECONOMIC CHARACTERISTICS: GDP PER CAPITA (CURRENT PRICES) IN NON-GCC ESCWA MEMBER COUNTRIES, 2010

Country	In US$	World rank
Lebanon	10 019	59
Jordan	4 435	93
Syrian Arab Republic	2 892	112
Egypt	2 771	116
Iraq	2 625	119
The Sudan	1 642	127
Yemen	1 230	136
Palestine	-	-

Source: IMF.

3. *Average family size in the ESCWA region*

Among the demographic similarities between GCC and non-GCC countries, especially when compared to developed countries, is average family size. Household size ranges between 4.23 persons in Egypt to 6.59 in Oman, with an average of six (though traditionally in the Arab world it may include one or more extended family members, such as a grandparent), compared to roughly 2 to 2.5 persons in most developed countries.

4. *Adult literacy rates in the ESCWA region*

Adult literacy[43] which is indispensible for ICT capacity-building is comparable in GCC and non-GCC countries, with no dividing line between the two groups. Literacy rates range between 63 per cent in Yemen, 87 per cent in Saudi Arabia and 94 per cent in Kuwait. These rates, nevertheless, are in stark contrast to developed countries, where the entire or nearly-entire population is literate.

TABLE 44. ADULT LITERACY RATES OF BOTH SEXES IN THE ESCWA REGION (PERCENTAGE AGED 15 AND ABOVE)

Country	2010* (*percentage*)
Bahrain	90.01
Egypt	66.42
Iraq	74.15
Jordan	91.17
Kuwait	94.58
Lebanon	89.68
Palestine	93.88
Oman	86.31
Qatar	93.18
Saudi Arabia	86.71
The Sudan	60.95
Syrian Arab Republic	84.71
United Arab Emirates	90.07
Yemen	63.21

Source: United Nations Development Programme, International Human Development Indicators Database, available at: http://hdrstats.undp.org/en/tables/default.html.

* Some are estimates.

[43] Adult literacy rate is one of 11 indicators making up the ITU ICT Development Index (IDI).

B. ADJUSTING GLOBAL INDICATORS AND ADDING NEW SUITABLE ONES FOR THE ESCWA REGION

Most international ICT indicators are suitable for measuring the information society in ESCWA member countries without modifications. However, some of these indicators need to be adjusted to better suit the socio-economic characteristics of the ESCWA region.

1. *Proposed changes to certain ICT Development Index indicators of the International Telecommunication Union*

The following table depicts proposed adjustments to some indicators used for the calculation of IDI indicators of ITU.

TABLE 45. PROPOSED CHANGES TO THE ULTIMATE VALUES USED BY ICT DEVELOPMENT INDEX INDICATORS OF INTERNATIONAL TELECOMMUNICATION UNION

Indicator	Ideal value as per ITU	Suggested ideal value
Fixed telephone lines per 100 inhabitants	60	15 to 40[a/]
Fixed broadband Internet subscribers per 100 inhabitants	60	15 to 40[a/]
Adult literacy rate	100	[b/]
Tertiary gross enrolment ratio	100	[b/]

a/ Depending on the average family size in each ESCWA member country (or an average for the region), which is much larger than it is in developed countries.

b/ It is recommended that transient manual workers in each GCC country, many of whom lack formal education, should be excluded, as their ever-changing numbers distort the values for the permanent population.

2. *Additional proposed indicators for measuring use of ICT in education*

The ICT use in education indicators mentioned in the Core ICT Indicators report are not enough[44] to measure the level of development of ICT in education systems. New indicators such as proportion of schools with a website, proportion of schools which use computers for education in libraries and many other ICT-related indicators should be added to provide more detailed understanding of the maturity of ICT in education systems of ESCWA member countries.

The following new proposed indicators are based on the experiences of other regions, especially Europe:[45]

TABLE 46. PROPOSED INDICATORS FOR MEASURING USE OF ICT IN EDUCATION

Indicator code	Description
ED9	Number of Internet-connected personal computers in schools per 100 students Measures the number of Internet-connected computers in school per 100 students (of the computers used for educational purposes)
ED10	Proportion of schools with a website Measures the number of schools with a website divided by the total number of schools in the country
ED11	Proportion of schools which use computers for education in computer labs Measures the number of schools which use computers for education in computer labs divided by the total number of schools in the country

[44] European Commission (2006).

[45] Ibid.

TABLE 46 (*continued*)

Indicator code	Description
ED12	Proportion of schools which use computers for education in classrooms Measures the number of schools which use computers for education in classrooms divided by the total number of schools in the country
ED13	Proportion of schools which use computers for education in libraries Measures the number of schools which use computers for education in libraries divided by the total number of schools in the country
ED14	Proportion of schools which use computers in other locations Measures the number of schools which use computers for education in one other location divided by the total number of schools in the country

Source: European Commission (2006).

3. *Use of ICT by Government*

Providers of global indicators do not cover the use of ICT by Governments, though they are measured in national surveys in some countries. Such indicators have more value in ESCWA countries for a number of reasons. For instance, the size of the civil servant body in many ESCWA countries is much bigger in terms of its ratio to total population than its counterparts in developed countries, especially in GCC countries, Egypt and the Syrian Arab Republic. Thus, Government use of ICT and its performance in ICT indicators has greater weight on the overall performance of the country than in the West. Also, unlike the case in developed countries where the private sector takes the initiative in pioneering and leading ICT adoption, the role is reversed in most ESCWA countries, where Governments have assumed the leading role in an environment where the business sector tends to follow, though the private sector in certain ESCWA countries is starting to take initiatives.

Accordingly, measuring ICT performance by ESCWA Governments would add value to understanding the overall national performance, where it is heading and at what pace. The following set of ICT indicators is proposed:

TABLE 47. PROPOSED INDICATORS FOR MEASURING USE OF ICT IN GOVERNMENT

Indicator code	Description
EG9	Percentage of citizens subscribed to online Government institution services
EG10	Annual traffic volumes on Government websites divided by number of Internet users (to measure the demand side)

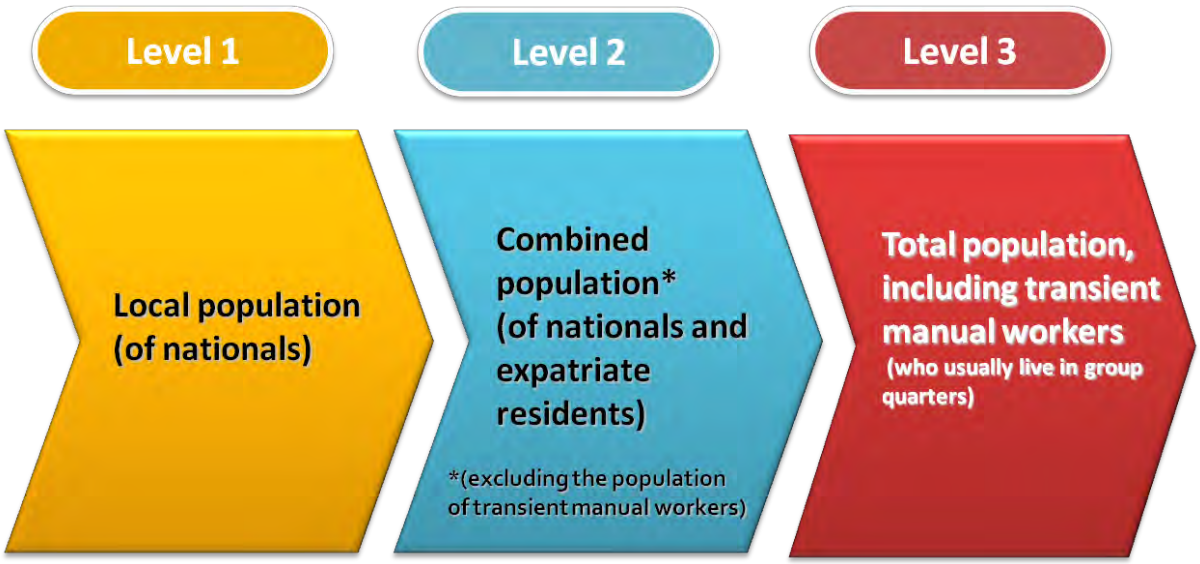
Although many dimensions of the information society are not yet covered in ESCWA member countries (e-applications, enabling environment, building security and trust and digital content), we recommend currently focusing on the core ICT indicators and expanding them gradually to include the use of ICT by Governments as mentioned above.

As noted in previous sections of this study, many indicators published in international, regional and national reports provide inaccurate values, especially about GCC countries, because of the use of inadequate population figures. We recommend that an independent Government body be given the sole responsibility of generating and regularly updating an official database of all statistics about the population and various demographics of a country, using best international practice and standards. Such a body, which is already starting to be established in most ESCWA member countries, would also be responsible for using the proper channels to regularly communicate census results, population estimates and relevant demographic data to the United Nations and other global organizations. The body should also monitor global research reports to ensure accurate data are used.

4. *Unique characteristic of the Gulf Cooperation Council*

With respect to the distortion or misrepresentation of GCC national performance indicators caused by large expatriate populations, especially the transient labour force, one possible solution could be the use of three levels of population figures, which would provide a more realistic account of the population demographics and a much higher level of accuracy for the relevant indicators. The first population level (Level 1) would include only nationals in each GCC country, while the second level (Level 2) would combine nationals and expatriates, but exclude the population of the transient labour force. The third level (Level 3) would include the entire population, including the transient manual labour force. While this approach may be highly unusual to adopt, it is a reasonable remedy to the unique and dynamic demographic make-up of the GCC countries. Each of the three population figures will be the most relevant and accurate in depicting the values for a different set of indicators. Ideally, Level 2 will be the most suitable in the context of most ICT indicators, but further investigation and validation should be conducted in this direction.

Figure V. The proposed three levels of population figures for GCC countries



C. RECOMMENDED DATA SOURCES

Data collection methods for each variable (element) of an indicator should be identified as to whether it is primary (data that is not available) or secondary (data that is published or readily available at the source).

The data source for each variable should then be named and verified. If the source is secondary, the name of the organization providing the data should be specified (for instance: Central Bureau of Statistics). If the source is primary, the name of the survey and organization should be specified (for instance: General Population Survey). Some variables, primary or secondary, may have more than one source (table 48), which can be used for verification purposes. For instance, a primary variable can have more than one source as it may be common to more than one survey.

The collection method for each secondary variable should also be identified (Internet search, phone call, or other), along with the source website or key contact number/e-mail address. A list of all secondary sources should be compiled, along with the set of data required from each.

An Indicators Master List should be developed to group all identified and selected indicators, broken down into constituent variables, along with their sources and collection methodology. This list will act as a reference for all data collection processes (table 48).

TABLE 48. PROPOSED INDICATORS FOR MEASURING USE OF ICT IN POPULATION

Ref	Key performance indicator	Measure	International reference	Main source
1.1.1	Mobile cellular telephone subscriptions per 100 inhabitants	Number of mobile subscriptions	ITU - A2	National TRA
		Population		Central Bureau of Statistics

1. *Primary data collection*

Field surveys are usually the ideal method for the collection of primary data and they are very important to measure Internet user penetration/behaviours. However, since they are considered costly, they should be conducted only if they are closely monitored and supervised (by a strong in-house team or a third-party consultant) to ensure high standards are observed and eliminate bias and other statistical flaws.

Unfortunately, the few surveys conducted in the ESCWA member countries to measure Internet user behaviours were biased and could not be extrapolated to represent their population as they did not use representative samples. Most surveys conducted in the region are intended to be used as marketing or promotional tools rather than for the purpose of fact-finding.

For primary data processing, stratified random sampling methods are recommended. Weighting methods may also be used when required to give a more realistic depiction of a given subject, such as when dealing with the business sector in ESCWA member countries; weighing by: (a) the number of companies in each size category and (b) the number of employees in each size category.

Certain mechanisms can be put in place to periodically deliver required data without the need for a field survey. Indicators for ICT in education such as "Learners-to-computer ratio in schools" can be reported annually by schools to the Ministry of Education, upon standing instructions from the Ministry.

Classification of companies by size should follow the international standard as per table 49 below:

TABLE 49. CLASSIFICATION OF ENTERPRISE SIZE (BY NUMBER OF EMPLOYEES)

Classification of enterprise size (by number of employees)			
Micro	Small	Medium	Large
1-9	10-49	50-249	250+

2. *Secondary data sources*

For secondary data collection, table 50 shows the recommended data sources to be used.

Finally, the communication channels between various United Nations organizations, international organizations and Governments in the ESCWA region should be enhanced to ensure that updated population and demographic figures are communicated in a proper and timely manner.

TABLE 50. RECOMMENDED SECONDARY DATA SOURCES IN ESCWA MEMBER COUNTRIES

Country	Official source for population and general information	URL	Official source for ICT data	URL
Bahrain	Central Informatics Organisation (CIO)	www.cio.gov.bh	Telecommunications Regulatory Authority (TRA)	www.tra.org.bh
Kuwait	The Public Authority for Civil Information (PACI)	www.paci.gov.kw	Ministry of Communications (MoC)	www.moc.kw
Oman	Oman Census Administration	www.omancensus.net	Telecommunications Regulatory Authority (TRA) Information Technology Authority (ITA)	www.tra.gov.om www.ita.gov.om
Qatar	Qatar Statistics Authority (QSA)	www.qsa.gov.qa	Supreme Council of Information and Communication Technology (ictQATAR)	www.ict.gov.qa
Saudi Arabia	Central Department of Statistics and Information (CDSI)	www.cdsi.gov.sa	Communication and Information Technology Commission (CITC)	www.citc.gov.sa
United Arab Emirates	National Bureau of Statistics (NBS)	www.uaestatistics.gov.ae	Telecommunications Regulatory Authority (TRA)	www.tra.gov.ae
Egypt	Central Agency for Public Mobilization and Statistics (CAPMAS)	www.capmas.gov.eg	National Telecommunication Regulatory Authority (NTRA) Ministry of Communications and Information Technology (MCIT)	www.tra.gov.eg www.mcit.gov.eg
Iraq	Central Organization for Statistics and Information Technology (COSIT)	cosit.gov.iq	Communications and Media Commission	www.cmc.iq
Jordan	Department of Statistics (DOS)	www.dos.gov.jo	Telecommunications Regulatory Commission (TRC)	www.trc.gov.jo
Lebanon	Central Administration of Statistics (CAS)	www.cas.gov.lb	Telecommunications Regulatory Authority (TRA)	www.tra.gov.lb
Palestine	Palestinian Central Bureau of Statistics (PCBS)	www.pcbs.gov.ps	Ministry of Telecommunications and Information Technology (MTIT)	www.mtit.gov.ps
Syrian Arab Republic	Central Bureau of Statistics (CBS)	www.cbssyr.org	Ministry of Communications and Technology (MoCT)	www.moct.gov.sy
The Sudan	Central Bureau of Statistics (CBS)	www.cbs.gov.sd	National Telecommunication Corporation (NTC)	www.ntc.gov.sd
Yemen	Central Statistical Organisation (CSO)	www.cso-yemen.org	Ministry of Telecommunications and Information Technology (MTIT) National Information Center (NIC)	www.mtit.gov.ye www.yemen-nic.info

3. *Statistical information systems*

Statistical information on ICT is useless if not published and disseminated to all stakeholders of the information society. In fact, the Geneva Plan of Action, adopted by WSIS in December 2003,[46] called upon all countries and regions to develop tools to provide statistical information on the information society, with basic indicators and analysis of its key dimensions.

Online database systems on ICT are effective tools for aggregating country level information; they can be used to store data collected by and for various stakeholders of the information society such as telecom indicators from operators and survey results conducted by ministries or agencies in charge of measuring the information society.

The establishment of ICT indicators databases on a national level in each ESCWA member country is not only useful, but also crucial at the current regional stage of development which requires careful planning and reliable information. The database should not be a mere repository of information and its annual update, but should be a dynamic database that produces ICT indicators as well. Such indicators can then be benchmarked against other countries to monitor progress year after year.

Box 4 highlights one of the most prominent ICT online database systems in the region, the ICT Indicators Portal Project in Egypt, while box 5 describes the ESCWA Statistical Information System (ESIS).

Box 4. The ICT Indicators Portal Project in Egypt

The World Summit on the Information Society (WSIS), Geneva 2003 and Tunis 2005, called upon all countries and regions to develop tools to provide statistical information on the information society. As a result, the United Nations, in cooperation with a number of international organizations formed the Partnership on Measuring ICT for development with a mandate to develop a common set of core information and communication technology (ICT) indicators which would constitute the basis for a global database on ICT statistics.

In 2006, against this backdrop and as a response to the WSIS call, the Ministry of Communication and Information Technology (MCIT) in Egypt launched a promising national project on ICT indicators with the aim of measuring the information society in Egypt. The project exhibited the success of the Public Private Partnership model; it was carried out in partnership with the Central Agency for Public Mobilization and Statistics, the National Telecommunication Regulatory Authority, the Information Technology Industry Development Agency and Microsoft Cooperation.

The "ICT Indicators Portal Project" provides necessary, accurate and meaningful data related to the ICT sector in Egypt. The scope of the project is very broad as it measures ICT usage in different segments of the society, namely households, businesses, Government, education, information technology clubs, Internet cafés and ICT for women. In addition, it pools together sets of hard and soft data with different frequencies; monthly, quarterly and annually.

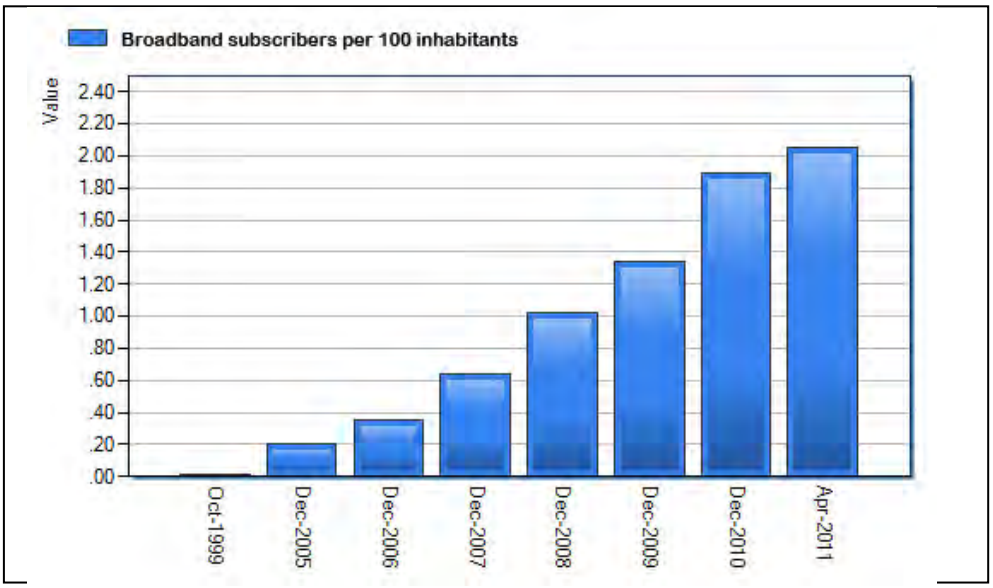
The Project aims:

- To build a database within MCIT for ICT indicators to help measure and analyse the information society in Egypt according to international standards;
- To build the capacity of the information society stakeholders in the area of ICT indicators in Egypt;
- To monitor ICT usage in Egypt within different sectors and across the various geographic regions of the country;
- To become a one-stop source on ICT indicators in Egypt, providing international organizations with the required data to feed their analytical ICT reports;
- To provide decision makers with early, accurate ICT indicators which help them set better policies and strategies related to the ICT sector.

[46] WSIS (2003), paragraph 28.

Box 4 (*continued*)

Figure VI. A sample chart produced by the ICT Indicator Portal Project in Egypt



As a main deliverable of the Project, the first portal in the region dedicated to ICT Indicators was launched in October 2008. The Egypt ICT Indicators Portal Project aims at measuring the development of the information society in Egypt by providing a collection of 168 up-to-date indicators measuring ICT usage in the following areas:

- ICT infrastructure and access;
- ICT usage by households and individuals;
- ICT usage by businesses;
- ICT usage in the Government sector;
- ICT usage in public access points;
- ICT usage in the education sector;
- ICT usage in the health sector (forthcoming).

Source: ICT Indicators Portal Project of Egypt, available at: http://www.new.egyptictindicators.gov.eg.

Box 5. ESCWA Statistical Information System

As part of its mission as a key knowledge repository for its member countries, ESCWA developed the ESCWA Statistical Information System (ESIS), a bilingual (Arabic/English), database-driven desktop application, which increases the accessibility of comparable statistics and indicators on the region and helps to make informed, evidence-based decisions about social, economic, environmental and cross-cutting development issues in the region.

ESIS facilitates statistical data exchange between ESCWA and its member countries and builds their capacities in compiling data and deriving indicators.

ESIS comprises three main components, namely the administration, data management and reporting. In addition, the system includes a fully documented help module and tutorials for all routines to make them understandable. ESIS users can be grouped as database owners, administrators, data managers and guests, each granted different access privileges.

- Administration

ESIS provides administrators with many privileges including adding, updating, deleting indicators and organizing them into modules/sectors, categories and sub-categories. Administrators also identify the countries/regions and time series in addition to all specifications of the indicators.

Box 5 (*continued*)

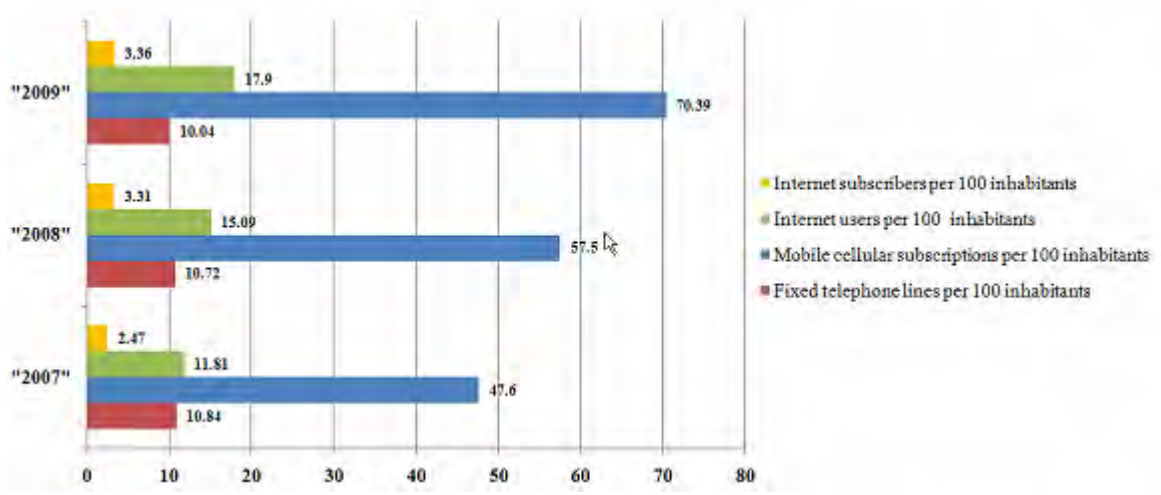
- Data Management

ESIS enables data managers to manually or automatically add, update, delete as well as restore statistical data, thus reinforcing data integration and harmonization.

- Reporting

ESIS produces standard and dynamic multidimensional reports, in tabular and/or graphic format, in Arabic and/or English and with or without metadata. The reports can be exported to Excel, PDF, HTML, RTF and other formats.

Figure VII. A sample chart produced by ESIS



- ESIS Web Component

A readable-only bilingual (Arabic/English) web portal component is accessible online at: http://esis.escwa.org.lb. It is a service that gives access to a comprehensive database to facilitate dissemination of indicators to member countries, decision and policymakers.

- ESIS Training Series

The ESIS training series is part of the ESCWA mission to build the capacities of its member countries in collecting, managing and disseminating indicators. The series is intended to train participants on using the features of the system through a hands-on approach facilitated by a dedicated test environment prepared specifically to meet the needs of the country. As of March 2011, a series of training workshops were held for participants from Jordan, Palestine, the Sudan, Yemen and the GCC countries. In addition, ESIS was adopted and installed at the Information Technology Authority (ITA) of Oman and the Telecom Regulatory Commission (TRC) in Jordan.

Source: ESCWA Statistical Information System, available at: http://esis.escwa.org.lb.

D. GUIDELINES FOR A SUITABLE COMMON BENCHMARKING MODEL

As most data on basic ICT indicators in ESCWA member countries are either lacking or not accurate, the most important task for measuring the information society in the region is to choose a simple benchmarking model which relies mostly on the core ICT indicators of the Partnership; such a model will be crucial in order to produce accurate sets of data about the information society needed by Government and business strategists. However, modification to existing global models is proposed and adoption of additional indicators is recommended to help produce better sector analysis.

In order for the ESCWA region to move towards a suitable common benchmarking model for measuring the information society, the following steps should be taken:

- Identify what to benchmark;
- Determine the appropriate model and what to measure;
- Identify countries and/or regions to benchmark;
- Collect the data;
- Analyse the data;
- Set an action plan for improvement and monitoring process.

1. *Identify what to benchmark*

The following sectors are recommended for benchmarking since they have strong impact on ICT development in ESCWA member countries and can be benchmarked against similar sectors regionally and globally:

(a) General population (individuals and households);
(b) Business;
(c) ICT sector;
(d) Education;
(e) Government.

Other sectors such as employment in the ICT sector can be covered at a later stage.

2. *Determine the appropriate model and what to measure*

The proposed benchmarking model consists of an adjustment to the two main components of IDI of ITU:

(a) *Modified version of the ICT Development Index*

The IDI of ITU remains a useful measurement model in spite of being very general and not covering many ICT dimensions or levels of development of the information society.

The IDI could be modified to better reflect the specificities of ESCWA member countries and to provide fair comparison with developed countries. The following table shows the structure of the Index, its components, the ideal values as per ITU and the new proposed ideal values.

Both indicators for fixed telephone lines per 100 inhabitants and fixed broadband subscribers per 100 inhabitants will reach the ideal, or saturation level in ESCWA member countries when values range between 15 and 40, depending on the average family size in each member country, which is often double or triple the average size in developed countries. The following table shows the average household size in selected developed countries versus selected ESCWA member countries.

TABLE 51. NEW PROPOSED IDEAL VALUES FOR SOME IDI INDICATORS

Indicator	Ideal value as per ITU	New proposed ideal value
ICT access		
Fixed telephone lines per 100 inhabitants	60	15 to 40[a/]
Mobile cellular telephone subscriptions per 100 inhabitants	170	No change
International Internet bandwidth per Internet user	100 000	No change
Proportion of households with a computer	100	No change
Proportion of households with Internet access at home	100	No change

TABLE 51 (*continued*)

Indicator	Ideal value as per ITU	New proposed ideal value
ICT use		
Internet users per 100 inhabitants	100	No change
Fixed broadband Internet subscribers per 100 inhabitants	60	15 to 40[a/]
Mobile broadband subscriptions per 100 inhabitants	100	No change
ICT skills		
Adult literacy rate	100	[b/]
Secondary gross enrolment ratio	100	
Tertiary gross enrolment ratio	100	[c/]

a/ Depending on the average family size in each ESCWA member country (table 53).

b/ Transient manual workers should be excluded from the total population.

c/ Transient manual workers falling in the tertiary age group should be excluded from the total tertiary age population.

TABLE 52. AVERAGE HOUSEHOLD SIZE IN SELECTED DEVELOPED COUNTRIES VERSUS ESCWA MEMBER COUNTRIES (2010 OR MOST RECENT YEAR AVAILABLE)

Country	Average household size[a/]
Germany	2.05
Japan	2.54
France	2.61
Bahrain	8.00[b/]
Egypt	4.23
Iraq	6.02
Jordan	6.00
Kuwait	8.75[b/]
Lebanon	4.56
Oman	6.73
Palestine	5.92
Qatar	9.19[b/]
Saudi Arabia	5.82
Syrian Arab Republic	5.26
The Sudan	5.33
United Arab Emirates	10.25[b/]
Yemen	7.67

Source: Madar Research.

a/ The value is calculated by dividing the total population by the total number of households.

b/ These four countries have large numbers of transient manual workers living in construction site facilities or group quarters. Such living arrangements cannot be statistically classified as households and should therefore be excluded from the total population figures in order to ensure that data on average household size reflects more accurately the permanent populations in these countries.

The following is a simple proposed method for calculating the ideal values for indicators of fixed telephone lines per 100 inhabitants and fixed broadband subscribers per 100 inhabitants for ESCWA member countries.

The above method is just an example and should be further developed, taking into consideration that the norm for fixed telephone lines in a country that are residential is 60 to 70 per cent and the rest are business.

Furthermore, the ideal value of the adult literacy rate and tertiary gross enrolment ratio indicators should be modified for GCC countries, or transient manual workers simply be excluded from both indicators.

TABLE 53. NEW PROPOSED IDEAL VALUES FOR INDICATORS ON FIXED TELEPHONE AND FIXED BROADBAND INTERNET SUBSCRIBERS

Country	Households/population factor	Ideal value*
Bahrain	0.125	20
Egypt	0.237	37
France	0.383	60
Iraq	0.166	26
Jordan	0.167	26
Kuwait	0.114	18
Lebanon	0.220	34
Oman	0.149	23
Palestine	0.169	26
Qatar	0.109	17
Saudi Arabia	0.172	27
Syrian Arab Republic	0.190	30
The Sudan	0.188	29
United Arab Emirates	0.098	15
Yemen	0.130	20

* The Ideal value is calculated by multiplying the (Households/Population Factor for each country) by (60/Households/Population Factor for France).

Note: France is used as a reference example of a developed country and may be replaced by the average in developed countries.

ITU has assigned a value of 100 for these two indicators, but this value cannot realistically be reached in GCC countries in the presence of large numbers of transient manual workers, many of whom lack formal education. Among the implications of ignoring this fact, for instance, is that the UNESCO Institute for Statistics shows that the United Arab Emirates and Qatar fall behind other ESCWA member countries in gross tertiary enrolment, with 25 and 11 per cent respectively.

This picture is totally unrepresentative, since expatriates constitute some 87 per cent of the total population and the total number of people falling into the tertiary age group includes a large percentage of transient manual workers, who should be excluded from the total tertiary age population indicator.

(b) *Modified version of the ICT price basket*

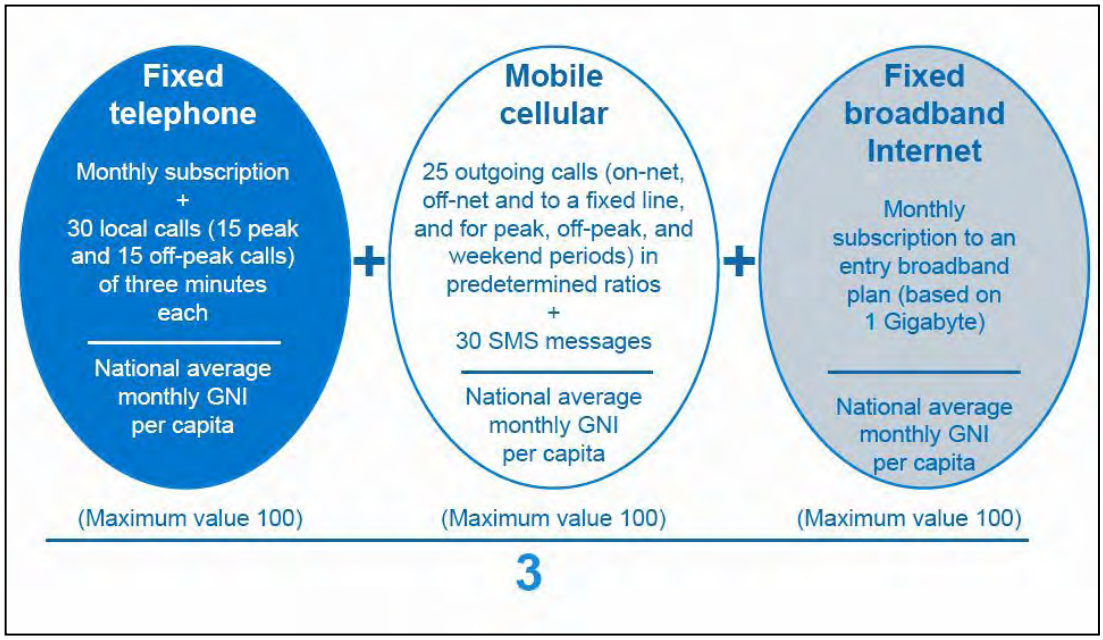
The ICT price basket is a composite basket that includes the following three tariff sets: fixed telephone, mobile cellular and fixed broadband Internet services. According to ITU: "The ICT Price Basket allows policymakers to compare the cost of ICT services across countries, and provides a starting point for looking into ways of lowering prices – for example, by introducing or strengthening competition, by reviewing specific tariff policies and by evaluating operators' revenues and efficiency."[47]

While the ITU ICT price basket is useful in identifying ICT prices as a percentage of the average monthly income of the citizens of a country, it does not give a perspective on what the price means for the less economically fortunate members of the society, the minimum-wage earners, who usually constitute a good portion of any community. As the Internet is currently becoming a necessity for all members of a society, the lowest economic slice should be taken as a reference for the index.

What follows is a proposal for the creation of an index which complements the "ICT price basket as a percentage of monthly GNI per capita" as proposed by ITU by providing additional useful information for policymakers. This proposal entails an "entry-level" form of the index as "ICT price basket as a percentage of the monthly minimum wage."

[47] ITU (2010a), p. xi.

Figure VIII. ICT Price Basket Methodology



Source: ITU (2010a).

The following table provides full details about the calculation of this index:

TABLE 54. ICT PRICE BASKET METHODOLOGY (MINIMUM WAGE-BASED)

Fixed telephone Monthly subscription + 30 local calls (15 peak and 15 off-peak calls) of three minutes each divided by Monthly minimum wage
+
Mobile cellular 25 outgoing calls (on-net, off-net and to a fixed line and for peak, off-peak and weekend periods) in predetermined ratios + 30 SMS messages Divided by Monthly minimum wage
+
Fixed broadband Internet Monthly subscription to an entry broadband plan (based on 1 Gigabyte) Divided by Monthly minimum wage
÷ 3 × 100
=
ICT price basket (minimum wage-based)

The proposed price index for ESCWA member countries is finally a simple average of the ICT price basket (GNI-based) of ITU and the ICT price basket (minimum wage-based):

ICT price basket (ESCWA) = (ICT price basket (GNI-based) + ICT price basket (Minimum wage-based)) ÷ 2

The minimum wage-based index would add value to the GNI-based index, especially in underdeveloped and developing countries where ICT prices are often the biggest hindrance to universal adoption of basic telecommunication services.

3. *Identify countries, subregions and regions to benchmark*

The following countries, subregions and regions need to be identified and benchmarked against:

- GCC region versus non-GCC ESCWA region;
- GCC region/countries versus developed countries;
- Non-GCC ESCWA region/countries versus developed countries;
- GCC region/countries versus Latin America;
- Non-GCC ESCWA region/countries versus Latin America.

4. *Collect the data*

Secondary data such as macroeconomic data, Internet and mobile subscriptions, price data, education data and ICT trade data will be gathered from official sources such as central bureaux of statistics and telecommunications regulatory authorities. Primary data should be gathered through surveys.

5. *Analyse the data*

Four levels of analysis should be considered to fully understand the ICT picture of ESCWA member countries:

- Indicator analyses;
- Index analyses;
- Sector analyses;
- Benchmark ESCWA region/countries with the selected regions/countries.

After analysing the data, goals should be set, an action plan for improvement should be developed and the process should be monitored.

E. RECOMMENDATIONS

Closing the digital divide and reaping the benefits of the information society is essential for ESCWA member countries. If policymakers are to be able to accurately determine which developmental strategies will be the most effective, promoting comparability and clarity of the measurement model is vital. In order to pursue these goals in the most effective manner possible, key indicators must be defined and statistical models developed which are able to assess current status, measure the many facets of the information society, and monitor progress towards its realization. Determining which key performance indicators will be of greatest value is a complex exercise, combining many data points into actionable information. In order to be optimally effective, standardized indicators must be relevant to a wide variety of national circumstances and cultural contexts.

Statistical measurement is vital for the development and growth of the information society in the ESCWA region, yet as a result of the rapid and continuous development of methodologies and indicators for measuring the information society, this task is becoming increasingly difficult for Governments and NSOs.

The following list sets out a number of recommendations which could be adopted by ESCWA member countries to measure their information society through the use of indicators which are relevant to a broad spectrum of national circumstances and cultural contexts.

1. Develop a regional standard for measuring the information society in the ESCWA region, including the definition of region-specific indicators and methodologies. This regional standard must be compatible with global indicators and highlight the specificities of the region. Calculation methodologies for population figures and family size, as well as other region-specific indicators region, should be taken into consideration.

2. Revise the main objectives and goals for measuring the information society. In addition, there is a considerable need to raise awareness of these goals in order to facilitate the process of measuring the information society and ensure that its results are put to optimal use. The efficacy of utilizing indicators for measuring the information society when devising ICT policies and developmental strategies, supporting decision-making and developing the information society must be acknowledged.

3. Designate competent persons who fully understand the importance of measuring the information society at all levels, in order to provide international bodies and private institutions which conduct field surveys or opinion polls (such as the World Economic Forum) with accurate and relevant data which highlight the current status of the information society within the dual context of the challenges which it faces and its prospects for further development. Raising awareness in both the public and private sectors of the importance of measuring the information society and the significance of their participation in the process must be addressed.

4. Increase coordination at the national level between authorities and agencies responsible for measuring the information society. The important role played by NSOs in this regard should be emphasized and member countries should promote the formation of national task forces for the exchange and harmonization of information, and the adoption of national data on information society indicators for dissemination to international bodies.

5. Provide and regularly disseminate up-to-date information on measuring the information society at the national, regional and international levels in order to serve the objectives of each level. This could be achieved through dedicated websites, which could disseminate up-to-date data to decision-makers, international organizations and the public.

6. Analyse the indicators adopted by European countries in order to determine lessons which could have relevance for the ESCWA and Arab regions.

7. Allocate adequate funds to undertake periodic national statistical surveys for measuring the information society.

8. Form a regional task force to follow up on the standardization of measuring the information society. The task force could be overseen by ESCWA, in collaboration with ITU.

9. Develop an integrated package of cyberlegislation which includes the right of access to information. A right of this nature would empower Government employees entrusted with national data and statistics relating to the information society to share and disseminate data.

10. Publish standardized forms to be used in surveys dedicated to measuring the information society. In this regard, forms developed by international organizations could be used in their standard format or custom-tailored for use in national surveys.

11. Exert further efforts to harness the positive impact of ICTs on the national economy and gross national income of ESCWA member countries in the light of recent statistics and research which give strong credence to the existence of such an impact.

12. Pay particular attention to the development of indicators for the Arab region, including indicators for ICT in education, ICT in Government, measuring digital content, measuring the safety and security of information, and the impact of ICT on various economic indicators.

13. Intensify efforts to further build the capacity of the ESCWA region in information society measurement, including the organization of workshops and specialized meetings for the exchange of experience and best practice in measuring the information society across the full Arab region.

14. Develop, adopt and disseminate Arabic terminology relating to the measurement of the information society.

15. Adopt international standards used for the classification of ICT business and employment in the ICT sector, and disseminate such standards throughout the region for maximum benefit.

F. CONCLUSION

Early international efforts for measuring the information society concentrated on the development of sets of indicators recognized as key indicators. Those efforts mainly focused on infrastructure and information increase, but later involved other economic, social and environmental indicators. For instance, such international organizations as ITU, OECD, UNESCO and UNCTAD have long been collecting various sets of indicators covering telecommunication, the economy, education and trade. It became obvious that any effort must focus on available indicators rather than trying to come up with new ones. One of the fundamental drawbacks to this approach is that those indicators were based on objective and quantitative statistics rather than on the subjective perception of individuals about their social environment.[48]

Apart from efforts led by the international community on issues relating to measuring the information society, several empirical and theoretical studies have attempted to provide statistical models for constructing indices and selecting indicators to represent aspects of the information society and the role of ICT in building this society. However, selection is a critical task involving different types of indicators, most commonly composite and subjective indicators.

Most of the present measurement models rely on composite indicators which are used to summarize the complex and multidimensional aspects of the information society. By aggregating several indicators using weights, composite indicators are able to represent the big picture, are easier to interpret and can facilitate the task of ranking countries. If they are poorly interpreted, however, they may send misleading and ineffective messages to policy and decision makers, pushing them to draw rather simplistic conclusions. Statisticians may also tend to resent composite indicators, whereby a lot of work in data collection and editing is wasted in order to be hidden behind a single number of dubious significance.[49]

Alternatively, subjective indicators have gained significance for capturing progress toward information societies through the perception of citizens on a number of related attributes. These indicators tend to measure what is relatively intangible and directly experienced. Without subjective indicators, measurement efforts are bound to be inadequate.

A number of scholars have suggested using such indicators for measuring the impact of ICT by means of participatory assessment approaches that include open-ended questions; whereas some have stressed that evaluating the impact of ICT must be determined and interpreted contextually.[50]

Regardless of the choice of indicators, such a critical task potentially involves statistics that are subject to measurement errors and interpretation. In many cases, once an indicator has been chosen and used, it is likely that policymakers will pay particular attention to it and focus their efforts on improving the indicator, rather than addressing the situation this indicator is supposed to measure.

The previously reviewed measurement frameworks show that there is still neither an explicit model nor a single overarching theory for measuring the information society. Regardless of the choice of a model, the process of selecting indicators must be governed by the goals of the task at hand. Even the most comprehensive theoretical models used for representing the information society could not be validated and tested as they do not solely rely on empirical data, but involve qualitative assessment as well. In updating its measurement model, ITU notes these limitations and suggests that future attempts include consideration of cause and effect relationships in the information society.[51]

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[48] Giovannini (2007).

[49] Statement by Andrea Saltelli, European Commission Joint Research Centre, Composite Indicators. Available at: http://composite-indicators.jrc.ec.europa.eu/.

[50] Fowler (2002).

[51] Grigorovici, Schement and Taylor (2004).

REFERENCES

Abuqayyas, A., and Audin, C. 2008. *Measuring the Information Society - ITU Regional Workshop on Universal Service Funding (Damascus, Syria).* Geneva: ITU.

Central Bureau of Statistics (CBS), Syrian Arab Republic. 2007. *The Syrian Higher Education Report (1994-2005)*. Damascus: CBS.

Communications and Information Technology Commission (CITC). 2009. *Computer and Internet Usage in the Kingdom of Saudi Arabia 2007-2009*. Riyadh: CITC.

European Commission. 2006. *Benchmarking Access and Use of ICT in European Schools 2006 - Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries*. European Commission. Bonn: European Commission and Empirica. Available at: http://ec.europa.eu/information_society/eeurope/i2010/docs/studies/final_report_3.pdf.

Fowler, A. 1995. Assessing NGO Performance: Difficulties, Dilemmas and a Way Ahead in *Non-governmental Organisations – Performance and Accountability: Beyond the Magic Bullet.* Edited by Edwards, M. and Hulme, D. London: Earthscan Publications.

Giovannini, E. 2007. *Statistics and Politics in a "Knowledge Society".* Paris: Organisation for Economic Co-operation and Development (OECD). STD/DOC(2007)2.

Grigorovici, D., Schement, J. and Taylor, R. 2004. Weighing the Intangible: Towards a Theory-based Framework for Information Society Indices in *Global Economy and Digital Society*. Edited by Bohlin, E., Levin, S., Sung, N. and Yoon, C-H. Amsterdam: Elsevier Science.

Human Rights Watch. 2010. *Slow Reform: Protection of Migrant Domestic Workers in Asia and the Middle East.* New York: Human Rights Watch.

International Telecommunication Union (ITU). 2010a. *Measuring the Information Society 2010.* Geneva: ITU.

ITU. 2010b. *The World in 2010: ICT Facts and Figures, The Rise of 3G*. Geneva: ITU.

ITU. 2010c. *Definitions of World Telecommunication/ICT indicators: March 2010*. Geneva: ITU.

ITU. 2009. *Measuring the Information Society: 2009.* Geneva: ITU.

ITU. 2008. *Report on the World Summit on the Information Society Stocktaking*. Geneva: ITU.

ITU. 2007. World Information Society Report 2007: Beyond WSIS. Available at: http://www.itu.int/osg/spu/publications/worldinformationsociety/2007/.

Ministry of Communications and Information Technology (MCIT). 2009. *The Future of the Internet Economy in Egypt - A Statistical Profile*. MCIT.

Orbicom. 2003. *Monitoring the Digital Divide and Beyond*. Montreal: NRC Press.

Orbicom. 2005. From The Digital Guide to Digital Opportunities: Measuring Infostates for Development. Montreal: NRC Press.

Palestinian Central Bureau of Statistics (PCBS). 2009. *Business Survey on ICT, 2007: Analysis of ICT-Access and Usage of Enterprises in the Palestinian Territory.* Ramallah: PCBS.

Partnership on Measuring ICT for Development. 2011 Proposal of e-Government Indicators Report. ITU: Geneva. (Unpublished working document).

Partnership on Measuring ICT for Development. 2010. *Core ICT Indicators*. Geneva: ITU.

Partnership on Measuring ICT for Development. 2008. *The Global Information Society: A Statistical View*. Santiago: United Nations.

Pruulmann-Vengerfeldt, P. 2006. Exploring Social Theory as a Framework for Social and Cultural Measurements of the Information Society. *The Information Society*. Vol. 22 (5): 303-310.

Supreme Council of Information & Communication Technology (ictQatar). 2009. *Qatar's ICT Landscape 2009 - Assessment of Information & Communication Technology in Qatar*. Doha: ictQatar.

Telecommunications Regulatory Authority (TRA) - Bahrain. 2007. *Understanding Telecom Usage in Bahrain - Residential Module Findings*. Manama: TRA.

TRA - Bahrain. 2007. *Understanding Telecom Usage in Bahrain - Business Module Findings.* Manama: TRA.

TRA- Lebanon. 2010. *Broadband in Lebanon: From an Infrastructure Perspective.* Beirut: TRA.

TRA - Lebanon. 2008. *Telecommunications Usage Patterns and Satisfaction in Lebanon*. Beirut: TRA.

TRA - Oman. (2010). *Telecom Sector Indicators, Report: Q3-2010, Market research & Planning-EAU.* Available at: http://www.tra.gov.om/newsite1/2010_Q3.aspx?Lang=1.

TRA - United Arab Emirates. 2009. *UAE ICT Survey - Access and Use of Information and Communications Technology in the UAE*. Abu Dhabi: TRA.

TRA- United Arab Emirates. 2010a. ICT in the UAE. Household Survey, 2010. Abu Dhabi: TRA.

TRA - United Arab Emirates. 2010b. *UAE Telecommunications Sector Developments & Indicators 2007-2009*. Abu Dhabi: TRA.

United Arab Emirates National Bureau of Statistics (NBS). 2010. *Analytical Report on Economic and Social Dimensions in the United Arab Emirates 2009*, Abu Dhabi: NBS.

United Nations Children's Fund (UNICEF). 2008. UNICEF Humanitarian Action Report 2008; Jordan Displaced Iraqis. Available at: http://www.unicef.org/har08/files/har08_Jordan_countrychapter.pdf.

United Nations Department of Economic and Social Affairs (DESA). 2010. *United Nations E-Government Survey 2010, Leveraging e-Government at a Time of Financial and Economic Crisis*. New York: DESA. Available at: http://eGovernments.wordpress.com/2010/04/15/united-nations-global-e-Government-survey-2010.

United Nations DESA, Statistics Division. 2010. *Population and Vital Statistics report*. Statistical Papers. Series A. Vol. LXII (2). ST/ESA/STAT/SER.A/254-255.

United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for Statistics. 2009. *Global Education Digest 2009; Comparing Education Statistics Across the World*. Canada: UNESCO.

World Bank. 2008. *World Bank Atlas.* Washington D.C.: World Bank.

World Economic Forum (WEF). 2010. *The Global Information Technology Report 2009-2010, ICT for Sustainability*. Geneva: WEF.

WEF. 2009. *The Global Information Technology Report 2008-2009, Mobility in a Networked World.* Geneva: WEF.

World Summit on the Information Society (WSIS) 2003. *Plan of Action*. Geneva: WSIS. Available at: http://www.itu.int/wsis/docs/geneva/official/poa.html.

Closing the digital divide and bringing home the benefits of the information society are important concerns to member countries of the Economic and Social Commission for Western Asia (ESCWA). For policymakers to accurately determine which development strategies will be the most effective, a comparable and clear measurement model is vital. Key indicators need to be defined and statistical models that can be used to assess the current status of the information society, measure its many facets and monitor progress towards its realization must be developed. In order to be maximally effective, standardized indicators must be relevant to a wide variety of national circumstances and cultural contexts.

This study aims to set guidelines for the development of a common benchmarking measurement model for the ESCWA region. It presents an overview of the information society in the region and the global information society measurement models. It explores the interplay between the value of evidence-based decision-making, the limitations of available data, the relevance of existing models and the diverse regional contexts. It concludes with recommendations for adjustments and refinements to available measurement methodologies and benchmarking models. With these insights, decision makers in public and private sectors will be empowered with more useful information to drive effective decision-making.

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