ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA

IMPACT OF SELECTED E-SERVICES ON SOCIOECONOMIC DEVELOPMENT IN THE ARAB REGION

United Nations

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Executive summary

The information and communication technology (ICT) revolution, which began nearly two decades ago with the advent of mobile telephony and access to the Internet by the public at large, has led to the development and deployment of e-services which are transforming the way we communicate, access information, entertain, do business and use public services, to name but a few.

Despite the general belief in the positive socioeconomic impact of e-services, the absence of measurable impact indicators hinders the ability of policymakers to properly evaluate and adapt initiatives. This is particularly critical in the context of developing countries with scarce resources and competing development priorities like improving access to water, roads, electricity, health care and education. In fact, many ICT development projects have failed in the past largely because they were ill-adapted to the local context and the services offered did not match the needs of the targeted population. The study features examples of best practice in the region and elsewhere, in particular when discussing e-services, to illustrate the potential of ICT to drive transformation and innovation.

Measuring the impact of e-services on socioeconomic development is still in its early stages and suffers from a lack of data, particularly in developing countries. The measurement of e-services can be used to guide policies and encourage innovation led by citizens and small and medium enterprises (SMEs). Regional cooperation, the sharing of experiences and the transfer of knowledge from developed to developing countries will enhance the transformation and innovation potential of ICT in the region.

Chapter I discusses the development of the Information Society in the Arab region and available frameworks to measure it. It explores the extent to which they cover the impact of e-services, and the indicators they introduce. Impact is the most difficult aspect of e-services to measure, and related indicators are scarce. Moreover, data for a significant number of established indicators are unavailable for a majority of the member countries of the Economic and Social Commission for Western Asia.

Chapter II analyses three different categories of e-services in the region: e-government, e-commerce and so-called "mobile apps" for smartphones and tablets. The study relies on indicators and other information sources such as surveys carried out by the private sector and case studies to assess the impact of those e-services. The region has made important strides towards e-government, especially in the countries of the Gulf Cooperation Council, and e-commerce development is gathering momentum as well. Finally, mobile apps have the potential to positively impact the delivery of services and to create jobs, however, some data indicate that popular apps generally focus on social networking, entertainment and gaming, and seldom leverage local content and useful public services.

Chapter III proposes a framework to enhance the impact of e-services on socioeconomic outcomes. The proposed initiatives leverage recent trends in ICT and exploit its potential to transform sectors and spur innovation, which are both enabled by technological advances and the enhanced pervasiveness of ICT. The proposed initiatives are linked to metrics that pave the way for better measurement of the impact of ICT and e-services in the future. Member countries should consider the following recommendations in the light of their national development priorities and individual contexts.

(a) Improve data collection through statistical surveys and consider integrating those surveys into the national census. That will require coordination between national statistical offices, telecommunication regulatory authorities, and ministries in charge of ICT policies and strategies;

(b) Extend data collection to other sectors (such as health, education, and agriculture to name but a few) to account for the impact of e-services and ICT development in those areas;

(c) Build capacity for the collection of ICT statistics, especially in developing countries. Regional cooperation between countries and the sharing of best practice and experience may be among the most efficient ways to build capacity;

(d) Raise awareness of e-government services and promote their use through citizen-driven, bottom-up initiatives, especially at the local and regional level;

(e) Improve the collection of e-commerce data in business surveys and assist SMEs in embracing e-commerce;

(f) Introduce secure e-payment methods and improve efficiency of postal services through ICT-driven transformation. Member countries should also adopt and enforce proper cyberlegislation;

(g) Encourage the emergence of an industry to develop apps for government and other public services such as health and education. Those efforts should be coordinated with efforts to develop digital Arabic content, and such apps should be freely available through dedicated portals.

In the Arab region, there is significant potential for e-government services, e-commerce and use of ICT by businesses (though this is still limited to large enterprises). Some ICT-driven transformations have already taken place in the region through top-down political initiatives, while bottom-up innovation is still very limited or even non-existent. The impact of e-services can only be improved if the countries of the Arab region adopt measures aimed at unleashing the transformation and innovation potential of ICT. There are good reasons to be optimistic, thanks to the region's human resources and high-level political support in many countries for e-services adoption and the ICT-driven transformation.

ABBREVIATIONS AND ACRONYMS

AAG	Arab Advisors Group
ccTLD	Country code top level domain
CIO	Chief Information Officer
DESA	Department of Economic and Social Affairs
DSL	Digital subscriber line
EDI	Electronic data interchange
EGDI	E-Government Development Index
ESCWA	Economic and Social Commission for Western Asia
GCC	Gulf Cooperation Council
GDP	Gross domestic product
GITR	Global Information Technology Report
ICT	Information and communication technology
IDI	ICT Development Index
IP	Internet protocol
IPB	ICT Price Basket
ITU	International Telecommunication Union
MDG	Millennium Development Goals
NRI	Networked Readiness Index
OECD	Organisation for Economic Co-operation and Development
PES	Postal E-Services
SME	Small and medium enterprises
TLD	Top level domain
UIS	UNESCO Institute for Statistics
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNCTAD	United Nations Conference on Trade and Development
UPU	Universal Postal Union
WBG	World Bank Group
WEF	World Economic Forum
WPIIS	Working Party on Indicators for the Information Society
WSIS	World Summit on the Information Society

Introduction

The move towards the Information Society constitutes a real challenge to developing countries, particularly in view of the lingering digital divide which increases their vulnerability to reduced productivity and economic capacity. The World Summit on the Information Society (WSIS) responded to that challenge and the Geneva Plan of Action specifically called for "a realistic international performance evaluation and benchmarking (both qualitative and quantitative), through comparable statistical indicators and research results, should be developed to follow up the implementation of the objectives, goals and targets in the Plan of Action, taking into account different national circumstances".[1]

In addition, action line C7 stressed that information and communication technology (ICT) applications, if streamlined in traditional services, can support sustainable development leading to numerous benefits such as improving efficiency, reducing processing time, promoting citizen participation, enhancing transparency and facilitating access to governmental services and public information. The selection of ICT applications adopted by the Geneva Plan of Action encompasses e-government, e-business, e-learning, e-health, e-employment, e-environment, e-agriculture, and e-science. Moreover, a number of WSIS follow-up activities recognized the potential benefits of e-services, linking them to the achievement of the Millennium Development Goals (MDGs) and the WSIS targets.

This study adopts the term "e-services" instead of "ICT applications" in order to avoid any confusion with software applications. It will cover e-government and e-commerce, in addition to software applications used on mobile devices, so-called "mobile apps", even though they are not mentioned in the Plan of Action. The widespread use of smartphones and tablets has ushered in a new era of mobile apps development. Mobile apps have the potential to enhance the quality, availability and delivery of all other e-services and can support sustainable development in all fields.

While much progress has been made in measuring ICT infrastructure and use, measuring the impact of ICTs in general and measuring the impact of e-services in particular remains a challenge. Assessing impact must go beyond measuring access to and use of ICTs and e-services to include the social and economic context within which developments are taking place.

Against this backdrop and within the framework of follow-up and evaluation activities of the WSIS, this study assesses the availability, maturity and status of selected e-services in the Arab region, particularly the 17 Arab countries that are members of the Economic and Social Commission for Western Asia (ESCWA).[2] The study seeks to use measurement frameworks and available indicators to evaluate the possible impact of these e-services on the social and economic development of the region. Ultimately, the study aims to enhance the capacity of member countries to develop and implement better policies to support e-services that meet the socioeconomic development needs and priorities of citizens, in terms of availability in Arabic, affordability, user-friendliness and customization, scalability and development according to international standards.

In order to achieve that aim, the study assesses selected indicators and frameworks for the measurement of the impact of e-services on socioeconomic development. The assessment is needed both to evaluate what can be measured and, more importantly, to help policymakers in the region identify and recommend initiatives for the development of better e-services with enhanced socioeconomic impact.

In addition, the study highlights the link between implementing appropriate initiatives which offer better e-services that meet the needs of citizens, including disadvantaged communities, and the achievement of internationally-agreed development goals such as MDGs. It also provides useful insights on measuring the impact of e-services, which is still a challenging and difficult endeavour.

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[1] Geneva Plan of Action, Phase I, para. 28.

[2] The current membership of ESCWA is as follows: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, the Syrian Arab Republic, the Sudan, Tunisia, the United Arab Emirates and Yemen.

I. MEASURING THE INFORMATION SOCIETY
AND ITS SOCIOECONOMIC IMPACT

A. THE EMERGENCE OF THE INFORMATION SOCIETY

The early 1990s witnessed a dramatic development in the use of and access to ICTs. These technologies contributed to the development of the Information Society albeit at different paces between developed and developing countries. Moreover, the World Summit on the Information Society (WSIS) held in two phases in 2003 and 2005, promoted worldwide recognition that the development of the Information Society would bring about socioeconomic benefits and contribute to the fulfilment of MDGs. These developments changed the landscape of economies and societies in developed as well as developing countries. Arab countries were no exception to this transformation, driven by the unorchestrated efforts of Governments, the private sector, public donors, non-governmental organizations, individuals and civil society alike.[3]

ICT is a broad term encompassing many old and new technologies. These technologies range from radios and televisions to personal computers and smartphones. ICT encompasses networks that only offer voice telephony services for fixed and mobile subscribers along with networks that support a wide range of communication services including next-generation Internet protocol (IP). The range of ICT extends to networks that carry either one-to-many (broadcast) or one-to-one communication services, and networks that allow all users to be producers and consumers of content and services. And, last but not least, ICT encompasses narrowband to broadband access where end users are essentially always connected.[4]

The discourse about the socioeconomic impact of ICT implicitly addresses the higher end of the wide spectrum of technologies mentioned above. The concomitant, though independent, development of mobile telephony and access of the public at large to the Internet unleashed technological advancement and put the Information Society at the forefront of the political agenda. During the early years of the twenty-first century, ubiquitous broadband access and the development of next-generation IP-based networks supported the emergence of a large spectrum of e-services for fixed and mobile users alike.

Recent ICT developments include the availability of increasingly affordable handheld devices such as smartphones and tablets that connect to the internet. Such devices have brought tremendous computing power to users and, more importantly, established an easy and intuitive way to access e-services. The very notion that one needs a legacy computer system and a good level of computer literacy to access the Internet and benefit from e-services is now simply becoming obsolete.

Global trends indicate an impressive uptake of mobile cellular telephony followed to a lesser extent by the evolution of individual Internet use over the last 10 years (figure I). Fixed telephony is on a slight decline largely due to the phenomenon of fixed-to-mobile substitution and growth stagnation. Fixed broadband is on the rise but still under the threshold of 10 per cent of the world's population; however, mobile broadband subscriptions show strong growth and have surpassed fixed broadband subscriptions (data starts from 2007).

The global ICT developments witnessed during the period 2001-2011, though impressive, hide stark differences between developed and developing countries, including Arab countries. On the basis of a common data set for developed, developing, and Arab countries, it is useful to observe the relative evolution of each technology between the groups of countries as illustrated by the comparison in figure II.

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[3] Since 2003, ESCWA has assessed advances in building the Information Society within its member countries. In 2007, the analysis framework was aligned with the action lines of the Geneva Plan of Action.

[4] ITU has defined broadband as a downlink speed above 256 Kbit/s, a definition that is vulnerable to obsolescence. In this study, broadband will refers to an always-on connection with acceptable performance.

Figure I. Global ICT developments, 2001-2011
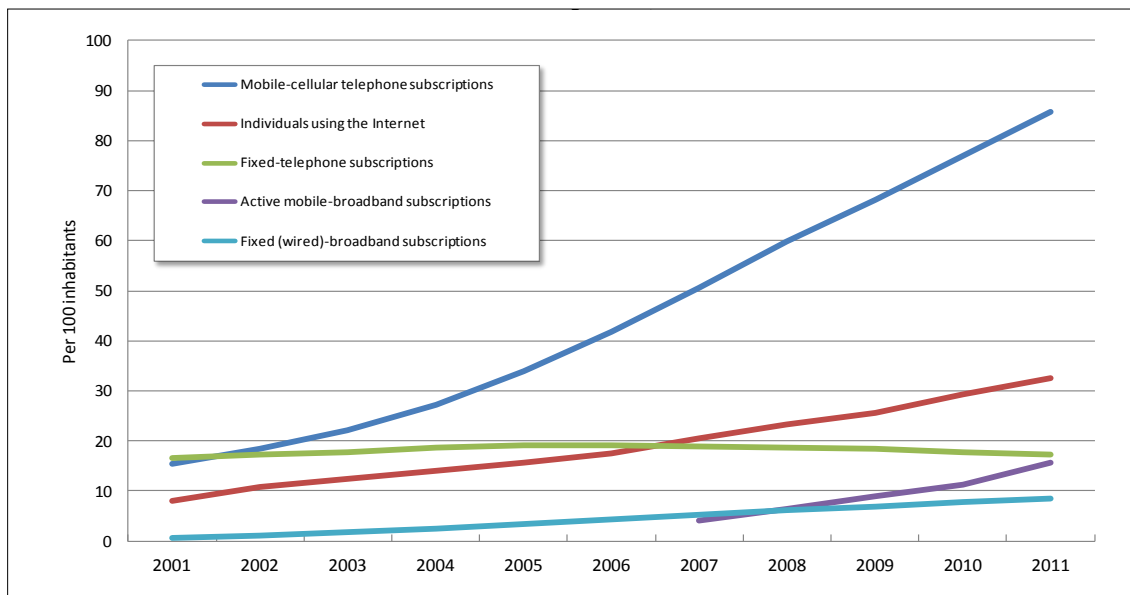
Source: ITU World Telecommunication/ICT Indicators database, 2012.

Figure II. Comparison of ICT penetration rates, 2001-2011

Ratio of ICT penetration rates (per 100 inhabitants): developed versus developing countries
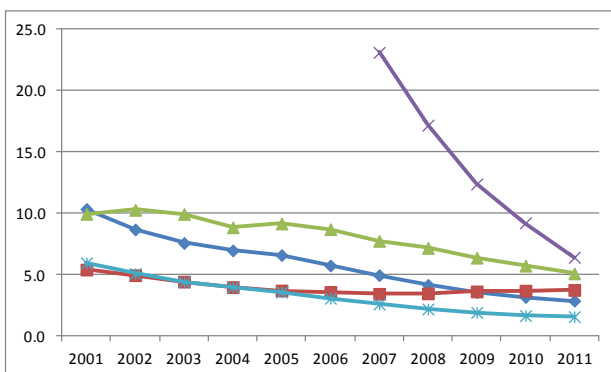
Ratio of ICT penetration rates (per 100 inhabitants): developed versus Arab countries
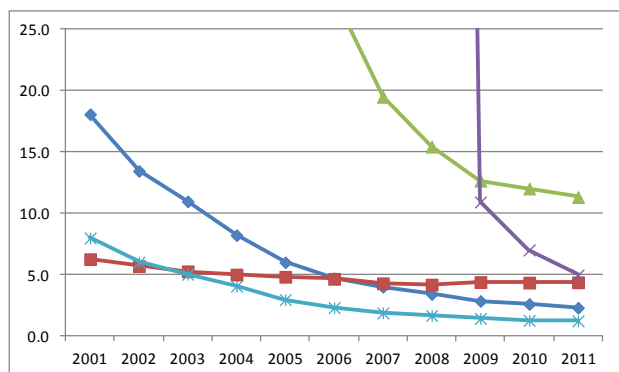
Source: ITU World Telecommunication/ICT Indicators database, 2012.

The chart on the left in figure II compares developed and developing countries. In 2001, there were 5 times more mobile cellular subscriptions in developed countries than in developing countries. This ratio fell to only 1.6:1 in 2011. Internet users showed a similar trend, falling from 10:1 in 2001 to only 3:1 by 2011. Fixed broadband, particularly the number of digital subscriber lines (DSL), has had a slower pace of growth in developing countries, largely due to its cost and the lack of legacy fixed-telephone infrastructure. The ratio fell from 10:1 to 5:1 during the same period. Fixed-telephony has become more prevalent in developing countries but growth has stagnated in recent years. And finally, the ratio of mobile broadband access transformed from 22-fold difference in 2007 to a difference of only 6 fold in barely four years' time, indicating that it will likely become the dominant Internet access technology in many developing countries.

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The chart on the right in figure II shows that the trend of ICT development was somewhat similar in the Arab region. Internet users exhibited steady growth; the ratio fell from 18:1 in 2001 to only 2.3:1 by 2011. Fixed broadband has grown dramatically in Arab countries, with the ratio falling from 200:1 to only 11:1 in 2011. However, the ratio is still double the average of developing countries. Finally, mobile broadband has undergone an impressive evolution. It was nearly non-existent in 2007 but in four years' time the ratio reached 5:1. This strongly suggests that mobile broadband will be the technology driving access to the Internet in the Arab region, especially given the above-average mobile telephony penetration rate.

It is evident that e-services may not be effective, and may not even exist without appropriate network infrastructure and broadband access. Other factors such as an enabling regulatory environment, ICT literacy and technical skills, and effective use of ICT by governments, businesses and individuals are necessary to improve the impact of e-services. Hence, internationally recognized statistical indicators are needed in order to properly evaluate the impact of ICT within a given social or economic domain. These indicators would then shed light on whether the introduction or improvement of e-services within a given context, for instance, e-government services, has led to a significant change. Indicators that directly measure ICT impact are rare, and so other indicators of ICT readiness levels or intensity of use in a given domain will be examined instead.

There are a number of internationally recognized frameworks to measure the Information Society, which have introduced relevant indicators. This chapter will present the frameworks that will form the foundation of the discussion of the impact of e-services in the Arab region in chapter II.

B. MEASURING THE INFORMATION SOCIETY

Efforts to measure the Information Society started during the 1990s in developed countries in which the Information Society had already begun to have a significant impact. Thus, developed countries were the first to introduce statistics to support and inform policymaking in the areas of the information economy and the Information Society. Those efforts focused on identifying indicators to measure ICTs.

1. *Global measurement efforts*

The Organisation for Economic Co-operation and Development (OECD) led the efforts of developed countries to measure the Information Society, through the Working Party on Indicators for the Information Society (WPIIS) which was formed in 1999. This eventually led to the production of the OECD Guide to Measuring the Information Society in 2005 which was revised in 2009 and 2011.

The issue of measuring the Information Society was naturally present during the WSIS debates and concerned all countries, developed and developing alike. It is in this context that in June 2004, the Partnership on Measuring ICT for Development was formed. The Partnership is a multi-stakeholder initiative and current members are as follows: the International Telecommunication Union (ITU), United Nations Conference on Trade and Development (UNCTAD), United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS), the United Nations Department for Economic and Social Affairs (DESA), United Nations Environment Programme, four United Nations regional commissions including the Economic and Social Commission for Asia and the Pacific, the Economic Commission for Latin America and the Caribbean, the Economic Commission for Africa and ESCWA, in addition to OECD, the World Bank and Eurostat. The goal of the Partnership is to improve the availability and quality of ICT data and indicators, particularly in developing countries.

The Partnership published a list of core ICT indicators in 2005 and updated the list in 2010. In 2011, the Partnership published the Framework for a Set of E-Government Core Indicators. Through the Task Group on Measuring the WSIS Targets, the Partnership also published a statistical framework for measuring the WSIS targets.

Each year, ITU, the United Nations organization in charge of collecting telecommunication and ICT statistics, gathers data from official country contacts, usually the national regulatory authorities or relevant ministries. ITU also created a model survey to collect data on household and individual use of ICT.

On the basis of that data, ITU introduced two indices in 2009. The first, the ICT Development Index (IDI), is based on eight indicators related to ICT infrastructure and use, in addition to UIS indicators of adult literacy and secondary and tertiary education enrolment rates. The second index, the ICT Price Basket (IPB), measures and compares ICT prices across countries. It combines the average cost of fixed telephony, mobile cellular telephony and fixed broadband in absolute values and provides it as a percentage of monthly gross national income.[5]

Recent rankings of selected Arab countries for the IDI and IPB are annexed to this study (tables A1.1 and A1.2). Neither IDI nor IPB relate directly to the impact of e-services; though they certainly provide a useful indication of member country readiness to embrace the Information Society.

The biennial E-Government Survey carried out by DESA is among the meaningful efforts to measure the Information Society. The 2012 edition of the survey evaluated the status of e-government services in 190 countries and introduced two composite indices based on the survey results.

Finally, the Networked Readiness Index (NRI) of the World Economic Forum (WEF) is a valuable resource. The index was created in 2002, and now provides data covering over 10 years. The latest edition of the index covered 142 developed and developing countries.

Box 1 provides an overview of the data sources behind different ICT indicators and the limitations or vulnerabilities associated with them.

Box 1. What is an ICT indicator?

ICT indicators are statistical quantities representing a technological aspect of the Information Society that allow for the analysis of current performance and the prediction of future performance. Indicators have rigorous definitions to ensure comparability between a large number of countries. Some well-known issues related to indicators include data availability, collection cost and proper implementation by the largest number of countries, especially developing ones. Another issue relates to their timeliness, as one to two years may be needed to compile the data. This is quite a long time in the rapidly evolving ICT field.

Data for indicators can either be collected from administrative sources, when available, or from surveys addressed to a sample group relevant to the scope of the indicator. For indicators related to ICT use by households and businesses, the Partnership (particularly ITU and UNCTAD) developed model surveys for national statistical offices.

Data are also collected through opinion surveys such as the Networked Readiness Index. Opinion surveys target specific groups and specific issues. The validity of the findings is, therefore, heavily dependent on the quality and representation of the respondents. In the ICT domain, indicators based on opinion surveys are best positioned to address issues such as impact or enabling environment that may not be covered by statistical indicators. Opinion-based indicators can be produced more quickly, making them more timely than indicators based on statistical data.

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2. *Evolution of Information Society measurement*

The S-curve illustrated in figure III is a useful measurement framework for the Information Society. It was initially created to represent the level of development of e-commerce, however, it has been adapted to cover more general ICT infrastructure and demand.

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[5] ITU, 2012a. Data are also provided for the absolute value of IPB in US$ and purchasing power parity US$.

Figure III. Development of e-commerce markets and measurement priorities: The S-curve
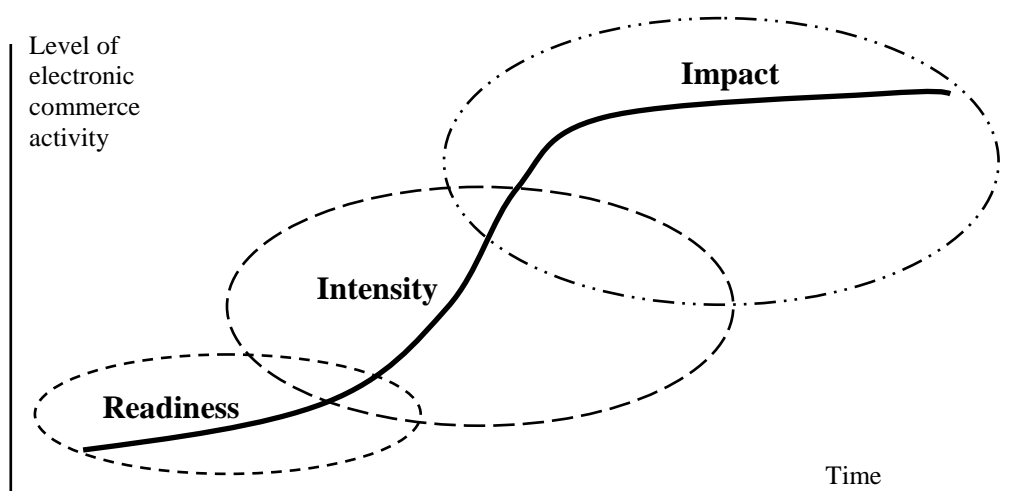
Source: OECD, 2011, p. 13.

The S-curve categorizes ICT indicators into three groups:

- Indicators that measure the readiness of infrastructure, society, economy and business sector to undertake ICT-related activities;

- Indicators that measure the use of ICT and the intensity of ICT-related activities carried out by individuals, businesses and other institutional actors;

- Indicators that measure the outcomes and impacts of ICT on social and business activities and overall economic growth and human development.

As stated by OECD, "when this model was first discussed by the OECD's Working Party on Indictors for the Information Society (WPIIS), it was recognized that the third stage – impacts – would be statistically challenging. This has proven to be the case".[6] In 2011, UNCTAD published a paper that explored the statistical challenges of measuring the impact of ICT, which noted the absence of feasible and internationally adopted indicators. For the time being, the current statistical approach focuses on indicators that could reasonably be measured by the largest number of countries.[7] Another measurement framework proposed by UNCTAD is closely related to the S-curve framework of indicators, but provides greater detail on the relationship between regulation, supply, use and impact (figure IV).

The representation of the Information Society in well-defined domains was essential to the work of OECD. The Partnership also defined the scope of ICT goods and services and indicators that measure infrastructure and demand in addition to model surveys.

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[6] OECD, 2007, p. 6.

[7] Developing countries may lack the capacity to collect data even under a more limited approach. UNCTAD, 2011a.

Figure IV. Conceptual framework for the measurement of the information economy
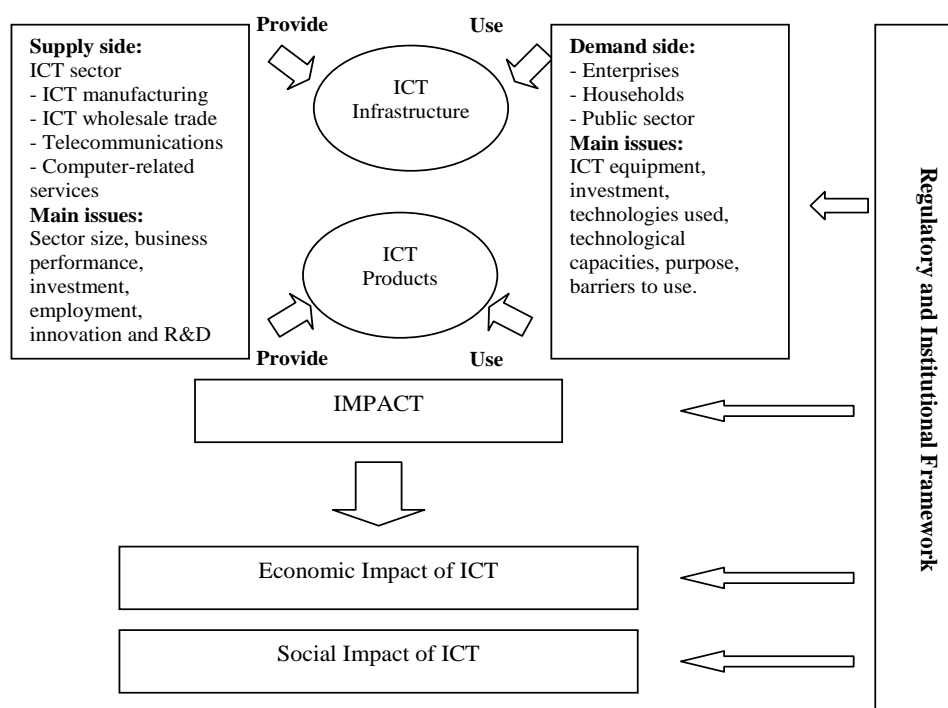
Source: UNCTAD, 2009, p. 13.

C. THE PARTNERSHIP ON MEASURING ICT FOR DEVELOPMENT

1. *Core ICT indicators*

The Partnership on Measuring ICT for Development has created a list of 53 core ICT indicators in six categories and two reference indicators (table 1). The full list of core ICT indicators is annexed to this study (table A.3). Although the core ICT indicators do not specifically address impact, they can be used as proxies. A number of the core ICT indicators will be used in chapter II for that purpose.

TABLE 1. TAXONOMY OF CORE ICT INDICATORS, 2012

Category	Designation	Number of indicators
ICT Infrastructure and access	A	10
Access to, and use of, ICT by households and individuals	HH	12 + 1 reference[a]
Use of ICT by businesses	B	12
The ICT sector and ICT trade	ICT	4
ICT in education	ED	8 + 1 reference[b]
ICT in Government	EG	7

Source: Compiled by ESCWA based on Partnership, 2010 and Partnership, 2011a.

Note: a/ Households with electricity.
　　　 b/ Schools with electricity.

The current status of data availability for those indicators, especially in developing countries, and particularly in ESCWA member countries, is an important factor. In its report to the forty-third United Nations Statistical Commission, the Partnership provided an in-depth assessment of the current status of data availability for the core ICT indicators, using reference dates of 2005 and 2010 to evaluate data availability.[8]

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[8] Partnership, 2012.

Indicators on ICT infrastructure and access (A indicators) are the most widely available. Data for five of the A indicators, namely A1, A2, A4, A8 and A9, were available for more than 80 per cent of the countries from 2009 to 2010. Three other indicators (A3, A6 and A7) were available for more than 60 per cent of the countries. Indicator A5 (mobile broadband subscriptions per 100 inhabitants) became available in 2009-2010 in about 40 per cent of the countries. Indicator A8 (fixed broadband Internet tariff), while in principle available since 2005, was not collected by ITU until 2008. Finally, data on indicator A10 (localities with Internet access) has only been collected by about 15 per cent of the countries and the Partnership suggested that it will likely be removed from the core list in the next revision.

Much progress has been achieved since 2005 on HH indicators on access to and use of ICT by households and individuals. Particularly, data for HH4 on households with a computer and HH6 on households with access to the Internet are now collected by more than 100 countries (50 per cent). Of course, a higher percentage of countries are collecting data on some of the A indicators as mentioned above, which could be explained by the fact that data related to HH indicators are derived from surveys and are sometimes collected through a national census. Eight of the HH indicators were included in the 2008 United Nations publication Principles and Recommendations for Housing and Population Censuses, Revision 2. ITU has published a manual to support developing countries in collecting statistics related to household use.[9]

For developing countries, a major concern is the relatively low availability of data related to the ICT use of individuals (HH5, HH7, HH8, HH10 and HH12). Of particular importance are indicators related to individuals using a computer (HH5), a mobile phone (HH7) and the Internet (HH10). The report notes that only 35 countries collected data on mobile phone use and 23 countries collected data on Internet use. The use of mobile phones is of particular importance as the A2 indicator of mobile subscriptions per 100 inhabitants is reaching levels above 100 per cent in many countries (including some developing countries) and cannot be considered indicative of individual use.

Data on business use of ICT (B indicators) and ICT1 and ICT2 are collected by UNCTAD. The Partnership highlighted the significant increase in the availability of these indicators between the two reference dates from an average of 35 countries reporting data per indicator in 2005 to an average of 60 countries in the period of 2007-2009. Yet those figures are much lower than the number of countries reporting data for HH indicators. Only 27 developing countries reported data related to ICT1 and ICT2 between 2007 and 2009. UNCTAD has published a manual to support developing countries in their data collection efforts.[10]

ICT3 and ICT4 indicators are produced by analysing international trade data collected by national customs and compiled at the international level in databases such as United Nations Commodity Trade Statistics Database. Such data are available for most countries. The World Bank and ITU have published a convenient second source of data related to these indicators.[11]

ED indicators on education are collected by UIS. To improve data collection, UIS introduced a roll-out strategy for its survey on ICT in education that began in Latin America and the Caribbean. Between late 2010 and March 2011, UIS conducted a data-collection exercise in all countries of that region. Of the 40 targeted countries and territories, 38 successfully completed the survey. UIS extended its regional roll-out strategy to Asia and the Pacific in 2012. In addition, UIS has published the Guide to Measuring Information and Communication Technologies in Education and the Questionnaire on Statistics of Information and Communication Technologies in Education.

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[9] The manual is available from http://www.itu.int/ITU-D/ict/publications/hhmanual/2009/index.html.

[10] The manual is available from http://unctad.org/en/docs/sdteecb20072rev1_en.pdf.

[11] Available from http://data.worldbank.org/products/data-books/little-data-book-on-info-communication-tech.

EG indicators on ICT in Government are the most recent addition to the core indicators and data are not yet available. A methodological manual on country-level collection of the data required to construct the EG indicators will be produced by the Economic Commission for Africa and other Partnership members in 2013. Capacity-building workshops are planned to train statisticians and other stakeholders, following the completion of the manual.

Table 2 shows the availability of data in ESCWA member countries for the core ICT indicators, excluding the EG indicators. Unsurprisingly, data on A indicators are generally available for most ESCWA member countries for the reference date of 2010. Eight countries reported data for HH and ED indicators and only six countries reported data for B indicators. Arab countries from several subregions, namely GCC, Levant and North African, are represented in theses three indicators groups. For ICT sector indicators, only Egypt and Jordan reported data for ICT1 while none reported data for ICT2; data related to ICT trade indicators (ICT3 and ICT4) are available for all countries except Iraq and Libya.

TABLE 2. AVAILABILITY OF CORE ICT INDICATORS FOR ESCWA MEMBER COUNTRIES

Country	ICT infrastructure and access (A)										Access to and use of ICT by households and individuals (HH)												
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	HH1	HH2	HH3	HH4	HH5	HH6	HH7	HH8	HH9	HH10	HH11	HH12	HHR1
Bahrain	x	x	x	x	x		x	x	x					x	x	x	x		x	x			
Egypt	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Iraq	x	x	x	x		x					x	x	x	x	x	x	x						
Jordan	x	x	x	x	x	x	x	x	x					x	x	x	x	x					x
Kuwait																							
Lebanon	x	x				x	x	x	x														
Libya	x	x	x	x		x	x																
Morocco	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		
Oman	x	x	x	x	x	x	x	x	x	x													
Palestine																							
Qatar	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		
Saudi Arabia	x	x	x	x	x	x	x	x	x														
Sudan	x	x		x		x	x																
Syrian Arab Republic	x	x	x	x		x	x	x	x														
Tunisia	x	x	x	x		x	x	x	x						x	x							
United Arab Emirates	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x
Yemen	x	x	x	x		x	x	x	x														

Country	Use of ICT by businesses (B)												ICT sector and ICT trade (ICT)			
	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	ICT1	ICT2	ICT3	ICT4
Bahrain															x	x
Egypt	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Iraq																
Jordan	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Kuwait															x	x
Lebanon															x	x
Libya																
Morocco															x	x
Oman															x	x
Palestine	x	x	x	x	x	x	x	x	x	x	x	x			x	x
Qatar	x	x	x	x	x	x	x	x	x	x	x	x			x	x
Saudi Arabia															x	x
Sudan															x	x
Syrian Arab Republic															x	x
Tunisia	x	x	x	x	x	x	x	x	x	x	x	x			x	x
United Arab Emirates	x		x			x	x	x	x	x	x	x			x	x
Yemen															x	x

Country	ICT in education (ED)									Available indicators	Percentage
	ED1	ED2	ED3	ED4	ED5	ED6	ED7	ED8	EDR1		
Bahrain	x	x	x	x	x	x		x	x	24	50.00
Egypt	x		x		x			x	x	43	89.58
Iraq										12	25.00
Jordan	x	x	x	x	x	x		x	x	38	79.17
Kuwait										2	4.17
Lebanon										8	16.67
Libya										6	12.50
Morocco	x		x		x		x	x	x	29	60.42
Oman	x	x	x		x				x	17	35.42
Palestine	x	x	x		x			x	x	20	41.67
Qatar										35	72.92
Saudi Arabia										11	22.92
Sudan										7	14.58
Syrian Arab Republic										10	20.83
Tunisia	x		x	x	x	x	x	x		30	62.50
United Arab Emirates										32	66.67
Yemen										10	20.83

Source: (Partnership, 2012), (WBG and ITU, 2012) for ICT3 and ICT4 indicators, and (OECD, 2011) for HHR1 indicator.

2. *Measuring WSIS targets*

During the first phase of WSIS, the Summit adopted the Plan of Action and introduced 10 targets related to ICT development, whose fulfilment was clearly set for 2015 in conjunction with that of MDGs.

The WSIS targets focus primarily on connectivity and access to ICT. Six of the targets begin with "to connect" and two more are in the form "to ensure that…have access to…". One additional target relates to adaptation of education curricula to ICT and another target concerns Internet content development. The spirit of the targets is quite clear: facilitate the fulfilment of MDGs through their impact on socioeconomic outcomes.

To measure the WSIS targets, the Partnership introduced a statistical framework and defined a list of indicators for each target. The Partnership slightly amended the wording of some of the targets to improve their measurability and suggested a new target for access to ICT by businesses. In keeping with the global spirit of the Plan of Action, the Partnership highlighted the relevant action line for each target (annex table A1.4),[12] and defined each of the target indicators. Aside from defining terms and explaining the calculation method for each indicator, three aspects of particular interest are addressed, namely:

- Whether the WSIS indicator maps onto one or more core ICT indicators;
- Whether there are any significant statistical issues associated with the indicator;
- Whether data sources for the indicator are available and/or reliable.

That information is set out in table 3. For WSIS targets 3, 4 and 5, mapping onto core ICT indicators was not possible.

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[12] ESCWA, 2011a presented a thorough discussion of the WSIS Action Lines in relation to ESCWA member countries.

(a)   *Target 1*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
1.1 Proportion of rural population covered by a mobile cellular telephone network, by type of mobile cellular telephone technology	Rural/urban disaggregation of A7	There is currently no internationally agreed statistical definition of a rural population. However, it may be reasonable to assume that all urban areas are covered by a mobile cellular network.	A7 is available for 85% of countries
1.2 Proportion of households with telephone, by type of network, by urban/rural	Rural/urban disaggregation of HH3	There is currently no internationally agreed statistical definition of a rural population. Indicators 1.3 and 1.4 may not be limited to computers (mobile phones, game machines, Digital TV, smartphones, tablets and other devices).	HH3: 32% of countries provide data on fixed telephones and 31% of countries provide data on mobile telephones
1.3 Proportion of households with Internet access, by type of access, by urban/rural	Rural/urban disaggregation of HH6 and HH11		HH6 is available for 51% of countries HH11 is available for 30% of countries
1.4 Proportion of individuals using the Internet, by location, by urban/rural	Rural/urban disaggregation of HH7 and HH8	Some surveys collect data on all Internet access locations while others focus on main locations (indicator 1.4).	HH7 is available for 38% of countries HH8 is available for 35% of countries

(b)   *Target 2*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
2.1 Proportion of schools with a radio used for educational purposes	ED1	None, pending availability of UIS Latin America and Caribbean survey.	ED1 is available for 33% of countries
2.2 Proportion of schools with a television used for educational purposes	ED2		ED2 is available for 25% of countries
2.3 Learners-to-computer ratio	ED4bis (ISCED[*] levels 1-3)		ED4bis is available for 17% of countries
2.4 Proportion of schools with Internet access, by type of access	ED5		ED5 is available for 33% of countries

[*] International Standard Classification of Education.

TABLE 3 (*continued*)

(c)   *Target 3*

WSIS target indicator	Significant statistical issues	Data sources
3.1 Proportion of public scientific and research centres with broadband Internet access	Units comparability issue	Could be collected as part of a national research and development data collection survey
3.2 Presence of a national research and education network, by bandwidth (Mbit/s)	Potential issue with definition and measurement	An ad hoc survey at the global level was conducted by ITU for 3.2 in 2009. The annual survey carried out by the Trans European Research and Education Networking Association collects data for European, Middle Eastern and North African countries on national research and education networks. No known regular or systematic national surveys.
3.3 Proportion of public scientific and research centres with Internet access to a national research and education network	Unit comparability issue	

(d)   *Target 4*

WSIS target indicator	Significant statistical issues	Data sources
4.1 Proportion of public libraries with broadband Internet access	Unit comparability issue.	Unknown
4.2 Proportion of public libraries providing public Internet access		Survey of the International Federation of Library Associations. Country-level data may not be available for many countries.
4.3 Proportion of public libraries with a web presence		Unknown
4.4 Proportion of museums with broadband Internet access		None
4.5 Proportion of museums with a web presence		European Group on Museum Statistics collects data on the number of European museums with a website.
4.6 Proportion of post offices with broadband Internet access	The extent to which a connection to an electronic network is equivalent to having broadband Internet access is unknown.	The Universal Postal Union (UPU) collects information on the number of permanent post offices connected to an electronic network, which may be suitable as a proxy for 4.6.
4.7 Proportion of post offices providing public Internet access	Ideally, the indicator should be available split by size as shown above. However, UPU does not collect a size distribution from operators at the site level. It collects the total number of staff at operator level, likely equivalent to administrative unit.	UPU collects information on the number of post offices providing public Internet access. Data are available for a large number of countries (see chapter II).
4.8 National archives organizations with broadband Internet access	Unlikely to be any significant statistical issues with these indicators.	None
4.9 National archives organizations with a web presence		
4.10 Proportion of items in the national archives that have been digitized	Unknown, but there may be differences in how national archives define catalogued items. It is not known to what extent this will affect the international comparability of indicators 4.10 and 4.11.	
4.11 Proportion of digitized items in the national archives that are publicly available online		

TABLE 3 (*continued*)

(e)   *Target 5*

WSIS target indicator	Significant statistical issues	Data sources
5.1 Proportion of public hospitals with Internet access, by type of access	Units comparability issue. Some issues might arise due to the technical nature of the categories.	Very limited or no data collection
5.2 Proportion of public health centres with Internet access, by type of access		
5.3 Level of use of computers and the Internet to manage individual patient information	None	Data collected by the World Health Organization Global Observatory for e-Health survey, conducted every 2-3 years. Survey may change over time.

(f)   *Target 6*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
6.1 Proportion of persons employed in central government organizations routinely using computers	EG1	Units comparability issue	Very few countries collect data for these indicators. EG indicators were recently introduced to the core list.
6.2 Proportion of persons employed in central government organizations routinely using the Internet	EG2	Units comparability issue	
6.3 Proportion of central government organizations with a local area network (LAN)	EG3		
6.4 Proportion of central government organizations with an intranet	EG4		
6.5 Proportion of central government organizations with Internet access, by type of access	EG5	Units comparability in addition to issues that might arise due to the technical nature of the categories. As organizations can use more than one access service, multiple responses are possible.	
6.6 Proportion of central government organizations with a web presence	EG6	Units comparability issue	
6.7 Level of development of online service delivery by national governments	None	None	EGDI, pending data availability

(g)   *Target 7*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
7.1 Proportion of ICT-qualified teachers in schools	ED8	None, pending availability of UIS Latin America and Caribbean survey	ED8 is available for 12% of countries
7.2 Proportion of teachers trained to teach subjects using ICT	None		ED38 is provided by UIS. Statistical standards are well documented, but data availability is very low especially for this target indicator.
7.3 Proportion of schools with computer-assisted instruction			ED22 is provided by UIS
7.4 Proportion of schools with Internet-assisted instruction			ED23 is provided by UIS

TABLE 3 (*continued*)

(h)   *Target 8*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
8.1 Proportion of households with a radio	HH1	Care should be taken to fully define "radio" in the questionnaire	HH1 and HH2 indicators have seen a significant fall in their collection rate between 2005 and 2010. They are considered as traditional indicators especially in developed countries, however they are still collected in some areas. HH1 is available for 21% of countries and HH2 is available for 31% of countries.
8.2 Proportion of households with a television	HH2	The exclusion of television functionality integrated into another device should be noted	
8.3 Proportion of households with multichannel television service, by type of service	None	Statistical issues still largely unknown. Developing countries rarely account for pirating of such service.	Some data are available from service providers but it is recommended that countries collect their own data from surveys based on the framework definition for international comparability issues.

(i)   *Target 9*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
9.1 Proportion of Internet users by language, country level	Elaboration of HH7	It may be difficult to determine user language	HH7 is available for 38% of countries (without precise definition of the user language) so in practice no data is available for this indicator.
9.2 Proportion of Internet users by language, top ten languages, global level	None	Data are assumed to be indicative rather than precise estimates owing to the difficulty of determining the exact number of speakers for each language.	This indicator is estimated by Internet World Stats, including ITU and the United States Census Bureau.
9.3 Proportion of web pages, by language		The Language Observatory Project methodology, crawls country code top-level domains (ccTLD) of selected countries. This approach is complex and time consuming and only applied to small ccTLD and not to generic TLD.	Language Observatory Project
9.4 Number of domain name registrations for each ccTLD, weighted by population		Internationalized domain names (IDN), specifically ccTLDs using regional non-ASCII characters, are not necessarily managed by ccTLD registries and may be under-represented in registration counts. Counts include registrations that reflect the commercial value of the country code[*] (not all countries allow this).	Regional top level domain associations (CENTR, APTLD, AfTLD and LACTLD) supply ccTLD registration data for most countries. For some countries, registration information is provided by registrar websites. ZookNIC also collects global ccTLD data
9.5 Number and share of Wikipedia articles by language		None	Data on article counts by language are publicly available from the Wikipedia statistics page. Data refer to official article counts for each of the nearly 300 supported languages.

[*] Some examples are ".tv", the country code for Tuvalu; ".fm", for the Federated States of Micronesia; and ".ad" for Andorra.

TABLE 3 (*continued*)

(j)   *Target 10*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
10.1 Mobile cellular telephone subscriptions per 100 inhabitants	A2	Subscriptions are distinct from users; users may have several subscriptions, and subscriptions may be taken by non-residents. Indicator HH10 is becoming more relevant.	A2 is available for 94 % of countries
10.2 Proportion of households with telephone, by type of network	HH3	Units comparability issue	HH3: 32% of countries provide data on fixed telephones and 31% of countries provide data on mobile telephones
10.3 Proportion of individuals using a mobile cellular telephone	HH10	Ensure that all users are included whether or not they are the owners of the equipment and/or the mobile subscription.	HH10 is available for 28% of countries
10.4 Proportion of individuals using the Internet	HH7	None	HH7 is available for 38% of countries
10.5 Proportion of households with Internet access, by type of access	Composite of HH6 and HH11	Some issues might arise due to the technical nature of the categories. As households may use more than one access service, multiple responses are possible.	HH6 is available for 51% of countries and HH11 is available for 30% of countries

(k)   *Annex indicators*

WSIS target indicator	Mapping onto core ICT indicators	Significant statistical issues	Data sources
A.1 Proportion of businesses using computers	B1	Units comparability issue	B1 is available for 35% of countries
A2. Proportion of businesses using the Internet, by type of access	Composite of B3 and B9 indicators	Some issues might arise due to the technical nature of the categories. As businesses may use more than one access service, multiple responses are possible.	B3 is available for 36% of countries B9 is available for 33% of countries
A3. Proportion of businesses using mobile cellular telephones	None	Use of mobile phones should be for business purposes whether or not the phone is owned or paid by the business.	This indicator maps onto UNCTAD M1 indicator (Proportion of businesses using mobile phones). Very few countries currently collect data for it.

Source: Compiled by ESCWA based on Partnership, 2011b and Partnership, 2012.

The Partnership identified two major statistical issues in the framework to measure the WSIS targets: overlapping scope and units comparability.

The WSIS targets and their indicators were not conceived as part of a statistical model and, as a result, the units and sectors for targets 2, 3, 4, 5, 6, 7 and the proposed business connectivity indicators overlap. For example, scientific and research centres (target 3) will include some museums (target 4), some public hospitals (target 5) and some central government organizations (target 6). Central government organizations in target 6 will theoretically include many of the government organizations performing research and development in target 3, and so on.

The Partnership decided to ignore the overlap rather than to define units that would not overlap. It provided the following two arguments in favour of that decision:

- A technical argument grounded on the "different statistical standards used to define and scope units" among different targets;

- A principled argument assuming that this would be "consistent with the aim of the targets, that is, to consider entities undertaking particular functions in the economy, rather than to split the economy into mutually-exclusive functional units".[13]

In order to translate the WSIS targets into measurable indicators, many of them will take the form of "proportion of entities with access to ICT". The problem is that "even with consistent definition and good identification, indicators of this form may not be comparable across countries because of different structures and functions of country systems. For example, country A may have a small number of large entities of a particular type whereas country B might have mainly small entities of this type. In this simplistic example, country A is likely to rate higher in 'proportion of units with ICT' indicators, simply through structural differences".[14]

For those indicators noted as having "units comparability" as one of their significant statistical issues, the Partnership recommends classifying statistical outputs by the size of the organization. Of course, this would render the survey work a bit more complex and costly.

A closer examination of the WSIS targets indicators reveals the laudable efforts of the Partnership to capture the spirit of the WSIS targets in indicators that go beyond access to ICT and delve into the domains of usage and impact. For instance, the exact wording of target 5 (related to health entities) does not necessarily imply introducing indicator 5.3 related to the handling of patient information through electronic means. In terms of the S-curve discussed in the previous chapter, the efforts of the Partnership moved beyond the lower part of the curve related to access indicators, into the upper parts of the curve that represent intensity and impact and are harder to measure.

Out of the 52 indicators for measuring WSIS targets (including the additional three indicators to connect all businesses with ICT), more than half of them (27 indicators) fall under the broad category of usage and/or impact[15] while the remaining indicators deal primarily with access to ICT. As shown in table 3, only two of those 27 indicators (indicators 6.7 and 9.5) currently have good data availability. By contrast, ten of them (indicators 4.3, 4.9, 4.10, 4.11, 6.1, 6.2, 6.6, 9.1, 9.3 and A.3) have little to no data availability. The remaining 15 indicators (1.4, 2.1, 2.2, 4.5, 5.3, 7.1 to 7.4, 9.2, 9.4; 10.3, 10.4, A.1 and A.2) have average to below average data availability. Carrying out the same exercise for the remaining WSIS indicators representing access reveals that data availability is only somewhat better.

The above observations highlight a more fundamental problem for the indicators of the Partnership WSIS targets and the core ICT list. In its report to the forty-third session of the United Nations Statistical Commission, the Partnership explained that "ICT infrastructure indicators are the most widely available among the core indicators. They usually come from administrative data sources, mainly telecommunication operators, and are collected by Governments at the national level (ministries or regulatory authorities) and by ITU at the global level". Survey-based data for the remaining indicators are not yet widely available for a large number of developing countries.[16]

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[13] Partnership, 2011b, p. 4.

[14] Ibid, p. 5.

[15] This study considers "web presence" or "digitization of national archives" to fall within usage/impact.

[16] Partnership, 2012, para. 24.

Pending a full implementation of surveys to measure the core ICT indicators and the WSIS targets framework, it is difficult if not impossible to statistically measure the impact of ICT. Therefore, approaches which blend statistical indicators with opinion survey-based indicators are more useful.

D. THE NETWORKED READINESS INDEX

The Networked Readiness Index (NRI) measures "the degree to which economies across the world leverage ICT for enhanced competitiveness".[17] Since 2002 it has been calculated annually and published in the Global Information Technology Report (GITR), and the eleventh edition was published in 2012. This approach has resulted in a valuable time series that can be used for benchmarking and comparisons. For the 2012 edition, NRI underwent an important overhaul during which a fourth subindex was added on measuring the economic and social impacts of ICT, and the number of indicators dropped from 71 to only 53. It covered 142 countries, out of which were 13 ESCWA member countries and two other Arab countries. For various reasons, the 2012 sample excluded Iraq, Libya, Palestine and the Sudan.

The 53 indicators of NRI are organized into 10 pillars which feed into four subindices, namely environment, readiness, usage and impact. The global NRI score is a simple average of scores in those four areas. The index is based on an original mixture of quantitative (measured indicators) and survey-based data.

1. *The NRI framework and composition*

Figure V. The evolved NRI framework
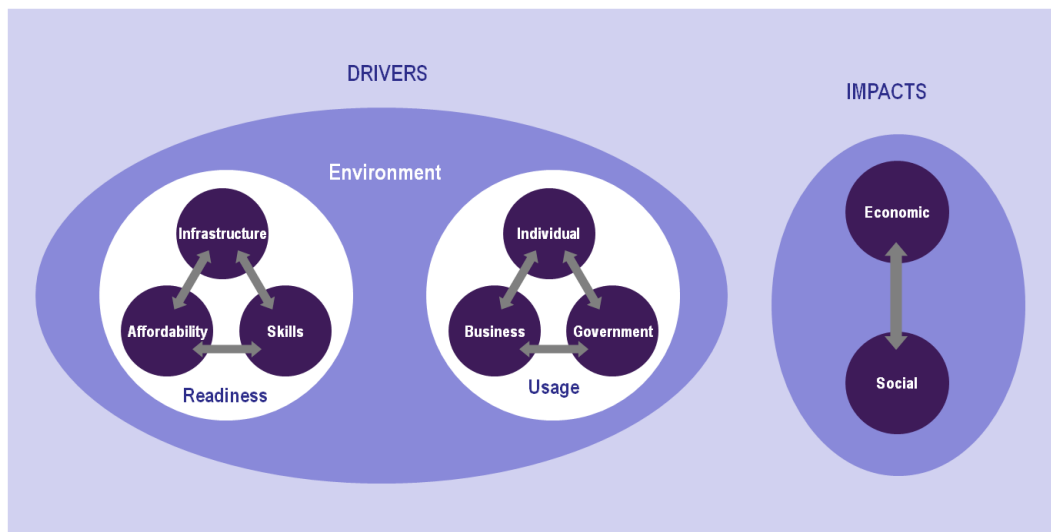
Source: WEF, 2012a, p. 5.

The 2012 GITR highlighted tremendous changes in the ICT sector during the last few years which led to the development of what it called a "hyperconnected world", characterized by an explosion of the number of connected users and devices, the growth of data, and the beginning of a real ICT-driven transformation of social and economic endeavours. A restructuring of the NRI framework was an inevitable consequence of those changes. The illustration of the evolved NRI (figure V) shows the relationship between the subindices of environment, readiness, usage and impact.

The evolution of the NRI framework impacted each of its subindices. Variables were updated and rationalized, a process that led to the removal of some (such as those related to fixed telephony) and the inclusion of others (such as mobile broadband subscriptions). The environment subindex was restructured to "reflect the importance of having an overall framework that …acts as a catalyst for innovation and entrepreneurship rather than acting as a filter". The revised pillars include political and regulatory

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[17] WEF, 2012a, p. 3.

environment and the business and innovation environment. The pillars in the readiness subindex were refined to focus on infrastructure, affordability and skills which also map onto key policy action areas. Some of the indicators of the new subindex on impact had previously been classified as indicators of usage.[18] Table 4 presents the composition of NRI.

TABLE 4. THE NETWORK READINESS INDEX COMPOSITION: SUBINDICES, PILLARS AND INDICATORS

Environment	Readiness	Usage	Impact
1st Pillar: Political and regulatory environment	**3rd Pillar: Infrastructure and digital content**	**6th Pillar: Individual usage**	**9th Pillar: Economic impacts**
1.01 Effectiveness of law-making bodies*	**3.01** Electricity production, kWh/capita (**World Bank**)	**6.01** Mobile phone subscriptions per 100 population (**ITU**)	**9.01** Impact of ICT on new services and products*
1.02 Laws relating to ICT*	**3.02** Mobile network coverage rate, % population (**ITU**)	**6.02** Internet users per 100 population (**ITU**)	**9.02** ICT Patent Cooperation Treaty applications per million population‡ (**OECD**)
1.03 Judicial independence*	**3.03** International Internet bandwidth, kb/s per user (**ITU**)	**6.03** Households with personal computer, % (**ITU**)	**9.03** Impact of ICT on new organizational models*
1.04 Efficiency of legal system in settling disputes*	**3.04** Secure Internet servers per million population (**World Bank**)	**6.04** Households with Internet access, % (**ITU**)	**9.04** Employment in knowledge-intensive activities, % workforce (**International Labour Organization**)
1.05 Efficiency of legal system in challenging regulations*	**3.05** Accessibility of digital content*	**6.05** Fixed broadband Internet subscriptions per 100 population (**ITU**)	
1.06 Intellectual property protection*		**6.06** Mobile broadband Internet subscriptions per 100 population (**Informa**)	**10th Pillar: Social impacts**
1.07 Software piracy rate, % software installed (**Business Software Alliance**)	**4th Pillar: Affordability**	**6.07** Use of virtual social networks*	**10.01** Impact of ICT on access to basic services*
1.08 Number of procedures to enforce a contract (**World Bank**)	**4.01** Mobile cellular tariffs, purchasing power parity $/min. (**ITU**)		**10.02** Internet access in schools*
1.09 Time to enforce a contract, days (**World Bank**)	**4.02** Fixed broadband Internet tariffs, purchasing power parity $/month (**ITU**)	**7th Pillar: Business usage**	**10.03** ICT use and government efficiency*
	4.03 Internet and telephony sectors competition index, 0-2 (best) (**ITU**)	**7.01** Firm-level technology absorption*	**10.04** E-Participation Index, 0-1 (best) (**DESA**)
2nd Pillar: Business and innovation environment	**5th Pillar: Skills**	**7.02** Capacity for innovation*	
2.01 Availability of latest technologies*	**5.01** Quality of educational system*		
2.02 Venture capital availability*	**5.02** Quality of math and science education*	**7.03** Patent Cooperation Treaty applications per million population‡ (**OECD**)	
2.03 Total tax rate, % profits (**World Bank**)	**5.03** Secondary education gross enrolment rate, % (**UNESCO**)	**7.04** Extent of business Internet use*	
2.04 Time required to start a business, days (**World Bank**)	5.04 Adult literacy rate, % (**UNESCO**)	**7.05** Extent of staff training*	
2.05 Number of procedures to start a business (**World Bank**)		**8th Pillar: Government usage**	
2.06 Intensity of local competition*		**8.01** Government prioritization of ICT*	
2.07 Tertiary education gross enrolment rate, % (**UNESCO**)		**8.02** Importance of ICT to government vision of the future*	
2.08 Quality of management schools*		**8.03** Government Online Service Index, 0-1 (best) (**DESA**)	
2.09 Government procurement of advanced technology products*			

Source: Compiled by ESCWA based on WEF, 2012a.

Note: * Data are collected through the Executive Opinion Survey (25 indicators); Data on the remaining 28 indicators are collected by the organization shown between parenthesis.

‡ The Patent Cooperation Treaty, concluded in 1970, aims to protect inventions in each State party to it. As of June 2012, the treaty had 146 States parties. An application filed under the treaty is called an international application, or "PCT application".

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[18] WEF, 2012a, p. 4.

2. *Data sources*

Survey-based indicators make up a significant portion of the data in each of the four NRI subindices. Counting the two DESA indices derived from the E-Government Survey, survey-based indicators account for 75 per cent of the impact subindex, 61 per cent of the environment subindex, 53 per cent of the usage subindex and only 25 per cent of the readiness subindex.

This shows that the evaluation of the pillars of impact and environment, and usage to a lesser extent, rely on survey work rather than pure statistics. Only the readiness pillar is primarily covered by statistical data.

(a)   *Quantitative indicators from external sources*

All data collected from external sources are normalized into 1-7 (best) scores.[19] Scores are computed with a precision of one or two decimal points; however, exact figures are used at every step of the computation process.

ITU supplies data for 10 indicators related to individual usage (6.01-6.05), affordability (4.01-4.03) and infrastructure and digital content (3.02 and 3.03). The two ITU indicators of infrastructure and digital content concern mobile network coverage and international Internet bandwidth. The five indicators of individual usage concern mobile subscriptions, fixed broadband subscriptions and Internet users per 100 inhabitants and the proportion of households with personal computers and with Internet access. All seven indicators are taken from the ITU Statistics Database. They are also part of groups A and HH of the core ICT indicators.

Two indicators of affordability are based on the ITU Statistics Database (mobile and fixed broadband access tariffs); while the third indicator of affordability, namely the level of competitiveness of Internet and telephony sectors in the given country, is derived from the ITU Regulatory Database.

The World Bank is the data source for seven indicators. Five indicators under the environment subindex are related to the quality of the business environment in the country and are drawn from the World Bank Doing Business report (1.08, 1.09 and 2.03-2.05). The remaining two indicators of infrastructure and digital content are related to electricity production and secure Internet servers (3.01 and 3.04). Data for these indicators are drawn from the World Development Indicators, and some data for indicator 3.01 are drawn from the World Factbook.

Data provided by UIS on the tertiary education gross enrolment rate is used for indicators of the business and innovation environment (2.07) and skills related to the secondary education gross enrolment rate (5.03) and the adult literacy rate (5.04).

Data on patents filed under the Patent Cooperation Treaty for indicators 7.03 and 9.02 are sourced from OECD. Data on two indicators are drawn from the DESA E-Government Survey under the Government usage pillar (indicator 8.03, Government Online Service Index) and Social impacts pillar (indicator 10.04, E-Participation Index).

Data on indicator 9.04, employment in knowledge-intensive activities as a percentage of work-force, are drawn from the International Labour Organization. Data on indicator 1.07, software piracy rate as a percentage of installed software, are derived from the Business Software Alliance, while data on indicator 6.06, mobile broadband Internet subscriptions per 100 population, are provided by Informa.

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[19] WEF, 2012a, pp. 30-31 provides full details of NRI computation.

(b)   *Qualitative indicators from the Executive Opinion Survey*

For all indicators based on the Executive Opinion Survey (hereafter "the Survey") a score of 1 to 7 (best) is given by respondents. The Survey covers a larger scope than the strict domain of ICT and GITR. It is a key component of the work methodology of WEF and its result feed into many other WEF reports, chiefly the Global Competitiveness Report for which it was initially instated.[20]

The Survey has a proven track record and a sound methodology. For the 2012 edition, WEF assigned local correspondents in 150 countries to assist in carrying out the Survey, which engaged a record 15,000 participants. In addition, although the Survey is conducted yearly during the first quarter, published reports use results from the two most recent Surveys. For instance, the 2012 edition uses data from the 2010 and 2011 Surveys. This practice offers many advantages, in particular, it makes results less sensitive to the point of time when the Survey was conducted and allows for better comparability with data from external sources.

The Survey is a very effective tool that provides data on many aspects of the economy and technology where statistical data may be missing. About it provides insight into outcomes (especially related to impact) where statistical data may not account for rapid change in the ICT sector.

One limitation of the Survey is that it targets the business community (the main focus of WEF). Although ICTs are impacting all aspects of social endeavour and public services, the Survey only gathers the opinions of a narrow group. Thus the results of the Survey should not be taken as representative of the public at large. If other stakeholders were included in future rounds of the Survey, the results would be more broadly representative.[21]

3. *The impact subindex*

The impact subindex is composed of the economic impacts and social impacts pillars, each of which have four indicators. Some of the indicators of impact were previously part the usage subindex, including the following:

- Internet access in schools and impact of ICT on access to basic services (moved from the individual usage pillar);

- Impact of ICT on new services and products and impact of ICT on new organizational models (moved from the business usage pillar);

- ICT use and government efficiency and e-participation index (moved from the Government usage pillar).

As was shown in the discussion of the WSIS targets framework, boundaries between usage and impact are sometimes hard to define. The two newly introduced indicators under the impact subindex are ICT Patent Cooperation Treaty applications per million population and employment in knowledge-intensive activities as a percentage of workforce (both statistical indicators).

GITR acknowledges that, "ICT has proven transformational in many aspects of the economy and society, influencing not only the outcomes but also the process through which products and services are delivered", nonetheless "observed economic and social impacts are the result of a thick network of several interacting factors, where ICT is but one of them".[22] Consequently, the impact subindex is a work in progress.

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[20] WEF, 2012b, pp. 69-78 describes the methodology of the Survey.

[21] See ESCWA, 2011b, pp. 21-22.

[22] WEF, 2012a, p. 28 (note 10 to chapter 1.1).

Table 5 summarizes the global NRI scores and rankings (among 142 surveyed countries) for 13 ESCWA member countries, as well as their individual scores and rankings for the impact subindex and its two economic and social impact pillars.

TABLE 5. SELECTED ESCWA MEMBER COUNTRIES ACCORDING TO OVERALL NRI RANKING,
WITH IMPACT SUBINDEX RANKINGS

Country	NRI		Impact subindex		Economic impacts		Social impacts	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
Bahrain	4.90	27	4.44	30	3.44	54	5.44	12
Qatar	4.81	28	4.43	32	3.81	34	5.05	21
United Arab Emirates	4.77	30	4.42	33	4.09	29	4.76	33
Saudi Arabia	4.62	34	4.01	40	3.64	40	4.37	40
Oman	4.35	40	3.92	42	3.44	55	4.41	38
Jordan	4.17	47	3.66	57	3.23	70	4.10	49
Tunisia	4.12	50	3.90	44	3.46	51	4.33	42
Kuwait	3.95	62	3.17	93	2.73	110	3.60	76
Egypt	3.77	79	3.43	74	3.33	62	3.52	83
Morocco	3.56	91	2.94	109	2.49	127	3.40	92
Lebanon	3.49	95	2.99	104	2.97	92	3.00	114
Syrian Arab Republic	2.85	129	2.43	132	2.26	136	2.61	129
Yemen	2.41	141	1.93	142	2.08	141	1.77	142
Average	3.98		3.51		3.15		3.87	

Source: WEF, 2012a.

The following observations arise from table 5:

- The impact subindex ranking of the countries of the region is generally lower than their overall NRI rankings. The difference is significant for some countries like Kuwait and, to a lesser extent, Jordan and Lebanon. Only Egypt and Tunisia performed better on the impact subindex rankings than in the overall NRI rankings;

- The social impacts pillar shows higher ranking than the economic impacts pillar in particular among the leaders (Bahrain and Qatar) but also lower-ranked countries like Jordan, Kuwait and Morocco. This is likely due to good e-government efforts that will be discussed in chapter II. By contrast, Egypt and Lebanon have a higher ranking in economic impacts than in social impacts.

Although the impact subindex is a work in progress, tentative conclusions can be drawn from it. The results of NRI seem to reflect a trend whereby ICT impact in the region is generally driven by Government initiatives and services.

II. SELECTED E-SERVICES AND THEIR IMPACT IN THE ARAB REGION

A. E-GOVERNMENT AND POSTAL E-SERVICES

1. *E-government in the Arab region*

In its 2012 E-Government Survey, DESA attempted to "take into account Member States' efforts with regard to the rising importance of a whole-of-government approach and integrated online service delivery, as well as the effectiveness of multichannel services and how these approaches will help advance economic efficiency and effectiveness in government service delivery with people's participation".[23] Both the e-government development index (EGDI) and the e-participation index are computed from the results of the E-Government Survey.

Since 2010, the majority of ESCWA member countries have improved their average scores and individual rankings on EGDI (table 6). Dramatic improvements have been made in most GCC countries (box 2). Though no ESCWA member country was counted among the top 20, Bahrain, Saudi Arabia and the United Arab Emirates were included among the emerging leaders in e-government development.

TABLE 6. EGDI SCORES AND GLOBAL RANKINGS OF SELECTED ESCWA MEMBER COUNTRIES

Country	2010		2012	
	EGDI score	Ranking (183 countries)	EGDI score	Ranking (190 countries)
Bahrain	0.7363	13	0.6946	36
Egypt	0.4518	86	0.4611	107
Iraq	0.2996	136	0.3409	137
Jordan	0.5278	51	0.4884	98
Kuwait	0.5290	50	0.5960	63
Lebanon	0.4388	93	0.5139	87
Morocco	0.3287	126	0.4209	120
Oman	0.4576	82	0.5944	64
Qatar	0.4928	62	0.6405	48
Saudi Arabia	0.5142	58	0.6658	41
Syrian Arab Republic	0.3103	133	0.3705	128
Sudan	0.2542	154	0.2610	165
Tunisia	0.4826	66	0.4833	103
United Arab Emirates	0.5349	49	0.7344	28
Yemen	0.2154	164	0.2472	167
Average/Ranking	0.4383	88	0.5009	93

Source: DESA, 2010, p. 71; and DESA, 2012, pp. 126-127.

The United Arab Emirates gained an impressive 21 places in the global ranking between 2010 and 2012, and surpassed Bahrain for the number one spot in the region. At the time of the 2010 E-Government Survey, the United Arab Emirates lacked a unified federal e-government portal and its EGDI score reflected that deficit. From 2010 to 2012, Oman, Saudi Arabia and Qatar also significantly improved their overall ranking by 18, 17 and 14 places respectively. Bahrain fell by 26 places in the overall ranking but nevertheless achieved second place among selected ESCWA member countries.

Jordan fell by a remarkable 47 places in the overall ranking, and Egypt and Kuwait also fell significantly by 21 and 13 places respectively. For the bottom five member countries, the rankings of both the Syrian Arab Republic and Lebanon improved by five places each, while the Sudan fell by 10 places and there was no significant change for Yemen and Iraq.

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[23] DESA, 2012, p. 38.

The scores on EGDI are calculated by an arithmetic mean of three component indices: online service; telecommunication; and human capital. The online services index is divided into four development stages, namely: emerging (stage I), enhanced (stage II), transactional (stage III) and connected (stage IV). Table 7 shows the 2010 and 2012 scores of selected ESCWA member countries on the online services index.

TABLE 7. ONLINE SERVICES INDEX SCORES OF SELECTED ESCWA MEMBER COUNTRIES

	2010					2012				
Country	Overall score	Stage I (16.9%)	Stage II (28.8%)	Stage III (41.9%)	Stage IV (12.4%)	Overall score	Stage I (7%)	Stage II (24%)	Stage III (30%)	Stage IV (39%)
Bahrain	57%	93	62	43	46	75%	100	76	81	67
Egypt	41%	81	44	29	24	53%	100	64	27	57
Iraq	12%	35	11	3	12	25%	75	33	6	26
Jordan	42%	74	38	34	34	34%	83	48	31	20
Kuwait	36%	60	34	34	14	51%	100	62	48	38
Lebanon	21%	47	25	9	14	42%	100	62	17	38
Morocco	19%	..	..	..	..	47%	100	62	29	43
Oman	29%	69	28	15	20	58%	92	60	77	67
Qatar	22%	40	18	22	6	65%	83	64	62	64
Saudi Arabia	24%	68	22	13	10	70%	92	60	77	67
Sudan	12%	34	14	1	16	22%	67	31	10	19
Syrian Arab Republic	3%	10	4	0	2	20%	58	31	4	19
Tunisia	38%	76	34	30	20	42%	92	45	29	41
United Arab Emirates	20%	68	22	1	10	75%	100	74	83	67
Yemen	4%	13	3	0	4	15%	33	7	8	23
Average	25%					46%				

Source: DESA, 2010, pp. 76 and 116-177; and DESA, 2012, pp. 128-129.

Note: Two dots (..) indicate that data are not available.

Changes in the scores of ESCWA member countries on the online services index between 2010 and 2012 can be partially explained by the particular efforts of some countries. However, major modifications that were made to the methodology of the survey between the 2010 and 2012 editions also played a role. The column heads of table 7 include the weight allocated to each of the four development stages in the computation of the global accomplishment rate. The modifications reduced the weight of stages I, II and III and increased the weight of stage IV. Stages III and IV are supposedly more sophisticated and hence more difficult to implement.[24]

Data for the EGDI subindices related to telecommunication and human capital are taken from outside sources. The core ICT indicators are the primary source for data that feed into the telecommunication index, specifically the rates per 100 inhabitants for Internet users, fixed telephony subscribers, mobile cellular subscribers, fixed broadband subscribers and fixed Internet subscribers. Data on the adult literacy rate and the combined enrolment rate for primary, secondary and tertiary education feed into the human capital index and are drawn from UNESCO, the World Bank, and the Human Development Report of the United Nations Development Programme.

Whereas EGDI measures the inherent sophistication and organizational impacts of e-government services, the e-participation index "presents valuable indications on the level of usage. Though only from the perspective of potential – not actual – use by citizens".[25]

Scores on the e-participation index from 2010 and 2012 reveal significant value changes (table 8). Unsurprisingly, the same countries which topped the regional and global ranking in EGDI also appear near the top of the e-participation index. From 2010 to 2012, the average score for the region nearly doubled.

TABLE 8. E-PARTICIPATION INDEX SCORES AND GLOBAL RANKINGS
OF SELECTED ESCWA MEMBER COUNTRIES

Country	2010		2012	
	Score	Ranking (179 countries)	Score	Ranking (190 countries)
Bahrain	0.6714	11	0.6579	8
Egypt	0.2857	42	0.6842	7
Iraq	0.0429	135	0.1053	28
Jordan	0.2857	42	0.1053	28
Kuwait	0.2286	53	0.1842	25
Lebanon	0.2714	45	0.3158	20
Morocco	0.1286	86	0.3947	17
Oman	0.1571	76	0.4474	16
Qatar	0.1286	86	0.6316	9
Saudi Arabia	0.1000	102	0.6316	9
Syrian Arab Republic	0.0143	157	0.0263	31
Sudan	0.1000	102	0.0789	29
Tunisia	0.3000	39	0.3684	18
United Arab Emirates	0.1286	86	0.7368	6
Yemen	0.0429	135	0.0000	32
Average	0.1924		0.3579	

Source: DESA, 2010, p. 124; and DESA, 2012, p. 134.

Note: In 2010, countries were ranked 1 (best)-157. In 2012, countries were ranked 1 (best)-32.

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[24] Mean scores of the top 25 countries for stages III and IV nearly doubled, increasing from 38 (14) and 43 (11.5) per cent in 2010 to 76 (9) and 70 (9.5) per cent in 2012. Values between parentheses are rounded standard deviations.

[25] DESA, 2012, p. 103.

Improvement in the region was exhibited particularly in the following five countries: Egypt, Oman, Qatar, Saudi Arabia and the United Arab Emirates. Although Bahrain scored slightly lower in 2012 than in 2010, it is still among the top performers in the region. By contrast, Lebanon and Tunisia each scored slightly higher in 2012 than in 2010, but other countries in the region improved at a much faster pace and Tunisia and Lebanon are now ranked in the bottom half of the region. Jordan and Kuwait are also ranked in the bottom half of the region, with scores that fell significantly from 2010 to 2012. There was little change for the four lowest ranking countries in the region (Iraq, the Sudan, the Syrian Arab Republic and Yemen).

Contrary to EGDI, where there was a dramatic increase in the scores of many countries on the online services index from 2010 to 2012, scores on the e-participation index have generally remained stable in recent years (box 3). The general stability of the e-participation index seems to enhance the credibility of the significant increases in the scores achieved by some countries.

Box 3. Evolution of the e-participation index: E-Government Surveys of 2010 and 2012

An incremental ranking system was used to organize the scores on the e-participation index in 2010. Although that system was not used again in 2012, the methodology can be applied to the 2012 results. The table below shows the distribution of the e-participation index scores for 2010 and 2012.

E-participation index scores		Group I 0.7 to 1.0	Group II 0.5 to 0.7	Group III 0.3 to 0.5	Group IV 0.1 to 0.3	Group V 0 to 0.1	Total
Number of countries (number of ranks)	2010 survey	8 (6)	14 (11)	19 (9)	68 (14)	70 (6)	179 (46)
	2012 survey	14 (6)	19 (8)	19 (6)	56 (8)	84 (4)	190 (32)

The table shows that the distribution of scores changed little between the two surveys. Even with the addition of 11 more countries in the 2012 survey, the global distribution of scores over value ranges remained stable, and a significant majority of countries (two thirds) are still within the two lowest groups.

For 2012, the United Arab Emirates was the only country in the region in group I. Four ESCWA member countries (Bahrain, Egypt, Qatar and Saudi Arabia) are in group II. Oman and Lebanon are in group III, while the remaining ESCWA member countries are distributed within groups IV and V.

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Source: Compiled by ESCWA based on DESA, 2010, p. 124; and DESA, 2012, p. 134.

However, conclusions drawn from EGDI and e-participation index scores should be viewed as tentative. Notwithstanding anecdotal evidence that substantiate the dramatic improvement of e-government services in some countries and their adoption of key concepts highlighted by the 2012 E-Government Survey (such as whole-of-Government approach and multichannel service delivery), robust conclusions require longer time series with identical, if not at least comparable, survey methodologies.

Looking beyond EGDI and the e-participation index, other measurement systems also attempt to quantify the impact of e-services. Currently, additional statistical data are needed for the ICT in government portion of the core ICT indicators (particularly EG7 and others)[26] to shed light on the real levels of use and impact.

In addition, some indicators of NRI relate to government usage of ICT. The index confirms the dramatic improvements of e-government services in the region. Two indicators of the eighth pillar are drawn from the WEF Executive Opinion Survey, while the third is sourced from the normalized country score on the online service index of EGDI. The social impact pillar of NRI also includes one indicator related to Government, which is also drawn from the Executive Opinion Survey. Scores and rankings of ESCWA member countries for the three NRI indicators based on the Executive Opinion Survey that relate to Government and ICT are summarized in table 9.

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[26] The Partnership task group on e-government proposed 15 e-government indicators, including four dedicated to e-government transformation. Currently, only seven of those indicators (but none related to transformation) have been included as core ICT indicators.

Country	Global ranking	Government prioritization of ICT		Importance of ICT to Government vision		ICT use and Government efficiency	
		Score	Ranking	Score	Ranking	Score	Ranking
Bahrain	27	6.0	7	5.4	6	5.6	8
Qatar	28	6.0	8	5.7	2	6.0	2
United Arab Emirates	30	5.9	11	5.4	7	5.8	4
Saudi Arabia	34	5.7	14	5.5	5	5.5	13
Oman	40	5.5	19	5.2	11	5.3	16
Jordan	47	5.0	47	4.2	51	4.5	48
Tunisia	50	5.5	21	4.6	25	4.8	36
Kuwait	62	3.9	114	3.2	109	3.7	102
Egypt	79	4.6	71	3.5	96	3.9	87
Morocco	91	4.6	73	4.2	52	4.0	83
Lebanon	95	2.6	142	2.2	141	2.5	140
Syrian Arab Republic	129	4.2	95	3.5	97	3.3	123
Yemen	141	2.9	139	2.0	142	2.3	142
Average		4.8		4.2		4.4	

Source: WEF, 2012a.

The first striking observation concerns the values and global rankings of the five leading countries, which are all GCC members. The values speak for themselves and support the conclusion that GCC countries excel in areas measured by these indicators. Their performance in those areas ensured their advanced overall scores and rankings on the index, and is consistent with their scores on the 2012 EGDI and the e-performance index.

By contrast, the scores of Kuwait and Lebanon on ICT and government are low relative to their overall NRI ranking. Egypt achieved scores a notch lower than its overall ranking, which contrasted with its high score on the e-participation index. In the areas of Government ICT prioritization and ICT vision, the Syrian Arab Republic achieved a higher ranking than it did overall, but its scores on the indicator of ICT use and government efficiency and the DESA indices show that implementation was weak. The global ranking of Jordan is consistent with its scores on indicators of ICT and government, yet those values are inconsistent with its low scores on the 2012 EGDI and e-participation index.

One especially important observation in the particular context of government-related indicators is that the Executive Opinion Survey only targeted the business community. Thus, the indicators based on the survey should not be understood as representative of a global opinion regarding the attitude of Governments towards ICT and its potential benefits to society.

(a) *Key elements of a successful e-government programme*

This section applies the methodology of the 2012 E-Government Survey to the e-government achievements of selected ESCWA member countries. The survey highlights key elements of successful e-government initiatives, namely:

- Whole-of-Government approach;
- Multichannel service delivery;
- Reaching out to vulnerable populations;
- Expanding usage.

While this section will not provide a full summary of e-government approaches in the Arab region, the elements outlined above provide a framework for analysis that will shed light on successful approaches.

(i) *Whole-of-Government approach*

The "whole-of-Government" is a concept that goes beyond e-government per se. It aims to make the entire Government look as a single coherent body from the perspective of users (such as citizens, businesses, visitors, peer Government entities and so on). In addition, the approach seeks to ensure that government services are organized for the users and around their needs. The whole-of-Government approach is an essential component of a programme to improve interoperability between government agencies, provide better services for citizens and reduce costs.

The 2012 E-Government Survey provides a detailed outline of the characteristics of the whole-of-Government approach. It includes the following:

- The designation of a national coordinating authority with leadership such as a Chief Information Officer (CIO) with real authority across departmental and ministerial boundaries to facilitate strategy and decision-making regarding national ICT architecture, and assist agencies in their efforts to run more effective and efficient programmes;

- The ability of government systems to communicate with one another, which is sometimes referred to as interoperability. Two indicators to measure the degree of interoperability of government systems are an identification management system that enables the Government to positively identify an individual citizen in the course of an online transaction (the system might be integrated with an electronic identification card database and/or tied to the citizen's mobile phone), and an online tracking system that permits citizens to check on the status of online transactions;

- The presence of a single government portal linked to all government services, which is sometimes referred to as online service integration. The majority of countries (135) now offer such a "one-stop-shop", sometimes with links to specific ministry or administration websites.[27]

The 2012 E-Government Survey identified top scoring countries in all aspects of whole-of-Government implementation, including five countries from the region, namely: Bahrain, Egypt, Oman, Saudi Arabia and the United Arab Emirates. Boxes 4 and 5 provide examples of whole-of-Government features implemented by selected ESCWA member countries.

Box 4. Bahrain: High-level commitment to e-government and identified CIO function

The Supreme Committee for Information and Communication Technology aims to implement the directives of the Ministry of Cabinet Affairs in line with e-government initiatives and to devise comprehensive strategies and plans to develop the ICT field across the country. The Supreme Committee is headed by the Deputy Prime Minister. Ten other ministers are members of the committee including two deputy prime ministers and ministers for such key areas as the interior, finance and education.

The e-Government Authority was established by Royal Decree 69 in 2007 and aims to coordinate and execute e-Government initiatives with the Supreme Committee. The Authority proposes overall policies and appropriate legislation to the Supreme Committee for approval, and oversees the implementation and execution of the programmes. This includes facilitating communication and services between all Government entities, introducing new channels for e-government services, and offering technical and knowledge-based support to the ministries and other Government entities. Within a period of three years, the Authority began offering 200 basic governmental services electronically via various communication channels to all citizens, residents, visitors and businesses of Bahrain. The Authority reports to the Ministry of Cabinet Affairs.

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Source: Bahrain, 2010, pp. 8 and 11.

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[27] DESA, 2012, pp. 56-59.

(ii)   *Multichannel service delivery*

The E-Government Survey defines "multichannel service delivery" as the provision of public services by various means in an integrated and coordinated way. There are two types of delivery channels: traditional, which can include face-to-face contact, telephone or postal mail; and digital channels, which encompass websites, mobile services, and public Internet access points such as kiosks.

The survey further highlighted that multichannel service delivery can be complemented by human interaction and networks. The intermediaries can be from the public or private sectors, or from a social enterprise or community support group.

Furthermore, the survey stated that only 19 countries were delivering services through all channels, and among them were the GCC countries with the exception of Saudi Arabia, which is nevertheless highly ranked. It is also notable, though unsurprising, that among the digital channels, websites are used by all 190 surveyed countries, yet only 60 provide mobile phone access and only 32 countries provide public kiosks.

Regarding mobile services, the survey identified four delivery channels: text message notification, specialized government sites for mobile devices, mobile apps, and payment using mobile phones. None of these channels is available in more than 33 countries; however it is interesting to note that Bahrain, Qatar and Saudi Arabia are among the very few countries (alongside with the Republic of Korea, Singapore, the United Kingdom and the United States) providing access to e-government services through all four mobile channels.

(iii)   *Reaching out to vulnerable populations*

The E-Government Survey discusses the issue of providing support to vulnerable populations. Some the criteria assessed by the survey are as follows:

    a.   The inclusion of at least one vulnerable group on the national website. Vulnerable groups are identified as the poor, the elderly, the illiterate, the blind, immigrants, women and youth. Among ESCWA member countries, only Kuwait and Oman were mentioned. Kuwait provides services to the disabled while Oman offers a specific section related to the retired and elderly (who may be disabled);

    b.   The provision of government websites in more than one language. In the region, there are nine countries with portals that support Arabic and English: Bahrain, Egypt, Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. The government portal of Lebanon supports Arabic, English and French. In Palestine, the Sudan, the Syrian Arab Republic and Yemen, government portals are only available in Arabic;

    c.   The inclusion of accessibility features on Government websites. To assist the disabled, e-Government services may include the following:

i. For the hearing impaired, websites can provide videos of sign language. Only 7 countries world-wide offer such a feature;

ii. Websites can provide audio clips of the text that appears on the page. Currently, 13 countries offer that service including Bahrain, Oman and the United Arab Emirates;

iii. Websites can be designed to allow users to configure font size, font colour and background colour. This is by far the most widely available accessibility feature, but only 61 countries offer it.

As an illustration of services offered to persons with disabilities, all the web pages of "Omanuna", the e-government portal of Oman, have special features which include a headphone icon that links to an audio recording of the page content, and an icon to enlarge the displayed text (see figure VI).

Figure VI. Oman: E-government portal

Source: http://www.oman.om.
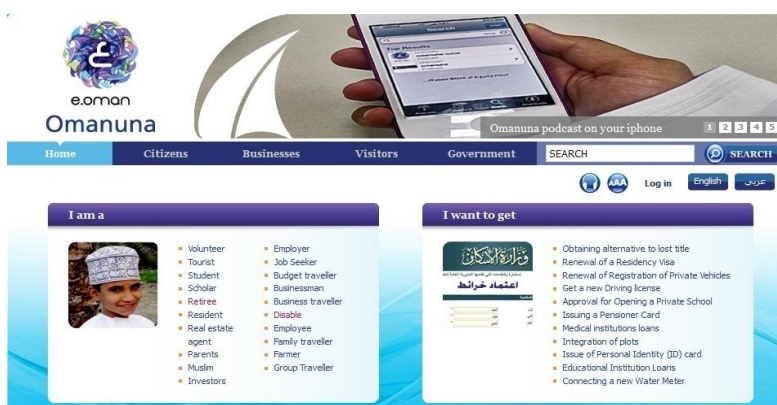
(iv) *Expanding usage*

The E-Government Survey notes the lack of comprehensive data to assess the use of e-services by citizens at a global level. Yet, existing studies point to low use in the Arab region (box 6).

Box 6. E-government awareness and use in selected Arab countries

In Jordan, researchers conducted a survey and group discussions with 1,200 students from different departments of Al-Ahliyya Amman University. Although university students are not representative of the whole Jordanian population, the survey results are still useful. They reveal that a large majority (75 per cent) of students do not know about e-government services or website and 85 per cent have never visited the Government website. The top services used are by far information services like checking traffic tickets (81 per cent) or weather information (51 per cent). The students expressed concerns about the security of transactional services and giving information over the Internet. According to the author, Jordanians use the Internet mainly for entertainment.

In Madinah City, Saudi Arabia, another survey was conducted in two rounds in 2008 and 2009, and interviewed officials who ran the e-government service programme and managers of "e-offices" that provide citizens with support and access online services. The main finding of the study was that security concerns and lack of confidence in sharing private information over the Internet are major impediments to the use of e-government services. Additionally, not all government services were available on the main portal. Information exchange between different government agencies is low and some employees are resistant to change. The study focused on the role of e-office staff members who train citizens to use e-government services. Interviews with e-office managers revealed that no individual training is offered to citizens on the use of e-services. Furthermore, visitors to e-offices have a low level of trust in technology and most of them do not have Internet access.

Sources: Al-Jaghoub et al., 2010, p. 5; Al-Sobhi et al., 2010.

Many countries and regions have been slow to adopt e-government services. For instance, a report prepared for the European Commission illustrated the gap between the availability of e-government services in 27 European countries and their use (figure VII). Although transaction services are available in some Arab countries, anecdotal evidence indicates that citizens use government portals primarily to obtain information.

**Figure VII. Availability and use of selected e-Government services
in 27 European countries**
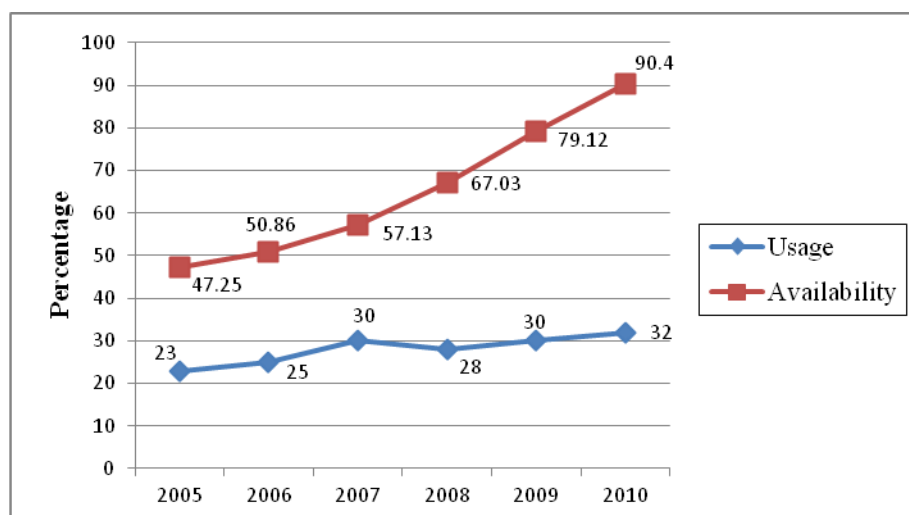
Source: DESA, 2012, p. 103.

Note: Use represents the percentage of individuals aged 16 to 74 who have used the internet for a benchmark of 20 basic services.

The E-Government Survey identifies challenges, recent efforts, and opportunities to improve citizen participation and use of e-government services, including the following:

a. Improving trust and convenience in the use of e-government services could be accomplished through a clear privacy statement and/or the indication of security features. Among ESCWA member countries, 10 e-government portals provide privacy statements on their main page.[28] Only Bahrain clearly advertises the measures undertaken and certification obtained to ensure the confidentiality, privacy and security of its government portal;

b. Providing users with the ability to tag, assess and rank content is one way for Governments to collect feedback on the e-government portal. Governments can also publicize basic data on citizen use of e-government services. In addition, GCC countries, Egypt and Iraq regularly post polls and surveys on their portals to collect citizen feedback. Some allow for more advanced features such as sending suggestions and more specific observations on the portal content and its design;

c. Integrating social media into e-government portals may be one way to improve participation and reach out to citizens. This might include a "follow-us on Facebook or Twitter" statement. Some 78 countries worldwide offer such a service, and among them are Bahrain, Iraq, Oman, Qatar, Saudi Arabia, the Sudan and the United Arab Emirates. Governments can also provide information through instant messaging or chat rooms. Only 14 countries worldwide were identified as offering such features, including Qatar, Saudi Arabia and the United Arab Emirates;

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[28] Iraq, Palestine, the Syrian Arab Republic and the Sudan do not provide such a statement. In Qatar, the privacy statement is embedded within a more general "terms of use" statement.

d. Offering access to open government data, or raw data used or produced by the Government, can also improve transparency and the use of e-government portals. Eventually open data may work in both directions whereby users of open data could contribute to the production and improvement of data especially in fields of their interest and assist the Government in gathering better information from volunteers in cases of emergencies (e.g., observing pandemics or reporting infrastructure problems). Bahrain, Saudi Arabia and the United Arab Emirates have made public data available on their websites.[29]

2. *Postal e-services in the Arab region*

Postal services are not, strictly speaking, part of Government; though in many countries they remain publicly administered and their personnel have civil servant status. Moreover, despite their transformation in many countries into private companies (in part or whole), they are still considered an essential public service, thanks to the nature of their core mission and their large network.

In 2012, the Universal Postal Union (UPU) surveyed its 191 member countries to measure the development of electronic postal services. The survey concerned 55 e-services classified into four groups: e-Post, e-Finance, e-Commerce and e-Government. Among the 94 countries that responded to the survey were 10 member countries of ESCWA. Their responses are summarized in annex tables A1.5 and A1.6.

Few of the countries that participated in the survey have implemented e-government services through the posts. Thus, it is striking that two Arab countries, namely Qatar and Tunisia, are among the very few developing countries that offer a comprehensive set of e-Government services through the post. UPU published an analysis of the survey results and a postal e-services (PES) index. E-Government was excluded from the index owing to a low response rate. Table 10 provides the PES index score, global ranking and other rankings of participating ESCWA member countries.

TABLE 10. SELECTED ESCWA MEMBER COUNTRIES BY PES SCORE AND RANKING

Country	PES index		E-Post services ranking	E-Finance services ranking	E-Commerce services ranking
	Score	Ranking			
Qatar	2.98	5	3	10	17
Tunisia	2.85	6	15	5	8
Saudi Arabia	0.59	27	18	40	29
Egypt	0.23	31	36	13	84
Jordan	0.19	33	47	18	48
United Arab Emirates	0.13	34	39	15	92
Lebanon	-0.82	62	44	64	46
Kuwait	-1.22	72	85	42	63
Syrian Arab Republic	-1.69	92	86	80	86
Iraq	-1.69	93	91	78	62
Average	0.16		46	37	54

Source: UPU, 2012, pp. 32-33.

Note: Rankings are 1 (best)-94.

E-Post services concern the core mission of postal services and impact other e-services, particularly e-Commerce and e-Government. A reliable and secure postal system is needed for the delivery of goods purchased online. E-Finance represents the online provision of financial services offered by the post, especially for the benefit of vulnerable and underbanked populations. Even in developed countries, postal savings accounts provide access to bank services for vulnerable populations including the poor, the elderly and youth with limited resources. Posts may become direct actors in the development of e-commerce leveraging on the improvement brought by e-Post services to their core mission and their image as a trusted third party. An example of such an initiative in Saudi Arabia is provided in box 7.

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[29] DESA, 2012, pp. 105-111.

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Box 7. The Saudi Post E-Mall

Introduced in 2009, the E-Mall (www.e-mall.com.sa) helps Saudi merchants get into online retail, while also helping to build package volumes for Saudi Post delivery services. The E-Mall includes a variety of individual online stores, an electronic payment system and integrated doorstep delivery. The E-Mall is accessible on mobile devices, with an app that allows browsing and purchasing.

Saudis spent some US$1.3 million (SAR 5 million) on Saudi products in 2011 through the E-Mall. There are 70 subscribed stores showing more than 5,000 products. Although the Mall offers many imported items (electronics, fragrances, clothing, and so on) it is also offers local handicrafts and traditional food within the "Souq El-Qaria" (the village's mall). Beyond encouraging the market for local products made in remote areas, some of these handicrafts are offered by charities and not-for-profit organizations.

People living far from fancy malls in major cities who may lack Internet access can visit any nearby post office from which they can access the E-Mall. Saudi Post personnel can assist customers if need be. Orders are shipped the next day. The Wasel addressing system and the complete transformation of Saudi Post that it entailed made it possible to implement the E-Mall project.

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Sources: IMRG International, 2011, p. 9; and http://www.arabnews.com/e-mall-brings-products-villagers-need-post-office.

Note: For more on the Wasel addressing system, see box 17.

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B. E-COMMERCE AND USE OF ICT BY BUSINESSES

1. *E-Commerce in the Arab region*

E-commerce encompasses numerous types of interactions: between businesses, from businesses to their consumers, from business to Government, and transactions between consumers. Box 8 explains the evolution of the OECD definition of e-commerce since 2001.

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Box 8. What is E-commerce?

In 2001, OECD introduced two definitions for e-commerce. Defined broadly, e-commerce is an "electronic transaction… conducted over computer mediated networks" and defined narrowly, it is "an Internet transaction… where services are ordered over the Internet". In 2009, the definitions were combined. "An e-commerce transaction is the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted online. An e-commerce transaction can be between enterprises, households, individuals, governments, and other public or private organisations".

The definition "includes orders made in web pages, extranet or electronic data interchange (EDI). The type is defined by the method of making the order", but "excludes orders made by telephone calls, facsimile or manually typed e-mail". It is network neutral because "the two-tiered previous definition has resulted in less international harmonization". Furthermore, it is flexible enough to include "new forms of e-commerce" that "might become of interest and will need to be considered in the future".

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Source: OECD, 2011, p. 72.

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There are very few official statistics on e-commerce from developing countries in general, and ESCWA member countries are no exception. Official statistics (essentially from developed countries) and some marketing studies carried out by private entities shed light on the global volumes of e-commerce in general and cover selected countries from the region (box 9).

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Box 9. Global e-commerce in figures

According to research carried out by the Interactive Media in Retail Group (IMRG), the volume of global business to consumer e-commerce reached some US$950 billion (€690 billion) in 2011. In terms of country rankings, the United States comes first followed by the United Kingdom and Japan. Meanwhile, the volume of e-commerce in China increased by 130 per cent in a single year.

Some official statistics from developed countries shed light on the volume of business to consumer e-commerce transactions and the relative importance of those transactions as a share of retail sales. Those statistics also show the relative importance of business to business transactions. For instance, the United States Census Bureau publishes a quarterly e-commerce report providing the volume of business to consumer e-commerce as a share of total retail transactions. The data show that business to consumer transactions grew from 0.6 per cent of total retail in the last quarter of 1999 to 5.4 per cent in the last quarter of 2012, representing a volume of nearly US$59.5 billion.[*] This represents a 9-fold increase in 12 years with a 20 per cent compound annual growth rate over the period. However, the current share of business to consumer e-commerce within global retail is still below a double-digit figure even in the United States.

Another important source of data from the United States Census Bureau is the yearly e-stats report. The report, though delayed when compared to the quarterly report (2010 data and revised 2009 data became available in 2012), provides a more comprehensive picture of e-commerce including business to business transactions and other aspects of business to consumer transactions. The latest e-stats report showed that, in 2010, business to consumer transactions accounted for only 10.3 per cent of the e-commerce in the United States. The remaining volume of e-commerce transactions were between businesses, typically carried out over electronic data interchange (EDI), either supported by special networks or the Internet. For the year 2010, the share of business to business e-commerce within total business to business transactions was a significant 35 per cent, whereas for the same year, business to consumer e-commerce accounted for only 2.8 per cent of the total business to consumer transactions.

In 2011, the multinational financial services corporation, Visa, contracted with IMRG to study e-commerce in GCC countries. The report showed that business to consumer e-commerce reached US$3.3 billion in 2010 and estimated that it was likely grow to US$15 billion by 2015.

Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	United Arab Emirates
Retail sales	5 400	46 000	18 000	10 000	76 000	116 000
Business to consumer retail e-commerce	175	280	70	375	520	1 900
E-commerce as a percentage of retail sales	3.24	0.6	0.39	3.75	0.68	1.63

Note: Retail sales figures are in millions of United States dollars. All figures are estimates for year 2010.

In terms of volume, the United Arab Emirates is the region's leader, accounting for US$1.9 billion of the total US$3.3 billion; the latter value, though, accounts for only 1.22 per cent of the estimated combined retail sales in GCC countries. A closer examination of the percentages of each country reveals that, though the United Arab Emirates is the leader in terms of volume, in Qatar and Bahrain business to consumer e-commerce as a share of retail sales is more than double the United Arab Emirates' value. In the three remaining GCC countries, its share is well under 1 per cent.

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Source: IMRG International, 2011.

[*] Data are preliminary. The sum of the volumes of the last four quarters amounts to a little more than US$200 billion on a moving yearly average, indicating that the United States accounts for more than 20 per cent of the global volume estimated by IMRG.

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The following paragraphs will examine some qualitative aspects of business to consumer e-commerce transactions in the Arab region on the basis of available surveys. Subsequently, business adoption of ICT and ICT impact on the economy will be discussed on the basis of core ICT indicators and NRI indicators.

(a)   *E-Commerce consumer behaviour in selected ESCWA member countries*

The multinational financial services corporation, MasterCard, routinely carries out consumer research on the global scale. Recently results of consumer surveys provide insight into seven countries from the region: Egypt, Lebanon and all GCC countries except Bahrain. Five hundred consumers in each country were surveyed. All respondents accessed the Internet at least once a week and were 'banked' individuals, representative of the age and gender population of that country. The participants were asked if they had shopped online. Those who had access to the Internet via mobile devices were asked if they had used their device or planned to use it in the next few months to shop online. The responses are summarized in table 11.

Unsurprisingly, percentages are higher in GCC countries (barring Oman) than in Lebanon and Egypt. Differences of income per capita and Internet penetration levels may account for the gap. Nevertheless, the composition of the sample may have mitigated differences of income between countries as respondents were likely among the relatively high-income population in each country. The study did not provide any data on the amount spent per transaction. The findings of the MasterCard study mostly corroborate earlier findings related to e-commerce prevalence. The only significant difference was in the prevalence of e-commerce in Egypt.

TABLE 11. SHOPPING BEHAVIOUR OF MASTERCARD HOLDERS
IN SELECTED ESCWA MEMBER COUNTRIES
(*Percentage*)

Country	Respondents who shop online	Respondents who used their mobile phone for shopping	Respondents who plan to use their mobile phone for shopping
Egypt	31	9	30
Kuwait	47	23	15
Lebanon	31	14	13
Oman	25	3	3
Qatar	49	6	11
Saudi Arabia	46	15	26
United Arab Emirates	42	12	15

Source: Compiled by ESCWA based on data available from www.masterintelligence.com.

The use of mobile phones for conducting e-commerce is still low, with Kuwait having the highest figure of 23 per cent. Interestingly, only 15 per cent of respondents in Kuwait reported that they planned to use their mobile phone for shopping in the future. In most other countries, a greater number of respondents planned to use their mobile phone for shopping than had already done so.

The main items purchased online, irrespective of the channel used, in each of the seven surveyed countries, are summarized in table 12.

TABLE 12. TOP E-COMMERCE SPENDING CATEGORIES OF MASTERCARD HOLDERS
IN SELECTED ESCWA MEMBER COUNTRIES
(*Percentage of respondents*)

Country	Airline ticketing	Apps	Software	Coupon/ deal sites	Music download	Medicine/ pharmaceuticals	Gaming/ virtual world	Others
Egypt	44	63	..	..	52	..	..	65[b]
Kuwait	61	..	59	65	..	..	60	..
Lebanon	68	68	..	100	77	..	..	..
Oman	69	78	..	98	..	..	..	67[b]
Qatar	70	..	..	..	69	64	..	66[a]
Saudi Arabia	50	..	57	..	64	..	48	..
United Arab Emirates	78	76	..	68	64	..	..	..

Source: Compiled by ESCWA based on data available from www.masterintelligence.com.

Notes: a/ tickets for music concerts/performing arts.
         b/ hotel reservation.
         Two dots (..) indicate that data are not available.

Airline ticketing was quoted by all respondents, followed by music download in five of the seven countries. Apps and coupon/deal sites follow with four countries. It is difficult here to draw absolute conclusions, but available data clearly show that online shoppers are relatively young (gaming and music downloads), upper-middle class (airlines ticketing and hotels), and technophiles (apps and software). The fact that mobile apps are quoted in four countries is significant for the future evolution of the mobile apps market.

Finally, survey respondents were asked to rate the importance of a range of factors related to the consumer experience of e-commerce transactions. The results for each country are summarized in table 13.

TABLE 13. TOP FACTORS IMPACTING ONLINE SHOPPING HABITS OF MASTERCARD HOLDERS
IN SELECTED ESCWA MEMBER COUNTRIES
(*Percentage of respondents*)

Country	Price/value of items	Secure payment facility	Convenient payment methods	Website reputation	User friendly website	Speed of transactions	Promotional offers
Egypt	83	78	80	82	..	..	79
Kuwait	76	76	77	..	77	..	..
Lebanon	56	..	57	57	..	58	..
Oman	82	88	80	84	..	80	..
Qatar	88	88	87	..	..	84	..
Saudi Arabia	72	72	70	73	..	72	..
United Arab Emirates	85	85	82	81	79	..	..

Source: Compiled by ESCWA based on data available from www.masterintelligence.com.

Note: Two dots (..) indicate that data are not available.

Unsurprisingly price/value of items and convenient payment methods were highly ranked by all respondents. The results show that security concerns are a major issue. Secure payment facilities and website reputation were also ranked among the most important factors.[30] Four countries ranked speed of transactions as significant.

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[30] Many respondents declared that they do not feel secure shopping online. The responses by country ranged from 37 per cent (Oman) to 61 per cent (Kuwait).

In 2012, the Arab Advisors Group (AAG) published E-commerce Portals in the Arab World, an analysis of 114 portals that provided detailed insight on e-commerce and online behaviour in Egypt, Jordan and Saudi Arabia. The portals were selected from a list of most popular sites in each country and through search engines. Egypt, Jordan and Lebanon host the headquarters of more than 40 per cent of the 114 surveyed portals. Only 28 of them receive more than 1,000 visitors per day, 10 receive more than 10,000 visitors, and only two cross the threshold of more than 100,000 visitors per day (souq.com and darendeal.com). The survey reported a high turnover rate of portals. Since the 2010 survey that covered 102 portals, 28 have gone out of business and an additional 40 new ones have been set up. Almost all of the surveyed portals (106) have their domain names registered under the ".com" generic top level domain (TLD); while only six are registered under a national country code TLD and only two are under the ".net" TLD.

Box 10. SADAD payment system in Saudi Arabia

SADAD is the most widely used payment system in Saudi Arabia, allowing clients of 14 Saudi banks to make payments to 109 entities from the private and public sectors.

The system originated from a legal obligation of banks operating in Saudi Arabia to accept payment at their branches for utility bills. Eventually (in the early 2000), banks began to establish a direct link with every billing entity including the Government. This was a fully meshed and costly link between every bank and every biller hampering the inclusion of new billers.

SADAD was designed to link any bank to any billing entity, allowing banking clients to use their account to simply and securely pay their bills. The number of billers grew impressively from only 11 in early 2007 to 109 in 2012; the main billers are still dominated by government services (53, including municipalities). Other billers include financial and insurance services (17), telecommunications and utilities (14), other services (13), technology and media, including Internet service providers (9), universities (8) and transportation services (3).

SADAD offers four payment channels to end users: at the branch, through ATM machines, by phone and though online banking. It is significant that the use of online banking grew from barely 1 per cent in 2003 to 40 per cent in 2011, and payments at branches decreased during the same period from 73 per cent to only 3 per cent. In 2011, SADAD processed nearly 124 million transactions, accounting for US$28.58 billion (SAR 107 billion). This indicates how SADAD, beyond its core mission as a payment platform, contributed to the emergence of an online payment culture in Saudi Arabia.

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Source: Alshouiby, 2012.

The analysis also explored consumer behaviour in Egypt, Jordan and Lebanon, and focused on three issues: methods of payment, type of products purchased and frequency of online purchase. It is notable that the survey did not cover the average value of purchases. Credit cards are the preferred payment method in all countries except in Saudi Arabia, where bank account transfers are most preferred (likely due to the availability and maturity of SADAD, as described in box 10), followed by credit cards. Internet shopping cards provided by banks are another popular payment method in Egypt and Jordan. It is also significant to note that, although more than half of the surveyed sites accept cash on delivery, this method of payment was not mentioned by the survey respondents.

It is also useful to note the importance of group buying sites like "GoNabit" and "Cobone" in the region as a lever to bring in new e-commerce users. The importance of group buying/coupon sites was highlighted by the MasterCard survey but the traffic generated by these sites is still below that of the best e-commerce portals as identified by the AAG survey (though they might benefit from a much higher buyer/visitor ratio).[31]

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[31] Cobone is reported as having only 1,446 visitors per day and GoNabit (strangely absent from the AAG survey) is reported by the same source used by the AAG survey (i.e., "whoismark.net") as having 3,244 visitors per day.

Consumers in all three countries were likely to purchase electronics, software, clothing and books online. They completed an online purchase every six months at least, and 46 per cent of Egyptian respondents completed an online purchase every month.

(b)   *A summary of e-commerce in the Arab region*

The following observations about e-commerce in the Arab region are drawn from the data provided in the previous section.

   (i)   Based on IMRG survey data about e-commerce in GCC countries along with their level of income and ICT infrastructure development, it is clear that e-commerce is still in its early phases in the region. In the absence of official statistics it is difficult to measure the impact of e-commerce on the economy. Data provided by different private entities may be difficult to reconcile or may ultimately be irreconcilable;

  (ii)   The main motivation for e-commerce in the region seems to be cheaper prices and good bargains. E-commerce users tend to carry out online research for the best price before buying;

 (iii)   Online purchases have centred on technology products, books, clothing and entertainment, and online ticketing (in particular airlines) and hotel booking are other important areas. This trend points to upper-income users even in lower-income non-GCC countries. E-commerce has not yet reached lower-income populations of the region who have the most to benefit from the lower prices it offers;

  (iv)   Few SMEs or local businesses in the region have an online presence. The E-Mall initiative of Saudi Post (box 7 above) is a good practice that brings small businesses online. Other initiatives led by private sector actors, including Google and Aramex, should also be considered;

   (v)   Security concerns regarding e-commerce and the Internet in general are pervasive in all surveyed countries. Secure payment platforms offered by Governments, initially to pay for their own services, might likely have a spill-over effect on e-commerce. Such e-payment solutions, though still rare in the region, offer an alternative to credit cards or reliance on cash on delivery and they help to develop a culture of online payment and confidence in online systems which is still absent in the region;

  (vi)   Last but not least, despite laudable efforts throughout the region to draft and introduce e-commerce, e-signature and e-transaction laws, many of these laws, are either incomplete or not yet applicable. The lack of comprehensive cyberlegislation covering important issues like consumer protection and cybersecurity is hindering e-commerce development and adoption in the region.

2. *Use of ICT by businesses and its impact on the economy*

The use of ICT has a broad impact on businesses, economy and trade in the region, as reflected by the availability of data pertaining to specific core ICT indicators and NRI indicators.

(a)   *Analysis of core ICT indicators on the "ICT sector and ICT trade" and "use of ICT by businesses"*

Table 14 summarizes the availability of data provided by UNCTAD for ICT sector and trade indicators for ESCWA member countries. For the ICT sector indicators, two countries (Egypt and Jordan) provide data for indicator ICT1, and none provides data for ICT2 indicator. As for the ICT trade indicator data, ICT3 and ICT4 are available for 15 ESCWA member countries (only Iraq and Libya have no data and are omitted from the table).

The mere fact of data availability for the ICT1 indicator for Egypt and Jordan illustrates the efforts of those countries in developing national ICT activity. It is a source of concern, though, that no other country in the region has any data for ICT1, nor any data for the important ICT2 indicator which measures the gross value added of the ICT sector as a proportion of total business sector value added. Among the countries that report data for ICT1 and ICT2 are relatively few developing countries.

Unsurprisingly, for ICT3 and ICT4 indicators measuring the share of ICT goods in global imports and exports, the region as a whole appears as a net importer. Although data represent different years, the approximate value of total ICT imports and exports stand at US$26.5 billion and US$6.7 billion respectively, although some countries have a better balance between imports and exports. It is important to note that GCC countries account for US$19.3 billion of the total imports and the United Arab Emirates alone accounts for US$4 billion of total exports. The share of ICT goods in total exports does not account for significant differences between countries. For instance, the share of ICT goods in total exports from Lebanon and Saudi Arabia is significantly different (7.11 per cent and 0.11 per cent respectively), even though they have nearly the same value of exported ICT goods at around US$300 million.

TABLE 14. ICT SECTOR AND ICT TRADE INDICATORS FOR SELECTED
ESCWA MEMBER COUNTRIES
(*Percentage*)

Country	ICT1	ICT2	ICT3	ICT4
Bahrain	..	..	4.44	0.9
Egypt	7.6 (2009)	..	3.75	0.14
Jordan	3.6 (2008)	..	4.26	1.29
Kuwait	..	..	6.42 (2008)	0.29 (2009)
Lebanon	..	..	2.79	7.11
Morocco	..	..	5.87	3.77
Oman	..	..	3.05	0.14
Palestine	..	..	3.21 (2009)	0.88 (2009)
Qatar	..	..	4.28	0.03 (2009)
Saudi Arabia	..	..	7.17	0.11
Sudan	..	..	3.33 (2009)	0.03 (2009)
Syrian Arab Republic	..	..	1.06 (2008)	0.01 (2008)
Tunisia	..	..	6.31	6.53
United Arab Emirates	..	..	4.5 (2008)	1.95 (2008)
Yemen	..	..	1.98 (2009)	0.05 (2009)

Source: UNCTADStats database: http://unctadstat.unctad.org.

Notes: Data are for 2010 except as noted.

Two dots (..) indicate that data are not available.

The Partnership identified a statistical issue for both ICT3 and ICT4 indicators due to the classification of re-exports and re-imports and whether a country uses the Special or General Trade System. In particular, "re-exports are separately reported for some countries and, in a small number of cases, the value of ICT re-exports (which is included in the value of ICT exports for those countries) is significant".[32] This might well explain the high level of exports from the United Arab Emirates, given its role as a regional hub for distributing ICT products.

Table 15 summarizes available data on B indicators and reveals the impact of ICT on businesses in selected ESCWA member countries. Data are available for only six countries, namely: Egypt, Jordan, Palestine, Qatar, Tunisia and the United Arab Emirates. One might consider as useful proxies for potential e-commerce activities the B1, B3, B5, B7, B8, and B12 indicators particularly in relation to the provision of

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[32] Partnership, 2010, p. 60.

customer service and the delivery of products online. Analysis of those indicators reveals a consistent pattern in the results for all countries: B1>B3>B5. However, the B3 to B1 ratio is lowest for Egypt and Jordan and highest for the United Arab Emirates which also has the highest B5 to B3 ratio. In general, B7 and B8 indicators have low values with only two notable exceptions: the United Arab Emirates and Palestine. Finally, B12 indicator components show that more businesses are providing customer services online than delivering products online, though the latter is quite significant in the United Arab Emirates.

In comparing B2 and B4 indicators, a consistent pattern emerges, in which B2 is always higher than B4. It is striking that Jordan and Palestine have significantly lower percentages for B1 and B3 indicators than Tunisia and Egypt, but also significantly higher percentages for B2 on the "proportion of persons employed routinely using computers". The percentage for B2 is highest in Qatar.

The infrastructure-related indicators reveal that fixed broadband access (component of the B9 indicator) is becoming much more important than narrowband access even in non-GCC countries. Tunisia is the only exception and still has a significant narrowband access likely because its business enterprises embraced Internet use earlier.

TABLE 15. CORE ICT BUSINESS INDICATORS FOR SELECTED ESCWA MEMBER COUNTRIES

Indicator		Egypt (2009)	Jordan (2008)	Palestine (2009)	Qatar (2008)	Tunisia (2009)	United Arab Emirates (2008)
B1: Proportion of businesses using computers		63.58	18.35	29.64	67	83.23	97
B2: Proportion of persons employed routinely using computers		14.74 (2008)	36.02	28.97	48.8	19.72[*]	..
B3: Proportion of businesses using the Internet		34.61	10.15	20.42	50	70.54	92
B12: Proportion of businesses using the Internet for	Sending or receiving e-mail	28.83	7.34	9.11	41	63.46	87
	Getting information about goods or services	23.98	9.38	8.03	36	59.78	84
	Getting information from general government organizations	13.43	3.41	..	38.22	48.1	72
	Internet banking	8.15	..	0.7	22.66	29.91[*]	52
	Interacting with general government organizations	5.66	..	..	27	30.38	62
	Providing customer services	16.3	2.33	2.59	23.38	2.93	49
	Delivering products online	6.42	0.48	..	..	5.34	26
	Telephoning over the Internet/VoIP	..	2.42	..	..	18.75	..
	Posting information or instant messaging	..	..	..	..	..	..
	Staff training	..	..	..	..	5.24	..
	Internal or external recruitment	..	..	..	..	4.82	..
	Accessing other financial services	..	..	..	..	..	..
B4: Proportion of persons employed routinely using the Internet		8.54 (2008)	27.98	22.53	44.73	14.49[*]	..
B5: Proportion of businesses with a web presence		21.55	4.11	4.03	26	30.48	85
B6: Proportion of businesses with an intranet		11.06	2.74	..	8	33.22	43
B7: Proportion of businesses receiving orders over the Internet		2.24	0.48	3.56	27	10.18	26
B8: Proportion of businesses placing orders over the Internet		2.4	0.55	..	23.26	12.47	29

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TABLE 15 (*continued*)

Indicator		Egypt (2009)	Jordan (2008)	Palestine (2009)	Qatar (2008)	Tunisia (2009)	United Arab Emirates (2008)
B9: Proportion of businesses with Internet access	Narrowband	4.54	3.73	5.72	12.17	37.49	18
	Fixed broadband	32.35	..	13.87	38	33.04	79
	Mobile broadband	..	..	..	..	..	..
B10: Proportion of businesses with a local area network (LAN)		19.31	6.43	4.02	23	52.06	50
B11: Proportion of businesses with an extranet		0.46	0.57	0.31	5.3	6.24	25

Source: UNCTADStats database. UNCTAD summarizes B indicator data, when available, in the appendices of its annual Information Economy Report (UNCTAD, 2011b).

Notes: Two dots (..) indicate that data are not available. Data for Tunisia are for enterprises having 6+ employees. An asterisk (*) indicates that only permanent employees were counted.

Another observation concerns the low (for Qatar and Tunisia) to very low (for Egypt, Jordan and Palestine) ratios of extranets. An extranet is a particularly important element of business-to-business relationships and e-commerce as well as for mobile staff to keep contact with the business while on the move. It is particularly noticeable that none of the countries reported any data on mobile broadband. In the light of third and fourth generation mobile deployments made during the past few years, it is likely that more recent statistics will show significant advances in this domain, especially in GCC countries.

(b) *Business usage and economic impact*

The seventh pillar of NRI relates to business usage and the ninth pillar relates to economic impact. The scores and global rankings of selected ESCWA member countries on the related indicators are provided in table 16.

TABLE 16. NRI SCORES AND RANKINGS OF SELECTED ESCWA MEMBER COUNTRIES ON BUSINESS USAGE AND ECONOMIC IMPACT

Country	Business usage					Economic impact			
	7.01	7.02	7.03	7.04	7.05	9.01	9.02	9.03	9.04
Bahrain	5.7	2.4	2.1	5.5	5.0	5.2	0.1	4.6	20.7
(27)	(20)	(117)	(51)	(40)	(11)	(30)	(71)	(42)	(68)
Qatar	6.0	5.0	1.3	5.9	4.7	5.4	0.3	5.4	24.2
(28)	(7)	(11)	(61)	(19)	(24)	(18)	(54)	(6)	(55)
United Arab Emirates	5.9	3.8	4.5	5.5	4.7	5.4	1.2	5.1	36.1
(30)	(16)	(32)	(44)	(36)	(25)	(15)	(41)	(21)	(30)
Saudi Arabia	5.7	4.3	2.1	5.3	4.6	5.1	0.7	5.2	22.9
(34)	(23)	(21)	(48)	(45)	(28)	(33)	(47)	(18)	(59)
Oman	5.2	3.2	0.4	5.4	4.3	4.8	0.0	4.5	24.3
(40)	(49)	(57)	(78)	(42)	(42)	(47)	(82)	(44)	(54)
Jordan	5.4	2.7	0.5	4.9	3.5	4.5	0.2	4.2	
(47)	(37)	(92)	(75)	(76)	(103)	(67)	(60)	(67)	..
Tunisia	5.1	3.4	0.8	4.8	4.4	4.8	0.2	4.6	
(50)	(50)	(44)	(68)	(82)	(38)	(50)	(65)	(41)	..
Kuwait	5.4	2.8	0.4	4.7	3.5	3.6	0.3	3.5	18.7
(62)	(39)	(90)	(82)	(91)	(102)	(120)	(55)	(114)	(78)
Egypt	4.7	2.8	0.6	4.6	3.0	4.2	0.1	4.1	30.3
(79)	(78)	(83)	(73)	(96)	(131)	(86)	(78)	(74)	(43)
Morocco	4.7	2.6	0.6	4.5	3.9	3.8	0.2	3.6	6.8
(91)	(74)	(108)	(74)	(102)	(74)	(113)	(64)	(102)	(104)

TABLE 16 (*continued*)

Country	Business usage					Economic impact			
	7.01	7.02	7.03	7.04	7.05	9.01	9.02	9.03	9.04
Lebanon	4.8	2.6	0.9	4.7	3.6	3.6	0.4	3.1	31.9
(95)	(68)	(106)	(67)	(90)	(98)	(125)	(51)	(128)	(40)
Syrian Arab Republic	4.8	2.1	0.4	3.8	2.6	2.9	0.0	2.7	15.5
(129)	(70)	(134)	(80)	(132)	(140)	(139)	(81)	(137)	(90)
Yemen	4.0	1.5	0.0	3.6	2.9	2.2	0.0	2.6	17.0
(141)	(123)	(142)	(105)	(137)	(135)	(142)	(96)	(139)	(86)

Source: WEF, 2012a.

Notes: Two dots (..) indicate that data are not available.

Values represented between parentheses are global rankings.

Indicator values are from 1-7 (best) with the exception of 7.03 and 9.02 (percentage of population) and 9.04 (percentage of total workforce).

Eight countries achieved a higher ranking on indicator 7.01 on "firm-level technology adoption" than they did overall. Qatar achieved one of its best individual values for this indicator and ranked seventh globally. Even the Syrian Arab Republic and Yemen, though ranked low globally, ranked higher on this indicator. This might indicate a general trend of ICT adoption among the businesses of the region.

By contrast, indicator 7.02 on "capacity for innovation" appears to be one of the weak spots of the region, with the notable exception of Qatar, Saudi Arabia, and Tunisia to a certain extent. All other countries underperform their overall ranking especially Bahrain which has one of its lowest rankings for this indicator. Low values were also attained, without any notable exception in the region, for indicator 7.03 on the "percentage of Patent Cooperation Treaty applications" and indicator 9.02 on "ICT Patent Cooperation Treaty applications per million/population".

In general, Arab countries ranked slightly lower on indicator 7.04 on "extent of business Internet use" than they did overall, with the notable exceptions of Qatar and Lebanon. The limited extent of business use of the Internet in the region may become an issue for SMEs.

Bahrain, Qatar, Saudi Arabia and the United Arab Emirates, the four highest ranking countries in the region, outperformed their overall ranking on indicator 7.05 on the "extent of staff training". Morocco and Tunisia also outperformed their overall rankings for this indicator. By contrast, this indicator appears to be a weak spot for other countries especially Egypt, Jordan, Kuwait and the Syrian Arab Republic. There appears to be a high correlation in the region between business investments in staff development and a higher NRI ranking.

Only Qatar and the United Arab Emirates significantly outperformed their overall ranking on indicator 9.01 on the "impact of ICT on new services and products", while Kuwait and Lebanon ranked significantly lower on the indicator than on NRI overall.

Indicator 9.03 on the "impact of ICT on new organizational models" is logically linked with indicator 9.01 and it is a weak spot for many countries of the region with the exception of Qatar (which has one of its best scores for this indicator), Saudi Arabia, the United Arab Emirates, Bahrain and Tunisia. This raises an issue that without leveraging the transformation potential of ICT, its impact on socioeconomic outcomes and, in this particular context, on enterprises' efficiency will stay limited. That concept will be explored further in chapter III.

Finally, indicator 9.04 on "knowledge-intensive jobs as a percentage of workforce" provides quite a mixed picture. The United Arab Emirates achieved the highest percentage in the region while other GCC countries had a lower rank on this indicator than in the index overall. The relatively lower scores attained by some GCC countries could be explained by the influx of a migrant workforce with low qualifications

especially in the labour-intensive construction and services sectors. The region's bottom three countries in the global ranking performed significantly better on this indicator, especially in Lebanon, reflecting the quality of their human capital.

3. *Conclusion on e-commerce and use of ICT by businesses*

Available data on the core ICT indicators, NRI indicators, along with anecdotal and private source evidence illustrate the willingness of the businesses throughout the region and not only in GCC countries to integrate ICT into their processes. The data also show the willingness of end users to actively use e-commerce. However, in most countries, there is a clear need to improve the measurement of e-commerce.

For example, data on B indicators do not capture e-commerce transaction values or differentiate sales to domestic customers and purchases from foreign suppliers. In an effort to measure e-commerce, ESCWA developed a model questionnaire for business surveys to be carried out by national statistical offices in the Arab region.[33] The aim of the model questionnaire was to collect data on online sales and purchases by destination and commodity type (in volume or percentage).

The absence of official statistics based on systematic business surveys hinders policymaking efforts to improve the impact of ICT on the economy. To improve e-commerce measurement, the potential for cross-referencing different sources of data could be leveraged to obtain a more comprehensive picture. One possibility is to combine the results of specialized surveys. Value could be derived by combining the results of household surveys, modules in business surveys on overall trends in e-commerce activities and flows, along with the results of stand-alone sector-based ICT surveys to provide details on types of goods and services traded, value and volume of e-commerce, and payment methods. Customs data on trade flow, data from the postal system on the movement and value of parcels[34] and data from credit card companies could help in controlling the quality of data obtained by national statistical offices.

C. EMERGING MOBILE APPS

Mobile apps qualify as an emerging e-service having great potential to improve the impact of other e-services. Governments and the private sector worldwide have already started to develop and disseminate their services as mobile apps to enhance service delivery and provide instant and ubiquitous access to service offerings.

1. *Smartphones and tablets*

The emergence of smartphones and a broad range of related apps is one of the latest trends that, in association with mobile broadband, will likely shape the way the Internet will be accessed and used for years to come. The term "smartphone" is actually loosely defined. One might consider a smartphone as a phone with enough computing power to carry out logical functions and computations beyond basic telephony. Second generation digital mobile telephones, which became available in the early 1990s, were made possible by the previous technological revolution of very-large-scale integration (VLSI) which allowed handset manufacturers to pack millions of transistors within a single silicon chip. Without this miniaturization, it would have been impossible for a small device to have enough computing power to run the very complex signalling functions of modern mobile phones.[35]

The steady technological improvements and innovation, financed by to the transformation of mobile phones into a mass market product, led to even lighter and smaller mobile phones with significant computing

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[33] ESCWA, 2009.

[34] Helbe, 2012, discussed how UPU, through data it collects on the activity of postal operators, could help measuring e-commerce.

[35] Digital telephony is made from a set of new complex protocols built on top of the Signalling System No. 7 (SS7) developed for telephony in the 1980s.

power and sophistication in screen technologies. The first set of added functionalities consisted of utilities and tools such as address books, calendar functions, note taking, gaming and integrated digital cameras.

It was the support of data communication by mobile networks or operators and the need to support third-party applications that led to the emergence of modern smartphones that are characterized by an operating system which offers an application programming interface to third-party developers.[36]

But technology is never enough when it comes to mass market products. Ease of use and the quality of the user experience are key factors. In 2007, the Apple iPhone transformed the smartphone industry. Smartphones ceased to be sophisticated high-end niche products used only by business people, and became popular products embraced by the public at large and youth in particular.

The success of the iPhone owes much to the apps that have been developed for it. Developers worldwide have created about 775,000 apps developed for various devices that run the Apple operating system (iOS) including the iPhone, iPad and iPod touch. By the end of 2012 there were more than 300,000 native iPad apps. The success of the iPhone and iOS has led to the development of a competing Linux-based Android operating system. Contrary to iOS, Android is open-source, allowing it to be freely modified, distributed and licensed by device manufacturers. As of October 2012, Android claimed 700,000 apps available through its distribution platform Google Play. The number of shipped Android based smartphones, sourced by many manufacturers, has overtaken the number of iPhones. Trailing behind those two leaders are Blackberry and Windows Mobile with approximately 70,000 applications developed for each platform.[37] Box 11 highlights smartphone sales worldwide and their prevalence in the Arab region.

Box 11. The smartphone revolution in figures

According to IDC, the total number of mobile phones sold worldwide in 2012 reached 1.7 billion units, with smartphones representing 717 million or nearly two out of five phones sold in 2012. More importantly, the growth figures of smartphones are impressive. While the year-on-year growth of smartphones reached 45 per cent in 2012, the one billion feature phones sold have had a negative growth of -6.3 per cent in comparison to 2011. More recent figures from IDC indicate that for the fourth quarter of 2012, a volume of 224.5 million units were sold with Android operating system-based phones representing 68.3 per cent and iOS phones 18.8 per cent; the other operating-system-based smartphones (Blackberry OS, Windows Phone and others) shared the rest. In April 2013, IDC announced that smartphone sales for the first quarter of 2013 have out-stripped feature phone sales for the first time ever.

Arab Advisors Group conducted a series of surveys in six ESCWA member countries regarding smartphone adoption. In Jordan, Saudi Arabia and the United Arab Emirates, estimates based on a panel survey reveal the percentage of smartphones among total handsets to be 48 per cent, 57.4 per cent and 50.4 per cent respectively. In Egypt, Kuwait and Lebanon, AAG provides a forecast for the period 2012 to 2016 for each country. For Egypt, the percentage of smartphones among total handsets is forecasted to grow from 8.4 per cent in 2012 to 18.1 per cent in 2016 (25.6 per cent compound annual growth); while in Kuwait, the smartphone equipment level is forecasted to grow from 51.3 per cent in 2012 to 85 per cent in 2016 (19.2 per cent compound annual growth). Finally in Lebanon, it is forecasted to grow from 37 per cent in 2012 to 76.3 per cent in 2016 (30.7 per cent compound annual growth).

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Source: http://www.idc.com and http://www.arabadvisors.com/offer/13482.

Building on the success of the iPhone, Apple launched the iPad tablet in 2010. Like the iPhone, the success of the iPad owed much to iOS apps and its large touch screen interface. Multiple manufacturers are

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[36] Operating systems indicate the maturation of mobile phones as real information technology platforms. Prior to that, sophisticated mobile phones ran proprietary firmware.

[37] VisionMobile, 2012, p. 18.

competing with the iPad, and those devices run the Linux-based Android operating system. To date, the market of tablets is much smaller than that of smartphones but is rapidly developing.[38]

Through the development of mobile apps, smartphones and tablets could be categorized as disruptive technologies, which will likely lead a complete transformation in the way computing power and the Internet are used. The characteristics of disruptive technologies are discussed in detail in the following section.

2. *What is an app and why it is so disruptive?*

An app is a piece of computer software which, apart from the touch screen user interface, is similar to other computer software. However, contrary to traditional software, which might be immensely complex and, at the enterprise level, might cost millions of dollars in multi-year contracts for service customization and support, an app is a nimble piece of software that is limited both in terms of development cost, price for end users and inherent complexity.

Before going further, it is useful to recall that Christensen categorized disruptive technologies as those that "bring to market a very different value propositions than had been available previously" and generally "underperform established products in mainstream markets. But they have other features that a few fringe (and generally new) customers value. Products based on disruptive technologies are typically cheaper, simpler, smaller, and, frequently more convenient to use".[39]

The characteristics of mobile apps largely correspond to the above categorization of disruptive technologies. Specifically, mobile apps generally share the following features:

- Apps are not meant to compete with complex pieces of software. So far, complex traditional software has not been exactly replicated as an app. Even when similarities exist, apps are simpler and offer different functionalities;

- Apps offer fewer features than software for personal computers, and are far simpler than complex business software run on servers;

- The access of apps to the Internet is generally restricted to the domain they serve. For instance, if you use an online banking app it will access your bank account data and your bank's services and nothing else;

- Customers – especially youth and the less technology-savvy public at large appreciate the simplicity and convenience of apps, which results in a high-quality user experience;[40]

- Apps have an affordable purchase price and many are free. With few exceptions, apps cost only a few dollars each;

- A typical app generally costs a few tens of thousands of dollars to develop and can be developed in a few months. Moreover, an important part of the development cost (25 per cent) is related to the user interface and post-launch bug fixes and improvements.[41]

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[38] In 2012, IDC estimated that 128.4 million tablets were sold worldwide (with Apple still having the largest market share).

[39] Christensen, 1997, p. xv.

[40] In a more trivial manner, the generation that "grew with computers" essentially values software – however "serious" its purpose – only if it looks like a "cool game".

[41] VisionMobile, 2012, p. 43.

It is too early to tell if apps will lead to the end of the traditional software applications, as past disruptive technologies have done to established technologies. It is quite certain that complex software applications will remain in the ever-growing back-end computing cloud, and it is very likely that apps will affect end user interaction with and use of ICT. For simple tasks, apps offer a convenient way to use computing power. Apps may also become the medium through which we gain access to more sophisticated computer systems that are capable of more complex tasks or those that necessitate access to remote data residing in the back-end computing cloud. Socioeconomic apps for government, health, education, e-commerce, and all kind of business services largely fall under this latter category.

3. *Mobile apps globally and in the Arab region*

Both the producer and consumer sides of mobile apps are young and technology in the smartphone industry is evolving rapidly and fortunes are changing quickly. Comprehensive and up-to-date quantitative and qualitative data is scarce (or, if it exists, it is non-public and expensive): to build a comprehensive picture, one must rely on multiple fragmented sources of data.

There are, however, some undisputable trends based on global surveys of app developers and publicly available statistics related to the most downloaded apps including in some countries of the region. This study sheds light on the best practice of apps development for Government and other social services in some countries. Even though those apps are not yet among the most popular, they will eventually become the most common way for citizens to interact with Government and social services.

(a) *The developer community*

In 2012, the market analysis and strategy firm, VisionMobile, published a worldwide survey of more than 1,500 app developers. The following findings of that survey are relevant to the role of apps in the impact of e-services in the Arab region:

  (i) The Android-iOS duopoly is gaining momentum, reflected in the growing number of developers who use these two platforms (76 and 66 per cent respectively) and the decreasing or stagnating numbers of developers who use the others. Another sign of consolidation is that in the 2012 survey, developers used on average 2.7 platforms down from 3.2 reported in the 2011 survey. The survey classified many platforms as either in terminal decline or being in the danger zone, like Blackberry, despite quoted advantages such as a good installed base, a low cost of development and higher potential revenues from apps;

 (ii) User reach is the developer's main motivation for adopting a particular platform. This consideration even overtakes other important issues like ease of development and potential revenue. As a result of their market penetration, iOS and Android have benefited from an early availability of apps, with better quality, as developers' efforts were primarily geared to these two platforms before considering any others. According to the survey, popular apps like Skype or Twitter have less quality under Windows Phone 7 than under iOS or Android;

 (iii) The main distribution channels for apps are app stores developed and managed by the platform owners; percentages of app purchases from app stores vary from as high as 73 and 70 per cent for Blackberry and iOS, to 46 per cent for Android and Windows Phone. Another finding of the survey is that Facebook is the main promotion channel (47 per cent) app developers use;

 (iv) The survey forecasted that providing local services will drive the future development of the app market. It identified the emerging economies of Brazil, China, India and Russia as offering the largest demand opportunities for the development of such applications. The survey identified profound disparities between different regions of the world. Most apps are downloaded in North America and the Middle East came in last position with 4 per cent;[42]

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[42] The report did not indicate which countries were included in the designation "Middle East".

(v) The survey identified smartphone penetration and "app literacy" as main factors driving demand for apps. Anecdotal evidence indicates that a substantial number of smartphone users hardly ever use most of the applications on their devices. One interesting finding of the survey relates to the percentage of developers writing apps in a given language. Unsurprisingly, English comes first with 85 per cent of developers, followed by Spanish (21 per cent), Chinese (16 per cent), German and French (13 per cent) trailing far behind. Other languages are quoted but it is notable that Arabic is not even mentioned. Notably, in Europe, South America and Asia, more apps are developed in local languages than in English.

(b) *Apps stores and user trends*

The app stores of Apple, Android, Blackberry, and Windows Phone all provide lists of the most popular free and commercial apps downloaded, sometimes with category breakdown. The level of detail varies from one provider to another, especially regarding specific countries and categories. Sometimes, one must rely on third-party websites to get detailed country-level data for non-developed markets.[43]

Before analysing the results of those sources, it is useful to raise the following points:

(i) Data provided by those sources are not particularly reliable or exhaustive. Rankings in terms of top free and commercial apps illuminate user trends and preferences; however, it is unclear if the list represents the cumulative number of downloads since the app store launch or if the numbers relate to a given reference period. More importantly, those sites do not provide the number of downloads per app. It is impossible to carry out a rigorous analysis in the absence of more detailed data;

(ii) Commercial apps certainly provide a useful indication about what users might be willing to pay for, but one should not discount free apps. Use of apps may not be strongly correlated to the purchase price, and useful apps for public social services and even e-commerce and economic services (such as e-banking), are more likely to be offered free of charge.

TABLE 17. TOP THREE IPHONE APPS IN SELECTED ESCWA MEMBER COUNTRIES

Country	Paid		Free	
	App	Category	App	Category
Bahrain	WhatsApp Messenger	Social Networking	lo-mob	Photo & Video
	Madcoaster	Games	Google Maps	Navigation
	MediaBurner	Entertainment	Keek	Social Networking
Egypt	WhatsApp Messenger	Social Networking	lo-mob	Photo & Video
	MyPhone + for Facebook	Social Networking	Google Maps	Navigation
	CartoonTube	Entertainment	TrueCaller	Utilities
Jordan	WhatsApp Messenger	Social Networking	lo-mob	Photo & Video
	CartoonTube	Entertainment	4 Pics 1 Word	Games
	Temple Run: Brave	Games	Candy Crush Saga	Games
Kuwait	WhatsApp Messenger	Social Networking	Fun Run – Multiplayer Race	Games
	Sonic Dash	Games	مكتبة المسلم	Reference
	InsTrack Followers on Instagram	Social Networking	Mad Cop – Police Car Race and Drift	Games
Lebanon	WhatsApp Messenger	Social Networking	lo-mob	Photo & Video
	Temple Run: Oz	Games	Jail Break Now	Games
	Pou	Games	Google Maps	Navigation

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[43] In particular for ESCWA member countries the most useful websites are http://iosappstats.com/ for Apple iOS apps and http://www.appannie.com/ for Apple iOS and Android apps, though Android data was only available for Egypt.

TABLE 17 (*continued*)

Country	Paid		Free	
	App	Category	App	Category
Oman	WhatsApp Messenger	Social Networking	Google Maps	Navigation
	CartoonTube	Entertainment	Royal Oman Police	Utilities
	Madcoaster	Games	lo-mob	Photo &Video
Qatar	WhatsApp Messenger	Social Networking	Google Maps	Navigation
	CartoonTube	Entertainment	IKEA Catalogue	Lifestyle
	Racings NF	Entertainment	lo-mob	Photo &Video
Saudi Arabia	WhatsApp Messenger	Social Networking	Google Maps	Navigation
	Tweetbot for Twitter	Social Networking	Jail Break Now	Games
	McTube for YouTube Pro	Photo & Video	iMicroscope	Lifestyle
Tunisia	WhatsApp Messenger	Social Networking	Facebook	Social Networking
	BlueTooth Mania	Utilities	YouTube	Photo & Video
	15 Super Cars	Games	iBooks	Books
United Arab Emirates	WhatsApp Messenger	Social Networking	Google Maps	Navigation
	Temple Run: Oz	Games	lo-mob	Photo & Video
	8 Ball Pool	Games	Real Racing 3	Games
Yemen	WhatsApp Messenger	Social Networking	Facebook	Social Networking
	CartoonTube	Entertainment	Tango	Social Networking
	Tube Downloader Pro	Productivity	Viber	Social Networking

Source: Compiled by ESCWA as of March 18, 2013 from http://iosappstats.com.

Although the data are limited, app downloads for iOS devices in selected Arab countries are provided in table 17. Social media apps came on top, which was unsurprising given the changes taking place in the Arab region following the social movements of 2011 and the role of social media in those developments. Taking into consideration the above points, the following observations emerge.

 (i) In the Arab region, smartphone users are paying for apps related to social networking ("WhatsApp"[44] is top paid app in every Arab country). The trend is similar in developed countries. Games, entertainment and productivity apps follow social networking apps;

(ii) Whether commercial or free, there are still few Arabic language or local services apps among the top three downloads in the Arab region. Percentages vary between countries but if the sample is expanded to the top 20 apps, they represent anywhere between zero to only five or six. An investigation into the top 50 or even top 100 list may show some meaningful presence of such apps, yet in the absence of data on the number of downloads, it is impossible to evaluate their real importance.

An investigation into the specific categories of books, education, news and utilities (especially under the free apps) which have a higher potential for local services, may show that users in the region are downloading local and Arabic language apps.

(c) *Uptake in the region*

The uptake of smartphones in the region and around the world is only just beginning. Even in developed countries, smartphone users are still predominantly among the well-off and the young. Smartphones have yet to reach other categories of the population, especially those who are poor or vulnerable. Those populations will be the most likely to benefit from this trend when economies of scale bring smartphones within their reach.[45]

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[44] "WhatsApp" is a free app for Android, but the iOS app costs about US$1.

[45] This is beginning to happen in specific markets. VisionMobile, 2012, p. 26 reported that a Chinese-made Android-based smartphone selling for US$80 has been "a sell-out success" in Kenya since mid-2011.

Another factor in the uptake of smartphones is the absence of useful public services apps. Even when they are present, public awareness about them may be weak. Many e-government portals of developed countries are beginning to offer apps (always free) for a host of government and other public services, sometimes through a dedicated portal that functions like an app store on a much smaller scale (box 12).

Box 12. The United States Federal Government app store

The website of the United States Federal Government offers public service-related apps under different categories: reference, utilities, education, health and fitness, medical, news and travel. All apps are free to download and are available for four mobile platforms: iOS, Android, Mobile Web and Blackberry OS.

Judging by the number of surveys related to them, some popular apps from this portal include: The White House; United States Postal Service Tools; Congress – a Pocket Directory; First Aid by the American Red Cross; Federal Bureau of Investigation's Most Wanted; IRS2GO (Internal Revenue Service app); and Federal Communications Commission Mobile Broadband Test.

Some apps mix entertainment and education like the National Aeronautics and Space Administration's Visualization Explorer app and a particularly original app named "Meanderthal" from the Smithsonian Institution which allows users to see their face transformed into the face of an early human.
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Source: http://apps.usa.gov.

It is to be expected that when smartphone uptake in the region reaches more segments of the population, in association with a good offer and advertisement of apps associated with public services, that usage patterns will show the impact of mobile apps on the delivery of government and other public services, and on socioeconomic development.

III. ENHANCING THE IMPACT OF E-SERVICES THROUGH POLICY ACTION AND RELEVANT INITIATIVES

A. FRAMEWORK FOR POLICY ACTION

The previous chapters discussed frameworks and indicators for measuring the Information Society and its socioeconomic impact, followed by a discussion of selected e-services in the region with a particular focus on e-government, e-commerce and business use of ICT, and mobile apps. Those discussions pointed to a lack of statistical data (both in general and particularly in the region) to measure the impact of ICT and e-services. Although data availability is weak, it is clear that the use of e-services is growing in a number of socioeconomic endeavours.

Studies have established a link between ICT development and economic growth, particularly between broadband access and gross domestic product (GDP) growth.[46] The purpose of this study is not to observe the extent to which that has actually taken place; but rather, to recommend concrete policy initiatives to improve the process through which e-services impact socioeconomic development. The framework illustrated in figure VIII is expected to help ESCWA member countries achieve that objective.

Figure VIII. A framework for public policy initiatives to improve e-services impact
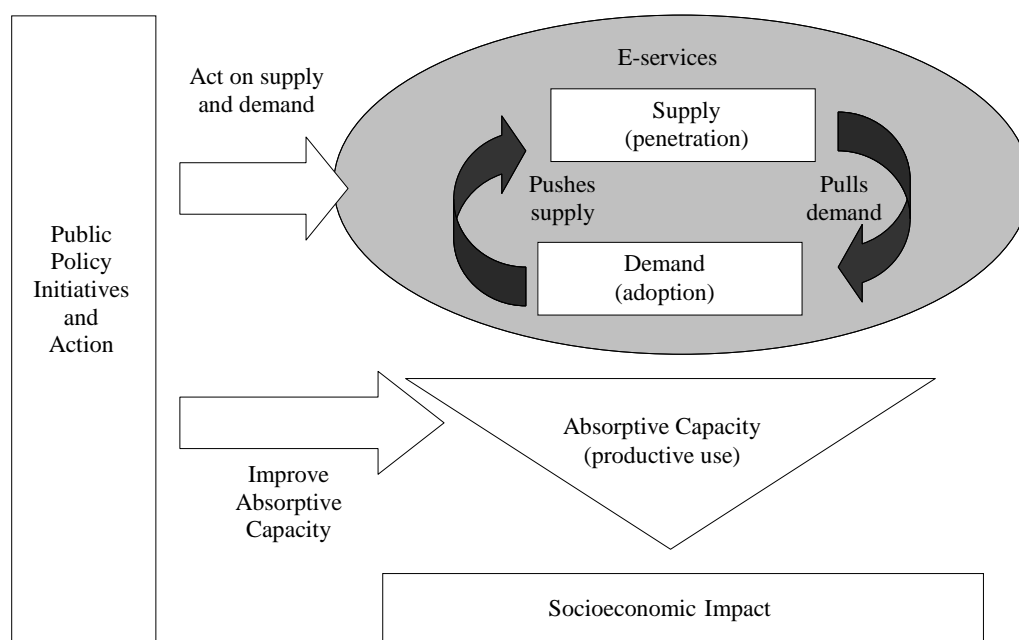
Source: Adapted from WBG, 2012a.

The right hand side of the framework was initially introduced by the World Bank for broadband infrastructure development, but it is equally applicable to e-services. This framework introduces similar concepts to those of the conceptual framework for measuring the information economy shown in figure IV.

The framework illustrates the following dynamic: e-services supply pulls demand for use, and use will create socioeconomic impact as outlined at the bottom of the framework. Use generates demand and economic rationale that pushes for the supply of more e-services. The sustainability of this process induces a virtuous circle whereby arrows move clockwise, as shown, in successive cycles, each contributing to the

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[46] See for instance Zhen-Wei Qiang and Rossotto, 2009; ITU, 2012b; and WEF, 2012a.

growth of e-service delivery and potential socioeconomic impact. The dynamics of this framework can stagnate or, worse, work in the opposite direction. In that case, a low supply of e-services fails to create demand, and yields very little impact on socioeconomic outcomes. Low demand hinders investment, and in the absence of investment, it will be more difficult to generate more supply. Thus, the dynamics of the framework illustrate the potential for a vicious circle, in which the arrows move counterclockwise.

Another key element of this framework lies in the absorptive capacity of a country that determines the extent to which e-service might effectively impact socioeconomic outcomes. Public policy can influence the dynamics of the framework through initiatives with the following aims:

- Stimulating the virtuous circle of supply and demand and synchronizing supply with demand. Acting on supply may take the form of supporting innovation in e-services delivery. Acting on demand may concern improving capacity, awareness and skills for ICT-based jobs, and inclusion of vulnerable population to become ICT users;

- Improving the absorptive capacity of the country which is linked with the ICT-driven transformation in public services organizations, businesses and all kind of economic activities.

Policies to improve ICT impact according to those two aims are presented below. The discussion will borrow many concrete policy recommendations and action proposals suggested by the new ICT strategy of the World Bank Group (WBG) (box 13), in particular under the innovate and transform pillars.

Box 13. Transform, Innovate and Connect: The ICT strategy of the World Bank Group

In 2001, WBG introduced an ICT for supporting the efforts of developing countries to deploy ICT infrastructure and increase its use. This strategy came on the eve of a decade during which developing countries engaged in major ICT infrastructure development, especially regarding mobile telephony, but also Internet access. The 2001 strategy was based on four pillars: sector reform, access to information infrastructure, ICT skills development and ICT applications.

Ten years later, the Independent Evaluation Group of WBG carried out an assessment of the ICT strategy on the basis of the activities carried out from June 2002 to June 2010, where its cumulative involvement in ICT amounted to US$4.2 billion.

The assessment concluded that "the Bank's most notable contributions have been in sector reform and support to private investments for mobile telephony in difficult environments, and in the poorest countries where most of its activities have taken place". It acknowledges that the contributions of WBG to other areas were limited and that "outside mobile telephony, large gaps exist in high-speed Internet access and broadband connectivity and in the diffusion and use of ICT in business, services, and government – the areas where ICT can deliver the largest developmental impacts".

On the basis of this assessment, WBG elaborated a new ICT strategy organized under the three pillars of Transform, Innovate and Connect:

- The **Transform** pillar "will promote ICTs to transform services for greater development impact – strengthening accountability and governance, improving public services, and enabling more inclusive private delivery of services";

- The **Innovate** pillar "will advance ICTs to improve competitiveness and accelerate innovation across the economy and target skills development for ICT-related jobs (a large portion known to be going to women) to improve productivity";

- The **Connect** pillar "will scale up its support for policy reforms and private and public-private ventures to catalyze investment in broadband infrastructure and expand access to broadband services, including for women".

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Source: World Bank Independent Evaluation Group, 2011, pp. vii and ix; and WBG, 2012a, p. vi.

In addition to the policy recommendations, this paper suggests some metrics which will pave the way to eventually improve the measurement of the impact of e-services on socioeconomic development.

B. POLICY ACTION TO PROMOTE INNOVATION AND ENABLE ICT-DRIVEN TRANSFORMATION

1. *Key trends in ICT as a lever for socioeconomic development*

As highlighted at the beginning of this study, the evolution and rapid spread of ICT during the past decade have radically changed its impact on social interaction, public services delivery and ways of conducting business. Those developments opened up new potential for public policy initiatives that aim to leverage ICT for better socioeconomic impact. Metrics related to those initiatives and their possible outcomes may serve as a useful proxy for tackling the complex issue of measuring impact.

Some trends in ICT use and potential to drive change have a direct impact on the definition of policy initiatives. Taking into account those trends, WBG suggested public policy initiatives aimed at accelerating ICT-driven development objectives in its 2012-2015 ICT strategy.

The trends and suggested initiatives outlined in box 14 are organized under three categories; the first two relate to the Transform pillar of the WBG strategy and the third relates to its Innovate pillar, namely:

- Inducing open and accountable development using ICT;

- Improving public service delivery though ICT-driven transformation;

- Promoting information technology services, the ICT industry and ICT-based entrepreneurship and bottom-up user-centric approach to innovation.

Policy guidelines to support each of those initiatives are described in greater detail below and examples of implementation are discussed.

Box 14. Key trends in ICTs as a lever for socioeconomic development

Trend 1: Sound broadband policies have become a key for faster GDP growth. There is a wide gap between developed and developing countries in terms of broadband subscriptions. Mobile networks may increase the proportion of individuals with access to high-speed Internet (trend 3).

Trend 2: Many countries are developing competitive information technology service industries. Those industries are becoming a source of growth and job creation, particularly for youth and women. Hence they have become a key driver for growth and job creation.

Trend 3: Mobile broadband and more affordable Internet-enabled devices are democratizing Internet access and expanding the reach of e-services.

Trend 4: Social media amplify the voices of citizens and to hold governments accountable. They are revolutionizing how people communicate, collaborate, and do business with one another. Social media are being leveraged across society for collaboration and collective action.

Trend 5: Policies of open government are gaining momentum to improve transparency, accountability and public participation for more effective government. More than 20 countries, including some ESCWA member countries, now have open data portals enabling local innovation.

Trend 6: Cloud computing is gaining momentum to improve the efficiency and quality of information technology services. Cloud computing allows all government entities to share infrastructure through the Internet or the government intranet.

Trend 7: Using analytics and data mining to understand behaviours and tailor services. The massive amount of information transiting through the Internet and mobile phones can be analysed to better understand individual behaviours and tailor information, services, and offerings accordingly. That information can feed into the formulation of informed public policies and the improvement of local governance.

Trend 8: Crowdsourcing to solve public policy problems. Crowdsourcing leverages citizens or technology developer communities to solve well-defined problems or provide real-time information to government and public service providers especially in cases of crisis (such as a pandemic).

Trend 9: Countries at all levels of development are integrating ICT into their national development strategies. In confronting the economic crisis that started in 2008, many countries have incorporated ICT initiatives as an integral part of their stimulus plans to prepare the foundation for long-term growth.

Trend 10: Countries are building leadership and institutional capabilities to use ICT to transform their economies. Governments are experimenting with institutional mechanisms to bring coherence to ICT investments across agencies and promote partnerships with the private sector and civil society.

Trend 11: ICTs demand new skills to promote competitiveness and they are beginning to transform universities into open systems with globalized offerings that support just-in-time learning. ICTs are also enhancing the transparency and accountability of education administration, and enabling participation in education policy and governance.

Trend 12: Redefining trust in the broadband world: information security and privacy. As countries transition to a digital world, they must build trust in ICT infrastructure, services, and applications.

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Source: WBG, 2012a, pp. 40-41.

2. Inducing open and accountable development using ICT

Taking into consideration trends 4 and 5 outlined in box 14, as well as the potential of mobile broadband outlined in trend 3, WBG suggests the following policy guidelines to induce open and accountable development using ICT.

- Use ICT to create pressure points for accountability and performance (collecting, publishing and verifying data, leveraging citizen participation);

- Increase the transparency of Government activities and leverage citizen participation. Encourage applications such as revenue watch, procurement watch and open budget, and use anticorruption hotlines, utility misuse reporting and participatory budgeting;

- Publish non-confidential government-collected data on public services, infrastructure and national statistical information, enabling civil society and entrepreneurs to develop services and applications with the data;

- Solicit solutions to clearly stated development challenges through crowdsourcing, gamification models, and "solver" communities;

- Adapt institutional arrangements, legal and regulatory frameworks, including open government directives, freedom of information legislation and frameworks for information security and privacy to make these initiatives sustainable. Information technology infrastructure may also need to be adapted, including open standards, interoperability frameworks, information security and privacy.[47]

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[47] WBG, 2012a, p. vii.

The first two guidelines could be seen as complementary to open data aimed at enhancing citizen capacity to scrutinize government action and become active contributors (guideline number 4) thanks to the potential of mobile phones to generate location-based and context-specific information. The third guideline from the above list could also be implemented through an open Government data portal. The last guideline outlines the needed legal and regulatory frameworks to organize the implementation of the suggested initiatives and ensure their technical sustainability and citizen's confidentiality and privacy.

Concrete initiatives to implement the above-listed policy guidelines might include the following:

- Setting up an open portal with a significant amount of accessible and up-to-date data related to the following: public accounts, infrastructure, economy and commerce, status of public services, and so on;

- Providing citizens with the ability to enrich and contribute to data provided by the Government and report on social issues and infrastructure needs and repairs;

- Introducing a transformation at all levels (central and regional government and cities) whereby citizens and also the private sector become co-creators of public services based on open public data;

- Ensuring that legal and regulatory frameworks are put in place through proper directives for open Government, freedom of information and data protection acts.

3. *Improving public service delivery through ICT-driven transformation*

The trends outlined in box 14 have the capacity to radically transform public service delivery. Key enablers of an ICT-driven transformation are as follows:

- Convenient and universal smartphone-based access to the Internet, whereby mobile phones become the main service delivery platform and revolutionize interaction between Governments and citizens, and Government and businesses;

- The transformation of back-end systems of government and public services; in addition, the components of such systems may be procured as "Software as a Service"[48] and include the private sector as a partner and leader for faster implementation as illustrated in box 15;

- Comprehensive national and sector-specific strategies aimed at organizing services around end user needs, and full integration of ICT within the workflow of the concerned sector beyond the simple delivery of ad hoc e-services.[49]

Box 15. E-government standard framework of the Republic of Korea

In e-government project development, software plays a central role in the implementation phase. Governments are concerned that they may become dependent on a supplier of proprietary software. A Government may become locked into dealing with that supplier for maintenance and future development. This may also hurt potential competitors, giving the original supplier a dominant position in the market. If the Government does not contract with a single supplier, however, the likelihood of duplication and waste will increase.

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[48] Sometimes referred to as "on-demand software". Software as a Service is a delivery model hosted on the cloud. It is typically accessed via a thin client via a web browser.

[49] WBG, 2012a, p. 8.

Box 15 (*continued*)

To address such concerns, the Government of the Republic of Korea decided in 2007 to develop software called "e-Government Standard Framework" (eGovFrame). This software comprises a standardized set of tools for developing and running e-government applications. Its aim was to improve the efficiency of ICT investment and the quality of e-government services, and to ensure the reusability and interoperability of different applications. To minimize the reliance on any single solution provider, the Government also chose to rely on open and neutral software. Finally, to encourage competition between suppliers, it took various steps to build the capabilities and competitiveness of local ICT SMEs.

There are four facets to the open innovation strategy of eGovFrame: (1) open sourcing, (2) open processes, (3) open outputs and (4) open ecosystem as shown below.
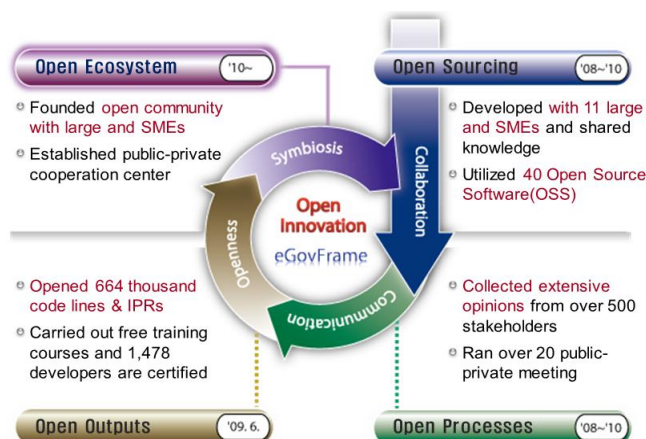
Today, eGovFrame focuses on improving the reusability and interoperability of government applications. As of January 2012, eGovFrame had been applied to 208 e-government projects with more underway.

The main benefits of eGovFrame include improved quality of e-government services and higher efficiency of investment in ICT. Developers can avoid duplication of work and focus strictly on the business logic, making use of already-developed common modules and standard templates. By 2013, budget savings of about US$294 million are expected from applying eGovFrame to the development of e-government projects. There is greater scope for reusing components in multiple government systems. Standard interfaces and source code enhance interoperability. Overall, the approach promotes work simplification, performance and quality assurance, cost savings and timely delivery.

The project supports inter-agency collaboration and information sharing within the Government by ensuring a high degree of interoperability. With the introduction of eGovFrame, competition among suppliers has also increased, and SMEs have been given better opportunities to bid for e-government projects. In fact, since its launch, SMEs have won 64 per cent of all e-Government projects connected with eGovFrame.

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Source: UNCTAD, 2012, pp. 47-51.

WBG suggested the following guidelines to improve public services through an ICT-driven transformation.

- Developing e-transformation strategies, including at the sector level;

- Building institutions capable of driving the transformation agenda across Government and advancing skills within these institutions and across the civil service;

- Breaking down siloed approaches to technology investments;

- Formulating sector-specific policies, regulations, and laws (such as those for health, education and energy) to support the use of ICT to transform service delivery and to strengthen the ability of the private sector to create new ICT-enabled services such as mobile banking;

- Formulating common standards and policies for transformation across government that enable:

  o An environment for open government and civil society participation, as part of accountability mechanisms and the co-creation of content and services;

  o Sector objectives;

  o Interoperability and efficiency;

  o An environment to strengthen the ability of the private sector to engage in public private partnerships for government service delivery;

  o ICT "trust" policies: laws and regulations regarding information security and privacy, including online authentication, electronic transactions, cybersecurity, critical infrastructure protection, data and privacy protection, consumer protection, cybercrime, freedom of information and of expression, and intellectual property and information security.[50]

Many countries, including ESCWA member countries, have already defined national e-strategies and sector-specific strategies called for by the first and fourth guidelines; however, national or sector-specific e-strategies aimed at a comprehensive ICT-driven transformation are quite new, and only a few developed countries have begun to articulate and implement such strategies (box 16).

The third guideline refers to consistency of investments in information technology. When the provision of government and public e-services are carried out by different providers, a lack of interoperability can result. Where Governments have established a strong CIO backed by high-level policies, some of those issues may be avoided.

Finally, the fifth guideline is a collection of cross-cutting items. Public-private partnerships are particularly important to provide public services for sector-specific e-strategy implementation. Partnerships are valuable not only because technology allows it, but also because of they are inherently efficient and have the added quality of being less prone to corruption.

Concrete initiatives to implement the above listed policy guidelines may include the following:

- Establishing a Government CIO with effective powers and high-level political support;

- Establishing a national ICT-driven transformation e-strategy with timely objectives and implementation plan;

- Establishing sector specific e-strategies for key public service areas like health, education and employment aimed at ICT-driven transformation; these strategies should be implemented through an open consultation process with the involvement of all stakeholders to ensure acceptance and proper implementation;

- Leveraging public-private partnerships for effective service delivery and concretely applying this concept to a significant number of public services;

- Implementing technology procurement and consistent architectures among different public administrations and services to ensure interoperability.

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[50] Ibid., p. 11.

4. *Promoting innovation in ICT*

Innovation in ICT has great potential for many developing countries, particularly for the relatively young and well-educated population of the Arab region. Unlocking this potential is essential to contribute to the development of an export-driven ICT service industry as some countries in the region have already done, to stir the development of local e-services and to provide an endogenous and sustainable contribution to the ICT-driven transformation.

Governments have an essential role to play in promoting the ICT industry through improving skills and the quality of education according to local and global industry needs, providing broadband infrastructure, establishing technology parks, or streamlining the interfaces between government and business.[51] At the highest levels, Governments should also provide leadership, extensive commitment and support to make rapid and deliberate policy choices, apply them effectively and overcome bureaucratic resistance.

Initiatives to promote the ICT industry, entrepreneurship and innovation include the following:

- Clustering ICT businesses working with both content and applications, to link SMEs and local research institutions to economic activities;

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[51] WBG, 2012a, p. 17.

- Leveraging segments of the ICT service industry at the lower level of the value chain to incubate decentralized SME at scale;

- Creating capacity-building intermediaries to help entrepreneurs implement business ideas and to modernize companies and improve their competitiveness through ICT;

- Creating open innovation forums or "living labs" to foster cooperation between startups and small firms and other actors to evaluate concepts and develop prototypes in real-life settings with real users;[52]

- Providing access to finance through social networks established by entrepreneurs or global systems for pooled citizen (micro) financing.[53]

Box 17 showcases the complete transformation of Saudi Post's addressing, thanks to the implementation of the Wasel addressing system.

Box 17. Wasel addressing system: ICT-driven transformation and innovation

In 2007, Saudi Arabia launched Wasel, an address system that established unique numeric codes for the postal service. The number consists of a combination of a five-digit postal zip code, a four-digit building code and a four-digit unit code for each unit within a building. Each postal address is displayed on the building, and Saudi Post installed numbered boxes for each unit.   The boxes were equipped with a passive radio frequency identification tag which stores the 13-digit Wasel code. Wasel is currently available in 25 cities serving two million locations and 58 per cent of the Saudi population.

The new addressing scheme uses the latest digital mapping technologies and it is integrated with the Saudi Post customer relationship management system and electronic readers, and the Express Mail Service database.

Wasel improved the overall efficiency of the mail process and the accuracy of service delivery, and contributed to high customer satisfaction (thanks to features like pick up of outgoing mail from the Wasel box at user's request and follow up on delivery of parcels and letters). It also allowed for the introduction of very useful services like the Saudi Locator ("Al Mouhadded" http://www.locator.sp.sa), which is also available as an app, and allows users to check a postal address, find its location and get directions.   Wasel allowed the Post to launch a series of new e-services, including the E-Mall discussed in box 7. Businesses which do not have their own geographic system can use Saudi Locator to develop e-services and effectively reach their clients. The availability of data on the location of homes and their owners allows for secure e-government and other public services. In addition, the Post has made the mapping service available to the police department and emergency services.

The Wasel addressing system has transformed the traditional postal business and re-invented Saudi Post. The organization was restructured with an independent IT business unit to ensure that it could keep pace with the latest in technology and to assist its other units in embracing ICTs. In order to encourage the creative spirit, an award for the best developer in the IT department is given twice a year. What started as an ICT-based system to improve postal service delivery became an ICT-driven transformation. New services were introduced and the company was transformed. Spillover effects have impacted other e-government and e-commerce services.

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Sources: Abdallah and Finger, 2010, pp. 99-113.

C. FROM POLICY INITIATIVES TO IMPACT MEASUREMENT

1. *Global outcome indicators*

The previous section of this chapter discussed policy initiatives aimed at enhancing ICT and e-services efficiency, leveraging on ICT-driven transformation and embracing innovation in service delivery. The

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[52] A "living lab" integrates research and innovation processes within a public-private partnership.

[53] WBG, 2012a, p. 20.

following indicators were proposed by WBG to measure the efficiency of the application of the 2012-2015 strategy in developing countries.[54] Nevertheless, those indicators may also be useful for measuring the performance of other countries.

- Indicators related to the Transform pillar:

  o Number of developing countries with an action plan to implement commitments under the Open Government Partnership;[55]

  o Number of developing countries in the top 50 of EGDI.

- Indicators related to the Innovate pillar:

  o ICT service exports as percentage of total service exports in developing countries;[56]

  o Number of developing countries in the top 50 of the Global Innovation Index[57] derived from 80 indicators, of which 21 are related to some form of ICT.[58]

Within the Arab region, Jordan is the only current member of the Open Government Partnership with a public action plan and commitments.

The results of EGDI reported in the 2010 and 2012 E-Government Survey are important indicators. The results of the e-participation index should also be considered.

Data from 2010 on ICT service exports (as percentage of total service exports) are available for eight member countries as follows: Egypt 4.2, Iraq 0.6, Lebanon 3.0, Morocco 8.0, Palestine 6.0, the Sudan 25.8, the Syrian Arab Republic 1.9, and Tunisia 5.9. Data for GCC countries were not available.[59]

Finally, the 2012 Global Innovation Index provides the ranking out of 141 surveyed countries for the following 14 member countries of ESCWA: Qatar 33; the United Arab Emirates 37; Bahrain 41; Oman 47; Saudi Arabia 48; Kuwait 55; Jordan 56; Tunisia 59; Lebanon 61; Morocco 88; Egypt 103; the Syrian Arab Republic 132; Yemen 139; and the Sudan 141.

2. *Metrics for specific policy initiatives*

The policy initiatives proposed by WBG are by no means exhaustive; however, they provide a comprehensive and consistent set of initiatives which have the potential to act on a broad range of issues to develop and enhance the impact of e-services. Though useful, the global outcome indicators discussed above do not make significant inroads into measuring the impact of ICT on social and economic activities. In order to achieve that goal, a detailed analysis of the relevant policy initiatives is needed.

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[54] WBG considers GCC countries to be "upper-income" rather than "developing".

[55] WBG views participation in the Open Government Partnership as likely to facilitate ICT initiatives such as open government data.

[56] Data on this indicator is available from WBG and ITU, 2012.

[57] The Global Innovation Index, published by the European Institute of Business Administration and the World Intellectual Property Organization, recognizes innovation as a driver of economic growth and prosperity, and indicators that go beyond the traditional measures of innovation (such as the level of research and development in a given country) acknowledge the need for a broad vision of innovation that is applicable to both developed and emerging economies.

[58] WBG, 2012a, p. 37.

[59] WBG and ITU, 2012.

Metrics associated with policy initiatives differ from impact indicators in at least two ways. First, the cumulative result of all policy initiatives does not represent a statistical framework for measuring ICT impact. Second, the proposed metrics are not measures of specific outcomes, but concern the means to carry out those initiatives.

Metrics are the first step towards the elaboration of indicators for measuring the impact of e-services for two reasons. First, they are directly associated with policy initiatives aimed at improving the delivery and efficiency of e-services drawn from current best practice. Second, they leverage the latest technological trends in the rapidly evolving ICT sector. The proposed metrics for the relevant policy initiatives are summarized in table 18.

TABLE 18. POLICY INITIATIVES AND PROPOSED METRICS TO ENHANCE ICT IMPACT

Policy initiative	Metrics
Setting up of an open data portal with a significant amount of accessible and up-to-date data related to public accounts, infrastructure, economy and commerce, status of public services, and so on.	A government data portal is implemented; level of detail and scope of provided data (e.g., number of concerned administrations); opportunities for citizens and businesses to provide feedback and enrich the data.
Providing citizens with the ability to enrich and contribute to data provided by the Government and report on social issues and infrastructure needs and repairs.	Number of ICT-enabled accountability and transparency initiatives with citizen engagement (such as open budget, community mapping).
Organizing processes at all levels (central, regional and local government) whereby citizens and the private sector can be co-creators of public services based on open public data.	Number of e-services developed at all levels of government, including citizen and business initiatives leveraging open public data where applicable.
Establishing legal and regulatory frameworks through proper directives for open government, freedom of information and data protection acts.	Executive directives in force in relation to open government data, freedom of information and data protection.
Setting up a government CIO with real powers and high-level political support.	Government CIO established, extent of political backing, funding, and powers over administration.
Setting up a national strategies for ICT-driven transformation with timely objectives and implementation plan.	A checklist of requirements based on the following: innovation, open data, citizen engagement, sustainable development, and so on.
Setting up sector-specific strategies for ICT-driven transformation. These strategies should be implemented through an open consultation process and involve all stakeholders, to ensure acceptance and proper implementation.	Number of sector-specific e-strategies in place, and for each, the following: - Degree of stakeholder engagement; - Precision of the stated objectives and time frame for implementation; - Number of e-services resulting from implementation.
Leveraging public private partnerships for effective service delivery and applying this concept in a significant number of public services.	Number of public services delivered resulting from public-private partnerships.
Ensuring interoperability of technology procurement and architectures among different public administrations and services.	Presence of a central office to ensure and enforce consistent procurement and interoperability of public initiatives (possibly related to CIO); number of known interoperability issues.
Clustering ICT businesses (for content and applications) to link SMEs and local research institutions to economic activities.	Number of SMEs involved in such clusters and degree of involvement of research institutions. Level of exchange between research institutions and SMEs, and number of SME activities impacted by such initiatives.

TABLE 18 (*continued*)

Policy initiative	Metrics
Leveraging the lower value-chain segments of the ICT service industry to incubate decentralized SMEs at scale.	Number of contracts provided to local IT-service industry for implementation of public service ICT infrastructure and e-services especially at the local level.
Creating capacity-building intermediaries to help entrepreneurs turn business ideas into reality, and to modernize and improve business competitiveness through ICT. The implementation of this initiative may take the form of incubators which assist local developers of e-services and provide them with technical and commercial support.	Number of supported projects per annum and degree of knowledge transfer from leading technology companies (subject to form of implementation).
Creating open innovation forums or "living labs" to engage startups and small firms, in cooperation with other innovation actors, to evaluate concepts and develop prototypes in real-life settings with real users.	Number of living lab events and number of attendees.
Providing access to finance through social networks established by entrepreneurs, or through global pooled financial mechanisms.	Number of entrepreneurs benefiting from such financing mechanisms as a share of total requested financing.

Source: Compiled by ESCWA.

However, moving from metrics to indicators needs major work and an elaboration effort similar to, but likely more difficult than the statistical framework for measuring the WSIS Targets discussed in chapter I. Hopefully, indicators built on policy initiatives that have a direct effect on e-services provided by government, public services and businesses will provide more meaningful representation of the impact of such e-services on socioeconomic outcomes.

The metrics allows an indirect approach to the problem of measuring impact. Rather than attempting to prove complex, and often difficult to establish causal links between e-services and socioeconomic outcomes, the approach to the problem is to measure the extent of implementation of policy initiatives which have been put in place to achieve the desired outcomes.

There are risks associated with this approach as even the best policy initiatives may not lead to expected outcomes, especially in the context of developing countries. However, in the absence of significant impact indicators and data resulting from a direct approach, an indirect approach may be valuable particularly where countries have established policies based on best practice to leverage the innovation and transformation potentials of ICT.

IV. CONCLUSION AND RECOMMENDATIONS

Improving the impact of e-services on socioeconomic outcomes should be one of the priorities of the region because of the benefits it would bring. In addition, like the rest of the world, the Arab region is impacted by the global revolution of access to ICT which will eventually become universal. As access becomes even more pervasive, a failure to take full advantage of ICT and deepen the socioeconomic impact of e-services will likely result in negative outcomes.

This study examined issues related to measuring the Information Society and impact of e-services in the Arab region, with a focus on the use of e-services in some specific domains. The Information Society measurement frameworks and the indicators they introduce have focused primarily on measuring ICT readiness and use, rather than impact. Furthermore, data sources for developing countries are limited. The study outlined approaches to measurement that are based on opinion surveys that provide useful insights on ICT impact. These approaches are still works in progress, but the initial analysis of ESCWA member countries revealed that ICT impact is driven to a significant extent by government initiatives, especially in rich GCC countries.

Within e-government, e-commerce and business use of ICT, GCC countries have made tremendous progress and rank well on international indices. Nevertheless, it is debatable if citizens are effectively using these services, and in the absence of official statistics, few conclusions can be drawn about the volume of e-commerce and business use of ICT in ESCWA member countries. Only 6 out of 17 ESCWA member countries report any data whatsoever, however, anecdotal evidence and private data sources point to a growing adoption of e-commerce in the region, particularly among upper income populations. E-commerce in the region seems also to benefit from spillover effects of government initiatives, in particular regarding secure payment methods. Nevertheless, there is growing evidence that the lack of trust in online services is a significant hindrance to the development of e-commerce along with other e-services that involve an exchange of private data.

Smartphones and the mobile apps are likely to become an essential means for accessing e-services. The apps industry has the potential to provide services in response to local-level needs. In line with global trends, the most downloaded apps in the Arab region centre on social networking, gaming, sports and entertainment. Many Governments and public institutions in the region have begun to develop and offer free apps related to their own services. This trend, in association with the growing popularity and affordability of smartphones, will eventually change the way e-services are developed, accessed and used, particularly among the less advantaged and largest categories of citizens, which will in turn bring about new perspectives for increasing their impact.

To enhance the impact of e-services on socioeconomic outcomes, policymakers must have access to reliable statistics and data to improve the effectiveness of policy action. The study presented a framework, policy initiatives and metrics that aim to deepen the socioeconomic impact of e-services. The proposed policy initiatives are based on the potential of ICT to transform e-services and drive innovation. They leverage the technological and social evolutions that ICT helped to introduce in the late twentieth century. Proposed metrics related to the policy initiatives may feed into indicators to measure the effectiveness of policies to improve the impact of e-services. Ultimately, they serve as a proxy for direct impact measurement which, to date, has not been feasible.

While no set of indicators (statistical or survey-based) for measuring the impact of e-services has been adopted yet, nor agreed upon in the framework of international collaboration, member countries may focus on implementing policy initiatives to improve the impact of e-services. The following recommendations have emerged from the analysis and could be adopted by countries in the region.

(a) Improve the collection of statistical data, in particular for core ICT indicators based on business and household surveys and censuses. Those surveys can be integrated into national censuses. Collecting

ICT indicators will necessitate coordination between national statistical offices, telecommunication regulatory authorities and ministries in charge of drafting and implementing ICT policies;

(b)   Enlarge data collection efforts beyond the core ICT indicators, in response to policy needs, and use additional indicators as proposed by the framework for measuring the WSIS targets to capture the impact of ICT and the e-services they enable on other sectors (such as health, education, agriculture and so on);

(c)   Build capacity to collect ICT statistics especially in developing countries. Regional cooperation and the sharing of best practice and experience may be one of the most efficient ways to build this capacity. A regional observatory on Information Society measurement could be set up for that purpose and managed by ESCWA;[60]

(d)   Raise awareness of e-government services, reward citizens for using them and improve participation through citizen-led bottom-up initiatives at the local and regional levels. Although some countries in the region have far more advanced e-government offerings, they must stir demand and encourage citizens to take advantage of the services offered;

(e)   Collect e-commerce data through business surveys and take concrete initiatives to assist SMEs in embracing e-commerce. The lack of official statistics on e-commerce, even in countries with an elevated level of e-commerce activities is of particular concern, as is the absence business-to-business e-commerce data. Anecdotal evidence suggests that SMEs do not use e-commerce. Private sector data and forecasts, which often have unclear measurement methodologies and vested interests, may not be useful in the formulation of policies aimed at developing e-commerce in the region;

(f)   Introduce secure e-payment methods, improve efficiency of postal services through ICT-driven transformations and adopt and enforce proper cyberlegislation. Trusted e-payment platforms are needed to promote the development of e-commerce, as are clear and applicable consumer protection laws, and platforms for a timely and secure delivery of goods and services purchased online;

(g)   Encourage the emergence of an app industry in conjunction with regional efforts to develop digital Arabic content. Promote the development of free apps for government and other public services such as health and education. Smartphones and tablets will very soon become the most pervasive delivery channel for e-services. The development of apps in the region, especially apps in Arabic that are tailored to local needs, must be strengthened. The most downloaded apps in the region largely follow the global trends, whereby demand for social networking, entertainment and gaming is still dominant;

(h)   Implement policy initiatives to improve the impact of e-services on socioeconomic outcomes, taking national development priorities and the local context into consideration.

Future attempts to measure impact could build upon this study in two directions. The first direction would be to propose a road map including the practical steps which member countries must take to enhance the present state of data collection and ICT related statistics, identify gaps and recommend actions for bridging these gaps, and use the data collected and the resulting indices for proper planning, benchmarking and decision-making. The second direction would be to further develop and exploit the metrics proposed by this study to measure policy initiatives which aim to enhance ICT impact.

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[60] Partnership, 2012, para. 42 highlighted the creation of a working group on ICT by the statistical conference of the Economic Commission for Latin America and the Caribbean in 2005, which eventually led to the establishment of the Observatory for the Information Society in Latin America and the Caribbean, which shares experiences on measuring access to, and use of, ICT in the region.

Annex

TABLE A1.1. SELECTED ARAB COUNTRIES BY ICT DEVELOPMENT INDEX (IDI) RANKING
2011 AND 2010

Country	Global rank 2011	Value 2011	Global rank 2010	Value 2010	Rank change 2011-2010
Qatar	30	6.24	31	5.94	1
Bahrain	40	5.85	45	5.19	5
United Arab Emirates	45	5.64	43	5.41	-2
Saudi Arabia	47	5.43	53	4.81	6
Oman	53	5.10	54	4.75	1
Lebanon	65	4.48	68	4.11	3
Jordan	75	3.95	77	3.61	2
Egypt	83	3.66	81	3.44	-2
Tunisia	85	3.58	83	3.42	-2
Morocco	90	3.46	92	3.19	2
Syrian Arab Republic	96	3.15	96	3.01	0
Algeria	104	2.98	103	2.86	-1
Yemen	126	1.76	126	1.70	0
Average		4.26		4.05	

Source: ITU, 2012b.

Note: Global rankings are out of 155 surveyed countries in 2011 and 152 in 2010.

TABLE A1.2. SELECTED ARAB COUNTRIES BY ICT PRICE BASKET (IPB) RANKING, 2011

Country	IPB global rank	IPB	Fixed telephony US$	Mobile cellular US$	Fixed broadband US$	Fixed telephony PPP$	Mobile cellular PPP$	Fixed broadband PPP$	Fixed telephony % GNI per capita	Mobile cellular % GNI per capita	Fixed broadband % GNI per capita	Average annual GNI per capita US$ 2010
Qatar	4	0.5	9.1	18.7	54.9	11.9	24.6	72.3	0.2	0.3	0.9	71 008[a]
United Arab Emirates	6	0.5	4.1	9.1	40.6	4.9	10.8	48.3	0.1	0.3	1.2	41 930[a]
Bahrain	15	0.7	4.7	15.0	26.6	5.9	18.8	33.3	0.2	0.7	1.3	25 420[b]
Oman	30	1.0	13.1	8.7	25.9	20.4	13.5	40.3	0.9	0.6	1.7	18 260[a]
Saudi Arabia	41	1.3	13.2	14.1	26.6	18.9	20.3	38.2	1.0	1.0	2.0	16 190[a]
Lebanon	64	2.5	11.7	25.2	17.6	17.8	38.2	26.7	1.6	3.4	2.4	8 880
Tunisia	66	2.5	5.8	10.0	10.5	13.1	22.6	23.8	1.7	2.9	3.0	4 160
Egypt	75	2.9	3.1	6.6	8.0	7.3	15.4	18.7	1.6	3.3	4.0	2 420
Algeria	79	3.4	6.3	13.8	17.8	11.7	25.8	33.3	1.7	3.7	4.8	4 450
Jordan	91	3.9	9.4	10.4	22.6	11.9	13.1	28.6	2.6	2.9	6.2	4 340
Morocco	100	5.1	2.3	22.2	11.7	3.8	37.6	19.8	0.9	9.4	4.9	2 850
Syrian Arab Republic	109	6.4	1.3	21.3	21.6	2.3	38.6	39.1	0.5	9.3	9.4	2 750
Yemen	119	10.8	0.9	11.3	16.7	2.3	27.2	40.2	1.1	12.6	18.7	1 070[a]
Sudan	121	12.9	6.0	6.1	29.0	10.3	10.4	49.6	5.7	5.7	27.4	1 270
Iraq	141	35.5	0.4	12.5	211.3	0.5	17.6	296.7	0.2	6.4	108.3	2 340
Average		5.99	6.09	13.67	36.09	9.53	22.30	53.93	1.33	4.17	13.08	

Source: ITU, 2012b.

Notes: Global rankings are among 161 surveyed countries. Gross National Income (GNI) and purchasing power parity (PPP) are based on World Bank data.
a/ Data for 2009.
b/ Data for 2008.

TABLE A1.3. PARTNERSHIP CORE ICT INDICATORS AS ENDORSED
BY THE UNITED NATIONS STATISTICAL COMMISSION

Core Indicators on ICT infrastructure and access
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
Core Indicators on use of ICT by businesses
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: • Narrowband   • Fixed broadband   • Mobile broadband
B10   Proportion of businesses with a local area network (LAN)
B11   Proportion of businesses with an extranet
B12   Proportion of businesses using the Internet by type of activity: • Sending or receiving e-mail   • Telephoning over the Internet/VoIP   • Posting information or instant messaging   • Getting information about goods or services   • Getting information from general government organizations   • Interacting with general government organizations   • Internet banking   • Accessing other financial services   • Providing customer services   • Delivering products online   • Internal or external recruitment   • Staff training

Core indicators on ICT in education	
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 HH5 Proportion of individuals who used a computer in the last 12 months
ED5	Proportion of schools with Internet access by type of access: • Any Internet access • Access by fixed narrowband only • Access by fixed broadband only • Both fixed narrowband and broadband 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
Core eGovernment Indicators	
EG1	Proportion of persons employed in central government organizations routinely using computers
EG2	Proportion of persons employed in central government organizations routinely using the Internet
EG3	Proportion of central government organizations with a local area network (LAN)
EG4	Proportion of central government organizations with an intranet
EG5	Proportion of central government organizations with Internet access, by type of access
EG6	Proportion of central government organizations with a web presence
EG7	Selected Internet-based services available to citizens, by level of sophistication of service
Core indicators on the ICT (producing) sector	
ICT1	Proportion of total business sector workforce involved in the ICT sector
ICT2	ICT sector share of gross value added
Core Indicators on international trade in ICT goods	
ICT3	ICT goods imports as a percentage of total imports
ICT4	ICT goods exports as a percentage of total exports
Core Indicators on access to, and use of, ICT by households and individuals	
HH1	Proportion of households with a radio
HH2	Proportion of households with a TV
HH3	Proportion of households with telephone: • Any telephone • Fixed telephone only • Mobile cellular telephone only • Both fixed and mobile cellular 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:

- Home
- Work
- Place of education
- Another person's home
- Community Internet access facility
- Commercial Internet access facility
- Any place via a mobile cellular telephone
- Any place via other mobile access devices

HH9	Internet activities undertaken by individuals in the last 12 months:

- Getting information about goods or services
- Getting information related to health or health services
- Getting information from general government organizations
- Interacting with general government organizations
- Sending or receiving e-mail
- Telephoning over the Internet/VoIP
- Posting information or instant messaging
- Purchasing or ordering goods or services
- Internet banking
- Education or learning activities
- Playing or downloading video games or computer games
- Downloading movies, images, music, watching TV or video, or listening to radio or music
- Downloading software
- Reading or downloading online newspapers or magazines, electronic books

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:

- Narrowband
- Fixed broadband
- Mobile broadband

HH12	Frequency of individual use of the Internet in the last 12 months:

- At least once a day
- At least once a week but not every day
- Less than once a week

HHR1	Proportion of households with electricity

Source: Partnership, 2012.

Revised WSIS targets	Most relevant WSIS action lines	Proposed indicators for measuring progress
Target 1. Connect all villages with ICTs and establish community access points	C2. Information and communication infrastructure C3. Access to information and knowledge C4. Capacity building	1.1 Proportion of rural population covered by a mobile cellular telephone network, by type of mobile cellular telephone technology 1.2 Proportion of households with telephone, by type of network, by urban/rural 1.3 Proportion of households with Internet access, by type of access, by urban/rural 1.4 Proportion of individuals using the Internet, by location, by urban/rural
Target 2. Connect all secondary schools and primary schools with ICTs	C2. Information and communication infrastructure C3. Access to information and knowledge C7. E-learning	2.1 Proportion of schools with a radio used for educational purposes 2.2 Proportion of schools with a television used for educational purposes 2.3 Learners-to-computer ratio 2.4 Proportion of schools with Internet access, by type of access
Target 3. Connect all scientific and research centres with ICTs	C2. Information and communication infrastructure C3. Access to information and knowledge C7. E-science	3.1 Proportion of public scientific and research centres with broadband Internet access 3.2 Presence of a national research and education network, by bandwidth (Mbit/s) 3.3 Proportion of public scientific and research centres with Internet access to a national research and education network
Target 4. Connect all public libraries, museums, post offices and national archives with ICTs	C2. Information and communication infrastructure C3. Access to information and knowledge C4. Capacity building C8. Cultural diversity and identity, linguistic diversity and local content	4.1 Proportion of public libraries with broadband Internet access 4.2 Proportion of public libraries providing public Internet access 4.3 Proportion of public libraries with a web presence 4.4 Proportion of museums with broadband Internet access 4.5 Proportion of museums with a web presence 4.6 Proportion of post offices with broadband Internet access 4.7 Proportion of post offices providing public Internet access 4.8 National archives organizations with broadband Internet access 4.9 National archives organizations with a web presence 4.10 Proportion of items in the national archives that have been digitized 4.11 Proportion of digitized items in the national archives that are publicly available online
Target 5. Connect all health centres and hospitals with ICTs	C2. Information and communication infrastructure C7. E-health	5.1 Proportion of public hospitals with Internet access, by type of access 5.2 Proportion of public health centres with Internet access, by type of access 5.3 Level of use of computers and the Internet to manage individual patient information

Revised WSIS targets	Most relevant WSIS action lines	Proposed indicators for measuring progress
Target 6. Connect all central government departments and establish websites	C1. The role of public governance authorities and all stakeholders in the promotion of ICTs for development C2. Information and communication infrastructure C3. Access to information and knowledge C7. E-government	6.1 Proportion of persons employed in central government organizations routinely using computers 6.2 Proportion of persons employed in central government organizations routinely using the Internet 6.3 Proportion of central government organizations with a local area network (LAN) 6.4 Proportion of central government organizations with an intranet 6.5 Proportion of central government organizations with Internet access, by type of access 6.6 Proportion of central government organizations with a web presence 6.7 Level of development of online service delivery by national governments
Target 7. Adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances	C4. Capacity building C7. E-learning	7.1 Proportion of ICT-qualified teachers in schools 7.2 Proportion of teachers trained to teach subjects using ICT 7.3 Proportion of schools with computer-assisted instruction 7.4 Proportion of schools with Internet-assisted instruction
Target 8. Ensure that all of the world's population has access to television and radio services	C2. Information and communication infrastructure C3. Access to information and knowledge C8. Cultural diversity and identity, linguistic diversity and local content C9. Media	8.1 Proportion of households with a radio 8.2 Proportion of households with a television 8.3 Proportion of households with multichannel television service, by type of service
Target 9. Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet	C3. Access to information and knowledge C8. Cultural diversity and identity, linguistic diversity and local content	9.1 Proportion of Internet users by language, country level 9.2 Proportion of Internet users by language, top ten languages, global level 9.3 Proportion of web pages, by language 9.4 Number of domain name registrations for each ccTLD, weighted by population 9.5 Number and share of Wikipedia articles by language
Target 10. Ensure that more than half the world's inhabitants have access to ICTs, within their reach and make use of them	C2. Information and communication infrastructure C3. Access to information and knowledge C6. Enabling environment C7. ICT applications: benefits in all aspects of life	10.1 Mobile cellular telephone subscriptions per 100 inhabitants 10.2 Proportion of households with telephone, by type of network 10.3 Proportion of individuals using a mobile cellular telephone 10.4 Proportion of individuals using the Internet 10.5 Proportion of households with Internet access, by type of access
Additional Target Connect all businesses with ICTs	C1. The role of public governance authorities and all stakeholders in the promotion of ICTs for development C7. E-business	A.1 Proportion of businesses using computers A.2 Proportion of businesses using the Internet, by type of access A.3 Proportion of businesses using mobile cellular telephones

Source: Partnership, 2011b.

TABLE A1.5. AVAILABILITY OF E-POST SERVICES IN SELECTED ESCWA MEMBER COUNTRIES

	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129
Egypt		x	x										x	x	x		x			x									
Iraq																													
Jordan		x											x	x	x		x			x									
Kuwait																													
Lebanon		x											x					x		x		x						x	
Qatar	x	x	x		x	x	x		x	x			x	x		x	x	x	x	x	x			x				x	x
Saudi Arabia		x											x	x	x		x	x	x	x	x	x	x	x	x	x	x		
Syrian Arab Republic																													
Tunisia	x	x	x						x	x			x	x	x	x	x	x		x	x								x
United Arab Emirates	x	x	x	x										x			x			x									

Service code explanation

101	Public Internet access point in post offices	116	Postal address validation
102	Web information on services and tariffs	117	Post office location
103	Postal electronic mailbox	118	Address change online address
104	Online direct mail	119	Holding of mail delivery online
105	Postal registered electronic mail	120	Track and trace validation
106	Electronic stamp	121	Electronic notification to Post of letter needing to be collected
107	Customized electronic stamps	122	Electronic notification to addressee that letter is to be delivered
108	Electronic postal certification mark	123	Electronic notification to sender that letter has been delivered
109	Electronic signature	124	Electronic notification to Post that parcel needs to be collected
110	E-telegram	125	Electronic notification to addressee that parcel is to be delivered
111	E-cards	126	Electronic notification to sender that parcel has been delivered.
112	Online burofax	127	Check mailbox contents online
113	Hybrid mail (electronic to physical)	128	Web-based customer service and contact
114	Hybrid mail (physical to electronic)	129	Applications on mobile devices
115	Postcode lookup		

Source: UPU, 2012, p. 14.

TABLE A1.6. OFFERINGS OF E-FINANCE, E-COMMERCE, AND E-GOVERNMENT SERVICES
BY SELECTED POSTS IN THE ARAB REGION

	E-finance services									E-commerce services						E-government services										
	201	202	203	204	205	206	207	208	209	301	302	303	304	305	306	401	402	403	404	405	406	407	408	409	410	411
Egypt	x		x		x			x	x											x						
Iraq																										
Jordan	x	x	x			x	x	x						x												
Kuwait						x	x	x																		
Lebanon														x												
Qatar	x			x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x
Saudi Arabia	x	x		x	x							x		x		x	x		x							
Syrian Arab Republic																										
Tunisia	x	x	x	x		x	x	x	x	x	x	x		x	x	x		x	x	x		x				x
United Arab Emirates				x	x	x	x	x	x							x		x		x						

Service code explanation	
201 Electronic invoicing	305 E-commerce web-based customer service and contact
202 Electronic account management	306 SSL web certificates
203 Electronic remittance	401 Digital identity
204 Online bill payments	402 Driving licence renewal
205 Bills management	403 Online shopping for tickets to cultural and/or sports events
206 E-payment of water bills	404 Electronic university registration
207 E-payment of electricity bills	405 Electronic payment of retirement pensions
208 E-payment of phone bills	406 Online passport application
209 Electronic money Transfer	407 Management of patients' electronic medical files
301 Online shop for philatelic products	408 Electronic medical certificates
302 Online shop for postal goods	409 Electronic collection of public medical fees
303 Online shop for non-postal goods	410 Electronic export documents
304 Subscription for periodicals	411 Electronic customs documents

Source: UPU, 2012, p. 15.

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