Regional Profile of the Information Society

in the Arab Region

ESCWA

United Nations Economic and Social Commission for Western Asia

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Acknowledgements

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The report was prepared by a team comprising all staff members of the ICT Division at ESCWA, led by Rami Zaatari under the direct supervision of Nibal Idlebi, Chief of the ICT Applications section, and overall guidance of Haidar Fraihat, Director of the ICT Division. In addition, the team included Ayman El-Sherbiny, Chief of the ICT Policy section, Nawar Alawa, Regional Advisor on ICT, George Younes, Mirna Barbar, Matthew Perkins, Syed Ahmed, Hania Dimassi, and Zahr Bou Ghanem. Additional substantive inputs were provided by Abdulilah Dewachi, ICT consultant. A substantive peer review of the report was conducted by Souheil Marine, a consultant in ICT for development.

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Feedback and comments from readers are welcome via e-mail at escwa-ictd@un.org.

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Abbreviations and Explanatory Notes

3G	Third generation
3GPP	Third Generation Partnership Project
4G	Fourth generation
AAG	Arab Advisors Group
AASTM	Arab Academy for Science and Technology and Maritime Transport
ADNS	Arabic Domain Name System
ADSL	Asymmetric Digital Subscriber Line
AICTO	Arab ICT Organization
AIGLE	Academy of ICT Essentials for Government Leaders in the ESCWA Region
ALECSO	Arab League Educational, Cultural and Scientific Organization
AMAG	Arab Multi-stakeholder Advisory Group
ANRT	Agence Nationale de Règlementation des Télécommunications
APCICT	Asian and Pacific Training Centre for Information and Communication Technology for Development
ArabDIG	Arab Dialogue on Internet Governance
ARADO	Arab Administrative Development Organization
ARPT	Authorité de Régulation de la Poste et des Télécommunications
ATM	Automated teller machine
ATUCOM	Tunisian Association for Communication
AUC	American University of Cairo
B2B	Business to business
B2C	Business to consumer
B2G	Business to government
BATELCO	Bahrain Telecommunications Company
BBC	British Broadcasting Corporation
BBM	BlackBerry Messenger
BDD	Beirut Digital District
BIX	Bahrain Internet Exchange
BOT	Build-operate-transfer
BSA	Business Software Alliance
CAGR	Compound annual growth rate
CAI	Computer-assisted instruction
CAIT	Central Agency for Information Technology
CCNA	Cisco Certified Network Associate

ccTLD	Country code top-level domain
CD	Compact disc
CERIST	Research Centre of Scientific and Technical Information
CERT	Computer emergency response team
CIS	Commonwealth of Independent States
CITC	Communications and Information Technology Commission
CKC	Community Knowledge Centres
CLD	Centre for Law and Democracy
CMC	Communications and Media Commission
CMMI	Capability Maturity Model Integration
CMS	Content management system
COPUOS	Committee on the Peaceful Uses of Outer Space
CSO	Central Statistics Office
CSR	Corporate social responsibility
CSV	Comma-separated values
CULTNAT	Centre for Documentation of Cultural and Natural Heritage
DAC	Digital Arabic content
DSL	Digital subscriber line
ECA	Economic Commission for Africa
ECOSOC	Economic and Social Council
EDGE	Enhanced Data Rates for GSM Evolution
EGDI	E-Government Development Index
EHBP	El Hassan Business Park of Jordan
EIF	European Interoperability Framework
EIG	Europe India Gateway
ERP	Enterprise resource planning
ESCAP	Economic and Social Commission for Asia and the Pacific
ESCWA	Economic and Social Commission for Western Asia
ETC	ESCWA Technology Centre
EUN	Egyptian Universities Network
FAJ	Federation of Arab Journalists
FALCON	FLAG and Alcatel Lucent Optical Network
FBWA	Fixed broadband wireless access
FDI	Foreign direct investment
FLAG	Fibre-optic Link Around the Globe
FOI	Freedom of information
FOSS	Free and open-source software
FTTH	Fibre-to-the-home
FTTX	Fibre to the x
GBI	Gulf Bridge International
Gbps	Gigabit per second
GCC	Gulf Cooperation Council
GDP	Gross domestic product
GER	Gross enrolment rate

GII	Global Innovation Index
GITR	Global Information Technology Report
GNI	Gross national income
GPI	Gender Parity Index
GSM	Global System for Mobile
GTA	General Telecommunications Authority
gTLD	Generic top-level domain
HIAST	Higher Institute for Applied Sciences and Technology
HSPA	High-speed Packet Access
IAI	Internet-assisted instruction
IANA	Internet Assigned Numbers Authority
ICANN	Internet Corporation for Assigned Names and Numbers
ICDL	International computer driving licence
ICT	Information and Communications Technology
ICT4D	ICT for Development
ictQATAR	Supreme Council of Information and Communication Technology
ID	Identity
IDAL	Investment Development Authority of Lebanon
IDN	Internationalized domain names
IER	Innovation Efficiency Ratio
IFC	International Finance Corporation
IGF	Internet Governance Forum
ILO	International Labour Organization
IMEWE	India Middle East Western Europe
IMF	International Monetary Fund
IMPACT	International Multilateral Partnership Against Cyber Threats
INSEAD	Institut Européen d'Administration des Affaires - European Institute of Business Administration
INTT	Instance Nationale des Télécommunications
IOR	Innovation output ratio
IPB	ICT Price Basket
IPR	Intellectual property right
IREX	International Research and Exchanges Board
ISC	Internet Systems Consortium
IsDB	Islamic Development Bank
ISP	Internet service provider
ISPER	Information Society Portal for the ESCWA Region
ITA	Information Technology Authority
ITI	Information Technology Industry
ITPPL	Information Technology Public-private Partnership in Libya
ITU	International Telecommunication Union
IXP	Internet exchange point
KACARE	King Abdullah City for Atomic and Renewable Energy
KACST	King Abdul Aziz City for Science and Technology
KAM	Knowledge Assessment Methodology
KBE	Knowledge-based economy

KI	Knowledge Index
KOICA	Korean International Cooperation Agency
LDC	Least developed countries
LMIS	Labour Market Information Systems
LMS	Learning management systems
LOST	Lebanese Organization for Studies and Training
LPI	Linux Professional Institute
LPIC-1	Linux Professional Institute Certificate - Level 1
LTE	Long-term evolution
LTT	Libya Telecom and Technology
Ma3bar	Arab Support Center for Free and Open Source Software
Mbps	Megabit per second
MCIT	Ministry of Communications and Information Technology
MDG	Millennium Development Goals
MENA	Middle East and North Africa
MEPI	Middle East Partnership Initiative
MoC	Ministry of Communications
MoCIT	Ministry of Communications and Information Technology
MoCT	Ministry of Communications and Technology
MOICT	Ministry of Information and Communications Technology
MSI	Media Sustainability Index
MSP	Multi-sector partnership
MTIT	Ministry of Telecommunications and Information Technology
MVNO	Mobile Virtual Network Operators
N/A	Not available
NACS	National Agency for Computer Security
NANS	National Agency for Network Services
NCC	National Computer Centre
NCITP	National Communications and Information Technology Plan
NCTR	Nile Centre for Technology Research
NER	Net enrolment rate
NERC	National Energy Research Centre
NGO	Non-governmental organization
NIC	National Information Centre
NITTA	National IT Training and Awareness Framework
NLP	Natural language processing
NPFOSST	National Programme for Free and Open-source Software Technology
NPRP	National Priorities Research Programme
NREN	National Research and Education Network
NRI	Networked Readiness Index
NTC	National Telecommunications Corporation
NTI	National Telecommunication Institute
NTRA	National Telecommunication Regulatory Authority
OB	Observer
OCR	Optical character recognition

OECD	Organisation for Economic Co-operation and Development
OeGAF	Oman e-Government Architecture Framework
OGD	Open government data
OS	Operating system
OWAM	Omani Women Association
PC	Personal computer
PCT	Patent Cooperation Treaty
PDF	Portable document format
PES	Public employment service
PFI	Press Freedom Index
PICTI	Palestinian Information and Communications Technology Incubator
PKI	Public-key infrastructure
PLT	Patent Law Treaty
PPP	Public-private partnership
PTC	Public Telecommunication Corporation
PUOS	Peaceful uses of outer space
QALM	Qatar Information eXchange
QCERT	Qatar Computer Emergency Response Team
QF	Qatar Foundation
QNB	Qatar National Bank
QNRF	Qatar National Research Fund
QSCCB	Qatar Social and Cultural Centre for the Blind
Qtel	Qatar Telecom
RAI	Radio-assisted instruction
RDI	Research, development and innovation
REN	Research and education network
RFS	Ready for service
RPoA	Regional Plan of Action
RSS	Royal Scientific Society of Jordan
RTI	Right to information
RWB	Reporters Without Borders
SANAD	Self-employment and National Autonomous Development
SCS-ICTI	Syrian Computer Society – Information and Communications Technology Incubator
SEA-ME-WE	South East Asia-Middle East-Western Europe
SECC	Software Engineering Competence Centre
SME	Small and medium enterprise
SMS	Short message service
SST4D	Space and satellite technologies for development
STC	Saudi Telecom Company
STE	Syrian Telecom
STI	Science, technology and innovation
SWOT	Strengths, weaknesses, opportunities, and threats
TAG-Org	Talal Abu-Ghazaleh Organization
TAI	Television-assisted instruction

Tbps	Terabit per second
TGN	Tata Global Network
TIMSS	Trends in International Mathematics and Science Study
TLD	Top-level domain
TRA	Telecommunications Regulatory Authority
TRC	Telecommunications Regulatory Commission
TRIPS	Trade-related aspects of intellectual property rights
TSA	Telecommunications Supervisory Authority
UAE	United Arab Emirates
UIS	UNESCO Institute for Statistics
UMTS	Universal Mobile Telecommunications System
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGIS	United Nations Group on the Information Society
UNODC	United Nations Office on Drugs and Crime
UNOOSA	United Nations Office for Outer Space Affairs
UNPAN	United Nations Public Administration Network
UNPSA	United Nations Public Service Award
UNWOMEN	United Nations Entity for Gender Equality and the Empowerment of Women
URL	Uniform resource locator
USPTO	United States Patent and Trademark Trademark Office
VC	Venture capital
VDSL	Very-high-bit-rate digital subscriber line
VoIP	Voice over Internet Protocol
VSAT	Very small aperture terminal
WCKC	Women's Community Knowledge Centre
WCT	WIPO Copyright Treaty
WEF	World Economic Forum
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WRC	World Radiocommunication Conference
WSIS	World Summit on the Information Society
WTO	World Trade Organization
YFOSA	Yemeni Free Software and Open-source Association
XML	Extensible markup language

Introduction

Introduction

Global changes are taking place at the economic, social and cultural levels, with information and knowledge playing a major role in the move towards the information society. The accelerating development in knowledge during the past decade has modified the principles of economic growth with the move towards a knowledge-based economy affecting all sectors of the economy.

The information society is a society that processes information efficiently in its socioeconomic development, including the production, exchange, adaptation, and use of information for the purpose of development and the enhancement of the quality of life and work environment for all citizens. In order to realize the information society, information and communications technologies (ICTs) need to be used. While ICTs are necessary, they are not sufficient, given that capacity-building must be equally enhanced in knowledge-related areas, covering economic, social, legal, educational and innovation issues.

Significant differences exist in the capacity of countries to adapt to changes in technology and knowledge. Consequently, the move towards the information society constitutes a real challenge to developing countries, particularly in view of the persisting digital divide with developed countries, thereby rendering them increasingly vulnerable to reduction in productivity and economic capacity. This leads, in turn, to a myriad of such social and economic problems as decrease in economic output, unemployment, poverty, corruption, and marginalization.

In this context, the General Assembly adopted resolution 56/183 in December 2001 to endorse a proposal presented by the International Telecommunication Union (ITU), which aimed at convening the World Summit on the Information Society (WSIS) under the patronage of the Secretary-General of the United Nations. The Summit aimed to reduce the digital divide by increasing awareness regarding the benefits of the information society, and by presenting mechanisms to help developing countries advance towards such a society within the context of the global knowledge-based economy. WSIS was divided into two phases, namely: (a) the first Summit (Geneva, 10-12 December 2003), which resulted in a Declaration of Principles and a Plan of Action; and (b) the second Summit (Tunis, 16-18 November 2005), which focused on the implementation of the Plan of Action, financing mechanisms for using ICTs for development, Internet governance issues, and follow-up to the first Summit.

It is crucial for member countries of the Economic and Social Commission for Western Asia (ESCWA) to realize information societies and transition to knowledge economies if they aspire to lay the foundations for sustainable economic development and achieve various internationally agreed development goals. Accordingly, ESCWA organized the Second Regional Preparatory Conference for WSIS (Damascus, 22-23 November 2004) under

the motto "Partnership for Building the Arab Information Society", which resulted in a Regional Plan of Action (RPoA) covering various issues relating to the development of an information society in the region.[1] Additionally, a conference on the Regional Follow-up to the Outcome of the World Summit on the Information Society was held in Damascus, 16-18 June 2009, which provided a forum where various WSIS stakeholders in the region met, presented, discussed and reviewed the progress made towards the implementation of the eleven WSIS action lines, as well as the execution of the RPoA for Building the Information Society. The conference resulted in updating the RPoA; and adopting the Damascus Proclamation for the Promotion of the Arab Knowledge Society for Sustainable Economic and Social Development.

Against this backdrop and within the framework of follow-up and evaluation activities of the WSIS, this report aims to depict the status of information societies in the Arab region,[2] measure the progress made in building these societies and evaluate the current status of each member country.[3] With those objectives, comprehensive analysis is provided on the following:

a. role of governments and all stakeholders in chapter I;
b. ICT infrastructure in chapter II;
c. access to information and knowledge in chapter III;
d. ICT capacity-building in chapter IV;
e. building confidence and security in the use of ICTs in chapter V;
f. enabling environment in chapter VI;
g. ICT applications in chapter VII;
h. cultural diversity and identity, linguistic diversity and local content in chapter VIII;
i. media in chapter IX;
j. regional and international cooperation in chapter X;
k. building the ICT sector in chapter XI; and
l. the regional and global comparative analysis and results in chapter XII.

Following the first phase of WSIS, serious work spearheaded by international and regional organizations for measuring ICT and the information society led to the formation of the Partnership on Measuring ICT for Development in Geneva, in 2004, which ESCWA is a member of. Since then, the continuous work of the Partnership has led to the development and adoption of a common list of core ICT indicators which help in measuring some aspects of the information society. While the work of the Partnership on Measuring ICT for Development has been the guiding measurement model for this report, such a model is a work in progress and has yet to cover more aspects of the information society. This stems mainly from the difficulties associated with measuring such an intangible concept as the information society. For this reason, the report relies substantially on essential work in information society measurement, carried out by the United Nations and several such bodies as the ITU, the United Nations Conference on Trade and Development (UNCTAD), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Department of Economic and Social Affairs (UNDESA) and the World Bank. In addition, the work of such independent international organizations as the World Economic Forum (WEF) has proved to be instrumental for benchmarking and evaluating the capacity of the world's economies to leverage ICT for their development.

Aspects of the information society evaluated by this report rely mainly on ten of the eleven WSIS action lines (excluding Ethical dimensions of the Information Society), in addition to the ICT Sector which is an area of interest to the Arab region. Each of chapter one through eleven is thus dedicated to a specific theme, providing a comprehensive analysis, evaluation and recommendations covering all member countries. Taking into account the current difficulties in measuring all aspects of the information society, and for evaluating purposes, the concept of maturity level has been adopted.

Therefore, maturity levels for each of the major aspects comprising the information society provide member countries with benchmarks for assessing rather than comparing their status in building information societies. Specifically, four maturity levels are used for each aspect of the information society, whereby level one indicates the lowest level of maturity and level four indicates the highest level of maturity. As such, the maturity level assessment results should be used by member countries as tools for identifying gaps, and outlining corrective measures rather than becoming the focus of national efforts dedicated to improving one's rank. The four subjective maturity levels cannot be translated into comparable statistical indicators.

Based on the analysis, findings and recommendations provided in this report, Arab countries would formulate a framework to be used as a guideline for formulating policies and strategies beyond 2015. Furthermore, several initiatives and projects may be launched to reduce the existing digital divide both among member countries and between the Arab region and the more developed regions of the world. Within that context, ESCWA will continue to provide countries in the region with the support and advisory services required to ensure synergy with the global trends of ICT, and the development of the information society in line with the WSIS processes and beyond 2015.

I

The role of governments and all stakeholders in building the information society

I. The Role of Governments and all Stakeholders in Building the Information Society

Building an inclusive and people-centred information society, bridging the digital divide and ensuring equitable, fair and sustainable development for all require the strong commitment of, and cooperation between, governments, international organizations, the private sector and civil society. This chapter will look at the efforts expended by various stakeholders to help achieve the main goals of WSIS. These extend from the drafting and implementation of national ICT strategies by governments and the role of civil society, to information society activities carried out through new or existing public-private partnerships (PPP) or multi-sector partnerships (MSP).

A. **Governments:** National e-strategies

As of mid-2013, most governments in the Arab region had adopted national ICT or e-strategies. Conscious of the need to adapt to changing realities and advancing technologies, many have chosen to amend their original strategies which had been written towards the beginning of the millennium. A selected few have gone through more than two iterations and have made it a policy to review and amend their strategies periodically.

Drafting a policy, even one with clearly articulated goals, does not guarantee its implementation. Some countries, be they situated inside or outside the region, are particularly good at drafting comprehensive ICT strategies that end up getting sidestepped because of a dearth of funds, the non-existence of a realistic implementation plan, the lack of a monitoring and evaluation process or more pressing national priorities.

The paragraphs below give a glimpse of the current status of national ICT strategies in a cross-section of countries situated in the Arab region. The main source of the data is the 2013 edition of a country's national profile of the information society, a document which is prepared by an information society expert who is also a national of the country at hand.

Against the backdrop of a prolonged period of political instability which has lasted more than two years, the Ministry of Communications and Information Technology (MCIT) of Egypt is in the process of updating its ICT Strategy.[4] The new strategy is based on seven pillars, each pillar containing a group of programmes, projects and initiatives. The seven pillars mirror some of the WSIS action lines in targeting the development of ICT infrastructure, information infrastructure, digital content, social development, the ICT industry, the regulatory framework, and investments in the ICT sector. This latest iteration of the Egyptian ICT strategy comes with a set of measurable targets in the short and medium terms that include achieving high growth rates for the ICT sector, the development of an electronics industry, attracting investments, creating job opportunities and increasing ICT exports. It is indeed commendable

for a country to produce a new policy in a time of turmoil, but its effective implementation in a worsening economic situation will undoubtedly prove to be a challenge.

The Syrian Arab Republic, in the throes of an internecine war, managed to set aside enough time during March 2012 to review the implementation rate of its 2004 ICT strategy.[5] An internal evaluation, undertaken by the Ministry of Communications and Technology (MoCT), concluded that the rate of implementation of the strategy was limited. Some components fared significantly better than others. As an example, the Restructuring of the Telecom Sector received a high implementation rating of 70 per cent, while the component entitled Sectoral Centres of Excellence failed to even take off and, as such, received a rating of 0 per cent. The remaining components received ratings of, in descending order, 30 per cent for ICT Capacity Building, 30 per cent for Knowledge Economy, 24 per cent for e-Government, 19 per cent for IT Sector Building, and 3 per cent for Technology Parks.

A new ICT strategy for the Syrian Arab Republic is being readied for release by the end of 2013. Its main axes are envisaged to be the development of ICT infrastructure, access to broadband for all citizens, the promotion of digital content in Arabic, ICT capacity-building, the development of e-government services, maximizing the economic benefits of ICT, building confidence and security in the use of ICT, development of a regulatory framework, stimulating innovation in ICT, increasing the level of regional and international cooperation and encouraging investments in ICT. It is unclear if the envisaged update of the strategy is taking any cues from the situation on the ground or if it will incorporate elements that will address dimensions that were of no or little concern when the first national ICT strategy was devised in 2004.

Taking a more politically stable country as our next example, Qatar, in 2011, adopted an updated national ICT strategy entitled Qatar's National ICT Plan 2015: Advancing the Digital Agenda.[6] This new plan is aligned with the country's higher level strategies, namely, Qatar's National Vision 2030, and Qatar's National Development Strategy 2011-2016. The updated plan focuses on five main components, which it labels Strategic Thrusts, namely, improving connectivity, boosting capacity, fostering economic development, enhancing public service delivery as well as advancing societal benefits. These five thrusts are subdivided into programmes which correspond to various areas of interest and which include ICT infrastructure, the legal and regulatory framework, cybersafety and security, digital inclusion, ICT human capital, innovation and entrepreneurship, digital content, e-government, e-education, e-health as well as Internet and society. ictQATAR, the main sponsor of this document, will monitor and assess progress using a variety of tools that include key performance indicators, benchmarks and public surveys.

As a final remark for this section, one could observe that the three updated strategies discussed above contain many significant similarities, especially if one compares their main components, thrusts or areas of focus. The major difference remains in the capacity of the three countries at hand to implement these strategies. It is safe to say that Qatar, with a stable and secure political environment and a prosperous economy, has the best chance at seeing its strategy successfully implemented. Egypt, which, prior to the beginning of its period of political instability in 2011, had carried out many successful information society implementations, will face major hurdles. The ministry in charge may have put a lot of thought into updating the country's ICT strategy, but, with a stagnating economy, dwindling foreign reserves, rising unemployment and continued civil unrest, Egypt will most likely find difficulty in financing an ambitious plan. The third country, the Syrian Arab Republic, having suffered from a major destruction of its infrastructure, may find that the components that it is focusing on in its updated national ICT strategy may have to be set aside for more pressing and more basic national priorities. If the security situation does not improve, the Syrian

Arab Republic will most likely end up achieving a very low implementation rate for the components of its updated ICT strategy which could be as low as, or even lower than, the rate achieved with the first strategy.

Table 1 gives a snapshot of the current status of ICT strategies in the Arab region. It is based on research carried out during July 2013, mostly on the websites of the government entities in charge of implementing national ICT strategies, as well as on the 2013 National Information Society Profile of the country being reviewed. Whenever available, links to the most current national ICT strategy, as well as to the government entity in charge, are provided. Due to space constraints, long uniform resource locators (URLs) were shortened with Google URL shortener. Amended/updated strategies have been

TABLE 1. National ICT strategies in the Arab region, 2013

Country	Title of current strategy	Status	Year of adoption	Implementing entity	Progress
Algeria	e-Algérie-2013 (http://www.mptic.dz/fr/?e-Algerie-2013,43)	Adopted	2008	Ministère de la Poste et des Technologies de l'Information et de la Communication	Limited
Bahrain	Third National Telecommunications Plan (Update) (http://goo.gl/y5XpV)	Adopted	2012	Telecommunication Regulatory Authority (http://goo.gl/bMw61)	Excellent
Egypt	National ICT Strategy (2013-2017) (Update) (http://goo.gl/qYBOR)	Update in progress	Update in progress	Ministry of Communications and Information Technology (http://www.mcit.gov.eg/)	Fair
Iraq	No national policy: various sector-specific ICT strategies adopted by several public entities	N/A	N/A	Various ministries, municipalities and public works (health, interior, communications)	N/A
Jordan	Jordan National ICT Strategy 2013-2017 (Update) (http://goo.gl/m8BKe)	Adopted	2012	Ministry of Information and Communications Technology (http://goo.gl/iwGxM)	Good
Kuwait	National Strategy for Building an Information Society	Adopted	2010	Central Agency for Information Technology (http://goo.gl/H3e6w)	Good
Lebanon	National e-Strategy for Lebanon (http://goo.gl/3ssel)	Adopted	2003	Presidency of the Council of Ministers (http://goo.gl/BF8Yl)	Limited
Libya	National ICT Strategic Plan for Libya (http://goo.gl/5ONUj)	In Progress	In Progress	Ministry of Communications and Informatics (http://www.cim.gov.ly/)	N/A
Morocco	Maroc Numeric 2013 (Update) (http://goo.gl/0ikwt)	Adopted	2009	Ministry of Industry, Commerce and New Technologies (http://goo.gl/sGJT9)	Good
Oman	eOman Strategy (http://goo.gl/BqPGk)	Adopted	2002	Information Technology Authority (http://goo.gl/vm31a)	Good
Palestine	National Strategy for Information Technology 2013-2015 (Update) (http://goo.gl/2p1Fa)	Adopted	2013	Ministry of Telecom and Information Technology (http://www.mtit.gov.ps/)	Limited
Qatar	Qatar's National ICT Plan 2015: Advancing the Digital Agenda (Update) (http://goo.gl/Yyy0v)	Adopted	2011	Supreme Council of Information and Communication Technology (ictQATAR) (http://www.ictqatar.qa/en)	Excellent
Saudi Arabia	The National Communications and Information Technology Plan (NCITP) (Update)	Update in progress	Update in progress	Ministry of Communications and Information Technology (www.mcit.gov.sa)	Good

TABLE 1. National ICT strategies in the Arab region, 2013 *(Cont.)*

Country	Title of current strategy	Status	Year of adoption	Implementing entity	Progress
Sudan	The Sudan National Strategy for ICT Industry (Update) (http://goo.gl/1DOB8)	Adopted	2007	National Information Centre (www.nic.gov.sd)	Fair
Syrian Arab Republic	National ICT Strategy for Socio-Economic Development in Syria (Update)	Update in progress	Update in progress	Ministry of Communications and Technology (http://www.moct.gov.sy/moct/)	Limited
Tunisia	Tunisia ICT Strategy (Update) (http://goo.gl/Q6tYK)	Update in progress	Update in progress	The Ministry of Information and Communication Technologies (http://goo.gl/u6yz7)	Fair
United Arab Emirates	General Policy for the Telecommunications Sector in the State of the United Arab Emirates (2006-2010) (http://goo.gl/7bOSq)	Adopted	2006	Telecommunications Regulatory Authority (http://www.tra.gov.ae/index-A.php)	Excellent
Yemen	Information Technology Master Plan for Yemen (in Arabic) (http://goo.gl/FM7qf)	Adopted	2011	National Information Centre (http://www.yemen-nic.info/)	Limited

Source: Compiled by ESCWA, 2013.

tagged with the word "update". Note that for Iraq, research and the submitted 2013 national profile were inconclusive in as far as indicating if a national ICT strategy is available and that, in 2012, Libya had initiated a search for consultants to draft a national ICT strategy, but that no further information as to the status of that search is available.

B. Civil society: The role of non governmental organizations

In times of turmoil, such as the ones affecting several countries in the Arab region, civil unrest and political instability may disrupt the flow of government services. The role of non-governmental organizations (NGOs) grows in importance as many pick up the slack caused by the incapacity of government institutions to carry out their normal everyday tasks. Much of this new role centres on ensuring access to the basic necessities of life. By definition, these necessities have more to do with mere survival and less with the principles of building an information society. One could argue that the added social and moral responsibilities of NGOs during periods of social and political instability may distract many from pursuing the goals envisaged for them during the WSIS process.

However, the statement above is not universal in its impact. The NGOs of member countries, even some which have gone through periods of civil and political unrest, continue to be quite active in their pursuit to build an information society in the region. The paragraphs below give a glimpse of the work related to WSIS carried out by three NGOs in two countries of the Arab region, namely, Lebanon and Tunisia.

In what seems to be a growing trend afforded by the easy-to-use nature of widely utilized information society tools, Lebanon, during the period covered by this report, experienced a growth in the number of citizen-led initiatives aimed at improving the day-to-day existence of Lebanese nationals and residents. A number of these initiatives are directly related to the principles of WSIS, with some calling for the democratization and better propagation of communication tools in general, and the Internet in particular. One such initiative led to the creation of a new NGO called alloFAIL.[7] Using Facebook and Twitter to get its message across, the organization

launched a grassroots campaign aimed at improving the services of the two mobile operators of the country. alloFAIL resorts to public pressure to reach its goals, but takes great pains at ensuring that its efforts are not politically motivated and that its pressure tactics are not directed against individuals or institutions, be they private or public. During the first half of 2013, the Lebanese Organization for Studies and Training (LOST),[8] a well-established Lebanese NGO with four locations spread out in rural areas, implemented an initiative called Get Connected. The initiative is "an attempt to empower youth and civic activists to use social media for advocacy, enable local CSOs to make more strategic use of multiple media platforms to advance their causes, foster networking among independent civic actors working on issues of common interest, and promote citizen journalism to widen the space for independent dialogue". [9]

The Tunisian Association for Communication (ATUCOM)[10] is an NGO that aims at promoting the usage, and at contributing to the development, of communication technologies as well as at assessing their impact on various such stakeholders as reporters, advertisers, public relations officers, researchers, sociologists, innovators, computer scientists, technicians, and engineers. Historically, the activities of ATUCOM have included training on the principles of the information society. One such course, entitled Foundations of the Information Society, comprises – but is not limited to - modules on the theories of information and their impact on society, the contributions of information to development, cyberculture, cybergovernance, Internet governance, distance learning, globalization, as well as the role of civil society in the development of an information society.[11] During June 2013, ATUCOM organized a training course entitled Computers and e-Administration for the Benefit of the Rural Youth.[12] The course aimed at training young people in rural areas on computers to improve their chances at getting better-paying jobs and to help them at succeeding and integrating in the information society.

C. **Partnerships:** Public-private or multi-sector

Making the information society a reality requires a large amount of effort that cannot be extended exclusively by one sector. PPPs and MSPs bring together entities and individuals from different sectors and allow them the opportunity to share knowledge and resources that may otherwise be unavailable or insufficient.

Partnerships in the information society fulfil a variety of needs and take different forms. No matter the form, the expectation is that the arrangement would ultimately be lucrative to all partners. As an example, a government contracts a private sector entity to maintain and manage a publicly owned telecommunications entity. The private sector entity benefits from having a large contract that ensures a steady monthly income and that carries minimum risk. The public sector gets to keep all the profits, without having to worry about the maintenance of the network or the management of resources. A second type of a PPP occurs when a public-sector entity, which does not have the necessary expertise or resources, hires a private-sector firm to build, operate and transfer (BOT). An information society example of a PPP/ BOT project could involve a government that wants to build and operate a telecommunications satellite, but does not have the required means or knowledge. That government chooses to hire a private-sector firm to build, operate and ultimately transfer said satellite to their ownership. Below are a few examples of active multi-sector partnerships that are directly related to advancing WSIS principles in the Arab region.

During July 2012, stakeholders gathered in Benghazi, Libya, to launch what was called the Information Technology Public-Private Partnership in Libya (ITPPL). This multi-sector partnership brought together collaborators from the public sector (the Government of Libya), an international organization (the US-Middle East Partnership Initiative (MEPI)), local NGOs (various Libyan

civil society organizations) and the private sector (Microsoft). ITPPL will use software and training to assist a large number of Libyan NGOs "to use technology to improve the effectiveness of their projects, build organizational capacity, and develop more sophisticated outreach".[13]

During 2011, and Egyptian NGO (Egypt ICT Trust Fund), an international organization (Islamic Development Bank (IDB)) and a government entity (Ministry of Education) launched a project aimed at using and integrating ICT in primary education to improve the prospects of social inclusion of school children with hearing and visual impairment. The main components of the project were the upgrading of ICT laboratories in four special primary schools situated in Cairo and Giza, the development of e-curricula and the provision of training for teachers.[14]

D. Classification and ranking of ESCWA member countries according to maturity level

1. Maturity level 1: Iraq, Libya and Palestine

Countries classified at this level are weighed down by the absence of an information society vision, the non-existence or irrelevance of a national ICT strategy, the lack of a practical information society/ICT strategy implementation plan and the scarcity of functional PPPs or MSPs.

Iraq continues to be classified at this level because its government does not have a unified vision for an information society. Palestine continues to be plagued by internal divisions that stop it from being able to implement an ICT strategy at the national level. Libya's low first-time ranking is attributed to the fact that the country had no national ICT strategy during the period covered by this report.

2. Maturity level 2: Egypt, Lebanon, the Sudan, Syrian Arab Republic, and Yemen

Countries classified at this level have already articulated an information society vision and/or a national ICT strategy, but still suffer from a lack of a practical information society/ICT strategy implementation plan and a scarcity of functional PPPs or MSPs.

All five countries at this level, namely, Egypt, Lebanon, the Sudan, the Syrian Arab Republic, and Yemen, had the potential of being rated at maturity level 3. For the greater part of the period covered by this report (2011-2013), all were hampered down by cyclical security incidents and/or unstable political conditions. Said incidents and conditions skewed the priorities of the governments of these countries and diverted their attention from WSIS goals. Egypt, previously rated at level three, can quickly reclaim that level if and when its public institutions resume their previous pace of implementations of WSIS initiatives. Tunisia, being assessed in this report for the first time, also has the potential to quickly move up to a higher maturity level if its current slow rate of progress towards achieving political stability improves.

3. Maturity level 3: Jordan, Kuwait, Morocco, Oman, Tunisia, and Saudi Arabia

Countries classified at this level already have a clear information society vision and/or a national ICT strategy, which are supported by a moderately effective information society/ICT strategy implementation plan and functional PPPs or MSPs.

Morocco and Tunisia, being assessed in this report for the first time, join the ranks of other countries performing reasonably well for this WSIS action line. In its effort to ensure the success of its current ICT strategy, namely Maroc Numeric 2013, and in order to keep it relevant for as long a period as possible, the Government of Morocco constantly monitored the implementation rate of various related initiatives and involved external consultants in the evaluation of the impact of the strategy.[15] This course of action attests to the high level of commitment of the Moroccan Government, an important factor in this favourable first-time ranking.

The ranking of the remaining countries at this level matches the rating they obtained in the 2011 edition of this report, indicating a steady rate of progress, but no major improvements. The Saudi Arabian Government, which is in the process of

creating a new ICT strategy for the country, has created a website to solicit ideas from the public.[16] This approach, which is novel for the Arab region, is to be commended, but its success can only be assessed at the conclusion of the exercise and would depend on the level of integration of the ideas of the public in the final product.

4. Maturity level 4: Bahrain, Qatar and United Arab Emirates

Countries classified at this level are working diligently to achieve WSIS goals. Their information society vision is clearly articulated, their national ICT strategy is well laid out, their information society/ICT strategy implementation plan is effective, and their PPPs or MSPs deliver on their promises.

Bahrain, Qatar and the United Arab Emirates continue to be ranked at this level. Bahrain and Qatar have shown their continued commitment to the WSIS process by periodically reviewing and updating their ICT strategy as attested in table 1 above. Their 2012 standing in the ITU publication entitled Measuring the Information Society shows improvements on many WSIS fronts.[17] The United Arab Emirates needs to review and update its 2006 ICT strategy to ensure a unified information society vision for the country as a whole, but individual emirates continue to perform positively.

TABLE 2. Ranking of ESCWA member countries by maturity level in the role of governments and all stakeholders in building the information society

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain										■	■	■
Egypt						■	■	■				
Iraq	■	■	■									
Jordan							■	■	■			
Kuwait							■	■	■			
Lebanon				■	■	■						
Libya*			■									
Morocco*									■			
Oman				■				■	■			
Palestine	■	■	■									
Qatar										■	■	■
Saudi Arabia							■	■	■			
Sudan				■	■	■						
Syrian Arab Republic				■	■	■						
Tunisia*									■			
United Arab Emirates										■	■	■
Yemen	■				■	■						

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2013 since they only joined ESCWA in 2012.

E. Suggestions and recommendations

(a) Conduct periodical reviews of the national information society vision and of the ICT strategy to ensure their alignment with evolving national priorities;

(b) Create, update and align strategies and such companion action plans that are sector-specific as e-learning, e-education, e-health, e-government, and e-commerce strategies (refer to chapter 7 for more details on sector-specific strategies);

(c) Research, evaluate, explore the possibility and study the feasibility of adapting and integrating new or recent global approaches and concepts, such as open data, into national ICT and sector-specific strategies;

(d) Devise and put into practice practical implementation plans, relevant indicators, as well as accurate monitoring and measurement tools that would help in the assessment of the relevance and impact of national ICT and sector-specific strategies;

(e) Scale and align your strategies and companion implementation plans with national priorities and economic realities. Policymakers and fund providers will shy away from grandiose and overambitious strategies that look good on paper but require excessive budgets and overly long implementation periods;

(f) Maximize the chances of success of your national ICT and sector-specific strategies by reaching out to a cross-section of the population at large through such popular social media websites as YouTube and Facebook, without neglecting such traditional media as radio, television and newspapers;

(g) Seek and cultivate partnerships with other persons or entities that share the same interests and that have complementary expertise and know-how. Choosing the right partner or partners will ensure that an activity or a project is carried out more efficiently by the person or entity best suited for the job at hand.

II

ICT Infrastructure

II. ICT Infrastructure

ICT infrastructure is an essential pillar in building the information society and one of the four major pillars of the knowledge economy alongside education and training, economic incentive and institutional regime and innovation systems.[18] Infrastructure is equally an important factor in achieving the goals of digital inclusion, enabling a universal, sustainable, ubiquitous, and affordable access to ICTs by all.

The underlying technology of ICT infrastructure is rapidly evolving, thanks to the advent of ever more sophisticated mobile networks and broadband Internet access available through fixed and mobile networks. This context necessitates major investments, and one of the related challenges facing Arab countries is to develop a world-class infrastructure capable of offering innovative services that caters to evolving demands of today's customers. This involves policy-level actions geared towards creating a competitive market-structure that serves new requirements imposed by current and next generations of ICT infrastructure. Such efforts cannot be fruitful without proficient regulatory authorities and contribution from all concerned stakeholders.

A. Overview of the telecom market structure and regulatory landscape

The market structure of the telecom sector in the Arab region is steadily growing toward a competitive environment. Arab governments, whether through ministries or a telecom regulatory authority, play a key role in formulating strategies and regulations for the development of telecom infrastructure.

Most Arab countries have established telecom regulatory entities, except for Kuwait, Palestine and Yemen. Table 3 shows the various regulators or ministries in the Arab region that regulate the landscape of the telecom sector accompanied with the date of their establishment or reformation. The status of Libya is unique where a regulator used to exist, but it has been disrupted since the Libyan revolution of 2011; from this perspective, it is defined as N/A in the table.

Taking into account the number of existing functional operators that provide services in each Arab country, table 4 summarizes the status of telecom market competition in the Arab region, which varies from monopoly or duopoly to competitive. In fixed-line services, monopolies prevail in seven Arab countries; in the remaining eleven countries, either duopoly or competition prevails. During early 2012, Qatar broke its fixed-line monopoly, when Vodafone, a consortium of Vodafone and Qatar Foundation (QF), obtained the second fixed-line licence, side by side with Qatar Telecom (Qtel). As far as mobile and Internet services are concerned, the market is mostly considered competitive. With the exception of Libya Telecom and Technology (LTT), which monopolizes the Internet service provisioning in Libya, 75 per cent of the mobile and Internet services in the region are competitive, while 25 per cent of these services follow a duopoly or controlled duopoly model.

TABLE 3. List of telecommunications regulatory entities in the Arab region, 2013

Country	Telecom regulator	Established/ reformed
Algeria[a/]	L'Autorité de Régulation de la Poste et des Télécommunications (ARPT)	2000
Bahrain	Telecommunications Regulatory Authority (TRA)	2002
Egypt	National Telecommunication Regulatory Authority (NTRA)	2003
Iraq	Communications and Media Commission (CMC)	2004
Jordan	Telecommunications Regulatory Commission (TRC)	1995
Kuwait[b/]	N/A - Ministry of Communications (MOC)	N/A
Lebanon	Telecommunications Regulatory Authority (TRA)	2007
Libya	General Telecommunications Authority (GTA)	N/A
Morocco[a/]	L'Agence Nationale de Règlementation des Télécommunications (ANRT)	1996
Oman	Telecommunications Regulatory Authority (TRA)	2002
Palestine[b/]	N/A - Ministry of Telecommunications and Information Technology (MTIT)	N/A
Qatar	Supreme Council of Information and Communication Technology (ictQATAR)	2004
Saudi Arabia	Communications and Information Technology Commission (CITC)	2004
Sudan	National Telecommunications Corporation (NTC)	1996
Syrian Arab Republic	Telecommunications Supervisory Authority (TSA)	2010
Tunisia[a/]	L'Instance Nationale des Télécommunications (INTT)	2001/2008
United Arab Emirates	Telecommunications Regulatory Authority (TRA)	2003
Yemen[b/]	N/A - Ministry of Telecommunications and Information Technology	N/A

Source: Compiled by ESCWA.
Notes: N/A means not applicable.
[a/] The official non-Arabic name of the telecom regulatory entity is in French.
[b/] The country does not have an independent regulator in charge of the telecommunication sector. This role is assumed by the shown ministry.

TABLE 4. Status of telecom market competiton in the Arab region, 2012

Country	Fixed-line services	Mobile services	Internet services[a/]
Algeria	Monopoly	Competitive	Competitive
Bahrain	Competitive	Competitive	Competitive
Egypt	Monopoly	Competitive	Competitive
Iraq	Competitive	Competitive	Competitive
Jordan	Competitive	Competitive	Competitive
Kuwait	Monopoly	Competitive	Competitive
Lebanon	Monopoly	Controlled duopoly	Competitive
Libya	Duopoly	Competitive	Monopoly

TABLE 4. Status of telecom market competiton in the Arab region, 2012 (Cont.)

Country	Fixed-line services	Mobile services	Internet services[a/]
Morocco	Competitive	Competitive	Competitive
Oman	Duopoly	Competitive	Duopoly
Palestine	Monopoly	Competitive	Competitive
Qatar	Duopoly	Duopoly	Duopoly
Saudi Arabia	Competitive	Competitive	Competitive
Sudan	Duopoly	Competitive	Competitive
Syrian Arab Republic	Monopoly	Controlled duopoly	Competitive
Tunisia	Competitive	Competitive	Competitive
United Arab Emirates	Duopoly	Duopoly	Duopoly
Yemen	Monopoly	Competitive	Duopoly
Count[b/]	**7 M, 5 D, 6 C**	**0 M, 4 D, 14 C**	**1 M, 4 D, 13 C**

Source: AAG, 2012a; AAG, 2012b; and AAG, 2012c.
Notes: [a/] These services concern fixed Internet access only.
[b/] M = Monopoly, D = Duopoly or controlled duopoly, C = Competitive.

Albeit much less than mobile and Internet services, fixed-line services in ESCWA member countries are getting slightly more competitive. Seven countries, or more than one third of the ESCWA member countries, exercise monopoly over fixed-line services. The seven operators that enjoy monopoly are: Algérie Télécom in Algeria, Telecom Egypt in Egypt, Ministry of Communications in Kuwait, Ogero/Ministry of Telecommunications in Lebanon, Paltel in Palestine, Syrian Telecom (STE) in the Syrian Arab Republic, and Public Telecommunication Corporation (PTC) in Yemen. Table 5 summarizes licences available in the Arab region as of mid-2012. Although NTRA in Egypt determined to go for the second fixed-line licence in September 2010, it decided to postpone the venture until international economic conditions recuperate.[19] In June 2012, six countries practiced a competitive environment for fixed-line operators, namely Bahrain, Iraq, Jordan, Morocco, Saudi Arabia, and Tunisia, whereas five countries had a duopoly. While some of the newly licensed fixed-line operators are stirring up competition and entering into the territory of traditional incumbents, others are addressing such niche markets as international calling, or extending coverage to underserved areas through special universal service licences. The outlook of the fixed-line licensing landscape in the Arab region shown in table 6 reveals that, as of June 2012, 48 fixed-line operators have been licensed in the region, but only 44 are operational.

In the mobile sector, competition prevails all over the region, while four countries still experience duopoly. Lebanon and Syrian Arab Republic practice controlled duopoly, with the Government of Lebanon owning the mobile networks infrastructure, while the mobile companies in the Syrian Arab Republic are still under a BOT contract and should transfer ownership to the Government by 2015. In other countries, the mobile landscape is quite special. For example, in Iraq, in addition to the three national operators, Mobitel is a regional cellular operator in Iraq and operates in the Kurdistan region only. In Palestine, although there are officially two licensed mobile operators, namely Jawwal and Wataniya, they face unlicensed competition from five Israeli operators. In Oman, by June 2012, there were six operational mobile virtual network operators (MVNO), namely: Renna, Apna Mobile, Mazoon, Samatel, Friendi, and Halafoni. In Libya, there were two licensed MVNOs, namely Libya

TABLE 5. Fixed-line licensing landscape in the Arab region, June 2012

Country	Operational licensees	Licensed but not operational	Total licensees
Algeria	1	0	1
Bahrain	9	0	9
Egypt	1	0	1
Iraq	4	0	4
Jordan	8	0	8
Kuwait	1	0	1
Lebanon	1	0	1
Libya	1	1	2
Morocco	3	0	3
Oman	2	0	2
Palestine	1	0	1
Qatar	2	0	2
Saudi Arabia	2	2	4
Sudan	2	0	2
Syrian Arab Republic	1	0	1
Tunisia	2	1	3
United Arab Emirates	2	0	2
Yemen	1	0	1
Total	**44**	**4**	**48**

Source: AAG, 2012b.

Phone and Al Jeel al Jadid. Only Libya Phone had started operations by June 2012.

As for fixed Internet services, with the exception of Libya which is still a monopoly, four countries experience a duopoly market while the remaining countries enjoy full competition. Internet is characterized by an evolution towards broadband Internet access. This concerns both fixed-broadband access as well as the emerging mobile broadband Internet and data services, thanks to mobile infrastructure evolution towards the so-called third and fourth generation (3G/4G) access technologies. More details on the broadband Internet ecosystem in the Arab region will be discussed in section B of this chapter.

B. Comparative analysis of ICT infrastructure in the Arab region by service type

1. Fixed-line telephone services dissemination

Overall, fixed-line subscribers in ESCWA member countries showed a negative growth of -0.3 per cent in 2012 compared to 2011 as shown in table 6.

TABLE 6. Fixed-line subscribers in the Arab region: growth and penetration rates, 2011-2012

Country	Fixed-line subscribers, 2011	Penetration rate, 2011 (%)	Fixed-line subscribers, 2012	Penetration rate, 2012 (%)	Growth in fixed-line subscribers (%)	Percentage point change in penetration
Algeria	3,059,336	8.5	3,202,000	8.8	4.7	0.3
Bahrain	276,523	20.9	289,990	21.3	4.9	0.4
Egypt	8,714,286	10.6	8,557,497	10.2	-1.8	-0.4
Iraq	1,794,000	5.5	1,871,000	5.6	4.3	0.1
Jordan	465,388	7.4	434,437	6.7	-6.7	-0.6
Kuwait	514,696	18.3	510,000	17.6	-0.9	-0.6
Lebanon	865,617	20.3	878,105	20.5	1.4	0.1
Libya	1,000,000	15.6	814,000	12.6	-18.6	-3.0
Morocco	3,566,076	11.0	3,279,054	10.1	-8.0	-1.0
Oman	287,323	10.1	304,545	10.5	6.0	0.4
Palestine	382,700	9.2	406,000	9.5	6.1	0.3
Qatar	309,000	16.5	327,000	16.9	5.8	0.3
Saudi Arabia	4,633,158	16.5	4,801,824	16.7	3.6	0.2
Sudan	483,617	1.1	424,586	0.9	-12.2	-0.2
Syrian Arab Republic	4,345,225	20.9	4,423,412	20.9	1.8	0.0
Tunisia	1,217,781	11.5	1,105,586	10.3	-9.2	-1.2
United Arab Emirates	1,825,496	23.1	1,967,486	24.3	7.8	1.2
Yemen	1,075,000	4.3	1,104,000	4.3	2.7	0.0
Total	**34,815,222**	**9.9**	**34,700,522**	**9.7**	**-0.3**	**-0.2**

Source: ITU, 2013.

One has to single out Libya representing the highest drop in fixed-line subscriber base, by 18.6 per cent, due to damages sustained to its telecom infrastructure starting in 2011, and related to the revolution and series of arm conflicts. The Sudan, Tunisia, Morocco, and Jordan significantly decreased their fixed-line subscribers by 12.2, 9.2, 7.8, and 6.7 per cent, respectively, while Egypt and Kuwait marginally decreased theirs by 1.8 and 0.9 per cent; however, their decrease is most likely attributed to a phenomenon seen in most regions of the world, dubbed fixed-to-mobile substitution.

Countries which improved their fixed-line subscribers base include the United Arab Emirates, which had the highest positive growth of 7.8 per cent, and Palestine coming second, with a growth rate of 6.1 per cent, closely followed by Oman and Qatar. Such countries as Algeria, Bahrain, Iraq, Lebanon, Saudi Arabia, Syrian Arab Republic, and Yemen saw a less than 5 per cent growth in their fixed-line subscribers. Yemen and Syrian Arab Republic, however, did not witness any significant improvements in 2012, and hence, maintained a similar number of subscriber base.

In terms of fixed-line penetration rates, the average of the region slightly decreased, namely by 0.2 per cent, compared to 2011, and stood at 9.7 per cent in 2012. The United Arab Emirates came first with a rate of 24.3 per cent in 2012, registering the highest increase in the region at 1.2 percentage points. This increase was mainly caused by a sustained influx of expatriates seen in the emirates, and a dynamic telecom sector offering a range of triple-play services, which include fixed voice services in addition to broadband and television services.[20] The Sudan remained the country with the lowest penetration rate, standing at 0.9 per cent in 2012, dropping a further 0.2 percentage points

from where it had stood in 2011. It is worth noting that the costs for fixed-line telephone services in the Sudan are the highest in the region, according to the ICT price basket of the ITU (see table 23 of chapter 3).

2. Mobile telephone services dissemination

Bahrain witnessed the highest growth in mobile services, as shown in table 7, with 25.4 per cent year-over-year growth from 2011 to 2012; this has led to an increase in its mobile penetration rate by 28 percentage points from 128 to 156 per cent respectively. Jordan achieved the second-best growth rate with a 20.1 per cent year-over-year growth for the same period, followed by Yemen, then Lebanon. Despite a high mobile penetration rate in the United Arab Emirates at 148.6 per cent in 2011, mobile subscriptions continued their growth to achieve 17.5 per cent year-over-year growth reaching 169.9 per cent, thus increasing its mobile penetration rate by 21.3 percentage points.

Almost 105.1 per cent of the total population in the Arab region had mobile phone subscription by 2012 compared to 98.9 per cent in 2011. In 2011, all countries of the GCC ranked top six in the Arab region, with Saudi Arabia ranking first, followed by Kuwait and Oman; in 2012, Kuwait came first, followed by Saudi Arabia, then Oman. Moreover, GCC countries, as well as Algeria, Egypt, Jordan, Libya, Morocco, and Tunisia, totalling 12 countries out of 18, exceeded the 100 per cent mobile phone penetration rate as an indication of mobile phone saturation. While these elevated rates might point to saturation in some countries, other such countries as GCC countries, having large numbers of expatriates and tourists, might report inflated penetration rates due to the phenomenon of owning multiple SIM cards. In this regard, ITU advises against counting

TABLE 7. Mobile phone subscribers in the Arab region: growth and penetration rates, 2011-2012

Country	Mobile subscribers, 2011	Penetration rate, 2011 (%)	Mobile subscribers, 2012	Penetration rate, 2012 (%)	Growth in Mobile subscribers (%)	Percentage point change in penetration
Algeria	35,615,926	99.0	37,692,000	103.3	5.8	4.3
Bahrain	1,693,650	128.0	2,123,903	156.2	25.4	28.3
Egypt	83,425,145	101.1	96,798,801	115.3	16.0	14.2
Iraq	25,519,000	78.1	26,756,000	79.4	4.8	1.3
Jordan	7,482,561	118.2	8,984,252	139.1	20.1	20.9
Kuwait	4,934,160	175.1	5,526,000	191.1	12.0	16.0
Lebanon	3,387,000	79.5	4,000,000	93.2	18.1	13.7
Libya	10,000,000	155.7	9,587,000	148.2	-4.1	-7.5
Morocco	36,553,943	113.3	39,016,336	119.7	6.7	6.4
Oman	4,809,248	169.0	5,277,591	181.7	9.7	12.8
Palestine	2,884,964	69.5	3,041,000	71.2	5.4	1.7
Qatar	2,302,225	123.1	2,600,000	134.1	12.9	11.0
Saudi Arabia	53,705,808	191.2	53,012,322	184.7	-1.3	-6.6
Sudan	25,056,185	56.1	27,658,595	60.5	10.4	4.4
Syrian Arab Republic	13,117,253	63.2	12,928,011	61.2	-1.4	-1.9
Tunisia	12,387,656	116.9	12,841,277	120.0	3.7	3.0
United Arab Emirates	11,727,401	148.6	13,775,252	169.9	17.5	21.3
Yemen	11,668,000	47.0	13,900,000	54.4	19.1	7.3
Total/average	**346,270,125**	**98.9**	**375,518,340**	**105.1**	**8.4**	**6.2**

Source: ITU, 2013.

SIM cards that have been inactive for three months or more; however, and in some cases, operators are slow to remove inactive accounts from their databases and might end up reporting inflated numbers.[21]

Yemen and the Sudan ranked last in the region, while Libya, Saudi Arabia and Syrian Arab Republic suffered a decrease in their mobile penetration rates by 7.5 points, 6.6 points, and 1.9 points, respectively. In Libya, the drop in the operator's mobile lines is believed to be due to the aftermath of the Libyan revolution and ongoing political unrest. In Saudi Arabia, and according to the CITC, the reason for the decline is the implementation of new decision for regulating the sales and activation of pre-paid SIM cards. This resulted in a deactivation of a large number of unidentified SIM cards which led to the drop.[22]

3. Internet services dissemination

Internet services are increasing rapidly in the Arab region thanks to the increased adoption of fixed broadband access and, in particular, the rapid adoption of mobile broadband due, on one hand, to the deployment of third and fourth generation mobile infrastructure and, on the other hand, to the adoption of so-called smartphones by end users. As shown in table 8, the total number of Internet users in the Arab region grew by around 11 per cent between 2011 and 2012, with Iraq and Libya having the highest growth rate at 42 and 41.9 per cent, respectively, followed by Oman and Jordan, at 25 and 17.5 per cent, respectively, year-on-year growth rate.[23]

As far as Internet penetration rate is concerned, the overall rate of the region reached 34.8 per cent in 2012, with four GCC countries, namely,

TABLE 8. Internet users in the Arab region: growth and penetration rates, 2011-2012

Country	Internet users, 2011	Penetration rate, 2011 (%)	Internet users, 2012	Penetration rate, 2012 (%)	Growth in Internet users (%)	Percentage point change in penetration
Algeria	5,108,016	14.0	5,556,072	15.2	8.8	1.2
Bahrain	1,046,803	77.0	1,196,347	88.0	14.3	11.0
Egypt	33,440,618	39.8	37,000,453	44.1	10.6	4.2
Iraq	1,685,153	5.0	2,392,918	7.1	42.0	2.1
Jordan	2,253,584	34.9	2,647,477	41.0	17.5	6.1
Kuwait	2,145,532	74.2	2,289,480	79.2	6.7	5.0
Lebanon	2,231,694	52.0	2,628,669	61.2	17.8	9.2
Libya	905,730	14.0	1,285,081	19.9	41.9	5.9
Morocco	17,277,224	53.0	17,929,195	55.0	3.8	2.0
Oman	1,393,938	48.0	1,742,422	60.0	25.0	12.0
Palestine*	1,754,441	41.1	1,930,398	45.2	10.0	4.1
Qatar	1,671,206	86.2	1,708,127	88.1	2.2	1.9
Saudi Arabia	13,634,938	47.5	15,500,772	54.0	13.7	6.5
Sudan	8,687,196	19.0	9,601,637	21.0	10.5	2.0
Syrian Arab Republic	4,751,480	22.5	5,131,620	24.3	8.0	1.8
Tunisia	4,185,635	39.1	4,436,302	41.4	6.0	2.3
United Arab Emirates	6,322,581	78.0	6,889,992	85.0	9.0	7.0
Yemen	3,811,099	14.9	4,460,941	17.4	17.1	2.5
Total/average	**112,306,868**	**32.1**	**124,327,902**	**34.8**	**10.7**	**2.7**

Source: ITU, 2013.
Note: * Data on Palestine for 2012 were estimated by ESCWA.

Qatar, Bahrain, United Arab Emirates, and Kuwait, registering the highest Internet user penetration rates in the region. Apart from those countries enjoying penetration rates nearing 80 per cent or more, eight countries have penetration rates spanning between 40 and 60 per cent. On the other extreme, Syrian Arab Republic, the Sudan, Yemen, Algeria, and Iraq have the lowest penetration rates in the region, with Iraq reaching a mere 7.1 per cent in 2012. The country that has achieved the highest progress in its penetration rate year-over-year is Oman, which increased its penetration rate by twelve points in one year, from 48 per cent in 2011 to 60 per cent in 2012; Bahrain comes second with a no less impressive improvement of 11 points, from 77 to 88 per cent, to achieve second position in terms of penetration rate in 2012, almost alongside Qatar.

4. Fixed broadband Internet services dissemination

The total number of fixed broadband Internet subscribers in the Arab region grew by 22.3 per cent between 2011 and 2012, compared to the 60 per cent growth attained in the period 2008-2010; this indicates a slower uptake than during the previous biennium. Although the 2012 penetration rate remains very low, at 2.7 per cent, it constitutes a 40 per cent improvement compared to the 1.93 per cent rate registered at the end of 2010. It is worth noting that the top two countries in growth rate, as shown in table 9, are the Syrian Arab Republic and Lebanon, marking a 212 per cent and 138 per cent year-over-year growth rate, respectively. In terms of penetration rates in 2012, Bahrain is the regional leader at 12.7 per cent, closely followed by the

TABLE 9. Fixed broadband Internet subscribers in the Arab region: growth and penetration rates, 2011-2012

Country	Fixed broadband subscribers, 2011	Penetration rate, 2011 (%)	Fixed broadband subscribers, 2012	Penetration rate, 2012 (%)	Growth in Fixed broadband subscribers (%)	Percentage point change in penetration
Algeria	1,000,000	2.8	1,111,100	3.0	11.1	0.3
Bahrain	183,004	13.8	173,176	12.7	-5.4	-1.1
Egypt	1,843,624	2.2	2,287,249	2.7	24.1	0.5
Iraq	..	..	..	..	..	..
Jordan	199,888	3.2	193,596	3.0	-3.1	-0.2
Kuwait	47,000	1.7	47,000	1.6	0.0	0.0
Lebanon	210,000	4.9	500,000	11.7	138.1	6.7
Libya	70,000	1.1	67,300	1.0	-3.9	0.0
Morocco	588,989	1.8	681,568	2.1	15.7	0.3
Oman	52,562	1.8	71,214	2.5	35.5	0.6
Palestine*	156,000	3.8	186,380	4.4	19.5	0.6
Qatar	163,000	8.7	159,000	8.2	-2.5	-0.5
Saudi Arabia	1,576,976	5.6	1,965,751	6.8	24.7	1.2
Sudan	17,430	0.0	24,789	0.1	42.2	0.0
Syrian Arab Republic	121,300	0.6	378,000	1.8	211.6	1.2
Tunisia	544,392	5.1	512,254	4.8	-5.9	-0.4
United Arab Emirates	866,968	11.0	951,785	11.7	9.8	0.8
Yemen	109,000	0.4	167,300	0.7	53.5	0.2
Total/average	**7,750,133**	**2.2**	**9,477,462**	**2.7**	**22.3**	**0.4**

Source: ITU, 2013.

Notes: * Data on Palestine for 2012 were estimated by ESCWA.
Two dots (..) indicate that data are not available.

United Arab Emirates and Lebanon, with penetration rates of 11.7 per cent for each. All other Arab countries are below the 10 per cent mark with many around the regional average; Libya, Yemen, and the Sudan occupy the last three positions at 1, 0.7 and only 0.4 per cent, respectively.

Several countries exhibited marginal growth rates below the Arab region average in their fixed broadband subscribers or have even shown negative growth signalling either saturation or substitution by mobile broadband fuelled by high mobile dissemination rates. In Tunisia, where ADSL constitutes most of the fixed broadband market, the country witnessed a sharp drop of 30,000 ADSL subscriptions during 2012, lowering its penetration rate to 4.8 per cent.[24] In other countries, where ADSL constitutes a sizeable share of fixed broadband, the drop in their fixed broadband penetration was partly due to a reduction in ADSL subscriptions. For instance, by mid 2012, ADSL subscriptions in Bahrain decreased by 5.75 per cent compared to the numbers registered at the end of 2011, owing to a high demand on mobile broadband.[25] In Jordan, ADSL subscriptions decreased significantly in 2011 and 2012 to the extent that Cyberia, one of the main ADSL operators in the country, announced shutting its services on 30 May 2013, due to fierce competition, stagnant market, decreased prices, and diminishing margins.[26] It is worth noting that the decrease in ADSL subscriptions in both Bahrain and Jordan was offset by the adoption of other broadband technologies.

5. Mobile broadband Internet services dissemination

The total number of mobile broadband Internet subscribers in the Arab region grew by 22.6 per cent between 2011 and 2012 as shown in table 10; furthermore, the penetration rate reached a value of 15.9 per cent in 2012, which is nearly six times higher than the fixed broadband penetration of 2.7 per cent. Table 10 further shows that the top two countries

TABLE 10. Mobile broadband Internet subscribers in selected Arab countries: growth and penetration rates, 2011-2012

Country	Mobile broadband subscribers, 2011	Penetration rate, 2011 (%)	Mobile broadband subscribers, 2012	Penetration rate, 2012 (%)	Growth in Mobile broadband subscribers, (%)	Percentage point change in penetration
Bahrain	126,385	9.5	912,603	67.1	622.1	57.6
Egypt	19,847,928	24.0	22,543,290	26.9	13.6	2.8
Jordan	312,209	4.9	691,619	10.7	121.5	5.8
Lebanon*	469,000	11.0	1,260,000	29.4	168.7	18.3
Morocco	2,590,534	8.0	3,273,563	10.0	26.4	2.0
Oman	1,076,254	37.8	1,646,098	56.7	52.9	18.9
Qatar	1,315,312	70.3	1,398,000	72.1	6.3	1.8
Saudi Arabia	11,337,154	40.4	12,280,264	42.8	8.3	2.4
Sudan	6,920,215	15.5	7,495,779	16.4	8.3	0.9
Syrian Arab Republic	200,199	1.0	389,800	1.8	94.7	0.9
Tunisia	254,145	2.4	557,148	5.2	119.2	2.8
United Arab Emirates	1,713,366	21.7	4,125,165	50.9	140.8	29.2
Yemen	21,000	0.1	48,108	0.2	129.1	0.1
Total/average	**46,183,701**	**13.2**	**56,621,437**	**15.9**	**22.6**	**2.7**

Source: ITU, 2013.

Notes: Data was not available for Algeria, Iraq and Palestine due to a lack of mobile broadband services; Kuwait and Libya did not report their data to ITU.

* Data on Lebanon for 2011 and 2012 were provided by the Lebanese Ministry of Telecommunications.

in terms of mobile broadband subscribers' growth rate are Bahrain, with an impressive 622.1 per cent (moving from only 9.5 per cent penetration to 67.1 per cent in one year), and Lebanon, with 168.7 per cent. The United Arab Emirates, Jordan, Yemen, and Tunisia achieved more than a 100 per cent growth between 2011 and 2012. Mobile broadband Internet service is the only service where all countries, regardless of their initial penetration level, achieved positive growth and enhanced their penetration rates.

In terms of penetration rates in 2012, Qatar, with 72.1 per cent, occupies the first position, closely followed by Bahrain, with 67.1 per cent. Three other GCC countries follow at relatively high rates: Oman (56.7 per cent), United Arab Emirates (50.9 per cent) and Saudi Arabia (42.8 per cent). Tunisia, Syrian Arab Republic and Yemen come last in terms of penetration rates at 5.4, 1.8 and 0.2 per cent, respectively.

Mobile broadband in the Arab region is mainly driven by the rollout of 3G mobile networks. In 2012, the majority of Arab countries, with the exception of Iraq,[27] Algeria and Palestine, witnessed a rollout of 3G networks.[28] Advanced mobile 4G networks began rollout in 2012, essentially in GCC countries, and will be further discussed below. Penetration rates of mobile 3G services in the Arab region are expected to grow from 21 per cent in 2012 to 51 per cent in 2017.[29]

6. Fibre to the Home

Fibre to the Home (FTTH) is one of several FTTx terms denoting a broadband network architecture using optical fibre, and extending from the telecommunication operator's switching equipment to (at least) the boundary of the home living space or business office space. With the development of such services that demand faster connectivity and larger bandwidth as triple-play service,[30] FTTH is

TABLE 11. Fibre to the Home (FTTH) service availability in the Arab region, May 2012

Country	Availability	Year service first offered	Number of operators/ service providers	Type of service
Algeria	Yes	2007	1	Corporate and residential
Bahrain	Yes	2006	8	Corporate and residential
Egypt	Yes	2010	2	Corporate and residential
Iraq	Yes	2008	1	Corporate and residential
Jordan	Yes	2008	3	Corporate and residential
Kuwait	Yes	2007	4	Corporate and residential
Lebanon	No/in progress	..	..	Corporate and residential
Libya	No/planned	..	..	..
Morocco	No/planned	..	..	..
Oman	Yes	2011	2	Corporate and residential
Palestine	No	..	..	..
Qatar	Yes	2012	1	Corporate and residential
Saudi Arabia	Yes	2010	3	Corporate and residential
Sudan	No	..	..	..
Syrian Arab Republic	No/planned	..	..	..
Tunisia	Yes	2007	5	Corporate
United Arab Emirates	Yes	2009	2	Corporate and residential
Yemen	No	..	..	..

Source: Based on AAG, 2012 (7 May).
Notes: Two dots (..) indicate that data are not available.

a main requirement in order to have the pipeline capacity needed. FTTH investment in the Arab region is progressing slowly and is still in the establishment phase. So far, 11 out of 18 countries have ongoing FTTH projects. Table 11 shows service availability in the Arab region as at May 2012. Type of service ranges from Ccrporate and residential to compounds only. And the number of operators and service providers per country ranges from one operator, as is the case in Algeria, Iraq and Qatar; to five operators in the case of Tunisia; and even to eight operators, in the case of Bahrain.

7. Next generation wireless networks – LTE

Long Term Evolution (LTE), popularly known as 4G technology,[31] is an evolution of the Third Generation Partnership Project (3GPP), based on the Enhanced Data Rates for GSM Evolution (GSM/EDGE) and Universal Mobile Telecommunications System/ High-speed Packet Access (UMTS/HSPA) network technologies. It is the latest standard for wireless communication of high-speed data for mobile phones and data terminals. LTE has been initiated by 3GPP to improve the mobile phone standard in terms of packet-optimized systems that support multiple radio access technologies, reduced latency, improved coverage, increased data rates, and improved spectrum efficiency. Table 12 below lists the availability of LTE in the Arab region. Out of the 18 Arab countries covered in this report, eleven have LTE either commercially launched or in the pipeline, either planned or in trial. The first countries to launch LTE were Kuwait, Oman, Saudi Arabia, and the United Arab Emirates, While Iran and Qatar were the latest two countries, with Ooredoo launching its LTE in Doha in April 2013, and Fastlink launching its service in Irbil in August 2013.

LTE bands differ from one operator to the other and from one country to the other. As a result, phones from one country may not work in other countries.

TABLE 12. Availability of LTE services in the Arab region, August 2013

Country	Operator	Service launched	Deployment status	LTE band
Bahrain	Zain Viva Bahrain Batelco	Yes	In service, April 2013 In trial, January 2013 In service, March 2013	LTE-2600 LTE-2600 LTE-1800
Egypt	Vodafone Egypt Etisalat Misr MobiNil	No	Planned, 2013 Planned, 2013 In trial	.. LTE-2100 ..
Iraq	Fastlink	Yes	In service, August 2013	..
Jordan	Zain Jordan Umniah Orange Jordan	No	In trial, 2013 In trial, 2013 Planned, 2014	.. .. ..
Kuwait	Zain VIVA	Yes	In service, Nov. 2012 In service, Dec. 2011	LTE-1800 LTE-1800
Lebanon	MTC Touch Alfa Telecom	Yes	In service, May 2013 In service, May 2013	LTE-1800 LTE-1800
Oman	Omantel/Oman Mobile Nawras	Yes	In service, July 2012 In service, Feb. 2013	LTE-1800, LTE-2300 LTE-1800
Qatar	Ooredoo (Qatar Telecom) Vodafone	Yes	In service, June 2013 Planned, 2013	LTE-2600 LTE-850
Saudi Arabia	Zain STC Mobily	Yes	In service, Sept. 2011 In service, Sept. 2011 In service, Sept. 2011	LTE-1800, LTE-2600 LTE-1800 LTE-2600
Tunisia	Tunisiana	No	Planned, 2013	..
United Arab Emirates	Etisalat du	Yes	In service, Sept. 2011 In service, June 2012	LTE-1800, LTE-2600 LTE-1800

Source: Compiled by ESCWA based on http://ltemaps.org/home and AAG, 2012 (11 November); and AAG, 2013 (4 April, 21 July and 26 August).
Note: Two dots (..) indicate that data are not available.

Users will need a multi-band capable phone for roaming internationally. It is believed that the region will undergo further LTE deployments during the next few years. Given that a global agreement on the harmonization of LTE bands will not be reached before ITU's World Radiocommunication Conference (WRC) to be held in 2015, the Arab region is highly advised to adopt a common stance ahead of this conference.

C. Internet infrastructure

Due to the huge demand for broadband services and new applications and the associated bandwidth and capacity needs, various upgrades and overhauls of Internet infrastructure become necessary to cater for those needs. Substantial enhancements and major developments of the Internet infrastructure have been constantly taking place in Arab countries, whether through the establishment of new core networks, new submarine cables, new national and terrestrial fibre optic networks, new Internet exchange points (IXPs) or new Internet hosts.

1. International Internet bandwidth in the region

The need for increasing international Internet bandwidth to cater for increased traffic volumes has

TABLE 13. Growth rate of international Internet bandwidth in the Arab region, 2011-2012 ***(Ranked by growth)***

Rank	Country	International Internet bandwidth (Mbps), 2010	International Internet bandwidth (Mbps), 2012	Growth rate (percentage)
1	Lebanon	2,500	60,000	2,300
2	Yemen	3,200	11,600	264
3	Morocco	75,000	266,000	255
4	Syrian Arab Republic	5,735	20,000	249
5	Oman	5,605	17,792	217
6	United Arab Emirates	105,100	253,875	142
7	Bahrain	10,000	21,000	110
8	Qatar	24,502	48,000	96
9	Saudi Arabia	317,944	555,961	75
10	Egypt	90,558	150,906	67
11	Tunisia	51,200	84,480	65
12	Algeria	36,000	45,000	25
13	Iraq	80	100	25
14	Libya	10,000	12,000	20
15	Jordan	13,000	15,000	15
16	Sudan	13,300	13,300	0
17	Kuwait	10,000	..	..
18	Palestine*	..	..	..
	Total	**737,724**	**1,530,014**	**107**

Source: ITU, 2013.
Notes: * International Internet bandwidth in Palestine is still provided by Israeli sources due to the occupation situation.
Two dots (..) indicate that data are not available.

never stopped growing since the inception of the Internet. The Arab region has registered a growth of 107 per cent between 2010 and 2012, with Lebanon registering a massive 2,300 per cent figure, the highest score in the region, as shown in table 13. Six Arab countries registered more than a 100 per cent increase over the same period and eight others registered a double-digit increase. Only the Sudan witnessed no increase, and no data was available for Kuwait for 2012.

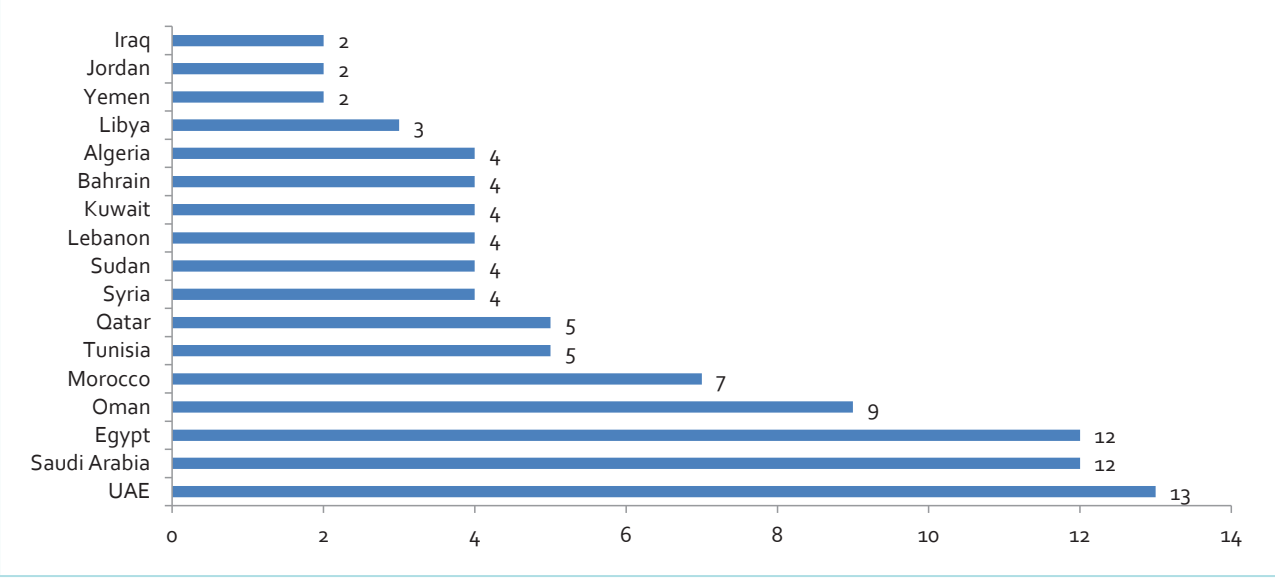
Experts and policymakers in the region have been calling for increased interconnectivity between Arab countries, forming an Arab regional backbone interconnecting most, if not all, Arab countries, enabling them to handle intraregional traffic without the need to leave and re-enter the region. One possibility of looking into this is by analysing the interconnectivity at the cabling (transmission) level; another way is by analysing the interconnectivity at the routing/peering level (IXPs) as discussed below.

2. Submarine cable systems

Submarine cable systems carry international voice and data traffic; they interconnect most countries in all geographical regions, including the Arab region, which is currently served by a substantial number of submarine cables that vary in length and potential capacity. As at August 2012, a total of 48 submarine cable systems link to Arab countries,[32] 40 of which were operational with existing or planned landing points in those countries, while the remaining eight submarine cable systems were planned but not yet operational.[33]

A close look at the landscape of submarine cable systems connectivity in the Arab region, which is depicted in figure 1 (including all cables, both operational and planned), reveals that such countries as Iraq, Jordan and Yemen are connected to as few as two cables, while other such countries as Egypt and Saudi Arabia are connected to as many as twelve cables, and the United Arab Emirates to even 13 cables. The mean number of cable connectivity in the region is four, which applies to Algeria, Bahrain, Kuwait, Lebanon, the Sudan, and Syrian Arab Republic. While such countries as Oman (nine), Morocco (seven), and Qatar and Tunisia (five) are slightly above the regional average, Libya is

FIGURE 1. Number of connected submarine cable systems per country in the Arab region
(Cables include operational and planned, ranked by number)



Source: AAG, 2012d.

connected to only three cable systems. Palestine is the only country in the region that is not connected to any submarine cable system. [34]

The need to establish additional and alternative cable routes to secure and sustain demand for international bandwidth, especially following several disruptions of submarine cables in the region, has led to the development of dedicated submarine cables that link only one Arab country to the outside world, but not to any other country in the region. Examples of such dedicated cables are ALASIA, ready for service (RFS) in 2013, and EUROPA, (RFS 2015, which respectively link Syrian Arab Republic and Lebanon to Cyprus. Other examples include LOKKOS (RFS 2012) linking Morocco to Spain, while ORAN-VALENCIA (RFS 2013) links Algeria to Spain, TUNISIANA (RFS 2013) links Tunisia to Italy, and SILPHIUM (RFS 2012) links Libya to Greece. In the Gulf region, OMRAN/EPEG (RFS 2013) and POI (RFS 2012) are two cables that link Oman to Iran.

The phenomenon of dedicated cables is not new; for instance, such cables as ALPAL-2 (RFS 2002) connecting Algeria to Spain, ATLAS OFFSHORE (RFS 2007) connecting Morocco to France, CADMOS (RFS 1995) connecting Lebanon to Cyprus, ESTEPONA-TETOUAN (RFS 1997) connecting Morocco to Spain, and many others have existed a for long time. While a dedicated cable can supply an Arab country with much-needed international Internet bandwidth and could serve as a direct gateway to the global Internet, this practice is not the best strategic solution for the Arab region. If the region aspires to integrating and lowering Internet transit costs, it should opt for a different network topology. Direct cable systems would interconnect Arab countries first, securing that regional traffic is routed internally. Regional IXPs would then secure routing the region's traffic to the global Internet.

As a matter of fact, direct cable connectivity in the region is limited, on point-to-point basis between pairs of Arab countries. Table 14 summarizes submarine cable systems connecting pairs of Arab countries.

If we move one step higher in terms of connectivity, table 15 shows a list of twelve global submarine cables with a landing point in two or more ESCWA member countries. The Fibre-optic Link around the Globe (FLAG) and Alcatel Lucent Optical Network (FALCON) FLAG-FALCON cable system (RFS in 2006) is the cable with the highest number of landing points in the region. FLAG-FALCON links eleven Arab countries, representing

TABLE 14. Submarine cable systems connecting two Arab countries

Submarine cable system	Ready for service (RFS)	Countries connected and landing points
Aden-Djibouti	1995	- Yemen: Aden - Djibouti: Djibouti City
Aletar	1997	- Egypt: Alexandria - Syrian Arab Republic: Tartous
Berytar	1997	- Lebanon: Jdeide, Ras Beirut, Saida, Tripoli - Syrian Arab Republic: Tartous
Qatar-UAE (DAS-Halul) (QA-U)	2004	- United Arab Emirates: Abu Dhabi, Das Island - Qatar: Doha, Halul Island
Saudi Arabia-Sudan-1 (SAS-1)	2003	- Saudi Arabia: Jeddah - The Sudan: Port Sudan
Saudi Arabia-Sudan-2 (SAS-2)	2012	- Saudi Arabia: Jeddah - The Sudan: Port Sudan

Source: AAG, 2012d.

TABLE 15. Submarine cables with a landing point in two or more ESCWA member countries

Cable system	Length (km)	Ready for service	Number of landing points	Landing points	Total capacity
FLAG-FALCON	11,589	September-2006	11	Bahrain, Egypt, Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan, UAE, Yemen	250, 250, 390, 520 Gbps
GBI	30,000	February-2012	7	Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, UAE	5.18 Tbps
EIG	15,000	February-2011	5	Egypt, Libya, Oman, Saudi Arabia, UAE	4.72 Tbps
SEA-ME-WE 3	39,000	August-1999	5	Oman, Saudi Arabia, Egypt, Morocco, UAE	505 Gbps
SEA-ME-WE 4	20,000	December-2005	5	Algeria, Egypt, Saudi Arabia, Tunisia, UAE	4.8 Tbps
TGN-Gulf	4,469	February-2012	5	Bahrain, Oman, Qatar, Saudi Arabia, UAE	1.28 Tbps
FOG	1,300	March-1998	4	Bahrain, Kuwait, Qatar, UAE	40 Gbps
IMEWE	12,091	December-2010	4	Egypt, Lebanon, Saudi Arabia, UAE	3.84 Tbps
FLAG – FEA	28,000	November-1997	3	Egypt, Jordan, UAE	440 Gbps
MENA-SCS	9,030	Planned for 2013	3	Egypt, Oman, Saudi Arabia	5.76 Tbps
TGN-EA	9,280	March-2012	2	Egypt, Saudi Arabia	1.28 Tbps
Transworld-TW1	1,274	2006	2	Oman, UAE	1.28 Tbps

Source: Compiled by ESCWA based on AAG, 2012d.

a sort of backbone for the Arab region on the transmission level. Gulf Bridge International (GBI) (RFS 2012) connects only seven Arab countries, a sub-group of the countries covered by FLAG, but it does not cover Egypt, Jordan, the Sudan, and Yemen. Other major cable systems link the MENA region to Asia and Europe, namely, South-East Asia-Middle East-Western Europe (SEA-ME-WE)3 and SEA-ME-WE4, each connecting five Arab countries to the rest of the world.

Furthermore, table 15 highlights such recent submarine cable systems deployed in the region as the Europe India Gateway (EIG) having 5 landing point in the region. The system became partly operational in early 2011, while at the end of the same year, one of two land-based routes across Egypt was completed, allowing the main share of the EIG system to enter into service in early 2012.[35] Other recent global submarine cables connecting the Arab region include the TGN-GULF cable system (RFS 2012) with five landing points, TGN-EA (RFS 2012) with two landing points and MENA-SCS (RFS 2013) with three landing points.

3. Internet Exchange Points

An Internet Exchange Point (IXP) is a physical infrastructure which allows Internet Service Providers (ISP) to exchange traffic and is meant to reduce the portion of an ISP's traffic which is delivered via upstream transit providers. Through IXPs, ISPs exchange the mutual Internet traffic between their networks (autonomous systems) instead of routing such traffic through expensive transit links. IXPs, thus, reduce the average per-bit delivery cost of their service, and improve routing efficiency and fault-tolerance.[36]

IXPs represent an essential component in the network architecture of today's networks. Efforts are exerted by a number of players, including regional and international organizations, to promote the concept of IXPs in the region. Table 16 provides a list of existing IXPs in the Arab region,

TABLE 16. Internet exchange points in the Arab region, June 2013

Country	Internet Exchange Point	Short name	Established	URL
Bahrain	Bahrain Internet Exchange	BIX	2003	www.bix.bh
	Gateway Gulf Internet Exchange	GulfIX	2009	www.gatewaygulf.bh
Egypt	Cairo Internet Exchange Point	CAIX	2002	www.caix.net.eg
	Middle East Internet Exchange	MEIX	2007	mon1.gpxglobal.net
Lebanon	Beirut Internet Exchange	BIX	2007	www.beirutix.net
Saudi Arabia	Internet Exchange of Saudi Arabia	IXSA	2009	www.ix.net.sa
Sudan	Sudan Internet Exchange Point	SIXP	2010	www.sixp.sd
Tunisia	Tunisian Internet Exchange Point	TunIXP	2011	www.ati.tn/TunIXP
United Arab Emirates	UAE Internet Exchange	UAE-IX	2012	www.uae-ix.net
	Etisalat Smarthub IX	-	2013	www.etisalat.ae/en/carriers/services/smarthub.jsp

Source: Compiled by ESCWA.

TABLE 17. Internet hosts in the Arab region, 2012 *(By decreasing number of hosts per 10,000 inhabitants)*

Rank	Country	Population	Total number of hosts	Number of hosts per 10,000 inhabitants
1	United Arab Emirates	8,105,873	337,804	416.74
2	Bahrain	1,359,485	47,727	351.07
3	Lebanon	4,291,719	64,926	151.28
4	Jordan	6,457,260	69,473	107.59
5	Palestine	4,270,791	42,435	99.36
6	Morocco	32,598,536	277,338	85.08
7	Saudi Arabia	28,705,133	145,941	50.84
8	Oman	2,904,037	14,531	50.04
9	Libya	6,469,497	17,926	27.71
10	Egypt	83,958,369	200,430	23.87
11	Yemen	25,569,263	33,206	12.99
12	Kuwait	2,891,553	2,771	9.58
13	Qatar	1,938,754	897	4.63
14	Tunisia	10,704,948	576	0.54
15	Syrian Arab Republic	21,117,690	416	0.20
16	Algeria	36,485,828	676	0.19
17	Sudan	45,722,083	99	0.02
18	Iraq	33,703,068	26	0.01
	Total/average	**320,768,059**	**1,256,522**	**39.17**

Source: http://www.isc.org, July 2012.

the first of which was established in Egypt in 2002, and the most recent one was established in 2013 as a second IXP in the United Arab Emirates. It is worth noting that Arab cross-border and regional communication are entirely dependent on global connectivity; so the next step in the evolution of the Internet infrastructure in the region requires the interconnection of some of the national IXPs in an effort to build regional IXPs.

4. Internet hosts

An Internet host (or host) is a computer connected directly to the Internet. A host should not be confused with any computer connected to the Internet whether through an ISP or an enterprise network. An Internet host may serve many clients and can play the role of a server and/or client for Internet applications. The number of Internet hosts is a good proxy of the Internet presence, ICT connectivity and infrastructure development of a given country, particularly the number of Internet hosts per capita as recommended by the United Nations Conference on Trade and Development (UNCTAD).[37]

Table 17 shows the ranks of the ESCWA member countries according to the number of hosts per 10,000 inhabitants. As the table below indicates, the United Arab Emirates and Bahrain position themselves on top of other countries in the region in terms of Internet host per capita, with 417 and 351 hosts per 10,000 inhabitants, respectively, followed by Lebanon and Jordan at 151 and 107 hosts, respectively. Fourteen Arab countries have less than 100 hosts per 10,000 inhabitants, out of which Tunisia, Syrian Arab Republic, Algeria, the Sudan, and Iraq have below one host per 10,000 inhabitants.

D. Classification and ranking of ESCWA member countries according to maturity level

1. Maturity level 1: Iraq, Libya, the Sudan, Syrian Arab Republic, and Yemen

This lowest level of maturity is characterized by the following: (a) low ICT penetration rates and unattractive telecom market conditions that discourage personal and business usage; (b) scarce international connectivity to the Internet backbone; and (c) poor Internet infrastructure and low dissemination, especially for broadband, inadequate national backbone and limited number of Internet players in the market. As compared to 2011, the Syrian Arab Republic was downgraded to this level due to the negative effects of the ongoing armed conflict on its infrastructure. Libya was rated in this level as well due to its damaged ICT infrastructure as a result of the 2011 revolution.

2. Maturity level 2: Egypt, Morocco, Palestine, and Tunisia

This level of maturity is characterized by the following: (a) average ICT penetration rates and increasingly attractive telecom market conditions for personal and business usage; (b) developing international connectivity to the Internet backbone; and (c) improving Internet infrastructure and fair dissemination of broadband services, adequate national backbone and active Internet players market. Member countries classified in this level retained their status from 2011 while the new member countries Morocco and Tunisia attained this level in 2013.

3. Maturity level 3: Jordan, Kuwait, Lebanon, and Oman

This level of maturity is characterized by the following: (a) above-average ICT penetration rates and attractive telecom market conditions promoting personal and business usage; (b) solid international connectivity to the Internet backbone; and (c) comparatively good Internet infrastructure and strong broadband Internet dissemination, good national backbone and active Internet players market. Lebanon stepped forward to this level since 2011 owing to notable growth in its mobile phone services, elevated Internet penetration growth rates, especially for fixed and mobile broadband, introduction of mobile broadband services, and massive growth in international Internet bandwidth.

TABLE 18. Ranking of ESCWA member countries by maturity level in ICT Infrastructure

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain										■	■	■
Egypt				■	■	■						
Iraq	■	■	■									
Jordan							■	■	■			
Kuwait							■	■	■			
Lebanon				■	■				■			
Libya*			■									
Morocco*						■						
Oman				■				■	■			
Palestine				■	■	■						
Qatar										■	■	■
Saudi Arabia							■	■				■
Sudan	■	■	■									
Syrian Arab Republic			■	■	■							
Tunisia*						■						
United Arab Emirates										■	■	■
Yemen	■	■	■									

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2013 since they only joined ESCWA in 2012.

4. Maturity level 4: Bahrain, Qatar, Saudi Arabia, and United Arab Emirates

This level of maturity is characterized by the following: (a) world-class ICT penetration rates and very attractive telecom market conditions promoting personal and business usage; (b) highly developed international connectivity to the Internet backbone; and (c) very strong Internet infrastructure and elevated broadband Internet dissemination, world-class national backbone and recognized Internet players. Saudi Arabia attained this level in 2013 owing to its elevated penetration rates and usage level, especially for broadband Internet services and a favourable and competitive telecom sector.

E. Suggestions and recommendations

(a) Continue to set up independent, proficient, transparent, and effective telecom regulatory commissions/authorities in member countries; and introduce new licensing schemes and regulatory frameworks to cater for new telecommunication technologies, especially wireless broadband;

(b) Accelerate the liberalization of the telecom sector and instigate additional competition in the subsectors, given its significant impact on increasing availability and affordability of various services;

(c) Give particular attention to the promotion of broadband services whether in their fixed or mobile variants. This requires a holistic approach as recommended by the Broadband Commission for Digital Development[38] involving: (i) policy leadership for investment; (ii) open telecommunication markets; (iii) development of government and other public electronic services; (iv) a universal service programme; and (v) encourage efficient and innovative mobile broadband practices for new market entrants and consumers;

(d) Provide regulatory incentives to develop telecommunications in marginalized areas, including packaging urban projects with rural/ remote area projects, in an effort to achieve universal service;

(e) Direct efforts towards the regional dimension to profit from economies of scale in terms of interconnectivity, bandwidth sharing, regional backbone, and regional manufacturing capabilities.

III

Access to information and knowledge

III. Access to Information and Knowledge

Today, ICT tools and services have become the main engine positioned to drive access to information and contribute to knowledge-creation and sharing. Nevertheless, attaining instant, ubiquitous access cannot be achieved without the existence of an adequate and affordable ICT infrastructure and the enactment of legislations guaranteeing the right of access to information. Furthermore, widespread use cannot be achieved without the availability of public-domain information and the development of relevant local digital content accessible through various communication resources, notably the Internet.

A. Comparative analysis

Up until recently, access to information and knowledge in the Arab region was an area of the information society that did not see much development or progress. Thanks to the Arab Spring, the region has witnessed significant and sweeping political transitions during the period 2010-2013, which were overwhelmingly facilitated through the use of various ICT-enabled communications tools, in particular Internet-enabled smartphones and social media applications, and instant access to crucial information.

While ICT is a key enabler, access to information in the Arab region is a study in contrast. The disclosure of public information in the region is a barometer of democracy, openness, national security, political stability, and even cultural diversity. Countries fearing change, or whose political systems are in transition, have clamped down on access to information by severing all or some ICT services in order to quell potential public unrest. The list of affected services has grown following the sweeping change initiated by the Arab Spring. Internet, VoIP and such messaging services as short message service (SMS), Skype, Blackberry Messenger (BBM), Viber, Facetime, and WhatsApp have all been scrutinized, banned, restricted, blocked, and unblocked in several countries spanning from North African Tunisia, Algeria and Egypt all the way to the Gulf countries of Bahrain, Saudi Arabia and the United Arab Emirates.[39]

Nevertheless, Arab countries have continued their efforts to improve access to non-sensitive information and knowledge. While progress has been noted in most countries, a gap in the level of information availability and access remain evident between and within countries. Modest Internet penetration rates, low broadband penetration rates, unaffordable access costs, and the dearth of initiatives which promote access, especially in rural and remote areas, and the absence of adequate legislation, are all major reasons leading to access disparities.

The impact subindex, one of four subindices of the 2013 Networked Readiness Indicator (NRI), includes a pillar covering social impacts. Social impact is assessed through the analysis of a survey indicator which examines the extent to which ICTs

enable access for all citizens to basic services. Due to a lack of national household and business surveys in most Arab countries, the data provided in table 19 compares the global NRI scores and rankings, among 144 surveyed countries, of thirteen Arab countries covered by the 2013 Global Information Technology Report (GITR), with their individual scores and rankings on the "impact of ICTs on access to basic services" indicator.

The observation of countries' individual scores, and in particular the global rankings attained by the five leading countries (all GCC countries), on the "impact of ICTs on access to basic services" reveals that this indicator is the forte of these countries, particularly Qatar, which ranked first globally on this indicator, and a positive contributor to their advanced global NRI scores and rankings. The scores of Jordan, Morocco and Libya on this indicator were somewhat similar to their global NRI scores; while Lebanon, Kuwait, Egypt, Algeria and Yemen attained lower scores and rankings on the access indicator compared to their global NRI scores, signalling a shortfall in how they use ICTs for improving access. It is worth noting that Arab and world averages on the global NRI scores, and in particular on this impact indicator, were truly identical. This signals that the distribution of Arab countries covered by the GITR, among rich GCC, upper-middle, and lower-middle income, is a true reflection of the world's diversity.

Analysing the disparities in the region between readiness and usage components of the NRI helps in highlighting impediments to access to information and knowledge for three categories of stakeholders involved, namely individuals, businesses and governments. The readiness subindex component of the NRI, as shown in the first column of table 20, shows the extent to which countries in the region are prepared and willing to use ICT in their daily activities. The "usage pillar" components of the usage subindex shown in the remaining three columns gauge the actual usage of ICT by the three main stakeholders in a given country.

TABLE 19. Impact of ICTs on access to basic services in selected Arab countries, 2013

Country	Impact of ICT on access to basic Services, 2013		Network Readiness Index, 2013	
	Score *	Ranking (144)	Score *	Ranking (144)
Qatar	6.1	1	5.10	23
United Arab Emirates	5.9	6	5.07	25
Bahrain	5.8	13	4.83	29
Saudi Arabia	5.6	16	4.82	31
Oman	5.1	31	4.48	40
Jordan	4.7	48	4.20	47
Kuwait	4.0	84	3.94	62
Morocco	3.9	92	3.64	89
Egypt	3.8	104	3.78	80
Libya	3.2	130	2.77	132
Lebanon	2.7	141	3.53	94
Algeria	2.6	142	2.78	131
Yemen	2.5	143	2.63	139
Average (Arab/world)	**4.3/4.3**		**3.97/3.97**	

Source: WEF, 2013a.
Note: * This is based on a seven-point total score whereby 1 = do not enable access at all; and 7 = enable access significantly.

A first look at table 20 establishes that countries of the GCC ranked better than other Arab countries on all subindices, with the exception of Jordan, which has been making noticeable progress and ranked better than Oman and Kuwait on the readiness subindex and even better than Kuwait on the business and government usage pillars. The small population sizes in GCC countries, coupled with a high GDP, as well as a high standard of living equally contributed to this higher ranking. The table further shows that the average score of the ICT readiness subindex in the region, at 4.51, clearly outweighs any of the usage average scores. Moreover, governments in the region were using ICT more effectively in the delivery of their services than both individuals and businesses, with an average score of 4.20 points compared to 3.80 and 3.37 points, respectively.

In this regard, the continuous ICT diffusion efforts exerted by the Governments of Bahrain, Qatar, Saudi Arabia, and the United Arab Emirates have been impressive in recent years, as reflected by their elevated top-ten global rankings in the government usage subindex. Concerning the other stakeholders, concerted efforts should be exerted to promote additional use of ICT by individuals and businesses. The business sector, in particular, needs to exploit the latest technologies, especially the use of the Internet for such business activities as buying and selling goods from business to business (B2B), and interacting with customers and suppliers (B2C). The gap between readiness and usage by individuals could be attributed to, among others, low broadband diffusion; low penetration rate of households with a computer or access to the Internet; and the restrictions that some countries are still imposing on free access to information and knowledge.

While most Arab countries have demonstrated increased readiness and usage levels, serious

TABLE 20. Readiness versus usage subindex components of the NRI, 2013

Country	Readiness sibindex *		Individual usage pillar		Business Usage pillar		Government usage pillar	
	Ranking	Score	Ranking	Score	Ranking	Score	Ranking	Score
Bahrain	35	5.27	30	5.13	56	3.59	4	5.78
Saudi Arabia	39	5.23	47	4.39	30	4.10	6	5.73
United Arab Emirates	40	5.23	36	4.90	28	4.31	2	5.99
Qatar	44	5.06	16	5.82	27	4.47	5	5.75
Jordan	55	4.97	66	3.55	55	3.59	56	4.22
Oman	56	4.92	50	4.31	52	3.62	21	5.14
Kuwait	58	4.87	40	4.83	83	3.35	105	3.63
Egypt	82	4.41	69	3.43	108	3.11	80	3.92
Lebanon	86	4.29	63	3.70	116	3.02	134	2.90
Morocco	88	4.28	67	3.54	99	3.20	81	3.92
Algeria	96	4.00	100	2.46	144	2.15	139	2.65
Yemen	117	3.24	135	1.57	137	2.68	141	2.56
Libya	126	2.91	89	2.80	136	2.69	143	2.44
Average		**4.51**		**3.80**		**3.37**		**4.20**

Source: WEF, 2013a.
Note: * The composition of the readiness subindex has changed with the GITR 2013; it now covers infrastructure, affordability and skills as opposed to individual, business and government readiness.

efforts are still required in order to improve access and bridge the gap between readiness and usage patterns. Primarily, the right of access to information should be guaranteed, ICT access costs further reduced and the availability of public information and digital content equally increased.

1. Public domain information

Realizing the tremendous opportunities and aspects of good governance ushered by the availability and exchange of public information, most countries in the Arab region have embarked, to a varying degree, on projects and initiatives which provide a wealth of official public information,

TABLE 21. Open government data initiatives/sites in the Arab region, 2013

Country	Initiative/site	Description and role	URL
Bahrain	Open Data Platform	The primary objective of the Open Data Platform is to publish datasets from ministries and government agencies in a manipulative format, and to make this data available to the public in order to promote transparency and e-participation.	http://www.bahrain.bh/wps/portal/data
Morocco	Les données publiques de l'administration Marocaine	This site is part of the e-government programme established by the Ministry of Industry, Trade and New Technologies in order to bring together in a single entry point a set of public data collected by several entities in a direct and usable format.	http://data.gov.ma
Oman	Open Data Initiative	The national Open Data Initiative encourages all public organizations to publish their data archives to the public in order to create a more transparent, participatory and collaborative government.	http://www.oman.om/opendata
Qatar	Qatar Information eXchange (QALM)	Open data in Qatar is provided through QALM, an ambitious national project which aims at providing national information and data derived from government ministries and agencies, in various such formats as PDF, Excel and CSV.	http://portal.www.gov.qa/wps/portal/opendata
Saudi Arabia	Open Government Data	As part of the National e-Government Portal, Open Government Data provides a wide arrey of information in PDF, Excel and XML covering, among others, matters related to weather, trade (internal and external), education and training, social services, population and housing, health, energy and water, transport and communications, and labour markets.	http://www.saudi.gov.sa/wps/portal/yesserRoot/aboutKingdom/openGovernmentData
Tunisia	Libérez vos données sur la Tunisie	This ICT private sector-driven project is part of Corporate Social Responsibility (CSR), an initiative of Web Design Tunisia.* It has been designed to collect and make available a catalogue of public data for free download in a usable and open format.	http://www.opendata.tn
United Arab Emirates	Bayanat.ae	This project provides public access to government data and information in a usable and reusable way. Documents are made available in XML, Word and PDF formats.	http://www.government.ae/en/web/guest/uae-data

Source: Compiled by ESCWA.
* See: http://www.wdtunisia.com.

especially as part of their implementation of e-government programmes. As of 2011, all member countries had online government portals which varied in functionalities, level of development and type of services and information provided.

The evolution of e-government from strictly providing e-services to citizens to a broader concept involving the development of policies and regulations which support the principles of transparency, participation, and collaboration, has led to the adoption of open government strategies. As a response, an open data movement has emerged. Open Government Data (OGD) is a prominent example of this intiative, whereby government agencies allow for a direct online access to large datasets of public information by citizens, media and other stakeholders.

Table 21 depicts OGD initiatives in the Arab region by examining dedicated websites providing various types of government data and their availability in multiple usable formats, namely Excel and Extensible Markup Language (XML). Seven Arab countries, namely five GCC countries and two from North Africa, have adopted OGD initiatives and are making economic, social and even environmental data available on dedicated sites in easily accessible format. These sites, which vary in their sophistication and the nature of information they provide, are mostly subsections of official e-government sites, except for Tunisia, whose OGD initiative has been initiated and supported by the private sector.

An essential element for the growth of the information society and its transformation to a knowledge society is not only the availability of public information, but rather the right to information, and the freedom of its accessibility without restrictions and/or permissions. In this regard, the analysis of access to information in the region cannot be performed effectively without putting it in the right legislative context. Freedom of information (FOI) acts warrant the rights of access to government information. [40] Although FOI is a keystone to open data use, it is not a prerequisite for OGD initiatives. FOI laws deal with the disclosure of government-held information and specify ways and instances in which information can be shared and accessed and when this information can be withheld for protecting the privacy of citizens or upholding national security.

The right to information (RTI) has been gaining increasing recognition and adoption worldwide as developing and developed countries alike have enacted FOI acts. Since 1990, the list of countries with adopted FOI laws grew from 13 to 93, and includes three Arab countries, namely Jordan, Tunisia, and Yemen. [41] The latter became the last country to join this list in June 2013.

In 2007, Jordan became the first country in the region to pass an FOI act with the Law No. 47/2007on Guaranteeing the Right of Access to Information. The Law, which contains 20 articles regulating access to information, has had limited progress and faced shortcoming due to its vagueness, various exceptions and its relationship with the larger legal framework.[42] In addition, this Law lacked the proper public awareness. According to an opinion survey conducted by the Al Urdun al Jadid Research Center on 20February 2009, 42 per cent of media personnel claimed that they were unaware of the existence of such law.[43]

Tunisia became the second country in the Arab region to have adopted the Decree on Access to Administrative Documents in May 2011 as a direct result of the proactive disclosure policy which swept the country as a result of the Arab Spring. Since then, key government information and statistics have been published, including national budget and finance reports and data on labor force and population.[44] However, the implementation of this legislation has lacked the proper support mechanisms, public awareness in still very low, and the broad exceptions to this decree can undermine its impact in assuring transparency and accountability.[45]

Yemen is the third country in the region to have passed an elaborate and comprehensive law on the right of access to information (No. 13 for the year 2012). The Law is one of the most important public policies that have been legislated and passed by

the parliament and was approved and issued by the President of the Republic on 1 July 2012.[46] The Yemeni law was lauded by the Centre for Law and Democracy (CLD) as one of the best in the region, putting Yemen in 19th position according to its global right-to-information rating, ahead of Tunisia (position 41) and Jordan (position 89) out of 93 countries.[47]

It is hoped that the passage of the Yemeni law would trigger similar actions in other Arab countries, particularly in Egypt, Lebanon and Morocco, as these countries have been working on their own laws in this field. Lebanon is poised to join the growing list of countries with access-to-information laws as its draft law was submitted to the parliament in April 2009 and approved by the parliament's legislative committee in July 2013.[48]

In 2011, the Government of Morocco has promised to draft an access-to-information law following a constitutional change which, for the first time, guaranteed access to information; however, no practical plans have been announced yet.[49]

Following the Egyptian revolution of 2011, the country has been trying to formulate and pass its right-to-information law in an attempt to improve economic conditions for investments and establish a system of accountability; however, the drafting process has seen many hurdles due to some resilience and restrictions imposed by different sections of the Egyptian Government.[50] As concerns other Arab countries, bills on the right to information have been debated in Bahrain, Kuwait and Palestine.

2. Access to information and knowledge

The opportunities offered by information and knowledge exchange are tremendous, especially when it is inclusive, encompassing all members of society without marginalizing persons with disabilities or disadvantaged and remote areas. ICT plays an ever increasing role in enabling access to digital content and overcoming impediments to access, be it physical, cultural and/or social. While the region has made progress in developing and sharing public information as seen in section 1 above, efforts

TABLE 22. Accessibility of digital content in selected Arab countries, 2012

Country	Accessibility of digital content, 2012		Networked Readiness Index, 2012	
	Score*	Ranking (144)	Score	Ranking (144)
United Arab Emirates	6.1	23	5.07	25
Qatar	6.0	27	5.10	23
Bahrain	5.9	31	4.83	29
Saudi Arabia	5.5	43	4.82	31
Jordan	5.4	48	4.20	47
Oman	5.3	53	4.48	40
Kuwait	5.3	54	3.94	62
Morocco	4.5	96	3.64	89
Egypt	4.4	100	3.78	80
Lebanon	4.2	110	3.53	94
Yemen	3.8	121	2.63	139
Libya	3.5	131	2.77	132
Algeria		137	2.78	131
Average (Arab/world)	**4.85/4.90**		**3.97/3.97**	

Sources: WEF, 2012a; and WEF, 2013a.
Note: * This is based on a seven-point total score whereby 1 = not accessible at all; and 7 = widely accessible.

are still needed to enhance accessibility of digital content. Access to information and knowledge comes in various forms. It encompasses accessibility, affordability as well as availability of digital content. Content can be in the form of journals, archives and library services as well as access to statistical data for developmental purposes.

The NRI captures accessibility of digital content in selected Arab countries as shown in table 22; recent available data show that GCC countries scored higher than other Arab countries on this indicator, with the exception of Jordan, which came in fifth position. While, on average, the score of the Arab region in accessibility was similar to the world average, disparities were largely seen within the region. The United Arab Emirates and Kuwait attained better rankings on accessibility (23 and 54, respectively) compared to their NRI rankings (25 and 62, respectively). Qatar, Saudi Arabia and Oman, however, saw lower rankings on accessibility compared to their NRI rankings. Egypt and Lebanon, in particular, faced visible shortcomings whereby their accessibility rankings were considerably lower than their NRI rankings (20 and 16, respectively).

The shortcomings exhibited by some countries can be mostly attributed to such factors as the limited availability of digital Arabic content, the scarcity of laws that protect right-to-information access, relatively low broadband penetration rates and high subscription costs.

In this respect, the ICT Price Basket (IPB) is a benchmarking tool devised and computed by ITU to monitor the relative price of ICT services and provide an indication on the affordability of ICT services worldwide. While the IPB unfairly assigns equal weights to fixed telephony, mobile telephony and

TABLE 23. Ranking of selected Arab countries on the ICT Price Basket, 2011

Global rank (161)	Country	Fixed-broadband penetration, 2011 *(Percentage)*	GNI per capita* (US$)	Sub-baskets (Percentage of GNI per capita)*			ICT Price Basket value
				Fixed	Mobile	Broadband	
4	Qatar	8.7	71 008	0.2	0.3	0.9	0.5
6	United Arab Emirates	11	41 930	0.1	0.3	1.2	0.5
15	Bahrain	13.8	25 420	0.2	0.7	1.3	0.7
30	Oman	1.8	18 260	0.9	0.6	1.7	1.0
41	Saudi Arabia	5.6	16 190	1.0	1.0	2.0	1.3
64	Lebanon	4.9	8 880	1.6	3.4	2.4	2.5
66	Tunisia	5.1	4 160	1.7	2.9	3.0	2.5
75	Egypt	1.8	2 420	1.3	3.4	4.0	2.9
79	Algeria	2.8	4 450	1.7	3.7	4.8	3.4
91	Jordan	3.2	4 340	2.6	2.9	6.2	3.9
100	Morocco	1.8	2 850	0.9	9.4	4.9	5.1
109	Syrian Arab Republic	0.6	2 750	0.5	9.3	9.4	6.4
119	Yemen	0.4	1 070	1.1	12.6	18.7	10.8
121	Sudan	0.0	1 270	5.7	5.7	27.4	12.9
141	Iraq	..	2 340	0.2	6.4	108.3	35.5

Source: ITU, 2012.

Notes: * The GNI per capita is based on the Atlas method by the World Bank.
The rest of ESCWA member countries were not featured in the table due to data unavailability.
Two dots (..) indicate that data are not available.

fixed-broadband - given that mobile telephony is the forte of many developing countries - the pricing data provided for fixed-broadband helps in determining possible impediments to access.

Table 23 compares and ranks selected Arab countries based on their price basket values as a percentage of their per capita GNI.[51] It also highlights the broadband sub-basket costs in relations to fixed broadband penetration rates. Great disparities in broadband costs are noted, from less than 1 per cent of monthly GNI per capita in Qatar to over 100 per cent of the monthly GNI per capita in Iraq. In addition, the price of broadband access is still the most expensive component of the ICT price basket in almost all Arab countries, way above the costs of fixed or mobile phone services.

A further analysis of the data in the same table suggests a correlation between affordability of fixed broadband and penetration rates in the Arab region. While broadband affordability and penetration levels are likely linked to GDP and other human development factors, broadband access costs in the region were inversely proportional to their penetration rates. For instance, Bahrain, Qatar and the United Arab Emirates enjoyed the highest penetration rates of fixed broadband and the most affordable broadband sub-basket values. While the contrary situation would be hoped for, the cost of broadband access in such less developed countries as Yemen, the Sudan and Iraq were invariably higher than similar cost in more developed countries; by contrast, these less developed countries had the lowest fixed broadband penetration rates globally.

In this context, it is worth highlighting a possible link between lowering the cost of broadband and its impact on penetration rates. In 2011, Lebanon slashed its fixed broadband subscription costs and increased capacity and access speeds. While the telecom sector in Lebanon is still under a tight government control in terms of both regulation and pricing, the action taken by the Ministry of Telecommunications lowered Lebanon's broadband sub-basket value from 3.4 in 2010 to 2.4 in 2011, well below its ICT price basket value at 2.5. As shown in table 23 of chapter 2 on infrastructure, the subsequent growth of Lebanon's fixed broadband penetration rates between 2011 and 2012 reached more than 138 per cent.

ICT plays an ever increasing role in enabling access to digital content and overcoming impediments to access. In this regard, ictQATAR introduced, in November 2011, Qatar's first e-accessibility policy, poised to make ICT more accessible for persons with disabilities and an important step towards ensuring the participation, inclusion and equal access to technology for all citizens. The policy addresses a range of e-accessibility issues, which include websites, telecommunications services, mobile handsets, ATMs, government services, access to assistive technologies, and digital content.[52] Oman has also adopted an e-accessibility policy in September 2012, developed by ITA in collaboration with the private sector, as part of a larger e-transformation plan. The policy aims to provide fair and equal access to government e-services without marginalizing the disabled and the elderly.[53] As a direct outcome of the policy, all web pages of Oman's e-government portal "Omanuna" have specials accessibility features which include a headphone icon to read the page content, and a font enlargement icon to enlarge the displayed text.

Chapter 8 exemplifies a number of projects and initiative undertaken in the region related to the development and access of digital Arabic content; these will not be discussed further in this chapter. Concerning access to statistical data for developmental purposes, Egypt ICT Indicators Portal[54] is a product developed by MCIT. It serves as an institutional mechanism created to support decision-making inside the Ministry, and provides all stakeholders with access to updated information and statistical data on the ICT sector in the country. ICT indicators accessed through the portal cover infrastructure, economy, business, households, individuals, and government uses of ICT tools. In

recognition of the portal's main source of public information and data on the ICT sector in Egypt, MCIT won the United Nations Public Service Awards (UNPSA) for the year 2013, under Category 3: "Fostering participation in public policy decision making through innovative mechanisms".[55]

3. Multi-purpose community public access points

Realizing the need to improve access and knowledge to information,[56] most governments in the Arab region have established some form of multi-purpose community public access points/centres in collaboration with national, regional and international organizations as well as NGOs. These centres vary in size, the services they provide, their suitability model, the population they target, and areas they serve. The main purpose of these centres remains providing access to various ICT services, especially the Internet, building ICT capacity and knowledge-sharing.

However, the Arab region has been witnessing a sustained rise of ICT penetration rates, coupled with improved affordability and usability of ICTs, which rendered the concept of community public access points not so viable. In light of this, national access initiatives started to shift their focus from traditional services to more specific ones, in addition to expanding their services to rural areas, and catering to issues related to people with disabilities and gender. Another reason for the witnessed decline in the number of public Internet centres, as is the case in Tunisia, is the increase in the number of such public institutions connected to the Internet as educational institutions, public libraries and postal mail centres.[57] Supporting examples from the Arab region are highlighted below.

The growth of IT clubs in Egypt has reached a saturation point with 2,164 established IT clubs in December 2010 up from 1,807 at the end of 2008. This lead MCIT to focus its community-based access point around a new initiative labeled the "IT Houses" launched in September 2011.[58] The initiative is part of a broader project which aims at offering integrated services, including ICT capacity-building courses, such e-government services as issuing national ID cards and driving licences, and various services targeting SMEs in remote and marginalized areas of Egypt, especially the Bedouin and desert areas. Nine so-called IT Houses were established in the North Sinai Governorate at the beginning of the project, which grew rapidly and spread all over Egypt to include 123 IT Houses as of May 2013.[59]

After launching its first ICT-based Women's Community Knowledge Centre (WCKC) in the Shinas district in collaboration with the Omani Women's Association, ITA continued its support to the National IT Training and Awareness Framework (NITTA) initiative,[60] a cornerstone of its broader eOman initiative.

The Community Knowledge Centres (CKC),[61] accessible to both gender, seek to develop and build the ICT literacy and digital skills of all segments of the society through specialized ICT training programmes, which have been expanded to cover such emerging topics as access to e-government services offered through Oman's official eGovernment Services Portal. As at mid-2013, the total number of CKC reached 19 centres, nine of which were dedicated to women in collaboration with the Omani Women Association,[62] and implemented in different regions across the Sultanate. Since their launch in 2009, the number of trainees benefiting from CKC services reached 23,898, while WCKCs have trained 5,637 women.[63]

In Jordan, the Knowledge Stations continue to play an important role in providing a variety of ICT-based services to a broad segment of the society. By the end of 2012, the total number of stations operating in the Kingdom reached 192, up from 176 in 2010, out of which 28 were serving in very poor areas. From their inception in 2001 until the end of 2012, the number of beneficiaries exceeded 1.6 million citizens. The number of ICT-based training sessions offered reached 20,362, while the total number of citizens who completed these sessions reached 190,000. It is worth noting that, on average, the number of female ICT

trainees have outnumbered their male counterpart by a three-to-two ratio.[64]

In Qatar, a PPP was formed in June 2010 between ictQATAR, Qtel, Vodafone Qatar, Qatar National Bank (QNB), and Microsoft, which resulted in the establishment of Mada (Qatar Assistive Technology Centre), a non-profit organization dedicated to improving the quality of life of individuals with disabilities by connecting them to the world of ICT. The centre focuses on extending ICT access to the visually and hearing impaired and the physically disabled.[65]

In addition, ictQATAR and Mada partnered with Qatar Social and Cultural Centre for the Blind (QSCCB)[66] in June 2012 to establish two computer labs dedicated to the blind and visually impaired, one of which will be dedicated for women only. The labs will be equipped with the latest assistive technology for the visually impaired and be located at the QSCCB in Doha.[67]

4. Using different software models

With a growing number of software solutions and tools based on the open-source model, free and open-source software (FOSS) is positioned to improve access to information and knowledge. FOSS provides a viable alternative to proprietary and commercially-licenced software, especially for public and private users with limited spending on ICTs. However, the adoption and use of FOSS remains limited in the Arab region as unlicenced and pirated commercial software prevails. The region still suffers

TABLE 24. Selected community-based entities promoting the use of FOSS in the Arab region

Country	Name	Description and role	URL
Bahrain	Bahrain Linux User Group	A group of computer enthusiasts with a focus on Linux.	http://www.linuxbahrain.com
Egypt	The Egyptian GNU/Linux Users Group	A user group dedicated to the promotion, use and support of FOSS in general and GNU/Linux in particular in Egypt.	http://www.eglug.org
Jordan	Jordan Open Source Association	A group of open-source student activists from several universities in Jordan dedicated to promoting open-source and uncensored Internet.	http://jordanopensource.org
Kuwait	Kuwait Linux User Group (KLUG)	Dedicated to promoting Linux, BSD, and open source software in Kuwait.	http://www.q8linux.net
Lebanon	Lebanese GNU/Linux Users Group	Dedicated to building knowledge in GNU/Linux and other open-source software.	http://www.leglug.org
Libya	Tripoli Linux User Group	An online group that conducts workshops, seminars and courses in Linux.	http://tlug.ly
Palestine	Palestinian Open Source Community	A non-profit organization that aims to promote the benefits of open source.	http://www.opensource.ps
Sudan	Nile Centre for Technology Research (NCTR)	The centre is part of the National Telecommunication Corporation (NTC) dedicated to building an open-source community and developing local skills and knowledge of open source.	http://www.nctr.sd/en/index.php/nctr-opensource/suda-foss.html
United Arab Emirates	Open Source UAE	A community of open-source enthusiasts at Zayed University.	http://os-uae.org
Yemen	Yemeni Free Software and Open Source Association (YFOSA)	A community which promotes the use of FOSS in Yemen.	http://www.yfosa.org

Source: Compiled by ESCWA.

from an elevated software piracy rate, namely 65.9 per cent in the Arab region compared to a world average of 42 per cent, coupled with defunct and limited enforcement of trade and copyright laws.

Individuals, national technology groups and private institutions and associations were faster to embrace FOSS than the public sector as indicated by the number of related initiatives/groups launched in the region, and illustrated in table 24. Support for these initiatives is mostly provided by the private sector, chiefly regional and multinational businesses which abide by international laws and trade regulations for their viability; and the educational sector whereby FOSS provides a wealth of applications supporting e-learning, especially web servers, content management systems (CMS) and learning management systems (LMS).

The following two non-government initiatives promoting FOSS remain the most notable in the Arab region. Both are multisector partnerships, the first being regional and the second being national. Ma3bar[68] is the Arab Support Center for Free and Open Source Software, hosted by the University of Balamand in North Lebanon and supported by the UNDP and UNESCO regional offices in Beirut. The second initiative is the National Programme for Free and Open Source Software Technology (NPFOSST),[69] partly supported by UNDP, and based in King Abdulaziz City for Science and Technology (KACST) in Saudi Arabia.[70] Both initiatives aim at prompting the use of free and open source in the public and private sectors while providing capacity-building and technical support through partnering entities and community user groups. The cornerstone of sustainability for the two initiatives is their multisector partnerships structure and the academic, research, technical, and logistical support provided by the educational institutions hosting them.

While most governments in the region have realized the importance of FOSS as a smart choice for reducing cost, increasingd flexibility and improving interoperability, few have taken concrete steps towards embracing this model. Notable efforts undertaken by Oman, Tunisia and Egypt are highlighted below.

As part of its ongoing National Free and Open Source Initiative to support the adoption and use of free and open-source software in Oman, ITA carried out a series of awareness-raising and capacity-building activities. These included a Free and Open Source Software Conference (FOSSC-Oman' 2013)[71] at Sultan Qaboos University; conducting a series of related training workshops; launching a portal for downloading FOSS packages;[72] distributing more than 30,000 open-source software DVDs to government employees; and training 48 academic staff from the Higher College of Technology in Muscat on Linux Professional Institute Certification, Level1 (LPIC-1), and another 140 teachers from the Ministry of Education on various FOSS end-user applications.[73]

Tunisia was one of the first countries in the Arab region to formulate, as early as 2001, a National Open Source Software Plan. In this regard, the Government set up a unit dedicated to open-source software (Open Source Tunisia)[74] at the Ministry of Information and Communication Technologies, which is in charge of using FOSS as an alternative to proprietary software in public, educational and private-sector entities. In 2010, the proportion of public entities with an open-source software infrastructure reached 42 per cent, while the proportion of public-sector technical staff trained on FOSS reached 26 per cent.[75]

After sealing a US$44 million deal with Microsoft in December 2012, including the renewal of an agreement for using desktop software and servers licences throughout government offices, the Government of Egypt was faced with an unprecedented protest from a group of open-source activists headed by the Egypt Open Source Association.[76] The adoption and use of FOSS had already been in the pipeline of the Egyptian Government since 2011; however, the reaction to the deal with Microsoft accelerated the process. As a result, Egypt started working on a new open-source software strategy in March 2013, in an effort to achieve a gradual shift towards open-source software use by the government.[77]

One of the main hurdles impeding the adoption of FOSS in the region has been its shortfall in addressing the particularity of the Arabic language,

especially the lack of native support for interface localization into Arabic. In this regard, Talal Abu-Ghazaleh Organization (TAG-Org) has developed an Arabized Linux-based, open-source, operating system (OS) which is positioned to provide an alternative solution to Microsoft Windows OS.[78]

Finally, it is worth noting that the recognition and adoption of FOSS was not much of choice for a number of ESCWA member countries, namely those on which the United States had imposed embargoes covering the export and re-export of software and/or technology products, which are partly still in effect for political reasons. During the past decade, Iraq, Libya, Syrian Arab Republic, and the Sudan were all on a United States list of embargoed countries,[79] and resorting to FOSS was an evident choice to partly relieve the burdens of the sanctions.

B. Classification and ranking of ESCWA member countries according to maturity level

In order to rank ESCWA member countries according to maturity level in access to information and knowledge, a number of factors were considered. These include the availability of FOI laws, adoption of OGD initiatives, broadband penetration rates, broadband subscription costs as a percentage of income, availability of digital content, and accessibility, especially for marginalized citizens and remote areas.

1. Maturity level 1: Iraq, Libya, Palestine, the Sudan, and Syrian Arab Republic

This maturity level is characterized by low broadband Internet penetration rates, high access costs as a percentage of income, inexistence of FOI laws and OGD initiative, and limited availability of ICT access in rural and remote areas; with limited digital public-domain information that is accessible to citizens. Libya was introduced at this maturity level, while Iraq and Syrian Arab Republic were downgraded to this level owing to lower accessibility and restriction on information as a result of ongoing internal conflicts. Palestine was also downgraded to this first level due to delays in the implementation of a national e-government project, with anticipated benefits on the availability and access to a wide gamut of government information.

2. Maturity level 2: Jordan, Lebanon, Morocco, Tunisia, and Yemen

This maturity level is characterized by average broadband Internet penetration rates, reasonable access costs as a percentage of income, as well as existence of some access to information laws, availability of digital public-domain information albeit with some limitations due to censorship, and the existence of few initiatives providing access in rural areas. Morocco and Tunisia were introduced for the first time at this level of maturity; both countries have exhibited fair progress related to access initiative, and have attained access indicator values similar to those of other countries in this maturity level. Yemen has attained this maturity level in 2013 owing to its newly adopted RTI law.

3. Maturity level 3: Egypt, Kuwait, Oman, and Saudi Arabia

This maturity level is characterized by good broadband Internet penetration rates, widespread broadband Internet usage coupled with low access cost and access initiatives catering to the needs of marginalized individuals and those living in remote or disadvantaged areas. Saudi Arabia attained this level owing to high broadband penetration rates, coupled with low access cost and widespread usage. In addition, the Kingdom's e-government programmes hasveavailed a wealth of easily accessible public-domain information.

4. Maturity level 4: Bahrain, Qatar and the United Arab Emirates

This maturity level is characterized by high broadband Internet penetration rates with affordable subscription costs, extensive broadband usage, availability of large public-domain digital information databases, and public access initiatives catering to the disadvantaged. The United Arab Emirates attained this maturity level in 2013; it enjoys high

TABLE 25. Ranking of ESCWA member countries by maturity level in access to information and knowledge

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain							■				■	■
Egypt							■	■	■			
Iraq			■	■	■							
Jordan				■	■	■						
Kuwait							■	■	■			
Lebanon				■	■	■						
Libya*			■									
Morocco*						■						
Oman							■	■	■			
Palestine	■		■		■							
Qatar							■				■	■
Saudi Arabia				■	■				■			
Sudan	■	■	■									
Syrian Arab Republic			■	■	■							
Tunisia*						■						
United Arab Emirates							■	■				■
Yemen	■	■				■						

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2013 since they only joined ESCWA in 2012.

broadband penetration rates, low and affordable subscription costs, and free and open access to a wealth of public-domain information, especially through its OGD initiative.

C. Suggestions and recommendations

Access to information and knowledge requires an advanced ICT infrastructure, ubiquitous and affordable ICT services, including broadband services, related laws, the availably of relevant digital content, access initiatives, and widespread community/public ICT access points. Based on the regional comparative analysis, recommendations for ESCWA members countries are as follows:

(a) Increase the accessibility of Internet services by reducing broadband subscription costs to levels affordable by a wider section of the community; with concessions for free and open access in public areas;

(b) Boost the demand for e-services and increase ICT usage by raising awareness and building capacities for utilising ICT across all stakeholder

groups, particularly for individuals and businesses;

(c) Adopt access policies and initiatives targeting the participation and inclusion of all citizens, especially the disabled and the ones located in remote or marginalized areas;

(d) Increase the availability of digital Arabic content in order to encourage usage by large segments of the population and provide free access to online content on the Internet in order to encourage knowledge creation and sharing;

(e) Adopt RTI and FOI legislations which guarantee the right of free access to information, especially public domain information;

(f) Promote the use of open-source software, which ensures openness standardization and cost reduction, and collaborate with national, regional and international organizations working in the field.

IV

ICT capacity-building

IV. ICT Capacity-Building

Being aware of the importance of knowledge-based economy and its potential benefits to socio economic development, Arab countries are undergoing noticeable transformations towards this new economy model. One of the main pillars of this transformation is building the needed human resources that would actively participate in development and innovation.

In fact, ICT plays a major role in all education levels. It could be used as an efficient tool for learning and providing the adequate expertise and skills needed in the knowledge society. Arab youth are facing several challenges hindering the building of a knowledge society. These challenges include, inter alia, the lack of cognitive skills[80] and incapacity of the Arab education system, in general, to produce employable youth with appropriate hard and soft skills.[81] Therefore, there is a need for modernized capacity-building plans that allow for job creation and offer a better future for youth.

A. Comparative analysis

1. Basic literacy and ICT to eradicate illiteracy

Literacy is considered to be one of the basic prerequisites for obtaining job opportunities, especially in an increasingly knowledge-based society, in which it has to be coupled with other specific skills and training. The literacy rate in the Arab region has generally increased in the last five years. However, in some countries, adult female literacy is still low when compared to the world average.[82]

(a) Adult literacy

In 2010, the world adult literacy rate stood at 84.1 per cent[83] (88.6 per cent for males and 79.7 per cent for females); the Arab region[84] is significantly below this global average at only 75 per cent, superior only to Sub-Saharan Africa and South and West Asia.[85] Arab countries need to increase efforts in enhancing literacy rates. However, when comparing the current rates to those projected for 2015, the region will witness a net increase in adult literacy rates to reach 79 per cent.[86] This could be explained by better educated youth who will join the adult population. The greatest change is expected in Algeria, followed by Morocco, Tunisia and Yemen. By 2015, the total literacy rate is projected, to exceed 90 per cent in several Arab countries, namely Qatar, Kuwait, Palestine, Jordan, Lebanon, Bahrain, United Arab Emirates, and Libya. As for the woman adult literacy rate, projected for 2015, the rates in some countries as the Sudan will still be low. These include the Sudan (68 per cent), Egypt (66 per cent), Morocco (55 per cent) and Yemen (55 per cent), as shown in table 26.

(b) Youth literacy

The performance of Arab countries in youth literacy is considerably higher than in adult literacy thanks to the efforts of Arab governments to improve education enrolment rates.[87] The world youth literacy rate stood at 90 per cent in 2010, whereas the average of the Arab region stood at 89 per cent.[88] Figure 26 shows youth literacy rates in selected Arab countries. Libya heads the region with a youth literacy rate of 99.6 per cent, followed by Palestine with 99.2 per cent. Yemen has a youth

literacy rate of 76.9 per cent, caused by a low youth female literacy rate of 60 per cent, owing mainly to early marriage.

The gender parity index (GPI) for youth literacy in the Arab region rose from 0.77 (in 1999) to 0.94 (in 2010).[89] The United Arab Emirates, Qatar, Oman, Lebanon, Kuwait, Palestine and Jordan each had a GPI exceeding one.[90] These countries have seen notable efforts in recent years towards bridging the gender gap.

(c) ICT initiatives to eradicate illiteracy

Several ICT initiatives were employed with the aim to increase the literacy rate: e-books and online texts, talking books, YouTube sequences, television, videos, DVDs, and multimedia software for enhancing reading skills.[91]

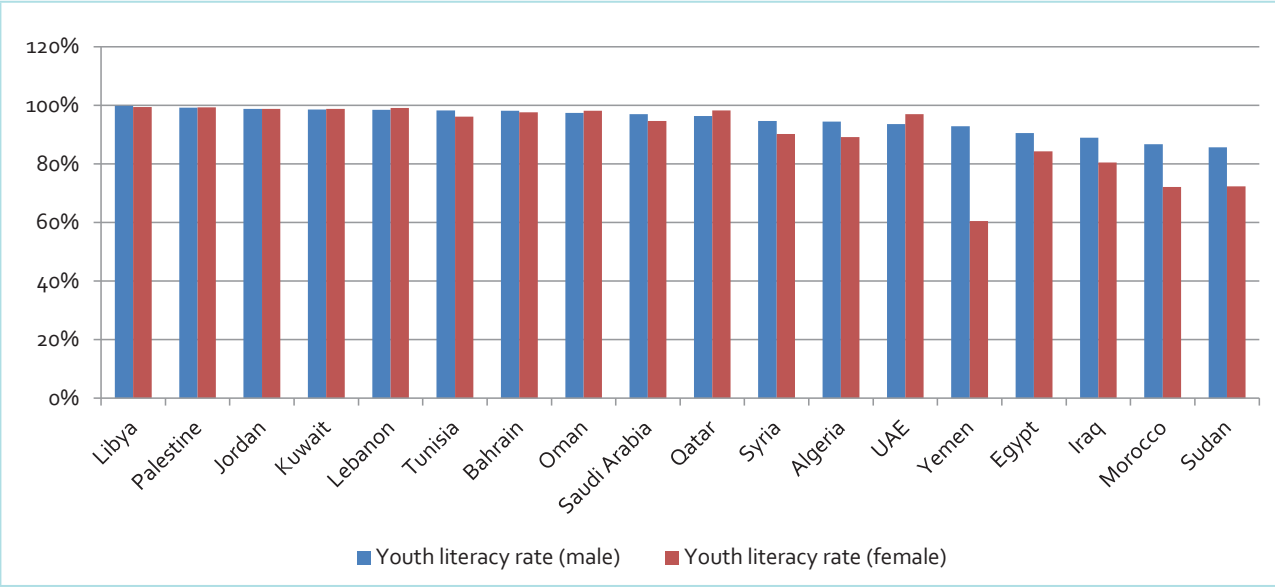
Among these initiatives in the Arab region, the Iraqi Ministry of Education is awarding incentives for volunteers working in illiteracy eradication, and an increasing number of volunteers have joined the illiteracy eradication campaign.[92] The campaign included developing new curricula and establishing community centres. In Egypt, the MCIT produced courses on CDs targeting 10,000 illiterates annually.[93] In Yemen, the number of literacy centres has increased in the last two years, and the number of enrolled illiterates has been growing at the rate of 5.4 per cent per year.[94] A pan-Arab joint initiative launched by the Arab League Educational, Cultural

TABLE 26. Adult literacy in selected Arab countries

Country	2005 - 2010			Project for 2015			Change		Total Literacy (%)
	Male Literacy (%)	Female Literacy (%)	Total Literacy (%)	Male Literacy (%)	Female Literacy (%)	Total Literacy (%)	Male Literacy (%)	Female Literacy (%)	
Algeria	81	64	73	87	73	80	6	9	7
Bahrain	93	90	92	95	92	93	2	2	1
Egypt	80	64	72	82	66	74	2	2	2
Iraq	86	71	78	85	79	83	-1	8	5
Jordan	96	89	93	97	92	94	1	3	1
Kuwait	95	92	94	95	94	96	0	2	2
Lebanon	93	86	90	95	92	94	2	6	4
Libya	96	83	91	97	86	91	1	3	0
Morocco	69	44	56	74	51	62	5	7	6
Oman	90	81	87	90	84	87	0	3	0
Palestine	98	92	95	98	94	96	0	2	1
Qatar	97	95	96	97	96	97	0	1	1
Saudi Arabia	90	81	87	92	85	89	2	4	2
Sudan	80	62	71	83	68	75	3	6	4
Syrian Arab Republic	90	77	83	92	81	86	2	6	3
Tunisia	86	71	78	90	77	84	4	6	6
United Arab Emirates	91	89	90	92	95	93	1	6	3
Yemen	81	47	64	85	55	70	4	8	6
Regional average*	**84.09**	**76.03**	**67.42**						

Source: UNESCO, 2012, available from http:// unesdoc.unesco.org/images/0021/002180/218003e.pdf.
Note: * Calculated by ESCWA.

FIGURE 2. Youth literacy rates in selected Arab countries



Source: UNESCO, UIS Database, available from http://stats.uis.unesco.org.
Note: The figure represents the most recent data available.

and Scientific Organization (ALECSO), UNESCO and ITU produces online/mobile training material to teach 28 Arabic characters used in "Fossha", the formal language, with a view to eradicate woman illiteracy.[95]

2. ICT in education and training

(a) Education expenditure and national policies on ICT for education

Arab countries spend about 5 per cent of their GDP on education. A share of about 20 per cent of government expenditure goes to education.[96] This allocation is needed in order to strengthen the infrastructure (if only to cope with the increasing number of students due to the "youth bulge"), to develop curricula and to improve the capabilities of teachers. While most Arab countries are close to the above-mentioned average, variations exist: the percentage of total government expenditure on education is as high as 31.1 per cent in Oman, 25.7 per cent in Morocco, and 23.4 per cent in the United Arab Emirates; at the lower end, it stands at 11.9 per cent in Egypt, 11.7 per cent in Bahrain and only 7.2 per cent in Lebanon.[97] One must note that this only concerns government expenditure and does not include public and private expenditure on education.[98]

In most Arab ICT policies and national plans, emphasis is placed on ICT capacity-building. These policies encourage the integration of ICT at all education levels and seek to enable the population, particularly the youth, in accessing the knowledge society. Furthermore, all Arab constitutions provide for free public education and make it compulsory to complete primary education, in certain countries also secondary education.

(b) Enrolment

Arab countries have witnessed noticeable progress in reducing the number of children not enrolled in schools. In this regard, the rate of children not enrolled in primary education dropped to 28 per cent by 2007 (although still 5.8 million Arab children at primary age education do not attend school).[99]

The rate of children enrolled in pre-primary education varies between Arab countries. In Kuwait and the United Arab Emirates , rates are close to

80 per cent. However, in other Arab countries, the rate is still below the region's average of 19 per cent (which is far below the world average of 41per cent and among the lowest in the world, higher only than sub-Saharan Africa), as is the case in Iraq, Libya, Saudi Arabia, Syrian Arab Republic, and Yemen.[100]

As to primary education, Morocco, United Arab Emirates, Yemen, Algeria, and Iraq have made significant progress. The net enrolment rate (NER) is above 95 per cent in Tunisia, Syrian Arab Republic, Kuwait, Oman, Algeria, Egypt, Morocco, and Qatar, and the global NER in primary education in the region reaches 89 per cent.

Concerning secondary education, the average gross enrolment rate (GER)[101] in the Arab region reached 69 per cent. Some countries are still lagging behind, including Iraq, Yemen and the Sudan. [102]

In tertiary education, Lebanon has a high enrolment rate of 51.67 per cent, followed by Bahrain, at 48.94 per cent, Jordan, at 39.86 per cent, Saudi Arabia, at 34.94 per cent, and Tunisia, at 32.65 per cent. The tertiary education enrolment rate in several Arab countries is still below 30 per cent, which is true for Algeria, at 29.13 per cent, Egypt, at 28.81 per cent, and United Arab Emirates, at 28.78 per cent. In Yemen, the tertiary enrolment rate is as low as 9.18 per cent.[103]

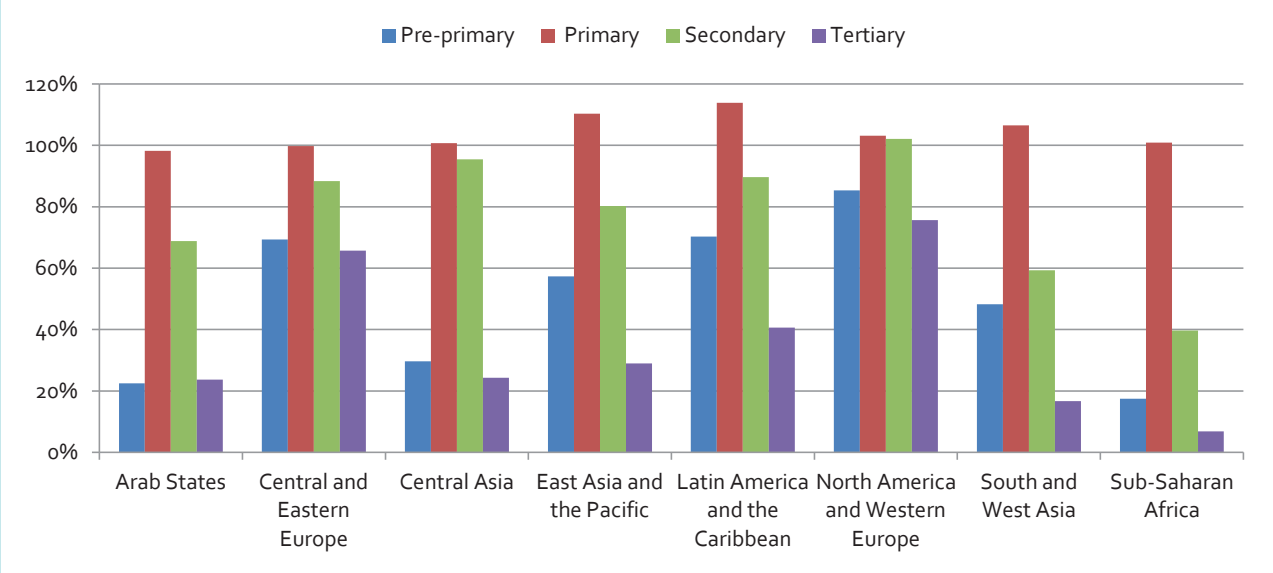
Figure 3 summarizes the GERs in the Arab region by education level and compares it to other regions in the world.

(c) Teachers and students

Teachers play an important role in ensuring that pupils use ICT effectively both inside and outside school. Therefore, they require training to be able to use ICT for teaching different subjects. The teacher-student ratio, in general, is appropriate; it stands at approximately 20:1 for pre-primary and 30:1 for primary education, except in the Sudan and Yemen, , where this ratio is greater than 40:1.[104] However, only an average of 55 per cent of teachers in the Arab region are able to use social media platforms. This rate is higher in United Arab Emirates, Jordan, Egypt, and Saudi Arabia.[105]

Tools and frameworks to develop teacher capacities and to enable them to help students to

FIGURE 3. Gross enrolment rate (GER) by education level, 2010



Source: UIS Database.
Note: Percentages may be higher than 100 per cent for GERs if children or youth older or younger than the level's defined age are enrolled.

become collaborative and creative learners exist, an example of which is the UNESCO ICT Competency Framework for Teachers.[106]

This initiative is intended to inform educational policymakers, educators of teachers, providers of professional development, and working teachers on how to help students and teachers to utilize technology effectively and develop ICT skills. The training suggested by this framework is based on three modules: technology literacy, deepening of knowledge and creation of knowledge.

(d) Schools

Some countries have managed to provide schools with learning resources and advanced educational equipment, while others are still below the required level. In order to allow students to learn using computers, schools have to be appropriately equipped and connected. Currently, four instruction types exist for ICT-assisted instruction:[107]

(i) Radio-assisted instruction (RAI): including radio broadcast and education through interactive radio instruction;
(ii) Television-assisted instruction (TAI): using interaction through video instead of radio;
(iii) Computer-assisted instruction (CAI): using computers to facilitate interaction between teachers and pupils;
(iv) Internet-assisted instruction (IAI): including websites and distributed learning systems.

In the Arab region, the existence of telecom facilities is rather widespread; 100 per cent of schools in Oman and Palestine are equipped with telephone lines; however, rates are lower in Egypt and Jordan, with 73 per cent for primary schools, 81 per cent for institutions providing lower secondary and 89 per cent for upper secondary education.[108]

In order to evaluate the connectivity of schools in the Arab region, a survey was conducted by the Mohammed Bin Rashed School of Government in 22 Arab countries, yielding approximately 4,000 respondents. It was found that 31.2 per cent of private schools and 19 per cent of public schools are equipped with computers, 20 per cent of private schools are connected to the Internet, whereas this is the case for only 10.8 per cent of public schools.[109] In Oman, for instance, 87 per cent of public schools are connected to Internet,[110] whereas in Yemen, only 60 per cent are.[111]

Some schools in the Arab region, namely 24.1 per cent of private schools and 17 per cent of public schools, use educational software. Generally, in the Arab region, 10 per cent of students have access to social media at school.[112] These media can be helpful in the case of school interruption due to conflict and crises by providing uninterrupted online schooling. Furthermore, 78.7 per cent agree that using collaborative web tools in class would be necessary, whereas only 39.2 per cent agree on using social media in class.[113]

(e) Curricula and skills

In the last two years, it became obvious that a change in the educational systems is necessary in order to prepare the youth for the knowledge society, and offer them a better future and more job opportunities. The skills needed to enter the knowledge society are foreign languages, mathematics, science, and information technology. Other skills needed include communication, leadership, responsibility, self-esteem, and logical as well as critical thinking.

To achieve these goals, ICT could be employed effectively in teaching and learning based on its ability to transform traditional classrooms and teaching methods from lecture-based into more interactive places where students' independent thinking is developed. Furthermore, social media and mobile platforms, with their interactive, participatory and open nature, could help modernizing education,. These platforms represent a good opportunity for interacting with a great number of peers for the purpose of learning, discussion, debating, and feedback.

Many youth in Arab countries informally learn how to use ICT tools outside the education system. Yet, there is a real need to revise curricula and ensure that the ICT knowledge and skills needed are formally included. The UNESCO study on ICT

in Education in Five Arab Countries reveals that curricula vary greatly between Arab countries:[114] while Jordan, Oman and Qatar have introduced IT courses in all three levels of primary, lower secondary and upper secondary education, specific objectives for basic computer skills are lacking in primary education curricula in Egypt and Palestine and are only starting to be implemented in lower secondary education. In Oman, curricula have been extended to include the use of ICT in all subjects and all educational levels.[115]

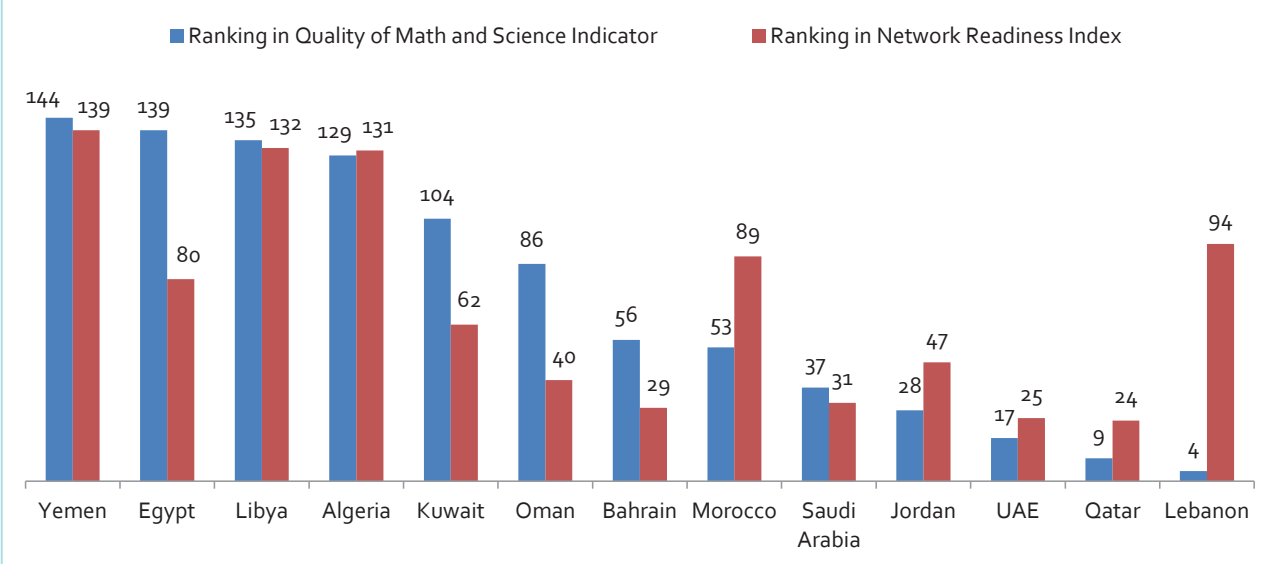
To benchmark the mathematics and science curricula, 14 Arab countries participated in the Trends in International Mathematics and Science Study (TIMSS) 2011 Assessment. The regional results yielded were below international average. In mathematics, 40 per cent of grade 8 students scored below the international benchmark, labeled "low".[116] In another initiative, selected Arab countries were ranked according to a business community survey on the "Quality of Math and Science Education" in their respective countries as summarized in figure 4. This survey is one of the NRI[117] indicators and highlights how such leading Arab countries in the NRI as Qatar and the United Arab Emirates outperform their global ranking in the "Quality of Math and Science Education" indicator; the performance of such countries as Jordan, Morocco, and particularly Lebanon, whose scores were lower, must be noted. As to the remaining Arab countries, nearly all underperform their global NRI rank for this indicator, in particular Bahrain, Egypt and Oman.

Moreover, Arab youth are lacking cognitive skills, according to the survey conducted for the Arab Knowledge Report 2011.[118] This survey revealed particularly low scores for written communication and problem-solving skills. This result challenges the acquisition capacity of students and puts at risk the participation of Arab youth in the knowledge society. This result also indicates the need to rethink the learning methods applied in Arab education systems.

(f) ICT infrastructure for higher education and research

In order to enable sharing of resources and knowledge among peer academic centres and

FIGURE 4. Ranking of selected Arab countries in "Quality of Math and Science Education" indicator vs. their global NRI



Source: WEF, 2013a.
Note: Ranking is based on GITR 2013 covering 144 countries. Ranks are by decreasing values of scores.

BOX 1. Egypt initiative: Tahrir Academy

The Tahrir Academy aims to build a library of educational videos for courses to be taught in Arabic. It targets children and youth in two age categories: the first from 3 to 18, and the second from 18 to 35. The Academy was initiated by a group of volunteers from schools, universities and youth communities. It partners with such universities as the American University of Cairo (AUC) for the production of specialized courses. The Academy uses such available social networks as YouTube to reach as wide an audience as possible, and it has uploaded more than 150 videos, with three million viewers and 4,000 subscribers. Its courses cover basic physics, mathematics and Internet skills, among other necessary knowledge for the targeted audience.

Source: See: http://www.tahriracademy.org.

institutions, it is important to link these institutions through high-speed dedicated research and education networks (REN). Many Arab countries have developed such networks whose bandwidth ranges from 2Mbps to 1Gbps. Table 27 depicts the status of these networks in selected Arab countries.[119]

3. Training programmes for capacity-building in the use of ICT

(a) International Computer Driving Licence (ICDL)

Although the ICT skills needed in Arab countries are far from being basic, many Arab countries still demand ICDL certification as proof of basic computer skills as a requirement for employment or promotion. In Jordan, there are 68,02 female certified candidates and 44,444 male.[120] In Syrian Arab Republic, around 54,100 ICDLs were issued during 2010 and 2011.[121] In the Sudan, the number of ICDL-certified males is 559 and 338 for females. [122] In Palestine, the number of certifications for males is 540 and for females 252.[123]

In Egypt, ICDL training was launched in May 2006; [124] a total of 836,801 candidates were certified by 2012.[125] Between 2003 and 2010, more than 99,438 ICDL certificates were awarded in Saudi Arabia.[126]

(b) Professional ICT training

Arab countries have to tackle the challenge of improving the capacity of graduates to the market's needs as regards ICT skills. Thus, the need for life-long learning and training opportunities becomes important in the region. Realizing the importance of professional training, Arab countries have started initiatives and partnerships to promote this type of training.

LPI has established three affiliated locations in the Arab region to offer certification of Linux exams.[127] In Egypt, the National Telecommunication Institute (NTI) was accredited by Cisco in 2006 as a Cisco Academy Training Centre for the MENA region.[128] NTI offers regional activities: it trains, supports and monitors 29 regional academies and 354 local centres in numerous Arab countries, namely Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Oman, Palestine, Saudi Arabia, Syrian Arab Republic, Tunisia, and Yemen. One of NTI's activities is to integrate the Cisco Certified Network Associate (CCNA) into core official courses in the Arab Academy for Science and Technology and Maritime Transport (AASTM).

In Oman, specialized IT training is available through ITA projects and agreements with Microsoft, Adobe, CompTIA, Cisco, and Oracle. The total number of trainees by December 2012 was 4,706. [129] Another training programme was established by the Omani Women Association in Muscat (OWAM), Microsoft and the Institute of International Education to eradicate women IT illiteracy by delivering IT curricula developed by Microsoft. This programme created eleven centres, dispersed over the country, and trained 4,825 women. In Palestine, Cisco training courses are provided at the National Computer Centre (NCC), which is related to MCIT. In addition, a partnership between the Ministry and the Korean International Cooperation Agency (KOICA) will be inaugurated by the end of 2013.[130]

TABLE 27. Research and Education Networks (REN) in selected Arab countries

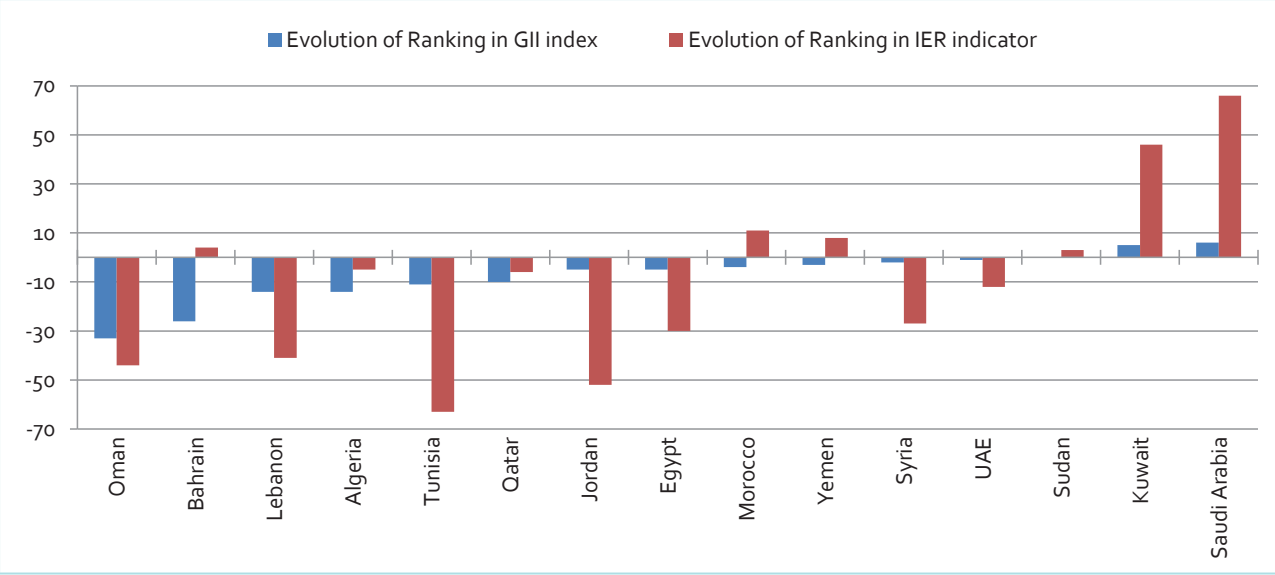
Country	Status	Bandwidth	Explanatoray Note
Algeria	Available	622 Mbit/s	Connected to the European GEANT
Bahrain	Under Preparation	N/A	
Egypt	Available	34 Mbps-1 Gbps	
Iraq	Initiated	N/A	
Jordan	Available	1 Gbps	
Kuwait	Under consideration	N/A	Part of the UNESCO-HP Brain Gain initiative
Morocco	Available	2-100 Mbps	Called MARWAN
Oman	Available	N/A	Called OMREN
Palestine	Available	45 Mbps	Connected to EUMEDCONNECT3
Qatar		40 Gbps (backbone)	Connected to the US Internet2 REN
Saudi Arabia	Available	1 Gbps	Managed by KACST, connected to GÉANT
Sudan	Available	155 Mbps, 2 points of presence	Connected to UbuntuNet, the African Research and Education Network through AfricaConnect
Syrian Arab Republic	Available	155 Mbps (international), 30-40 Mbps (national)	
Tunisia	Available	20-100 Mbps	
United Arab Emirates	Available	155.52 Mbps (international) and 10Gbps (national backbone), 1Gbps (access link)	Called Ankabut, connected to international research networks, including the US Internet2 and the European GEANT

Source: See: http://www.asrenorg.net/about/partners-and-members/national-networks.html.
Note: Lebanon, Libya and Yemen have not initiated such networks.

4. Innovation and patents

One way to measure innovation is by means of the Global Innovation Index (GII) developed by Cornell University, INSEAD and the World Intellectual Property Organization (WIPO).[131] Figure 5 shows the evolution of Arab countries by comparing their GII ranking between 2012 and 2013 as well as their Innovation Efficiency Ratio (IER).[132] Among the 15 surveyed Arab countries, only eight are placed in the upper half of the ranking with index values spanning between 35 and 42, while the remaining seven countries are in the lower half of the ranking (see table 41 of chapter 6). It is worth noting that the GII score of nearly all Arab countries has dropped between 2012 and 2013 with the notable exceptions of Saudi Arabia and Kuwait, who have improved their scores and ranking. As regards the IER, which measures the ratio of innovation outputs to innovation inputs, it is striking to observe that nearly all Arab countries underperform their GII ranks, sometimes with significant margins as is the case for United Arab Emirates, Bahrain, Tunisia and Lebanon. One notable exception is Kuwait, which

FIGURE 5. Evolution of Arab countries' ranking in the Global Innovation Index (GII) and Innovation Efficiency Ratio (IER) between 2012 and 2013



Source: INSEAD and WIPO, 2012 and 2013.
Note: Ranking is out of 141 countries covered in 2012 and 142 countries covered in 2013.

impressively improved its IER between 2012 and 2013 and greatly outperforms its GII value. This is an indication, and particularly true for high-income countries, that innovation inputs have not yet sufficiently materialized into innovation outputs. Such Arab middle-income countries as Algeria, Egypt and Lebanon might need to develop their innovation capabilities by means of a knowledge-based growth strategy to encourage innovation and creativity through a supportive ecosystem.

Another proxy for innovation is the number of patents filed (see table 28). With the exception of some GCC countries and Lebanon, all Arab countries are below the threshold of one patent application per million/population. Patents are a proxy of a certain model of economic development: it is striking to observe that among the leading countries, which are all developed, only 16 have filed 100 patents and above, with 311 patents for the absolute leader Sweden, followed by roughly the same number of countries, namely 17, with between 10 and 100 patents per million/population.[133]

TABLE 28. Number of patents filed under the Patent Cooperation Treaty (PCT) per million population in selected Arab countries *(2008-2009 average)*

Country	PCT patents/million population
United Arab Emirates	4.5
Saudi Arabia	2.2
Bahrain	2.1
Qatar	1.3
Lebanon	1.1
Morocco	0.7
Egypt	0.6
Jordan	0.5
Libya	0.5
Oman	0.4
Kuwait	0.4
Algeria	0.2
Yemen	0.0

Source: WEF, 2012b.

B. Classification and ranking of ESCWA member countries according to maturity level

In order to facilitate the analysis of the Arab region, countries are categorized within the following four maturity levels of ICT capacity-building.

1. Maturity level 1: Iraq, Libya, the Sudan, and Yemen

This level includes countries that lack awareness, dissemination programmes, computers in schools, and adequate vocational training, and whose university level involvement in terms of curricula and outputs, as well as research, development and innovation (RDI) in ICT are insufficient.

Countries at this level still need to dedicate more efforts to enhance the use of ICT in education and in the development of curricula. They also need to foster and encourage research and development in general, and in ICT, in particular. Libya, assessed for the first time, is introduced at this level due to the continuing crisis situation that affects the use of ICT in capacity-building, the absence of a national research and education network (NREN) and its low score in the quality of mathematics and science education.

2. Maturity level 2: Morocco, Palestine and Syrian Arab Republic

This level includes countries that have introduced awareness and dissemination programmes. They have computers present in schools, provide vocational training, and their universities have established some forms of ICT-oriented curricula and related outputs. However, RDI in ICT are still in the early stages.

Morocco, assessed for the first time, is introduced at this level primarily due to its low literacy levels, particularly among women, despite high public expenditure on education, well-developed ICT capacity-building institutions, and an ICT infrastructure to connect several educational institutions. Syrian Arab Republic is retained at this level because of its efforts to continue capacity-building activities despite the ongoing crisis that has destroyed several educational institutions and reduced its RDI in ICT over the last two years.

3. Maturity level 3: Bahrain, Egypt, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, and Tunisia.

This level includes countries that have developed awareness and dissemination programmes, increased introduction of computers in schools, produced consistent vocational training outputs in terms of quantity and quality, with suitability to the job market, and shown progress in RDI in ICT.

Oman, due to its noticeable efforts in integrating ICT in curricula, connecting schools and training teachers, and to the availability of ICT infrastructure for connecting national education institutions, is moved to this maturity level. Tunisia, assessed for the first time, demonstrates high rates of adult literacy and education enrolment in addition to an equal, if not higher, GII compared to other countries at this level.

4. Maturity level 4: United Arab Emirates

This level includes countries that have strong awareness and dissemination strategy, good benchmark ratios for computers in schools, efficient vocational training outputs, catering to market demand, and effective, and, for the region, relatively high outputs of RDI in ICT.

Only the United Arab Emirates is maintained at this level due to its performance in using innovative ICT for education, research and development, highest GII score and highest number of patents in the region.

Table 29 summarizes the ranking of ESCWA member countries in each maturity level.

C. Suggestions and recommendations

Several ESCWA member countries have witnessed, in the past two years, internal crises that challenged their developmental efforts; therefore, the progress pace in capacity-building topics has generally stalled in the region. The

following recommendations could be used as suggested guidelines:

(a) Review the learning methods of the Arab education system to ensure the acquisition by youth of cognitive and soft skills and to offer them adequate training more adapted to labour-market demand;

(b) Take advantage of the available technology offered by mobile and social media platforms to enhance quality at all education levels;

(c) Develop initiatives for better use of web-enabled and mobile tools to raise the literacy rate in certain Arab countries, especially among women;

(d) Enhance educational institutions' connectivity to the Internet, integrate the use of ICT tools and social media platforms in the educational system and train tutors and teachers accordingly;

(e) In some Arab countries, revise educational curricula to foster necessary knowledge in mathematics, science and ICT;

TABLE 29. Ranking of ESCWA member countries by maturity level in ICT capacity-building

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain				■				■	■			
Egypt							■	■	■			
Iraq	■	■	■									
Jordan							■	■	■			
Kuwait							■	■	■			
Lebanon							■	■	■			
Libya*			■									
Morocco*						■						
Oman				■	■				■			
Palestine				■	■	■						
Qatar							■	■	■			
Saudi Arabia							■	■	■			
Sudan	■	■	■									
Syrian Arab Republic				■	■	■						
Tunisia*									■			
United Arab Emirates										■	■	■
Yemen	■	■	■									

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2013 since they only joined ESCWA in 2012.

(f) In addition to providing a healthy enabling environment for research and development, support and encourage researchers and innovators to publish the results of their findings in science and technology reviews and journals, and protect their rights by applying to related international patents organizations;

(g) Encourage ICT professional training programmes, in addition to the ICT academic qualification, to provide graduates with the necessary practical skills and expertise to fulfil market needs;

(h) Encourage governments and educational institutions to make tuition fees affordable for all citizens, to provide student financial aid schemes and special scholarship programmes for ICT-related degrees;

(i) Invite educational institutions and peer research centres in the world to develop links to research and education networks in order to ease communication and sharing of information.

V

Building confidence and security in the use of ICTs

V. Building Confidence and Security in the Use of ICTs

Cybersecurity is an increasingly complicated topic in the region. In keeping with the consistent trend, a variety of threats and challenges face the region, including such issues as electronic crime, targeted malware, cyberwarfare and data privacy issues. While exposure to e-crime would be expected to grow as the use of ICTs increases, available data suggests that the region as a whole is facing greater threats in these areas. Notwithstanding these threats, uptake of ICTs, use of e-transactions and social media activity have continued to increase. Within this context, it is important to note that, while the promotion of trust in ICTs is an important enabling factor, impressive growth can be seen even under difficult circumstances.

In order to increase trust and confidence in the use of ICTs, several notable steps have been taken in recent years towards promoting cybersecurity in the Arab region. These include the promotion of the Arab Convention on Combating Information Technology Offences by the League of Arab States. Greater prioritization of the protection of children online has lead to increasing momentum for the addition of an option protocol to this Convention. At the national level, impressive initiatives have been launched by some member countries to promote privacy and the protection of personal data. Tunisia has taken important steps in this regard, with the creation of a National Authority for the Protection of Personal Data. In addition, the Government of Iraq passed Law 2012/78, which was specifically aimed at promoting safe and secure e-transactions, illustrating the current relevance of this topic.

A. Comparative analysis of successes in building confidence and security in the use of ICTs in the Arab region

Most countries in the Arab region have some level of legislation covering e-transactions, including protections at the user level. In the last two years, several of the remaining countries have taken important steps forward in this regard. In addition, instead of passing legislation dedicated to e-transactions, governments in the region may also enhance or update existing legislation to address cybercrime issues. Further analysis of e-transactions and e-signature laws will be examined in a later chapter of this report. Strong progress has been seen in the enhancement of capacities to respond to emerging cyberthreats, particularly in the form of computer emergency response teams (CERT). This improvement comes at an opportune time, as the last two years have seen several high-profile cases of malware in the Arab region, targeting businesses, private citizens and governments. Additionally, many Arab countries have designated specific authorities to be responsible for cybersecurity at the national level.[134] In fact, as shown in table 30, 14 out of 17 Arab countries have such authorities. Arab countries are at different stages as regards the maturity of their national cybersecurity initiatives: some have devised

a comprehensive national cybersecurity strategy and adopted key elements of its implementation like the adoption of specific laws and regulations to combat cybercrime or implement a national CERT; others have implemented CERTs or adopted laws but without a comprehensive national strategy; some have adopted a strategy without as yet any proper implementation and, finally, some have neither a strategy nor any, or very limited, level of implementation.

1. Use of electronic transactions and documents

In 2012-2013, major changes have been observed in the Internet usage patterns in the Arab region. The rise of social media usage has received a large amount of media attention, while incremental advances in e-transactions and e-commerce have received less focus. While clear data is scarce, significant variance can be seen between countries in the Arab region in ICT usage patterns. For example, a 2011 global survey by Pew Research Center found that Egyptians were significantly more likely to use their mobile phones to take photos or videos than Lebanese citizens.[135] A full analysis of this effect should include sensitivity to such issues as income, literacy and gender-related barriers to access ICTs.

This data also implies confirmation of anecdotally observed ICT usage changes in which such mobile technologies as smartphones and tablets are taking on significantly greater roles in the information society in the region. While previous metrics for analysing e-transactions tended to focus on using a PC or laptop to undertake such traditional e-commerce activities as purchasing goods online for delivery, the use of mobile devices to purchase digital goods has become increasingly popular. Examples of this shift in consumer behaviour include applications, gaming and entertainment. Reliable data for this trend is difficult to obtain because most vendors do not provide regionally or nationally disaggregated data. It is anticipated that ICT usage surveys will clarify this issue in the coming years. In this context, having updated laws on e-transactions and e-commerce, which are capable of dealing with these news platforms, becomes even more important.

2. Online and network security and safety

Whether at the level of a country or any other organization, CERTs are a valuable part of any cybersecurity strategy. As a central point of coordination, these teams use specialized skills to enhance the responsive capacity of law enforcement and the private sector, among other roles. Previous analysis identified six CERTs in 2010. Today, there are four more CERTs functioning in the Arab region, raising the total to ten. In addition, Lebanon and Morocco have established cybersecurity frameworks. This demonstrates the important steps forward which have been taken by Arab countries in the last two years. These include: enhanced cybersecurity strategies, updated laws for cybercrime, e-transaction, e-signature, and e-commerce. Further, the increased use of CERTs enables more effective response to emerging threats as they unfold. In addition, efforts at the regional level have shown great promise. In December 2012, Oman signed an agreement with ITU whereby the "Oman CERT" will host a regional CERT as part of the International Multilateral Partnership Against Cyber Threats (IMPACT) programme.[136] While operational details are not yet available, this initiative endeavours to provide regional coordination and response to emerging cybersecurity issues. In collaboration with ITU and IMPACT, Lebanon held a workshop in October 2012 to assess its readiness to establish a National Computer Incident Response Team.

Together with enhanced responses at the national level, CERTs are also well-positioned to enable transnational cooperation in order to effectively deal with the global nature of cybersecurity threats. Regional and global cooperation remains an important area for future capacity-building. An initiative of this nature would be particularly timely given the higher priority placed in a regional response to cybersecurity as witnessed by the 2010 Arab Convention on Combating Information Technology Offenses.[137] Developing a parallel mechanism to facilitate data exchange and coordinated response at the technical

TABLE 30. National entities in charge of cybersecurity and the presence of related initiatives in the Arab region, 2013

Country	National entity in charge of cybersecurity	National CERT and URL	National cybersecurity strategy or significant national initiative*
Algeria	Ministry of Post Information and Communications technology	No	Cyberbill launched in 2008
Bahrain	Telecommunications Regulatory Authority (TRA)	No	Safesurf.bh
Egypt	National Telecommunications Regulatory Authority (NTRA)	Egypt Computer Emergency Team (EG-CERT) http://www.egcert.eg	Cybersecurity is part of the National ICT Strategy 2012-2017
Iraq	N/A	No	No
Jordan	Ministry of Information and Communications Technology (MoICT)	No	National Information Assurance and Cyber Security Strategy 2012
Kuwait	Kuwait Central Agency for Information Technology (CAIT)	No	Several initiatives launched by CAIT (more information is available from http://www.cait.org)
Lebanon	N/A	No	Cybersecurity is part of the e-government strategy
Libya	N/A	No	No
Morocco	Direction Générale de la Sécurité des Systèmes d'Information	Maroc CERT (maCERT)[a/]	Part of National ICT Strategy Maroc Numéric 2013
Oman	Information Technology Authority (ITA)	Oman National Computer Emergency Response Center (OCERT) http://www.cert.gov.om	Centre for Information Security Initiative
Qatar	Supreme Council of Information and Communication Technology (ictQATAR)	Qatar Computer Emergency Response Team (QCERT) http://www.qcert.org	Government Information Assurance Policy and others
Saudi Arabia	Communication and Information Technology Commission (CITC)	Computer Emergency Response Team (CERT-SA) http://www.cert.gov.sa	No
Sudan	National Telecommunication Corporation (NTC)	Sudan Computer Response Team (Sudan-CERT) http://www.cert.sd	No
Syrian Arab Republic	National Agency for Network Services (NANS)	National Computer Emergency Response Team (SY-CERT)[b/]	No
Tunisia	National Agency for Computer Security (NACS)	Tunisian Computer Emergency Response Team (tunCERT) http://www.ansi.tn	No
United Arab Emirates	Telecommunications Regulatory Authority (TRA)	Arab Emirates Computer Emergency Response Team (aeCERT) http://www.aecert.ae	No
Yemen	National Information Center (NIC)	No	Guidelines for cybersecurity

Source: Compiled by ESCWA based on information provided by AAG, 2012e, and ESCWA, 2013a.

Notes: * If CERT does not exist.

[a/] http://www.macert.ma returns a link to the Moroccan Academic Computer Emergency Response Team; to date (checked September, 2013) no web presence was found for the national Moroccan CERT.

[b/] To date, no web presence was found for the Syrian CERT although information about its missions and contact information can be found through the NANS site, available from http://www.nans.sy.

level would be a valuable addition to this convention instrument and should be carefully considered by the relevant stakeholders.

A further mandate for this course of action derives from data regarding malware impact on computers around the globe. In a 2013 study released by Microsoft Trustworthy Computing, data on the number of computers cleaned from malware per 1,000 machines was analysed.[138] The available data strongly suggests that malware is a serious threat globally, including in the Arab region. In particular, developing countries appear to be experiencing a comparatively higher level of malware infections. While the cause of this data pattern is unknown, it is probable that the capacity for deploying filtration technologies and safe-computing campaigns is among the factors which contribute to the increased rates of malware in these countries.

In an effort to better understand the development of the information society, the World Bank has promoted a variety of indicators, among which is the number of secure Internet servers per one million people.[139] Because secure Internet servers are widely used in e-commerce, this data is intended to help illustrate increasing maturity of these systems at the national level. While useful in several regards, this data is also problematic for several such reasons as the capacity for persons in a given country to undertake secure transactions in other countries. As such, the relationship between where a person lives and the location of the servers they access is uniquely weak in the online, globalized market. At present, this measure is most often used to illustrate the level of maturity of the information society within a particular country.

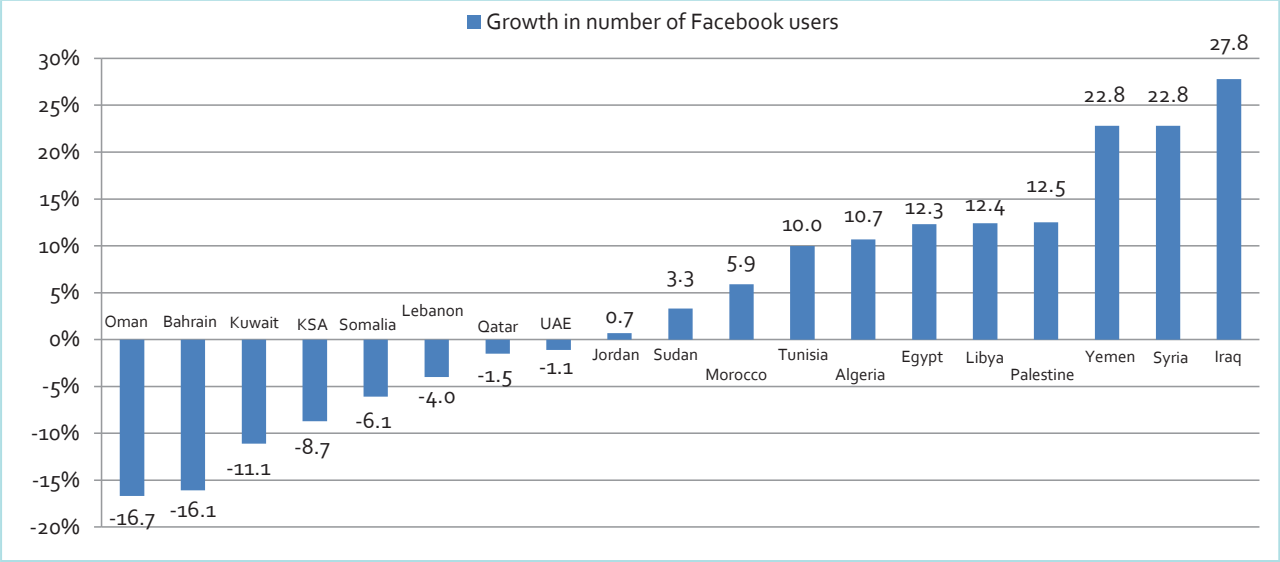
3. Privacy and data protection

Several countries in the Arab region have taken legislative action on the issue of data privacy. The United Arab Emirates, Tunisia, Oman, Kuwait, Morocco and Yemen have all addressed this issue. ESCWA provided a detailed analysis of these laws as part of its cyberlegislation project, which is available online.[140] While more work on this topic is clearly necessary, even in the comparative absence of robust privacy and data protection legislation, the Arab region has been characterized by rapid uptake of social media and communication technologies. Because there had been fairly low levels of social media usage in the region prior to 2010, such tools as Facebook have shown large percentage increases in their use.[141] Recently, however, these growth rates have slowed down, or even reversed. Attempts to estimate Facebook usage by the Dubai School of Government indicate that usage rates have begun to decline in some countries in the Arab region, as shown in figure 6.

While social media adoption is arguably one of the most significant areas of ICT usage in the Arab region over the last two years, there is very little evidence to support the hypothesis that the lack of robust legislation either hurt or helped the adoption of these technologies. In some cases, Facebook use has been banned outright, but with very little observable impact on adoption rates. These trends would suggest that neither governmental action, nor inaction, have played a statistically detectable role in influencing the use rates of social media in the region. It is much more likely that perceptions of novelty, combined with previously lower levels of growth, created a circumstance where quick gains were facilitated, but with slower growth rates and diminishing momentum. Because preliminary research in markets with higher Facebook usage rates appear to show declining usage among younger segments of the population, it would be reasonable to hypothesize that the social media tools which have been market leaders in the last few years are falling out of favour and may lose significance in the years to come. If so, this trend would be consistent with the adoption curve of such previous social media tools MySpace.

In addition to intriguing changes in usage rates throughout the Arab region, there is some data to suggest that attitudes towards online privacy are in need of further study. For example, in 2012, the polling firm Ipsos undertook a global survey of online information-sharing behaviour among Internet users.[142] At the regional level, only Saudi Arabia was considered, making the survey of limited use at the regional level. However, at the global level, it was

FIGURE 6. Growth in number of Facebook users between 7 January and 1 May 2013



Source: DSG, 2013b.

determined that 61 per cent of respondents in Saudi Arabia felt comfortable sharing everything or most things online, compared with a global average of 24 per cent. This data suggests that, while there are many other components which should be considered in future research on this topic, the individuals in Saudi Arabia who have the opportunity to share their information online are very willing to do so.

4. Countering misuse of ICTs

The Arab region has witnessed significantly greater momentum in efforts to formulate and adopt cybercrime laws, or to amend the penal code to include articles related to cybercrimes. During the period of 2011-2013, the Syrian Arab Republic adopted Law 2012/17 on the "Regulation of communication on the net and combating cybercrimes", Palestine prepared a draft to amend the penal code, and Lebanon included a chapter on cybercrime in the draft law of e-transaction and the protection of personal data. Table 31 shows the status of cybercrime laws in the Arab countries.

It is worth noting that, although such countries as Bahrain have included articles related to cybercrime in other cyberlaws, mainly e-transaction laws, these countries are realizing the growing importance of cyberlegislation are reviewing their cyberlegislation package to adopt specific law for cybercrime.

At the regional level, the 2010 Arab Convention on Combating Information Technology Offences, as promulgated by the League of Arab States, provides a framework for dealing with such important issues as legal definitions of offences and jurisdiction. Additionally, ESCWA, in the framework of its project "Regional Harmonization of Cyberlegislation to Promote Knowledge Society in the Arab Region", prepared a specific directive for cybercrime for the Arab region. These regional initiatives aim at harmonizing the understanding of cybercrime in the region and facilitating the collaboration among Arab countries for combating cybercrime at the regional level.

Important steps have also been taken in the area of protection of children online at the national and regional levels. For instance, TRA Lebanon launched a national Internet safety portal[143] targeting parents, youth and teachers (e-aman.com); it aims at increasing the awareness of Lebanese citizens about the risks of interacting in cyberspace and provides tools, methodologies and best practices to address

TABLE 31. Adoption of cybercrime laws in selected Arab countries

Country	Specific law for cybercrime	Year
Bahrain	Law 28 on e-Transaction includes articles related to cybercrime	2002
Egypt	Ministerial Decree No. 13507 on the establishment of a Cybercrime and Data Network Unit	2002
Jordan	Law 30 on Information System Crime	2010
Kuwait	Draft Law on combating Internet crime	
Lebanon	Circular No. 4 on the protection of software programmes and the fight against piracy	2006
Morocco	Law No. 53-05 on Electronic Exchange of Legal Data includes articles related to cybercrime	2007
Oman	Royal Decree 27 to amend the Penal Code and adding Article 276 on Computer Crime	2001
Palestine	Draft amendment of Penal Code to include articles on cybercrime	
Saudi Arabia	Law No. 79 on Combating Information Technology Crime Law	2007
Sudan	Law No. 14 on Information Technology Crime	2007
Syrian Arab Republic	Law No. 17 on Regulating communication on the net and combatting cybercrime law	2012
Tunisia	e-Transaction and e-ommerce law includes articles related to cybercrime	2007
United Arab Emirates	Federal Law No. 2, Combating cybercrime	2006
Yemen	Draft law on combating electronic crime	

Source: Compiled by ESCWA, see: http://cyberlegislation.escwa.org.lb/sites/default/files/download/Dir-5-Cybercrimes.pdf.

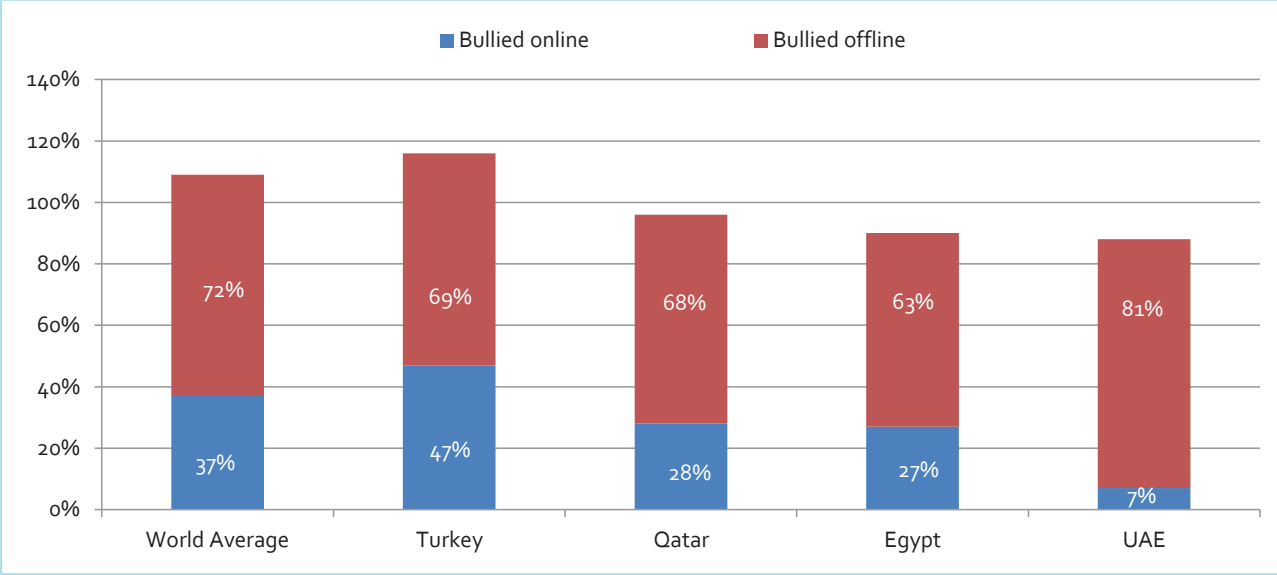
these risks. At the regional level, the Working Group for the Legal Aspects of Child Online Protection in the Arab Region held a conference in 2013 which undertook a detailed inventory of existing legislation, and identified the need for an optional protocol to the Arab Convention on Combating Information Technology Offences which would focus on the protection of children online. Some of the identified action areas for these legislative efforts include such issues as legal immunity for minors involved in the production of harmful content and cases involving minors either as perpetrators or participants in risky online activities.

As an example of the importance of these issues, available data suggests that cyberbullying is an issue of increasing relevance to the Arab region. As can be seen in figure 7, while there are subregional similarities in the total amount of bullying experienced by children aged 8-17, there are very significant differences in the amount of such behaviour online. This research suggests that there is a great need for country-level research in the Arab region to gather data on the nature of risk faced by children online. Further, when comparing Egypt and the United Arab Emirates, which demonstrate similar total levels of bullying, it can be seen that levels of bullying online are not similar. Other such research efforts in other regions have also demonstrated a high degree of variance among and between countries, even at the regional level.

B. Classification and ranking of ESCWA member countries according to maturity level

Many ESCWA member countries demonstrated progress in building confidence and security in the use of ICTs, particularly in the area of legislation. The

FIGURE 7. Percentage of children who have been bullied online and offline in selected countries



Source: Microsoft Corporation, 2012.

establishment of CERTs in more ESCWA member countries is also a significant improvement, both at the national and regional levels. However, none of the ESCWA member countries have achieved maturity level 4 yet.

1. Maturity level 1: Iraq, Jordan, Kuwait, Lebanon, Libya, Palestine, the Sudan, Syrian Arab Republic, and Yemen

The majority of countries ranked at this maturity level lack national and legislative frameworks in relation to security, privacy and protection from ICT misuse. Despite much progress made by some countries, namely Jordan, Syrian Arab Republic and the Sudan, the absence of implementing and adopting many of these initiatives deems these countries at the same maturity level as previous years. Many countries at this stage have conceptualized such important initiatives as e-transaction and e-signature laws, the management of public-key infrastructures (PKIs) and legal and practical consideration for a secure and accountable ICT environment. However, concrete implementation of these concepts is still required in order to progress to a more developed and mature environment. Libya is assessed for the first time at maturity level 1, due to the impact of underdevelopment, conflict and insecurity on the country.

2. Maturity level 2: Bahrain, Egypt, Oman, and Morocco

Countries at this level have basic laws in place to counter the misuse of ICTs and ensure a secure environment for e-transactions. The challenge for ESCWA member countries in this maturity level still remains in adopting better mechanisms that are able to properly detect, report and combat cybercrimes. Such countries can use their relatively developed ICT environments as an example to other member countries wishing to adopt similar initiatives by sharing best practices, lessons learned and building on this potential position. In order to progress to the next level of maturity, all member countries at this level must show greater interest in improving privacy laws for users, data protection as well as strengthening overall policies currently in place. Bahrain has transitioned from level 1 to level 2 due to the sustained investment in the legal and infrastructural components necessary to enhance trust in cybersecurity. Oman has also achieved this

level of maturity, based on its national CERT and safe computing programmes. As a new member country in ESCWA, Morocco is initially assessed at level 2 in this exercise.

3. Maturity level 3: Qatar, Saudi Arabia, Tunisia, and United Arab Emirates

Countries at this level have complemented a sufficient legislative environment with an established CERT and have demonstrated the capacity to respond to emergent cybersecurity threats. Programmes to promote safe computing and address protection of children online are in place. Countries at this maturity level must still focus on bi-lateral, regional and global cooperation and may struggle to fend off emerging threats to civilian and governmental infrastructure. Measures of computer security, including viral infections, should be improved. Each of these countries which progressed to this maturity level did so since the last review, and for similar reasons. Consistent investment and prioritization of cybersecurity and infrastructure programmes enabled these countries to implement important legislative modernization, CERTs and technical capacity-building, and demonstrated capacity to respond to threats online.

4. Maturity level 4: None

C. Suggestions and recommendations

(a) Develop a national cybersecurity strategy with a clear plan of action including the establishment of adequate national structures or institutions responsible for implementation;

(b) Proactively identify vulnerabilities in critical resources, infrastructures and key priorities as part of a cybersecurity plan involving all stakeholders;

(c) Through a programme of multilateral cooperation at the legislative level, implement comprehensive cyberlegislation in line with international treaties and conventions at the global and regional levels to cover all topics related to cyberspace, in particular those related to cybercrime, privacy and confidentiality of personal information;

(d) Pursue capacity-building programmes to enhance the operational ability of law enforcement, judges, lawyers, and regulatory bodies to effectively handle emerging forms of cybercrime;

(e) Outline standards and adopt novel and innovative methodologies on how to develop safe and reliable e-services and applications resilient to external risks and threats, including necessary mechanisms to maintain the privacy and confidentiality of personal information;

(f) Share best practices from existing CERTs among ESCWA member countries for promoting the establishment of an incident management capability with national responsibilities, and support their activities by providing them with the latest technological solutions and standards in the field of security and protection of cyberspace. These centres should become the national points of reference in all matters related to technical issues aimed at the protection of ICTs, and should be designed to cooperate at the bilateral, regional and global levels;

(g) Encourage cooperation between the public and the private sectors in order to maintain the protection and security of networks and information systems and the protection of national cyberspace, including the application of the security measures, resilience and recovery for local networks and computer systems;

(h) Contribute to the building of a "national culture of cybersecurity" through proper awareness and education campaigns regarding online risks, particularly those affecting children.

TABLE 32. Ranking of ESCWA member countries by maturity level in building confidence and security in the use of ICTs

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain												
Egypt												
Iraq												
Jordan												
Kuwait												
Lebanon												
Libya*												
Morocco*												
Oman												
Palestine												
Qatar												
Saudi Arabia												
Sudan												
Syrian Arab Republic												
Tunisia*												
United Arab Emirates												
Yemen												

Source: Compiled by ESCWA.

Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2013 since they only joined ESCWA in 2012.

VI

Enabling environment

VI. Enabling Environment

A. Comparative analysis

The Arab region is one of the most diversified regions in terms of enabling environment. According to the new definition of the NRI of the WEF, its environment subindex is now composed of two pillars: political and regulatory framework and business and innovative environment.[144] In this region, the GCC are quite advanced while other such countries as Yemen, Algeria and Libya are ranked among the less developed countries.

Qatar is leading the Arab world in the environment subindex[145] as it is ranked on place 14 among the 144 countries. Other GCC countries, namely United Arab Emirates, Saudi Arabia, Bahrain, and Oman are also quite in advanced positions in 2013. It should be noted that the United Arab Emirates rises nine places in the

TABLE 33. Scores and rankings of selected Arab countries on the environment subindex component of NRI, 2013

Country	Environment subindex*		Political and regulatory environment		Business and innovative environment	
	Ranking (144)	Score	Ranking (144)	Score	Ranking (144)	Score
Qatar	14	5.19	18	5.10	12	5.29
United Arab Emirates	19	5.05	26	4.84	17	5.25
Saudi Arabia	25	4.87	29	4.68	25	5.07
Bahrain	28	4.83	40	4.39	14	5.27
Oman	37	4.61	34	4.47	33	4.75
Jordan	42	4.35	48	4.05	40	4.65
Kuwait	69	3.90	71	3.67	71	4.13
Morocco	74	3.85	73	3.66	79	4.04
Lebanon	86	3.74	133	2.76	35	4.73
Egypt	99	3.62	96	3.39	98	3.85
Libya	130	3.18	130	2.83	120	3.54
Yemen	138	2.91	140	2.51	133	3.30
Algeria	143	2.60	141	2.46	143	2.74
Arab average		**4.05**		**3.75**		**4.35**

Source: WEF, 2013a.
Note: * Environment subindex = (½ x Political and regulatory environment + ½ x Business and innovation environment).

environment subindex ranking as compared to last year, while Saudi Arabia drops eight positions and Bahrain and Oman almost remain at the same levels (see table 34). Kuwait has been the less advanced GCC country in the environment subindex since 2009, and it dropped 13 positions from 2012 to 2013.

In the Levant region, Jordan has been the best-positioned country for many years. This is mainly due to efforts by the government and business sector to improve the regulatory framework and encourage innovation. In 2013, both Jordan and Lebanon go up six positions as compared to 2012, while the survey of the WEF did not cover the Syrian Arab Republic and Tunisia due to political instability.

In North African countries, Tunisia, occupying place 55 (out of 142) in 2012, is the best positioned in terms of legal and regulatory framework for the information society. In 2013, Egypt dropped 14 positions as compared to 2012, and Algeria also dropped seven positions.

It is quite interesting to mention that most Arab countries have better ranking in the business and innovation environment pillar than in the political and regulatory framework pillar. This is clearly observed in the case of Bahrain and Lebanon. In fact, while Lebanon is ranked in position 35 in business and innovation, it is ranked on place 133 in the political and regulatory framework.

1. Legal and regulatory environment

(a) National intellectual property laws, regulations and international agreements

Innovation and creation of software and content are essential for establishing knowledge-based

TABLE 34. Scores and ranking of selected Arab countries on the environment subindex component of NRI, 2010-2013

Country	2009-2010*		2010-2011*		2012		2013	
	Rank (133)	Score	Rank (138)	Score	Rank (142)	Score	Rank (144)	Score
Qatar	29	4.61	26	4.73	15	5.10	14	5.19
United Arab Emirates	24	4.68	25	4.77	28	4.83	19	5.05
Saudi Arabia	38	4.34	32	4.53	17	5.00	25	4.87
Bahrain	33	4.45	30	4.59	27	4.84	28	4.83
Oman	52	3.98	43	4.17	36	4.63	37	4.61
Jordan	41	4.18	49	4.04	48	4.16	42	4.35
Tunisia	57	4.02	45	4.15	55	4.02	..	..
Kuwait	60	3.78	52	3.99	56	3.99	69	3.90
Morocco	75	3.64	72	3.79	72	3.79	74	3.85
Lebanon	..	..	81	3.62	92	3.64	86	3.74
Egypt	70	3.71	71	3.79	85	3.68	99	3.62
Syrian Arab Republic	113	3.10	121	3.09	115	3.33	..	..
Libya	110	3.13	133	2.88	133	2.88	130	3.18
Yemen	..	..	..	..	134	2.86	138	2.91
Algeria	120	3.01	125	3.05	136	2.83	143	2.60
Average		**3.89**		**3.94**		**3.97**		**4.05**

Sources: Data compiled from four WEF reports, namely, WEF, 2013a, 2012a, 2011, and 2010.
Notes: * As opposed to previous editions of the NRI, the composition of the environment subindex has changed starting in 2012; it currently does not include a pillar on infrastructure environment.
Two dots (..) indicate that data are not available.

economy (KBE) and strengthening the ICT sector. As patent and trademark are essential for promoting research and innovation, the importance of adopting and enforcing patent international treaties, protocols and agreements to take part in the knowledge-based economy at the global level became apparent.

Arab countries joined many treaties related to copyright protection and patent. Table 35 summarizes the status of eight international treaties in 18 Arab countries. Because of the special status of Palestine as an observer state of the United Nations, they were not able to join any of the World Trade Organization (WTO) agreements. Ten of the 18 considered Arab countries are members of WTO, and, as at 2013, seven are observers.[146] Many Arab countries joined WTO in 1995, while Oman joined WTO in 2000, and Saudi Arabia in 2005.

Among the various international treaties, the Paris Convention for the Protection of Industrial Property is the most adopted in the Arab countries. Only Kuwait, in addition to Palestine, has not yet joined this Convention. Tunisia was the first Arab

TABLE 35. Status of selected Arab countries in international intellectual property rights treaties

Country	WTO	Paris Convention	PCT	WCT	Madrid Agreement	Hague Agreement	PLT	TRIPS
Algeria	OB	☑ 1966	☑ 2000	×	×	×	×	OB
Bahrain	☑ 1995	☑ 1997	☑ 2007	☑ 2005	☑ 2005 Protocol	×	☑ 2005	☑ 1995
Egypt	☑ 1995	☑ 1951	☑ 2003	×	☑ 1952 Agreement	☑ 1952	×	☑ 1995
Iraq	OB	☑ 1976	×	×	×	×	×	OB
Jordan	☑ 2000	☑ 1972	×	☑ 2004	×	×	×	☑ 2000
Kuwait	☑ 1995	×	×	×	×	×	×	☑ 1995
Lebanon	OB	☑ 1924	×	×	×	×	×	OB
Libya	OB	☑ 1976	☑ 2005	×	×	×	×	OB
Morocco	☑ 1995	☑ 1917	☑ 1999	☑ 2011	☑ 1917 Agreement	☑ 1930	×	☑ 1995
Oman	☑ 2000	☑ 1999	☑ 2001	☑ 2005	☑ 2007 Protocol	☑ 2009	☑ 2007	☑ 2000
Palestine	×	×	×	×	×	×	×	×
Qatar	☑ 1996	☑ 2000	☑ 2011	☑ 2005	×	×	×	☑ 1996
Saudi Arabia	☑ 2005	☑ 2004	×	×	×	×	☑ 2013	☑ 2005
Sudan	OB	☑ 1984	☑ 1984	×	☑ 1984 Agreement	×	×	OB
Syrian Arab Republic	OB	☑ 1924	☑ 2003	×	☑ 2004 Protocol Agreement	☑ 2008	×	OB
Tunisia	☑ 1995	☑ 1884	☑ 2001	×	×	☑ 1930	×	☑ 1995
United Arab Emirates	☑ 1996	☑ 1996	☑ 1999	☑ 2004	×	×	×	☑ 1996
Yemen	OB	☑ 2007	×	×	×	×	×	OB

Source: WIPO, available from www.wipo.int.
Notes: ☑ denotes member country, × denotes non-member country and OB denotes observer status. The dates shown indicate the years of joining a treaty.
TRIPS is short for Trade-related Aspects of Intellectual Property Rights.

country by far to join it in 1884, while Yemen enacted it only in 2007. The PCT is comparatively well adopted in the Arab region as among the selected eighteen countries studied, eleven enacted it, as shown in table 35. The WIPO Copyright Treaty (WCT), the Madrid Agreement Concerning the International Registration of Marks, the Hague Agreement Concerning the International Registration of Industrial Designs, and the Patent Law Treaty (PLT) are signed by few countries in the Arab region.

The overall status of the intellectual property laws in the Arab region has not particularly evolved during the last two years, the only exception being that Saudi Arabia joined PLT in 2013. Oman, Bahrain and Morocco are the countries most aligned with the international treaties; Egypt, Qatar, Tunisia, and the United Arab Emirates are at an advanced level, with the adoption of at least five treaties out of the eight.

(b) Software piracy

The piracy of PC software is a critical issue for the enabling environment for building knowledge society given its negative impact on the economy. According to the Business Software Alliance Study published in 2012, the global PC piracy rate hovers at 42 per cent, and the commercial value of the pirated software jumped from US$58.8 billion in 2010 to US$63.4 billion in 2011.[147] Moreover, at the global level, only 38 per cent of people declared that they have never acquired pirated software, 9 per cent admitted that they are using pirated software most of the time, 26 per cent using it rarely and 17 per cent occasionally.

In the Arab region, the average of the piracy rate increased by 0.3 per cent in 2011 in comparison with its value in 2010 reaching 66 per cent, which is higher than the world average at 42 per cent,

TABLE 36. Software piracy rates and commercial value of unlicensed software in selected Arab countries

Country	Software piracy rates (Percentage)			Commercial value of unlicensed software (Millions of US$)		
	2009	2010	2011	2009	2010	2011
United Arab Emirates	36	36	37	155	173	208
Qatar	51	49	50	50	52	62
Saudi Arabia	51	52	51	304	414	449
Bahrain	54	54	54	21	22	23
Jordan	57	57	58	26	28	31
Kuwait	60	60	59	62	68	72
Oman	63	62	61	39	33	36
Egypt	59	60	61	146	196	172
Morocco	66	65	66	64	75	91
Lebanon	72	72	71	46	49	52
Tunisia	72	72	74	44	52	51
Algeria	84	83	84	55	69	83
Iraq	85	85	86	129	147	172
Yemen	90	90	89	10	12	15
Libya	88	88	90	25	74	60
Arab (average / total)	**65.9**	**65.7**	**66.0**	**1,176**	**1,464**	**1,577**
World (average / total)	**43**	**42**	**42**	**51,443**	**58,754**	**63,456**

Source: BSA, 2012.

as shown in table 36. In four Arab countries, the piracy rate increased by 1 per cent in 2011, while it increased by 2 per cent in Libya and Tunisia, which might be due to the political instability in these countries. The piracy rate, however, decreased by 1 per cent in six countries, namely Kuwait, Lebanon, Oman, Saudi Arabia, United Arab Emirates, and Yemen. Only Bahrain has remained at the same piracy rate since 2009.

The commercial value of the unlicensed software increased in most of the countries, with the exception of Tunisia and Libya. This increase is mainly due to the expansion of the software market in these countries, as it is shown in the case of United Arab Emirates, where the commercial value of software piracy is estimated at US$208 million, while it is a relatively small country with a piracy rate of only 35 per cent. Moreover, while Saudi Arabia occupies the third position in the Arab region in terms of piracy rate with 51 per cent, it has the largest commercial value of software piracy in the region because of its huge software market. It is interesting to note that the commercial value of unlicensed software in the fifteen Arab countries constitutes only 2.48 per cent of the comparable global market.

As discussed in the previous edition of this profile, software piracy has a negative economic impact in terms of job creation, lost GDP and tax revenues. This is because software distribution and services are essentially local country-specific activities.

(c) Cyberlegislation

Cyberlegislation is crucial for building information society and knowledge-based economy in the Arab region.[148] Cyberlegislation covers various areas as stated in the ESCWA Cyber Legislation Directives.[149] Some of these areas, namely e-transaction and e-commerce, are for regulating the administrative and commercial interactions between official public and private institutes and between citizens and institutes. Other areas cover the protection of individuals and institutions from the misuse of the cyberspace and the protection of personal data and human rights on the cyberspace. In addition to the mentioned areas, it is worth noting that Yemen is the only Arab country that adopted a law on the right of access to information, namely Law 13, in 2012. This law facilitates the access to information, expands the freedom of expression and enhances transparency.

(i) E-transaction and e-commerce laws

Since 2011, Arab countries have made progress in this field. Iraq adopted an e-transaction law in 2011, and, during 2011-2013, many Arab countries, namely Algeria, Kuwait, Lebanon, and Palestine, have prepared very advanced draft laws covering e-signature, e-transaction and e-commerce. Among the six cyberlegislation areas, e-transaction and e-commerce are the most advanced area in the Arab region. In fact, many Arab countries, including Egypt and Syrian Arab Republic, adopted laws related to e-signature only; others adopted laws covering e-signature and e-transaction, including Jordan and Saudi Arabia, while seven other Arab countries adopted laws covering the three areas, e-signature, e-transaction and e-commerce, namely Bahrain, Iraq, Morocco, Qatar, the Sudan, Tunisia, and United Arab Emirates. It is worth noting that Yemen is the only country that adopted a specific e-payment law in 2006, while some other countries, including Jordan and Tunisia, have included articles related to e-payment in their e-transaction laws. The Central Bank of Lebanon has also adopted regulations related to e-payment. Table 37 shows the status of e-signature, e-transaction and e-commerce laws in selected Arab countries.

(ii) Personal data protection and cybercrime

Personal data protection laws are still lacking in the Arab region in general, only a few countries have a specific law for protecting personal data,[150] namely Tunisia (Law 63/2004), Morocco (Law 09-08/2009) and United Arab Emirates (Law 1/2007 on personal data protection). Few other countries included chapters and articles on the protection of personal data in other cyberlaws. Oman, for

instance, included articles in its e-Transaction Law 69/2008, and Yemen in its information law that was adopted in 2009 as well as Law 13/2012 that includes articles on privacy. The draft Lebanese law on information technology also includes a specific chapter on personal data protection, and in Kuwait, the draft of an e-transaction law contains numerous articles covering personal data protection aspects. A number of Arab countries have draft laws on personal data protection, including Syrian Arab Republic, which has an advanced draft. Algeria and Jordan are also currently preparing personal data protection laws.

Arab governments are aware of the importance of combating cybercrime and the need for special laws on this subject in order to mitigate the dangers of cyberspace. In 2013, six Arab countries have specific laws on cybercrime, namely Jordan, Oman, Saudi Arabia, the Sudan, Syrian Arab Republic, and United Arab Emirates. Oman and

TABLE 37. Status of e-signature, e-transaction and e-commerce laws in selected Arab countries

Country / Law	e-Signature	e-Transaction	e-Commerce
Algeria	Draft law	Draft law	Draft law
Bahrain	Yes, Law 28/2002	Yes, Law 28/2002	Yes, Law 28/2002
Egypt	Yes, Law 15/2004	Draft law	Draft law
Iraq	Yes, 2011	Yes, 2011	Yes, 2011
Jordan	Yes, Law 85/2001	Yes, Law 85/2001	..
Kuwait	Adopted draft law*	Draft law	..
Lebanon	Draft law	Draft law	Draft law
Libya	..	..	..
Morocco	Yes, Law 53-05/2007	Yes, Law 53-05/2007	Yes, Law 53-05/2007
Oman	Yes, Law 69/2008	Yes, Law 69/2008	..
Palestine	Draft law	Draft law	..
Qatar	Yes, Law 16/2010	Yes, Law 16/2010	Yes, Law 16/2010
Saudi Arabia	Yes, Law 18 /2007	Yes, Law 18 /2007	..
Sudan	Yes, 2007	Yes, 2007	Yes, 2007
Syrian Arab Republic	Yes, Law 4/2009	Draft law	Draft law
Tunisia	Yes, Law 83/2000	Yes, Law 83/2000	Yes, Law 83/2000
United Arab Emirates	Yes, Law 1/2006	Yes, Law 1/2006	Yes, Law 1/2006
Yemen	Partly, e-Payment Law 40/2006	Partly, e-Payment Law 40/2006	..

Source: Reports of the ESCWA project on cyberlegislation, available from http://isper.escwa.un.org/FocusAreas/CyberLegislation/Projects/tabid/161/language/en-US/Default.aspx.
Note: * The National Assembly of Kuwait adopted a draft law on e-transaction on 4 June 2013.
See: http://www.kuna.net.kw/ArticleDetails.aspx?id=2314988&language=en.

Syrian Arab Republic adopted their laws during the last two years. Three Arab countries, namely Bahrain, Kuwait and Yemen, have draft cybercrime laws that will be adopted in 2013 or 2014. Palestine chose to add a chapter on cybercrime to its penal code, while in Bahrain, Morocco and Tunisia, the e-transaction law contains articles associated to cybercrime (see table 32 for more details).

In Oman, a cybercrime law was promulgated under Royal Decree No. 12/2011 as the first integrated law curbing IT crime. It was declared to complement and crown the great efforts exerted by the Sultanate in all its units and agencies to address IT crime. The promulgation of this law was the result of a great effort of research and study of international experiences which lasted more than two years.

In the Syrian Arab Republic, Law No. 17/2012 became effective on 8 February 2012, and it covers various aspects of cybercrime, including hacking, mimicking websites, intercepting information, designing and using malicious software, sending spam, online fraud, illegal online use of payment cards, and privacy violation. Penalties, including imprisonment and fines, are indicated for each class of e-crime. The Law provides for the establishment of a law enforcement entity specialized in cybercrime using digital evidence through electronic investigation as well as search and seizure of ICT equipment and software.

2. Domain name management

The country code top-level domain (ccTLD) is managed by telecom regulatory authorities in six Arab countries, namely Bahrain, Iraq, Morocco, Oman, Saudi Arabia, and the United Arab Emirates; or by national authorities as is the case in Jordan and Syrian Arab Republic (see table 38). In Kuwait, Palestine and Qatar, the government is responsible for ccTLD. Only Algeria and Lebanon are still keeping the overall responsibility of the ccTLD at research and educational centres. Oman was the most recent country to move the management of ccTLD from the operator (Omantel) to the TRA as stipulated in the Telecom Act. In order for TRA to fully pursue this function, the ccTLD infrastructure (registry and domain names system) was deployed within the TRA in 2011.

The use of the Arabic script in domain names addressing has the potential to increase the number of Internet users in the Arab countries and enable greater access of the Internet. The number of Arab countries deploying Arabic domain name systems has increased from seven in 2011 to eleven in 2013. Currently, the following countries have already a registered Arabic ccTLD: Algeria, Egypt, Jordan, Oman, Palestine, Qatar, Saudi Arabia, the Sudan, Syrian Arab Republic, Tunisia, and the United Arab Emirates.

In Lebanon, the number of registered domains increased from 2,812 in 2008 to 3,413 in 2012, while in Syrian Arab Republic, the number of ccTLD registered in the National Agency for Network Services reached 1,345 at the end of 2012, while the number of registrations under Arabic ccTLD is 102 at the same date. In Yemen, the number of ccTLD registrations was only 50 by the end of 2010, and it attained 84 by the end of 2012. In the Sudan, the number of domains registered between 2008 and 2012 reached 7,154. In Tunisia, the number of registered domains increased from 4,466 in 2008 to 14,199 in 2012.[151]

At the global level, it is worth noting that, while the percentage of the ccTLD domain name registration is increasing, the generic top-level domain (gTLD), and especially .com domain name registrations, still dominate the domain name industry market.[152] By the end of 2012, domain name registrations across all the TLDs reached 252 million, while the ccTLD registrations for all countries reached 110.2 million. The .com and .net TLDs reached a combined total of approximately 121.1 million.

3. Standardization in ICT

Efforts leading to standardization in ICT at the national level vary among Arab countries. While some focus on the interoperability of e-government services, others focus on the development of software and ICT equipment, and again others focus on building capacity and awareness on the importance of ICT standards.

By 2013, two standardization projects were underway in Lebanon: the first on the interoperability between two ministries, namely the Ministry of Public Health and the Ministry of Education and Higher Education; and the second aiming at defining the Lebanese Government Interoperability Framework. This Framework will be built on the five-layer model of interoperability recommended in the European Interoperability Framework (EIF) for European Public Services. These five layers are political, legal, organizational, semantic, and technical.[153]

In Egypt, the Software Engineering Competence Centre (SECC) that promotes and supports the development of IT industry through the adoption of international standards has trained over 14,000 trainees and registered more than 150 process improvement consultations till 2013. It is worth pointing out that, so far, SECC has received 49 Capability Maturity Model Integration (CMMI) appraisals worldwide.

In Oman, the Oman e-Government Architecture Framework (OeGAF) serves as a guide for the development, deployment and operations of

TABLE 38. Entities in charge of managing ccTLD in the Arab region

Country / Law	ccTLD	Entity in charge of managing ccTLD	Entity type
Algeria	.dz	CERIST, Research Centre of Scientific and Technical Information (CERIST), Ministry of High Education and Scientific Research	Research centre
Bahrain	.bh	Telecommunication Regulatory Authority	Regulatory authority
Egypt	.eg	Egyptian Universities Network (EUN)	Educational
Iraq	.iq	Communications and Media Commission (CMC)	Regulatory authority
Jordan	.jo	National Information Technology Centre	National authority
Kuwait	.kw	Ministry of Communications	Government
Lebanon	.lb	American Universityof Beirut Computing Services	Educational
Morocco	.ma	National Agency of Telecommunications Regulation (ANRT)	Regulatory authority
Oman	.om	Telecommunications Regulatory Authority	Regulatory authority
Palestine	.ps	Ministry of Telecommunication and Information Technology, Government Computer Centre	Government
Qatar	.qa	Supreme Council of ICT (ICT Qatar)	Government
Saudi Arabia	.sa	Communications and IT Commission (CITC)	Regulatory authority
Sudan	.sd	Sudan Internet Society	Private sector
Syrian Arab Republic	.sy	National Agency for Network Services	National authority
Tunisia	.tn	Tunisian Internet Agency	ISP
United Arab Emirates	.ae	Telecom Regulatory Authority	Regulatory authority
Yemen	.ye	TeleYemen	Telecom operator

Source: The Internet Assigned Numbers Authority (IANA) as of July 2013. See: http://www.iana.org.

information systems of the various entities within the Government of Oman. OeGAF consists of four main types of architecture: business architecture, solution architecture, information architecture, and technical architecture. In December 2011, the e-Kit for OeGAF was made accessible to all government institutions through the Internet and the government network.

In 2012, the National Information Centre in the Sudan carried out a series of capacity-building workshops on the standards for ICT infrastructure, software, and e-government websites.

4. ICT investments and government-supported facilitation measures

(a) Venture capital and foreign direct investment

The availability of venture capital (VC) is essential for promoting innovation and entrepreneurship. Although a number of Arab countries have established VC at the national level, the overall picture in the region is not promising as most countries are still lacking the availability of such facilities. Except for Kuwait, the GCC countries are leaders in the Arab region according to the survey of the WEF for 2011-2012 (see table 39). Tunisia, Jordan, Egypt, Morocco and Lebanon follow the GCC countries in the availability of VC, followed by Kuwait. The group of countries with the lowest availability of VC comprises Libya, the Syrian Arab Republic, Yemen, and Algeria. In comparison with the years 2011-2012, few Arab countries, including Oman, Jordan and Algeria, have made slight progress in the scoring as well as in the ranking of VC availability, while other countries, incuding Bahrain, Saudi Arabia, Morocco, and Yemen witnessed a decrease in VC availability.

The question of the WEF related to FDI in its survey was "To what extent does FDI bring technology into your country?" Table 40 shows the score and ranking of the Arab countries for the 2011-2012 and 2010-2011

TABLE 39. Perception of venture capital availability in selected Arab countries

Country	2010-2011		2011-2012		2012-2013	
	Score	Ranking (142)	Score	Ranking (144)	Score	Ranking (148)
Qatar	5.4	1	4.7	1	4.5	2
United Arab Emirates	4.0	13	4.1	8	4.1	10
Oman	3.9	16	3.8	14	3.9	14
Bahrain	4.2	8	4.3	7	3.8	15
Saudi Arabia	4.2	7	3.7	18	3.4	25
Tunisia	3.1	35	..	..	3.0	44
Jordan	2.7	62	2.9	48	3.0	45
Egypt	3.0	41	3.0	40	2.9	51
Morocco	3.3	30	3.0	38	2.8	56
Lebanon	2.7	60	2.7	63	2.7	62
Kuwait	3.4	25	3.0	41	2.6	71
Algeria	2.1	110	1.8	138	2.0	123
Libya	..	..	2.3	93	2.0	128
Yemen	2.6	67	2.3	98	1.9	134
Syrian Arab Republic	2.1	107	..	..	..	..
Arab (average / total)	**3.3**		**3.2**		**3.0**	
World (average / total)	**2.7**		**2.7**		**2.7**	

Source: WEF, 2010b, 2011b and 2012b.
Note: Two dots (..) indicate that data are not available.

TABLE 40. Scores and rankings of selected Arab countries on FDI and technology transfer

Country	2010-2011		2011-2012		2012-2013	
	Score*	Ranking (142)	Score*	Ranking (144)	Score*	Ranking (148)
United Arab Emirates	5.5	10	5.7	6	5.9	2
Qatar	6.1	2	6.1	2	5.8	4
Saudi Arabia	5.5	8	5.5	8	5.5	8
Bahrain	5.3	18	5.5	11	5.3	10
Jordan	4.9	51	5.0	39	5.1	28
Oman	4.9	46	4.9	45	4.9	48
Morocco	4.9	54	4.9	46	4.7	61
Tunisia	5.2	25	..	..	4.6	70
Egypt	4.7	67	4.6	75	4.2	100
Algeria	3.8	123	3.4	140	3.6	128
Lebanon	4.0	112	3.9	117	3.6	129
Yemen	2.7	142	3.2	144	3.5	140
Kuwait	3.4	135	3.3	142	3.2	144
Libya	..	..	3.6	136	3.0	148
Arab (average / total)	**4.6**		**4.7**		**4.5**	
World (average / total)	**4.6**		**4.6**		**4.5**	

Sources: WEF, 2010b, 2011b and 2012b.
Notes: * This is based on a seven-point total score for the survey question: "To what extent does foreign direct investment (FDI) bring new technology into your country?", whereby 1 = not at all; and 7 = FDI is a key source of new technology.
Two dots (..) indicate that data are not available.

surveys. It is clear from this table that the availability of FDI in Arab countries has the same profile as the VC. United Arab Emirates and Jordan have significantly improved their ranking in comparison with 2011-2012; whereas the rankings of Oman, Egypt, Lebanon, and Libya have considerably decreased.

As an example of FDI projects related to software and IT services in the Arab region, while few data are available on the number of these projects, it is reportedthat, among the 7,553 FDI projects initiated between 2007 and 2011, only 254 (3.4 per cent) were destined for four Arab countries and distributed as follows: 172 projects for the United Arab Emirates, 29 for Egypt, 27 for Morocco, and 26 for Tunisia.

(b) Entrepreneurship, innovation and incubators

The GII, as defined by INSEAD and WIPO,[154] is one of the most reliable measurement of the innovation and entrepreneurship ecosystem at national level, as it depicts the implementation of the country's policy for the promotion of creation and innovation and describes the impact of such policies. In fact, it is composed of two subindices: the first measures the innovation input, namely institutions, human capital, infrastructure, market, and business sophistication; and the second subindex measures the innovation outputs, namely knowledge and technology outputs and creative outputs.

According to the 2013 GII, only four GCC countries occupy rankings among the top fifty worldwide, and none of them is in the top thirty, which means that, although some GCC established venture capital funds have succeeded to attract investment in technology, the ecosystem for innovation and entrepreneurship still requires

special attention from government, investors and private sector decision-makers. Additionally, although GCC countries appeared all together in a block, the regional rankings are more dispersed.[155] As shown in table 41, most Arab countries, with the exception of Kuwait, Tunisia and Yemen, have better rankings in the innovation input subindex as compared to the their innovation output subindex; said otherwise, their Innovation Output Ratio (IOR) is significantly below 1; the only exception for 2013 is Kuwait with an IOR value of 1.03. This finding implies that Arab countries have to review their policies and strategies to encourage innovation, knowledge impact and knowledge diffusion as well as to promote creativity in goods and services and online content. One should also note that only two countries, namely Saudi Arabia (+6) and Kuwait (+5),obtained better rankings in 2013 compared to 2012; all other Arab countries have dropped, often by significant amounts (more than ten ranks) whether among such high-income GCC countries as Oman (-33), Bahrain (-16) and Qatar (-10) or such upper-middle-income countries as Lebanon (-14), Algeria (-14) and Tunisia (-11).

It is notable that the GII explicitly identified most Arab countries as underperformers compared to countries with similar GDP levels. However, there is no "one-size fits all" explanation. For high-income GCC countries, with the notable exception of Saudi Arabia, the problem essentially lies with what the report dubs as the "paradox of plenty" where "resource-extracting activities crowd out investment in other productive sectors and hinder innovation"; still the report is positive with a view to these countries and expects that they would likely "do better in the years to come because of their natural endowments" as "many of them have been diversifying towards innovation-rich sectors already". Such middle-income countries

TABLE 41. Global Innovation Index, its input and output subindex in selected Arab countries

Country	Global Innovation Index 2013		Innovation Input Subindex 2013		Innovation Output Subindex 2013		Global Innovation Index 2012	
	Score	Rank (142)	Score	Rank (142)	Score	Rank (142)	Score	Rank (141)
United Arab Emirates	41.87	38	53.99	26	29.76	81	44.40	37
Saudi Arabia	41.21	42	45.89	44	36.52	44	39.30	48
Qatar	41.00	43	47.84	38	34.17	52	45.51	33
Kuwait	40.02	50	39.48	74	40.56	36	37.19	55
Jordan	37.30	61	42.06	61	32.54	63	37.13	56
Bahrain	36.13	67	44.53	47	27.74	90	41.12	41
Tunisia	35.82	70	38.12	80	33.51	59	36.51	59
Lebanon	35.47	75	42.71	56	28.23	88	36.21	61
Oman	33.25	80	43.28	53	23.22	111	39.50	4
Morocco	30.89	92	35.34	90	26.45	99	30.65	88
Egypt	28.48	108	33.81	101	23.15	112	27.88	103
Syrian Arab Republic	23.73	134	32.84	105	14.63	140	23.12	132
Algeria	23.11	138	31.62	112	14.61	141	24.38	124
Sudan	19.81	141	26.51	136	13.11	142	16.81	141
Yemen	19.32	142	23.86	141	14.79	139	19.14	139
Arab average		**32.49**		**38.79**		**26.20**		**33.26**

Source: INSEAD and WIPO, 2012 and 2013.

as Algeria, Lebanon and Egypt might need to "develop their innovation capabilities through a knowledge-based growth strategy to encourage innovation and creativity through a supportive ecosystem".[156]

Technology and ICT incubators are spreading in the Arab countries, and they constitute today an important component of the innovation and entrepreneurship ecosystem. In Oman, the government established, in addition to the Knowledge Oasis Muscat, two centres to promote innovation in the ICT sector, namely the Centre for Industrial Innovation and the Self-employment and National Autonomous Development (SANAD) programme. The first aims to create a culture of innovation and research and activate it in the industrial sectors of Oman, as well as to build capacity through the integration of new scientific and technological skills. The SANAD programme aims at the creation of gainful employment and business opportunity for the country's youth by electronically delivering ICT-enabled services from government and corporates to the public.

In Lebanon, Berytech[157] is the first facility to offer entrepreneurial experience, technological innovation, mentoring and business matching, and research and development. In 2013, Berytech, in partnership with Intel, launched "Arab Interns", which is an innovative platform designed to connect college students and fresh graduates with growing companies in the Gulf and MENA regions through internships. During the year 2012, the total value of the investment projects financed by the Investment Development Authority of Lebanon (IDAL), which is a government investment fund, was worth approximately US$248 million. This amount was provided for the promotion of investments in Lebanon and supported and provided incentives and facilities through the authority's one-stop shop for licensing. In addition, Beirut Digital District (BDD)[158] was inaugurated in 2012, which aims at creating an ecosystem of IT infrastructure coupled with services where ICT companies can increase their productivity and competitiveness.

B. Classification and ranking of ESCWA member countries according to maturity level

1. Maturity level 1: Iraq, Libya, Palestine, the Sudan, and Yemen

Arab countries at this maturity level do not have the necessary legal and regulatory frameworks needed to support the ICT sector and protect consumers; exhibit poor enforcement of existing laws; suffer from very high software piracy rates; and lack initiatives for ICT standardization. In addition, investment funds and entrepreneurship are still poor.

While the Sudan has signed a number of international treaties and has adopted a fair cyberlegislation framework which could easily qualify it at the second level of maturity, it was downgraded to this maturity level owing to a lack of data from national and international sources on the country, preventing a fair assessment and comparison with other countries.

2. Maturity level 2: Egypt, Iraq, Kuwait, Lebanon, Morocco, and Syrian Arab Republic

Countries at this maturity level have a moderate level in political and regulatory framework and in business innovation environment. They have signed a fair number of international agreements or treaties related to IPR and patents; and they have few laws regulating cyberspace, with modest progress achieved in the enforcement of cyberlaws. The supporting measures for the promotion of investment in the ICT sector are still moderate, and the same applies for their innovation ecosystem.

Egypt moved down to this level from level three in 2011 because of the drop in the enabling environment subindex, FDI and innovation index and the increase of the piracy rate.

3. Maturity level 3: Bahrain, Jordan, Oman, Saudi Arabia, and Tunisia

These countries have a good political and business innovation environment and have signed

a relatively good number of international agreements and treaties on IPR and patents; they have also adopted cyberlaws covering e-transaction, e-commerce and cybercrime. Additionally, the ICT sector in these countries benefits from the availability of FDI and VC.

Tunisia and Morocco are new ESCWA member countries, and they both have a good legal and regulatory framework for the development of the information society as well as good investment environment for the development of the ICT sector.

4. Maturity level 4: Qatar and United Arab Emirates

This level indicates an advanced level in enabling environment (among the 20 best countries worldwide according to the enabling environment subindex of the NRI), including legal framework and ICT investment climate. Countries at this level participate in most international agreements and treaties on IPR and patents, have medium piracy rates in software, and have cyberlaws covering e-signature, e-transaction and cybercrime. They also have an advanced management level of ccTLD and implemented a number of measures for improving the investment in the ICT sector in their countries.

C. Suggestions and recommendations

The following recommendations address the limitations in the Arab region that prevent the establishment of a mature enabling environment in the large majority of its countries:

(a) Pursue efforts to develop, update and complete an integrated package of cyberlegislation covering all topics related to the use of cyberspace and its applications, and allowing to build confidence and trust in cyberspace. Arab governments should draw special attention to cyberlaws related to personal data protection, consumer protection and e-payment;

(b) Harmonize the cyberlegislation for promoting the Arab regional knowledge society, facilitating the cross-border use of e-services, and combating cybercrime in the region. Governments should also comply with international conventions related to IPR and cyberlegislation and ratify and join those that fit the national laws;

(c) Build capacity of legislators, judges and lawyers on cyberlegislation and organize awareness workshops on the various aspects of these laws. Governments should also put in place procedures and mechanisms for enforcing and applying cyberlegislation at the national level;

(d) Put in place procedures for using properly licensed software and for fighting the utilization of pirated software and promoting development of software locally and regionally;

(e) Pursue efforts for defining national ICT standards in line with the international ones to guarantee the production of infrastructures and software according to the international standards and to ensure interoperability between different ICT applications and e-government services at national, subregional and regional levels;

(f) Encourage all national stakeholders to register their portals and websites under the ccTLD and promote the use of Arabic ccTLD;

(g) Develop the spirit of innovation and entrepreneurship in the ICT sector through the creation of incubators and science and technology parks and through establishing appropriate linkage between research and development institutions, industry and incubators;

(h) Encourage investment in ICT, establishment of venture capital and funds to promote the creation of start-ups working in the field of ICT.

TABLE 42. Ranking of ESCWA member countries by maturity level in establishing an enabling environment

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain							■	■	■			
Egypt						■	■	■				
Iraq	■	■	■									
Jordan							■	■	■			
Kuwait				■	■	■						
Lebanon				■	■	■						
Libya*			■									
Morocco*						■						
Oman				■				■	■			
Palestine	■	■	■									
Qatar							■				■	■
Saudi Arabia							■	■	■			
Sudan	■		■		■							
Syrian Arab Republic				■	■	■						
Tunisia*									■			
United Arab Emirates										■	■	■
Yemen	■	■	■									

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2013 since they only joined ESCWA in 2012.

VII

ICT applications

VII. ICT Applications

A. Comparative analysis of ICT applications in governments

Progress in improving e-government services in the Arab region continued in most countries in 2012 and 2013. However, countries facing political instability in the last two years suffered setbacks and, in some cases, failure of services as well as lack of data collection for monitoring the performance of e-services. This section relies extensively in its findings and conclusions on the United Nations e-Government Survey 2012 and its e-Government Development Index (EGDI).[159] The overall conclusion that emerges from the 2012 Survey, applicable to the Arab region in today's unstable and, in many ways, unsustainable climate, is that, while it is important to continue with service delivery, governments must increasingly begin to rethink their policies in terms of placing greater emphasis on institutional linkages between and among the tiered government structures in order to create synergies for inclusive sustainable development. An important aspect of this approach is to widen the scope of e-government for a transformative role of the government towards cohesive, coordinated and integrated processes and institutions through which such sustainable development should take place. Governments should re-engineer the enabling environment for e-governance to enable institutional interlinkages within the government and promote coordination and connectivity between ecosystems and development outcomes.

In the absence of a more region-specific metric for measuring e-government performance, the report uses the EGDI, which is a weighted average of three normalized scores of equal weights on the most important dimensions of e-government, namely scope and quality of online services, development status of telecommunication infrastructure, and inherent human capital. The original contribution of the EGDI lies in the first component regarding the scope and quality of online services; the other two are essentially based on indicators borrowed from ITU on infrastructure and UNESCO on adult literacy and education enrolment.

The first pillar of the EGDI measures the percentage of implementation of online government services based on the four stages defined by DESA: emerging (stage 1), enhanced (stage 2), transactional (stage 3), and connected (stage 4).[160] This pillar reflects government efforts in enhancing online government services, thus improving their overall EGDI score. Table 43 shows the percentages of the online services pillar in the ESCWA member countries. There is a significant increase in the totals achieved by the member countries in terms of online government services, which is an indication of increased and more focused efforts for the provision of more citizen-centric services that cater for the various needs of individuals. However, the change is also the result of the modified weights given to the different stages. The most notable change was observed by the United Arab Emirates,

which moved from a score of 20 per cent in 2010 to 75 per cent in 2012, thus joining Bahrain in the first rank among the member countries. The United Arab Emirates is considered an example of a best practice, particularly that they have worked for integrating e-services, information and features into one e-government portal.

In 2012, most of the ESCWA member countries ranked high in stage 1, with most achieving a full score of 100 per cent. Many countries have also scored well in providing enhanced information services at stage 2. The GCC countries lead the region in terms of transactional information services at stage 3, with a notable increase for Saudi Arabia from 13 per cent in 2010 to 77 per cent in 2012 as a result of its focused efforts on offering integrated online government services and introducing digital verification of the citizens' identity.

Table 44 presents the indexes and rankings of countries in the Arab region which are grouped into GCC and non-GCC countries.[161] At the country level, the biggest improvement in EGDI was achieved by the United Arab Emirates (37.3 per cent), moving up in ranking from 49 to 28, Qatar (30 per cent), moving up from 62 to 48, Oman (29.9 per cent), moving from 82 to 64, and Saudi Arabia (29.5 per cent), moving in ranking from 58 to 41. Changes are partly due to changes of parameters and weights which went into the EGDI computation. In addition, the GCC subregion is considerably richer than the other subregion with populations considerably less than even the smallest country in the rest of the region. Size and economics were major factors influencing the results obtained by countries in this subregion. Political stability is an additional factor. Countries that suffered a drop in index and ranking included Jordan and Bahrain, and countries which dropped in ranking included Kuwait, Yemen and Iraq

Table 43. Ranking of selected Arab countries by total percentage of implementation of online government services, 2012 *(Percentage)*

Country	Stage 1: emerging	Stage 2: enhanced	Stage 3: transactional	Stage 4: connected	Total implementation*
Bahrain	100	76	81	67	75
United Arab Emirates	100	74	83	67	75
Saudi Arabia	92	60	77	67	70
Qatar	83	64	62	64	65
Oman	92	64	48	57	58
Egypt	100	64	27	57	53
Kuwait	100	62	48	38	51
Morocco	100	62	29	43	47
Lebanon	100	62	17	38	42
Tunisia	92	45	29	41	42
Jordan	83	48	31	20	34
Iraq	75	33	6	26	25
Algeria	75	48	8	9	22
Sudan	67	31	10	19	22
Syrian Arab Republic	58	31	4	19	20
Yemen	**33**	**7**	**8**	**23**	**15**

Source: DESA, 2012.
Note: * The total percentage was calculated by assigning different weights to each stage. Stage 1 was multiplied by 0.07, stage 2 by 0.24, stage 3 by 0.3, and stage 4 by 0.39.

TABLE 44. EGDI scores and rankings of the Arab region, 2010-2012

Rank	Country	EGDI score			EGDI ranking		
		2012	2010	Percentage change	2012	2010	Net change
1	United Arab Emirates	0.7344	0.5349	37.3%	28	49	21 ↑
2	Bahrain	0.6946	0.7363	-5.7%	36	13	-23 ↓
3	Saudi Arabia	0.6658	0.5142	29.5%	41	58	17 ↑
4	Qatar	0.6405	0.4928	30.0%	48	62	14 ↑
5	Kuwait	0.5960	0.5290	12.7%	63	50	-13 ↓
6	Oman	0.5944	0.4576	29.9%	64	82	18 ↑
	GCC average	**0.6543**	**0.5441**	**20.2%**			
7	Lebanon	0.5139	0.4388	17.1%	87	93	6 ↑
8	Jordan	0.4884	0.5278	-7.5%	98	51	-47 ↓
9	Tunisia	0.4833	0.4826	0.1%	103	66	-37 ↓
10	Egypt	0.4611	0.4518	2.1%	107	86	-21 ↓
11	Morocco	0.4209	0.3287	28.0%	120	12	-108 ↓
12	Syrian Arab Republic	0.3705	0.3103	19.4%	128	133	5 ↑
13	Algeria	0.3608	0.3181	13.4%	132	131	-1 ↓
14	Iraq	0.3409	0.2996	13.8%	137	136	-1 ↓
15	Sudan	0.2610	0.2542	2.7%	165	154	-11 ↓
16	Yemen	0.2472	0.2154	14.8%	167	164	-3 ↓
17	Libya	N/A	0.3799	N/A	N/A	114	N/A
	Non-GCC average	**0.3948**	**0.3643**	**8.4%**			
	Arab region average	**0.4921**	**0.4278**	**15%**			
	World average	**0.4882**	**0.4406**	**10.8%**			

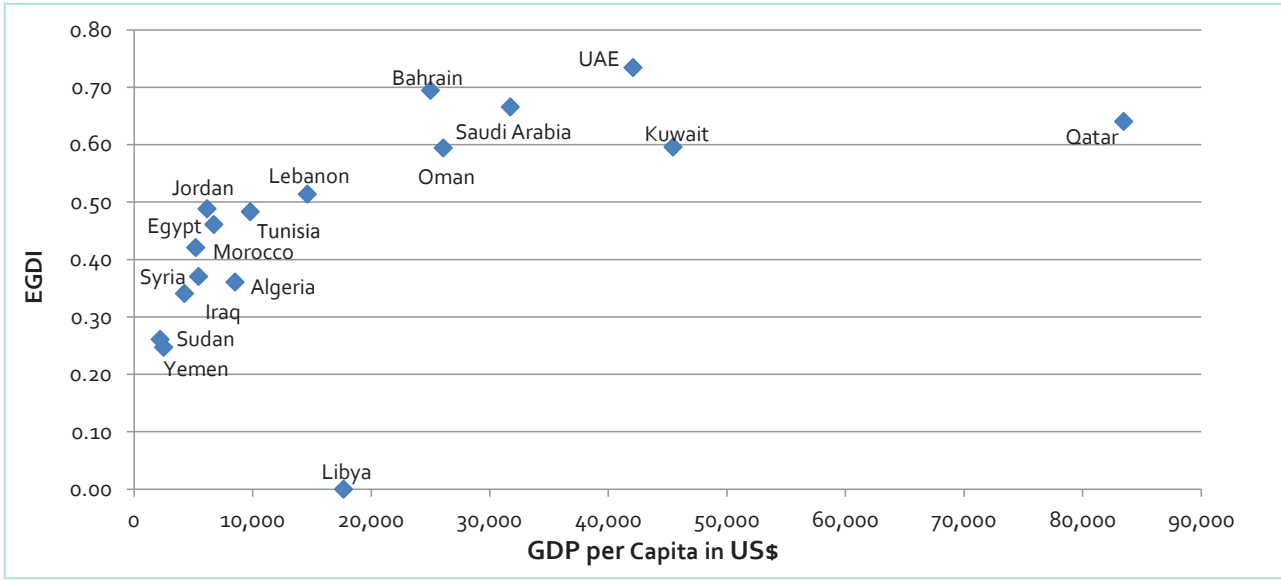
Source: See: http://www.un.org/en/development/desa/publications/connecting-governments-to-citizens.html.
Note: N/A indicates that data are not available.

as well as all Arab countries in North Africa. This is partly due to political instability, lack or limited availability of human skills, and modest financial allocation to government institutions undergoing development of computer-based applications for their services. The average index of the GCC subregion (0.6543) for 2012 was just over 20 per cent higher than that of 2010, and 34 per cent better than the world average.

The non-GCC average index for 2012 (0.3948) was 8.4 per cent higher than 2010 but 19.1 per cent below world average. Lebanon comes first when compared to countries in the Levant region with EGDI of 0.5139 and ranking of 87. Tunisia, with an EGDI of 0.4833, remains the leader among Arab countries in North Africa, particularly in light of the major regime changes observed in three countries of that region between 2011 and 2013.

The Arab region, as a whole, exhibited an improvement of the index by 15 per cent, mainly driven by the impressive improvement of GCC countries, which has led the entire region to improve its global index average (up 0.8 per cent of the world average from below 2.9 per cent in 2010) notwithstanding the relative worsening of scores obtained by non-GCC countries.

FIGURE 8. EGDI vs. GDP per capita, 2012



Source: Compiled by ESCWA. GDP per capita (current PPP international) are for 2012, except for Oman and Kuwait, which are for 2011. They were obtained from the World Bank website, available from http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD.

Figure 8 shows the relationship between the e-government index for 2012 and the GDP per capita. As expected, the GCC countries appeared at the higher end of the chart. The remaining countries clustered close to each other on the left side with such countries as Lebanon, Jordan and Tunisia appearing in the lead amongst the non-GCC countries.

B. Comparative analysis of ICT applications in business and commerce

The ICT landscape in the Arab region is evolving in light of the growing number of Internet users, improved access to international broadband, the rapid uptake of smart phones and mobile device, and the spread of social media providing more ubiquitous channels for interaction. Governments and business enterprises are becoming eager to provide services allowing for online transactions, and cloud computing is beginning to raise new opportunities as well as risks.[162] The region is not homogenous in its state of e-business with distinct levels of implementation between the GCC countries and the rest of the region, except for Jordan and Lebanon.

The Arab region, with the exception of the GCC countries, has been slow in accepting e-commerce. This is mainly due to the relatively low standard of living and high level of unemployment in the region. In addition, the region is characterized by a general culture of scepticism towards doing business online particularly regarding logistics, the security of transactions, technology speed, reliability of electronic payment systems, branding/recognition, tracking, monitoring and taxing transactions, limited legal frameworks to build trust, risk of bias and unfair competition, circumvention of such trade barriers as licensing, restrictions and bans, and banks being risk-averse due to the high rate of fraud. One key area that should facilitate how business is conducted through e-commerce should be improved ICT infrastructure and the growth of broadband. A growing number of people in the region buy their tickets and book their hotels online, they pay their bills the same way,

and they do it from local companies as well as from Amazon and eBay.[163]

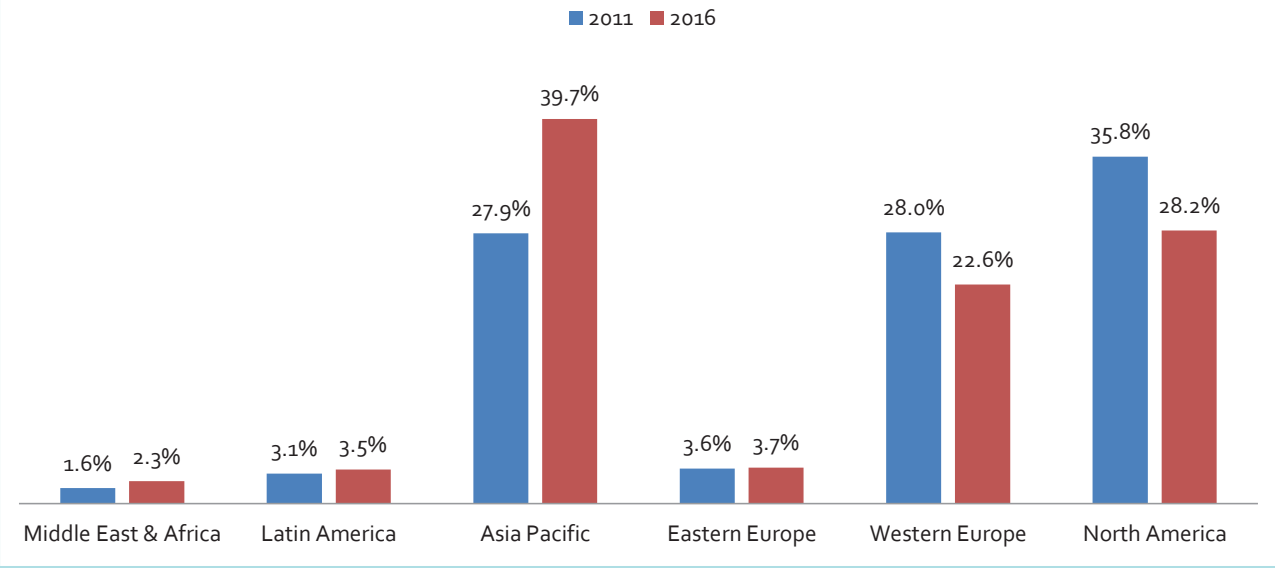
Nevertheless, measuring e-commerce is proving difficult as there are little official statistics on e-commerce from member countries. The Core ICT Indicators of the Partnership on Measuring ICT for Development for orders received or placed by enterprises (UNCTAD) and orders placed by individuals in a household (ITU) over the Internet, do not measure the value of transactions nor capture domestic versus international dimension, and do not consider the impacts of e-commerce. Private data sources are varying, with unclear or undisclosed methodologies in addition to limited geographical coverage and a focus on developed countries. They are also expensive to use. The percentage share of B2C e-commerce in the Middle East and Africa, which the Arab region is a subset of, is considered modest (see figure 9).

A recent report by Visa Incorporated concluded that the Middle East and North Africa is the fastest growing region in the world for e-commerce; a conclusion that is not shared by many observers in the region and which might be considered as a marketing promotion for such service. The report's 2012 data show that the region grew by an estimate of 45 per cent year-on-year to US$15 billon in sales.[164]

Undoubtedly, e-commerce is one of the key drivers for the economy in today's closely connected global environment and is rapidly expanding, particularly in the GCC region. Both individuals and business organizations will have concern about the security of online transactions. National profiles and available reports and statistics do not provide much qualitative and quantitative data about e-commerce in the Arab region apart from the GCC and other few countries like Jordan, Lebanon and sometimes Egypt. An example of such limited data can be found in box 2.

Creating an enabling environment for e-commerce also faces challenges, including the following: brand recognition; e-payment solutions and delivery issues; limited understanding on legal issues related to e-commerce; shortage of skills and trained experts in establishing and implementing e-commerce

FIGURE 9. B2C e-commerce percentage sale by region, 2011 and 2016



Source: Compiled by ESCWA based on data obtained from eMarketer, available from http://www.emarketer.com/Article/B2C-Ecommerce-Climbs-Worldwide-Emerging-Markets-Drive-Sales-Higher/1010004.

laws; differences among countries as regards legislation, capacity and resources; existing regional agreements and need for global interoperability; and use of such international models as the United Nations Convention on
e-Contracting).

Looking at back-end operations of businesses, ICTs also have a major role in managing processes and knowledge. There are several applications that have a relatively large installation base in the region though with little or no information and statistics about their customer base and providers. Many of these applications are either developed or customized locally, and they constitute quite a substantial core of the software development industry of the region. Applications include, but are not limited to: enterprise resource planning (ERP) and ERP-like applications; hospitality and property management systems; point of sale software; and archiving and workflow software.

In recent years, the region has witnessed an increasing interest in the implementation of ERP systems, particularly in such large organizations as oil companies of the Gulf states. In Saudi Arabia, ERP systems have been implemented by a large number of private and public-sector organizations, including government agencies, banks, trading companies, and manufacturing industries, among others. More than 700 Saudi organizations had implemented ERP systems by the end of 2011. Some statistics provided by leading ERP vendors clearly indicate that ERP adoption of Saudi organizations is higher than those of other Gulf states. ERP implementations can also be found in Egypt, Jordan and Tunisia but they are not as many as the implementations found in the GCC countries. This is partly due to the high cost of internationally recognized ERP systems compared with locally developed, and rather fragmented, solutions that seem to meet modest goals of small and medium-sized organizations.

Active ERP vendors in the region include Oracle and SAP. These companies, and others, have developed Arabic interfaces and localized solutions. For instance, Oracle Payroll offers deductions to the General Organization for Social Insurance and end-of-service benefits formulas for Saudi and United Arab Emirates organizations.[165]

C. Comparative analysis of ICT applications in education

In traditional education, students are trained primarily in physical classrooms. This does not

BOX 2. Regional trends and figures on e-commerce in the Middle East

E-commerce encompasses numerous types of interactions: between businesses (B2B), from businesses to their consumers (B2C), from business to government (B2G), and transactions between consumers. 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 and financial institutions shed some light on the volumes of e-commerce in general and cover selected countries from the region.

According to Go-Gulf.com, which published in May 2013 a series of infographics covering trends and statics on e-commerce in the Middle East, the estimated sales figure of B2C in the Middle East has reached US$9 billion in 2012 and is expected to reach US$16 billion in 2015. Sustained by increasing Internet users penetration rates and a wide adoption of smartphones, the value of mobile commerce (m-commerce) is expected to reach US$4.9 billion in 2015. The figures further show that 70 per cent of online purchases of physical goods in the region are paid through cash-on-delivery, and 30 per cent are paid online. As for e-commerce consumer demographics, 68 per cent of online shoppers were males and 32 per cent female belonging to different age groups; while 53 per cent of all online shoppers are 26 years of age or older. The most popular online shopping categories were found to be online games, followed by computer software and electronics.

Source: http://www.go-gulf.com/blog/ecommerce-middle-east/.

satisfy the need for new expertise that keeps people competitive in a knowledge-based economy. Drawbacks of traditional education methods include inadequacies in teaching resources, constraints on time and locations, repetition of effort, lack of consideration for individual learning modes, possibility of out-of-date knowledge, and an inability to meet requirements for collective or off-the-job training. The majority of countries in the region have not yet undergone any paradigm transformational move towards the new trends in education and learning. Such comprehensive technologies as cloud computing, cooperative communications and videoconferencing could turn small classrooms scattered around the world into one large virtual classroom. Schools in remote locations can share resources, and numerous students can access lessons taught by well established teachers.[166]

As schools educate the next generation, mobile technology is providing students with a more efficient and convenient way to engage with their learning materials and each other. Mobile devices provide unprecedented access to learning resources, peers and advisors, both inside and outside the classroom, regardless of their location at school, on the bus or at home.[167] Mobile education or m-education is also a tool to support the fulfilment of the education-for-all Millennium Development Goal. It can enable literacy development, promote student motivation, enhance access to teacher development opportunities, and improve communication between parents, teachers and principals. Mobile broadband can act as a step change in the way education is being provided in the region.

Several governments have made sizable investments in education technology,[168] including smart classroom equipment, digital learning materials and enhanced connectivity through broadband. However, these investments have not yielded the desired improvements. Teachers in many schools lack the basic pedagogical readiness to effectively lead a classroom, and they do not have the specific technological skills to use these new tools to enhance the learning process. This conclusion has also been stressed by several studies about the region, including the UNDP Arab Knowledge Report.[169]

The majority of the GCC countries have embarked on ambitious IT-for-schools projects. Most schools are fully connected to the Internet as well as provided with computers with high PC-to-student ratios, a figure which is no longer considered as an indicative measure due to the development of affordable laptops, tablets and smartphones. Jordan and Lebanon have similar projects also, but with the fast changing technologies in terminal devices, many of these projects had to undergo substantial revisions and upgrades.

Despite rapid improvements in digital readiness in Arab countries, which have a population of about 350 million, of which 70 million people are between the ages of 15 to 24, representing 19 per cent of the population, adoption of e-books is still at an early stage in universities and schools.[170] This is due to several challenging factors, including limited Internet penetration, challenges of piracy, issues related to the rule of law and censorship, and vast disparities in purchasing power. Another challenge facing the take-up of e-books and e-learning in the Arab world are technical issues related to ease and flexibility of handling the Arabic language.[171] Within this context, a North African initiative called the "Open Book Project" was launched to provide universities with open access to high-quality educational materials in Arabic, with a focus on science and technology.[172]

The Qatar National e-Learning Portal, for example, is an innovative platform dedicated to sharing knowledge to educate people and strengthen the economy. The portal provides access to online courses covering topics in information technology and business. Free online professional development courses are available to individuals and businesses throughout Qatar. The Portal also provides vocational

training to those working in the ICT sector.[173] In 2011, a three-year project was initiated by a partnership consisting of Qatar University, Athabasca University of Canada and Qatar Petroleum entitled "Using Mobile Technology for English Training in the Qatar Workplace". The project is funded through the Qatar National Research Fund and is expected to be completed by 2015.[174]

The most frequent users of e-learning courses in the region for professional training are the big oil companies. The usual practice is to use off-the-shelf courses from international companies that specialize in providing IT, business, projects, and general management courses through an international company portal or in-house. Such companies as ARAMCO of Saudi Arabia, ADNOC of United Arab Emirates and QP of Qatar are the usual customers for such international companies as SkillSoft and Edutech, which have large courses catalogues available for licensing in a variety of ways to suit the learning community of the customer. In Qatar, ictQATAR provides off-the-shelf courses to national organizations through its National Learning Portal, which links to the global SkillSoft portal. E-learning has become essential to these big companies as it managed to cut a substantial portion of the training budget, thus saving on travel expenses and lost time outside the workplace. They have also incorporated it in the competency models for staff assessment and promotions.

Other countries outside the GCC have attempted to provide learners with locally produced content for universities and adult education institutions. Examples include the Syrian Virtual University and the Arab Open University in Kuwait, as well as several other conventional universities in Lebanon, Jordan, Tunisia and other countries that provide blended courses to their students in certain subjects. The number of regional companies capable of designing e-learning courses and content is low.

In Jordan, e-learning is supported at the government level and has several players involved, including the project by the Ministry of Education, "elearning.jo", Queen Rania Al-Abdullah Centre for Technology in Education and the Jordan Education Initiative. The Jordan Education Initiative and the e-learning platform EduWave have made a strong contribution to Jordan's ICT growth. The law in Jordan now requires all public schools to offer English lessons starting from the first grade and computer studies from the second grade all through high school. All secondary schools in Jordan now have fully-equipped computer laboratories. ADSL connectivity has reached more than 600 of Jordan's 3,000 government schools. The number of students per computer ratio now stands at 51 compared to 120 in 1999.[175]

D. Comparative analysis of ICT applications in health care

The World Health Organization (WHO) defines e-health as "the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research".[176] In today's world, there is no more space for paperwork with countries trying to move completely to the digital systems where they can share information and patients' data online among physicians and medical institutions, as well as recording and updating patients' health history, reports, analysis, and X-rays.[177]

In the GCC, health-care information technology solutions are on the rise due to the health industry and government efforts in improving existing health-care services, establishing new hospitals and supporting initiatives like the national e-health policy and such projects as WAREED, the largest health information system project by the Ministry of Health in the United Arab Emirates.[178] New information analysis from Frost & Sullivan estimated the total health-care IT expenditure in the GCC countries in 2011 to be US$444 million and expected that it

would reach US$551 million by 2015. The market, especially in Saudi Arabia, is held back due to lack of skilled manpower. Most of the personnel trained and qualified for IT health-care systems are expatriates.[179]

The implementation of national e-health systems provides greater efficiency in health care and workforce productivity and better management of resources. To that end, ITU and WHO jointly commissioned a National e-Health Strategy Toolkit[180] that provides a comprehensive framework for governments to develop their own vision, action plan and monitoring practices for e-health. The Toolkit responds to the need to provide improved care to more people and facilitates the synergy between ICTs and the health sector. The opportunities and challenges of a national e-health strategy are further reinforced in a whitepaper entitled "Middle East Public Sector - National necessities: eHealth", issued by Deloitte Middle East. The report cautions that the one-size-fits-all approach will not work in the implementation and the needs of the different end users should be considered once an e-health system is in place.

The primary benefit of an e-health system is improved patient health but there are also direct and indirect benefits to the health system in general, namely a decrease in hospital readmissions, reduced waiting times due to better coordination of information and improved health-system planning.[181] Challenges and key recommendations for implementing the system include investment in computing infrastructure and national broadband services; planning and consultation; information protection, privacy and security; execution and requisite skills; and implementation of better plans allowing breakdown into smaller, manageable components.[182]

Needless to say that mobile-health or m-health solutions should come as an integral part of an e-health system by providing mobile devices to practitioners in remote areas as well as developing m-health applications for use by doctors, patients and medical communication. A WHO review of m-health programmes found that the Arab states have a number of established programmes in several categories, ranging from emergency toll-free telephone service, appointment reminders and patient records. Yet, the arena seems quite empty when it comes to the availability of m-health applications in the Arab region; an indicator of opportunities for the business sector.

ictQATAR is supporting the Supreme Council of Health's efforts to help translate the above challenges and recommendations into actions. And every year, more physicians, nurses and therapists are trained in how to use the electronic system. In Qatar, four out of twelve hospitals have already fully integrated the digital system and are now the standard for all new hospitals countrywide. A digital project of that size needs budgets, tech-savvy cadres, training along the way in order to feed all medical and health-care centres and ICT infrastructure in order to create an integrated, connected and organized e-health-care system covering the entire nation.[183]

E. Comparative analysis of ICT applications in employment

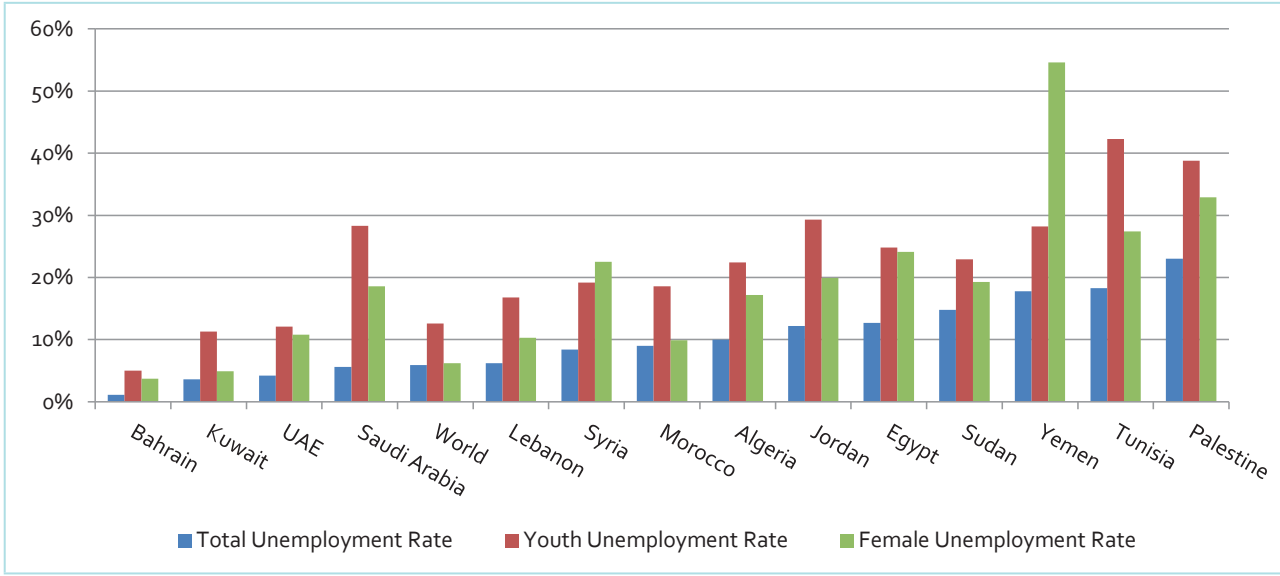
A study on employment conducted by the World Bank, covering Egypt, Jordan, Lebanon, Morocco, Tunisia, Syrian Arab Republic, and Yemen, concluded that theses countries face challenges of high unemployment and limited creation of quality jobs. [184] Employment services could constitute a relevant policy instrument to address labour market frictions, to facilitate individuals in finding available jobs, and to enhance the match, through skills building, for instance, between supply and demand of labour. One of the main challenges in the post-Arab Spring countries will be addressing the large and increasing stock of unemployed individuals, particularly among youth. Based on the latest available data, unemployment in non-GCC countries of the region is estimated to be 12.9 per cent, which is larger than the estimate for GCC countries (3.4 per cent) and the world (10 per cent).[185]

Estimated population growth in the Arab region in the period 2010-2015 (at 2.1 per cent) is much higher than the world average (at 1.18 per cent). The youth bulge in the Arab region, which is the population aged 15-24, accounts for about 20 per cent of the overall population, compared to 18 per cent worldwide.[186] It has also been shown that the youth unemployment rate in the Arab region is considerably higher than the world unemployment rate. Figure 10 shows the rates of total, youth and female unemployment in the region compared to world rates.

Public employment services (PES) generally deliver services free of charge to jobseekers, both unemployed and job changers, as well as to employers. According to the report, most Arab countries have PES in some form or another. However, there has not been a comprehensive evaluation to assess their institutional set-up as well as their budget/capacity constraints, programmes, and monitoring practices.[187] An alarming conclusion on the state of PES in the Arab region indicates that, in spite of the varying ratio of registered job seekers per one vacancy, job placement rates are not sufficient for absorbing the growing number of unemployed individuals. For example, in Egypt, less than 5 per cent of registered job seekers are employed every month; in Jordan, less than 3 per cent; and in Morocco, about 1 per cent. PES in the Arab region need to be more proactive and enhance their role in labour market intermediation. This would require focused attention by countries of the region on the application of such effective and citizen-friendly solutions as Labour Market Information Systems (LMIS).[188]

Both the ILO and the World Bank have provided advisory services and implemented projects in the Arab region for LMIS in such countries as Egypt, Jordan and Yemen. With the spread of access of the Internet, several private companies started offering services for employment services to employers as well as private individuals. At the regional level, bayt.com and akhtaboot.com are notable examples. There are also country-specific portals in several countries in the region. A comprehensive treatment of these portals is given in the 2011 Regional Profile.[189]

FIGURE 10. Total and youth unemployment rates in selected Arab countries, 2012 estimates



Source: ILO, KILM database.
Note: The values are estimates from 2012 or the latest year available.

F. Classification and ranking of ESCWA member countries according to maturity level

1. Maturity level 1: Iraq, Libya, Palestine, the Sudan, Syrian Arab Republic, and Yemen

This level is characterized by the absence of clearly formulated strategies or plans for ICT applications in public services and insufficient implementation and use of ICT applications in all areas, whether in the public or private sector. Libya was rated in this maturity level in light of the limited availability of ICT applications and e-services, in general, and the lack of online e-government services, in particular.

2. Maturity level 2: Egypt, Lebanon, Morocco, and Tunisia

At this level, countries have elaborated strategies for the digitization of some public services but implementation or plans of action to use ICT applications have not been properly followed; however, average progress in ICT applications use in most areas, whether in the public or private sector, can be witnessed. While the use of ICT in education is perceptible, computers and Internet access in schools is limited; usage of ICT in health care and in the employment sector is moderate. Morocco and Tunisia, being assessed in this report for the first time, join the ranks of other countries exhibiting average progress in ICT applications.

3. Maturity level 3: Jordan, Kuwait and Oman

As far as strategies are concerned, this level is characterized by more advanced implementation but, essentially, advanced levels of ICT applications implementation and use can be witnessed in many areas discussed in this chapter, whether in the public or private sector. Jordan has seen notable improvement in e-commerce with the emergence of regional e-commerce-based companies and has also achieved valuable results in e-learning.

4. Maturity level 4: Bahrain, Qatar, Saudi Arabia, and United Arab Emirates

At this level, governments have elaborated and successfully implemented comprehensive strategies in many ICT application domains; in addition, an advanced degree of automation and digitization of information, and high quality of services provided in many ICT application domains can be witnessed, whether in the public or private sector. Saudi Arabia joins this level in view of its focused efforts on enhancing its e-government services. Qatar and Saudi Arabia advanced to this fourth level of maturity in 2013 owing to the considerable improvement in their e-government implementation, and good progress in e-learning.

The ranking of ESCWA member countries by maturity level in ICT application for 2013 is shown in table 45.

G. Suggestions and recommendations

1. ICT applications in government

(a) Mobilize the proper resources through concerted national efforts to implement e-government initiatives, based on reinvented and reengineering government procedures and processes, thus avoiding potential losses incurred from developing multiple systems to solve the same problems;

(b) Designate a national coordinating authority, with real authority across departmental and ministerial boundaries, to facilitate e-government planning, implementation and monitoring; this will avoid duplication of efforts when different ministries work on e-government projects separately;

(c) Raise awareness among staff and citizens on the importance of e-government, all as part of a change management scheme to cater for and alleviate resistance to change;

(d) Improve government services through adjusting to the new concepts of openness and interaction, providing citizen-centric and interactive e-services, urging users to participation using Web 2.0 and social networking tools, and providing multi-channel service delivery, particularly through mobile devices;[190]

TABLE 45. Ranking of ESCWA member countries by maturity level in ICT applications

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain										■	■	■
Egypt				■	■	■						
Iraq	■	■	■									
Jordan							■	■	■			
Kuwait				■				■	■			
Lebanon				■	■	■						
Libya*			■									
Morocco*						■						
Oman							■	■	■			
Palestine	■	■	■									
Qatar							■	■				■
Saudi Arabia							■	■				■
Sudan	■	■	■									
Syrian Arab Republic	■	■	■									
Tunisia*						■						
United Arab Emirates										■	■	■
Yemen	■	■	■									

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2013 since they only joined ESCWA in 2012.

(e) Promote collaboration among ESCWA member countries for sharing experiences and best practices and develop applications that apply to more than one country in the region; ESCWA could provide the platform for such collaboration.

2. ICT applications in business and commerce

(a) Encourage the use of such electronic payment means as credit cards and e-banking, which will require the availability of appropriate infrastructure for handling transactions electronically as well as the support of central banks to establish national e-payment gateways and to provide financial and legal coordination between involved banks and companies;

(b) Improve measurement through reliable statistical surveys as regards e-commerce and ICT use by businesses to interact with their customers (B2C) or peers (B2B);

(c) Formulate and implement national plans to increase the participation of citizens and to build their trust in using e-business and e-commerce applications, including improved online security and the enactment of e-transactions, e-commerce and e-signature laws;

(d) Encourage and support studies, data collection and analytical research on the impact of such business applications as enterprise resource planning (ERP) and customer relationship management (CRM).

3. ICT applications in education and learning

(a) Integrate ICTs into the national strategy, with special focus on mobile technologies and m-learning, for school education, whether for digitizing curricula, supporting the classroom teaching process or providing appropriate teacher training; a selected number of pilot schools could serve as a starting point;

(b) Encourage the availability of affordable and relevant devices, content and connectivity, including smart phones, notepads, tablets, and integrated digital textbooks;

(c) Improve availability and access of quality lifelong and professional e-learning programmes to meet the needs of the constantly changing job market;

(d) Develop an ecosystem for the safe use of mobile technologies for education by teaching digital citizenship and responsible use to learners;

(e) Encourage research and development in the area of e-learning and m-learning.

4. ICT applications in health care

(a) Adopt national e-health strategies and focus on integrating ICTs, including mobile technologies, to support the priorities of the health sector. A national e-health strategy will result in an ecosystem for all involved medical and health-care practitioners and institutions, including those in remote areas;

(b) Measure the impact of e-health, through credible and reproducible evaluation mechanisms and metrics focused on the effect of e-health on health outcomes;

(c) Ensure affordable, reliable connectivity to health centres, institutions and remote areas.

5. ICT applications in employment

(a) Instal, or improve existing, LMIS as a priority in a region with the highest level of unemployment in the world. PES should be effective, proactive and citizen-friendly;

(b) Assist PES in the region to develop partnerships with the private sector to (i) deliver training and employment services to the many unemployed (notably youth); (ii) promote beneficiary participation in internships and on-the-job training; and (iii) develop demand-driven programmes tailored to the needs of the private sector. ICT will be particularly helpful in this matter because it is a tool that allows instant circulation of information among those stakeholders provided, however, that the necessary IT platforms have been properly designed and implemented.

6. General recommendations

(a) Countries should encourage the emergence of an applications industry aimed at developing digital Arabic content (DAC), and promote the development of freely available applications targeting governments and other public e-services in such areas as health, education and learning;

(b) The growing popularity and affordability of smartphones will change the way e-services and learning are delivered to the masses. Governments should provide incentives for developing mobile applications by the private sector, as well as initiate plans to harness the use of smartphones for learning purposes;

(c) Mobile Web Content is an important driver of mobile demand and as such, policymakers should foster the development of mobile applications and content, through the creation of an enabling innovation ecosystem.

VIII

Cultural diversity and identity, linguistic diversity and local content

VIII. Cultural Diversity and Identity, Linguistic Diversity and Local Content

The WSIS allocated an action line for improving cultural and linguistic diversity on the Internet as well as increasing local content in order to mitigate the language barrier and thus bridge the digital divide. For the Arab region, due to a common language and similar cultural identities among countries, this translates into enriching and enhancing the quality of DAC. DAC is defined by ESCWA to be any content in Arabic represented in digital form on the Internet, or on CDs, DVDs and other digital formats. It includes websites, portals and e-services, as well as audio and video content. It also includes software, databases, open-source products supporting Arabic language functionalities and tools, Arabized software interfaces, Arabic language processing software including speech and character recognition programmes, search and translation engines, and others.

A. Comparative analysis

Ten years after the first phase of the WSIS, representation of Arabic as a language and culture on the Internet has witnessed significant growth in a number of dimensions, including the increase in Arabic content online, numbers of users from the Arab region, scale and diversity of initiatives and programmes, and the gradual emergence of a highly promising DAC industry. There is a clear interest from different stakeholders in developing DAC in order to put the Arab region at the forefront of the content industry globally. Indeed, the Arab region has taken a marginal role in the hardware production and software development industries with only a small number of firms operating in this domain. The region, however, has promising opportunities for taking the lead in the digital content industry.

The importance of DAC was reaffirmed at the Connect Arab Summit 2012[191] by dedicating a goal to it as one of the regional priorities. The United Nations Group on the Information Society (UNGIS) Joint Statement on the Post-2015 Development Agenda also stressed the need for relevant content to allow ICTs to achieve development goals and act as a critical component of innovative development solutions.[192] Similarly, fostering content development is considered as one of the trends for enhancing cultural and linguistic diversity on the Internet.[193] Empirical research has also concluded that there is a strong correlation between developing network infrastructure, including broadband penetration and international bandwidth, and the growth of local content.

Yet, the estimated amount of online Arabic content remains within the 2 to 3 per cent mark out of the total searchable web, although 5 per cent of the world's population is from the Arab region and 62 per cent of Arabic speakers prefer to browse the Internet in Arabic.[194] These numbers indicate that, relative to the growing size of online content, not much Arabic has been added, particularly content that is of quality. Table 46 shows that Saudi Arabia is the largest contributor to Arabic content amongst

countries in the Arab region, with 28.37 per cent, followed by the United Arab Emirates, with 18.75 per cent. In both countries, there is a strong government support for developing Arabic content and, particularly in Saudi Arabia, a deep involvement of the academia in research and development activities related to DAC. Furthermore, the Government of the United Arab Emirates strongly supports the use of the national ccTLD (.ae), which crossed its 100,000th registration in 2012.[195]

When it comes to the national production in Arabic, the Syrian Arab Republic takes the lead with 82.45 per cent of Syrian web pages produced in Arabic. Government support was further reinforced with the establishment of the National Work Team for Arabic Content in June 2009;[196] however, the team has not been active since March 2011due to the current situation in the country. In this measurement, the Syrian Arab Republic is followed by Iraq, Palestine, and the Sudan,

TABLE 46. Contribution of selected Arab countries to online Arabic content

Country	Share of Arabic web pages *(Percentage)*	Share of Arabic web pages from the country's totalweb pages [a/] *(Percentage)*
Saudi Arabia	28.37	54.67
United Arab Emirates	18.75	23.56
Morocco[b/]	11.32	57.56
Egypt	6.77	46.24
Palestine	6.28	71.52
Jordan	4.32	50.16
Syrian Arab Republic	3.64	82.45
Algeria[b/]	3.28	52.42
Libya	3.11	48.50
Tunisia[b/]	2.95	39.78
Iraq	1.85	81.36
Kuwait	1.75	38.33
Yemen	1.45	50.72
Lebanon[b/]	1.38	16.69
Sudan	1.32	71.07
Oman	1.30	44.06
Qatar	1.25	20.94
Bahrain	0.92	35.71

Source: Madar Research and Development, 2012.
Notes: Measurement is made on the basis of ccTLD count. Although it is not free of errors, it is still useful to give an indication of the region's contribution to DAC.
[a/] The total of web pages is for Arabic and English only.
[b/] These countries produce content in French as well which was not accounted for in this table.

countries in which the use of Arabic is highly dominant in most fields.

Egypt's share of Arabic web pages stands at 6.77 per cent, which is rather low in view of the national efforts for increasing Arabic content online, particularly national initiatives for digitization. This might be attributed to the fact that a lot of this content is not available under Egypt's ccTLD (.eg) but rather under one of such gTLDs as .com or .org. This point was stressed in a report published by the Arab Thought Foundation[197] which states that ccTLDs are used at a rate of 13 per cent only in the Arab region. Publishing of content using the national ccTLD will help to reinforce the national identity, facilitate measurement efforts and work towards invigorating the domain name industry in the region.

1. Use of ICT in support of cultural and linguistic diversity

In a culturally rich region as the Arab region, home to a wealth of Arabic and Islamic knowledge and heritage, the efforts to digitize cultural and historic heritage are still quite limited. It is needless to say that there are advanced and commendable national efforts in several member countries, mostly led by the ministries of culture and national libraries; however, from a regional perspective, much more is yet to be done. The importance of digitization comes from its role in preserving such historical knowledge and heritage as manuscripts, books and maps as well as making such knowledge accessible and available remotely, not only in locations where the physical items are stored.

The ministries of culture in the Arab region are the main source of national cultural information. The online presence of these entities has seen an improvement in terms of quality and diversification. In December 2012, the Ministry of Culture and Heritage in Oman completed the digitization of all manuscripts in its possession totaling 4,600 manuscripts from Oman and the region.[198] Egypt continues to be the host of major initiatives for the preservation of Egyptian history and culture as well as that of the Arab world, including documentation projects implemented by the award-winning Centre for Documentation of Cultural and Natural Heritage (CULTNAT). Bibliotheca Alexandria, also in Egypt, is heavily involved in the documentation and digitization of content in various languages, including Arabic. The Digital Asset Repository, developed by Bibliotheca Alexandria, hosts a collection of more than 173,000 books in Arabic[199] that have been subject to optical character recognition (OCR) and are thus searchable although many are only partially accessible online.

A partnership between Qatar Foundation for Education, Science and Community Development and the British Library is ongoing to implement a project for digitizing and archiving historical and heritage material. By mid-2013, the project has processed over 85,000 pages of material on the Gulf's history and has set a milestone to digitize 500,000 pages of such material to be made available at the Qatar National Library.[200] Similar efforts are taking place in Morocco and Tunisia through national libraries, which have been able to digitize historical manuscripts and provide searchable indices online. The civil society is also involved, including the Juma Almajid Centre for Culture and Heritage in the United Arab Emirates and the Al-Babtain Central Library for Arabic Poetry in Kuwait. Also worth mentioning is the website of the Hadhramaout governorate in Yemen, a portal developed by the government to document cultural, touristic and economic information. [201]

2. Local and national digital content development

(a) Government initiatives

Governments have a crucial role to play in the development of DAC. On the one hand, they are providers of content as they are in possession of large amounts of information and knowledge available in public institutions. On the other hand, they are the providers of the necessary enabling environment that would allow the development of digital content by all stakeholders, including the private sector, civil society and individuals. Some

of the Arab countries have included tracks dedicated to digital content in their national ICT strategies. Morocco, for example, identified the development of local digital content as one of the priorities in its Digital Morocco Strategy for 2009-2013.[202] Egypt paid attention to digital Arabic content in its new Policies of the Communications and Information Technology Sector 2012-2017.[203] Another example is the ICT fund established by the TRA of the United Arab Emirates, which has a special track for supporting DAC[204] and has dedicated 25 million United Arab Emirates dirhams (AED), equivalent to US$6.85 million, for five years to support national Arabic language initiatives. [205]

Being one of the highly active regional initiatives, the King Abdullah Initiative for Arabic Content in Saudi Arabia continues to implement activities for enriching Arabic content online. In October 2012, the initiative started publishing the Arabic edition of "Nature" magazine an international scientific magazine available for download free of charge.[206] It should be noted that one of the success factors of the initiative are the partnerships it has developed with various stakeholders from the public and private sectors, nationally and regionally.[207]

(b) The growing role of the private sector

There is an obvious growth in the DAC industry in the Arab region with a market that reaches beyond the Arab region to the global level. When considering the holistic definition of DAC, the industry is lead by the media and entertainment sectors with a market estimate of US$7.1 billion for 2011.[208] Content developed for the Internet including dvertising and user-generated content has a market estimate of US$11.2 billion for 2011 and is expected to increase to US$16.5 billion by 2015.

The ecosystem developed in Jordan for digital content in general, and DAC in specific, is becoming more of a model that has seen regional and global successes in content development. The model starts off with linkages to academic programmes at national and local universities supported with such entrepreneurship centers as the Queen Rania Centre for Entrepreneurship. Promising and innovative ideas can receive support from a wide range of options, including profit and non-profit incubators, accelerators, mentoring services, and venture capitalists. Advanced financial and marketing coaching and advice are also available for established companies.[209] Jordan has been home to globally and regionally successful content development companies, particularly in the gaming and animation fields, including Rubicon, Frootapps, Maysalward, QuirKat, Wizards Productions, Jabbar Group Holding, and many others.

Lebanon also has a similar ecosystem for entrepreneurial and start-up support, including such players as incubators, accelerators, venture capitalists, seed funding, and the government. Examples of high-growth content development start-ups from Lebanon include:[210] Cinemoz, FOO and Wixel, which was founded by a female named after one of the five most powerful women in gaming.[211]

BOX 3. ESCWA activities on digital Arabic content

ESCWA has been leading numerous activities related to digital Arabic content (DAC) since 2003 and has launched, in 2012, a new phase of its initiative entitled "Promotion of the Digital Arabic Content Industry through Technology Incubators". The initiative includes the following activities: (a) launching a national awareness campaign on the importance and opportunities of DAC; and (b) launching national DAC competitions in selected member countries to select the best DAC product/application ideas for incubation at the partner incubators.

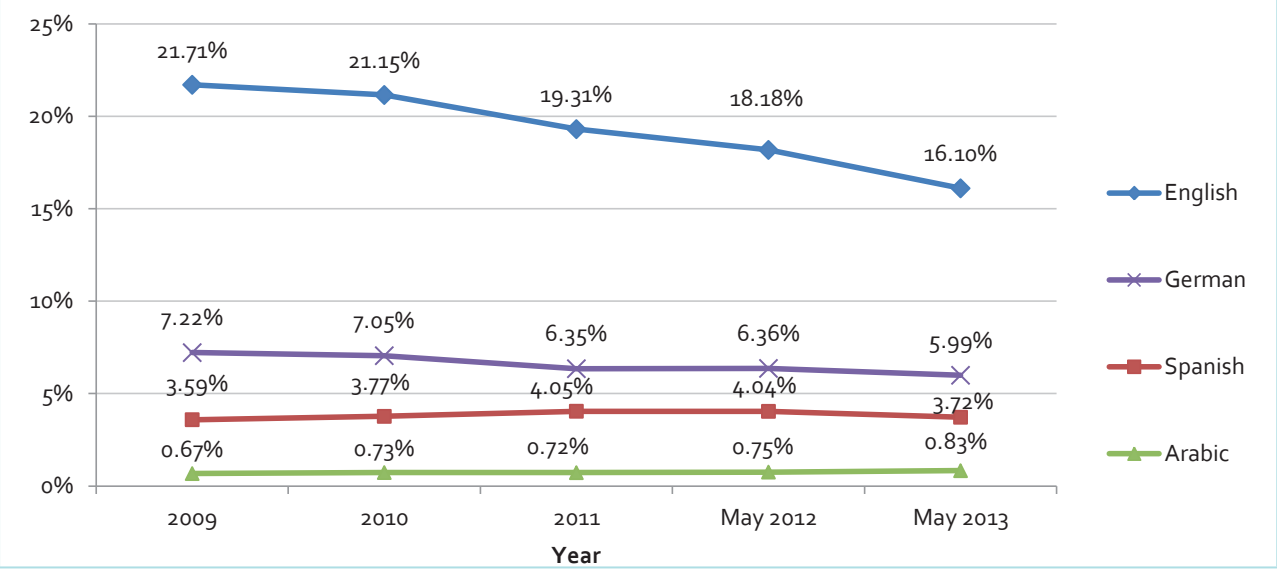
More on the initiative, studies and brochures is available from http://isper.escwa.un.org/FocusAreas/DigitalArabicContent/tabid/260/language/en-US/Default.aspx.

(c) Community-driven content and social networks

The Internet has become a tool for empowering individuals and communities at the social and economic levels. It has become the medium for sharing knowledge from all domains, for facilitating social and political activism, for communicating and networking, and for earning income. The increasing reachability and ease of use of online tools have allowed the regular user to become a journalist, a news reporter, an educator, and others. For the Arab region, the Internet has also become a pool for crowdsourcing, particularly, for enriching DAC. Wikipedia, for example, is a medium based on user-generated content that is reviewed by the community and put into Wikipedia's encyclopedia standard. Figure 11 shows a slow increase in the percentage of Arabic on Wikipedia measured on the basis of article count. The figure also shows a decrease in the percentages of other selected languages, mainly due to the introduction of additional languages to Wikipedia which are taking up their own space. Yet, Arabic, with 0.83 per cent, remains quite low in spite of the efforts led by the Wikimedia Foundation and other players to increase Arabic content. This low percentage is mainly due to limited accessibility and infrastructure in many Arab countries, limited technical and drafting skills, and the fact that Wikipedia did not support right-to-left languages when it was first launched. Wikipedia has partnered with academic institutions in Algeria, Egypt, Jordan, and Saudi Arabia to introduce the editing of Wikipedia as part of their coursework whether by authoring original content or translating what is already available online.[212]

Another partnership with the Wikimedia Foundation worth mentioning is that launched by Taghreedat.[213] Taghreedat is a crowdsourcing-based initiative that aims to enrich Arabic content on the Internet. Another example, this time from the private sector, is Qordoba, a digital publishing company established in the United Arab Emirates in 2011 by a female entrepreneur. Qordoba makes use of social networks to crowdsource translation experts and volunteers. The company's online platform now has more than 600 linguists and translation experts. Qordoba translated its five millionth word in April 2013.[214]

FIGURE 11. Percentage of selected Wikipedia languages based on article count, 2009-2013



Source: Compiled by ESCWA from statistics available from http://stats.wikimedia.org/EN/TablesWikipediaZZ.htm (accessed July 2013).

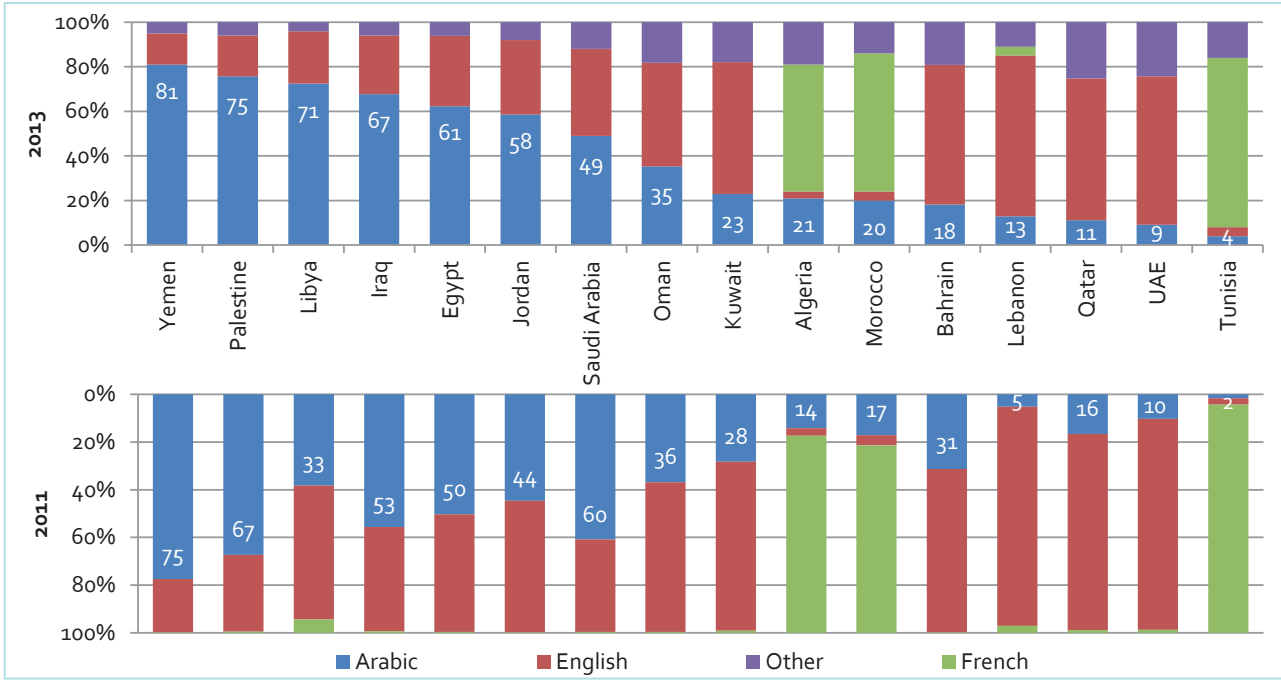
Facebook continues to be the most widely used social network globally with 33.4 per cent of users being females by May 2013. Between 2010 and 2012, Arabic was the second-fastest growing language and landed in the ninth position of languages used on Facebook in November 2012.[215] Since 2011, the preference for using Facebook in Arabic increased in most of the Arab countries in terms of the percentage of users (see figure 12). The highest increase was registered in Libya, from 33 per cent in 2011 to 71 per cent in 2013. Interestingly, all GCC countries saw a decrease in the percentage of using the Arabic interface of Facebook. This could be attributed to the availability of more Facebook languages preferred by the expatriate population residing in GCC countries.

3. ICT tools and research and development programmes

Developing Arabic natural language processing (NLP) tools is still highly confined to research programmes at academic institutions and research and development centres in the Arab region. This, however, is an area with high potential for subregional and cross-national collaboration in research and development and innovative activities and other relevant fields. It also presents a valuable opportunity for linkages between academic institutions and research centres, on the one hand, and the market, on the other hand. NLP tools for Arabic include text processing, text-to-speech speech-to-text, semantic and contextual search engines, translation, and other tools, and have numerous uses in web and mobile applications as well as e-services.

A few start-ups in the Arab region have embarked on such Arabic NLP-based projects as companies graduating from the ICT incubator in Syria, Arabi, which provides a tool for automatic vocalization of Arabic text; Votek, which provides a library for Arabic speech recognition and interactive services, and Abjad Hawaz, which provides a semantic and contextual search engine for Arabic text.[216] Arabic is

FIGURE 12. Facebook interface language use in selected Arab countries



Source: Compiled by ESCWA based on data taken from DSG, 2013b.
Note: Data for the Syrian Arab Republic and the Sudan are not available.

also perceived by global companies as a marketing opportunity. Google and Yahoo have their own departments for developing Arabic language tools. Google Translate, for example, is based on statistical machine translation[217] and for Arabic, the generated quality is still quite low, probably due to the low amount of online Arabic content in the first place. This was probably the incentive for the Arabic Web Days initiative.[218]

Academic and research institutions implementing programmes for Arabic NLP include the following: the Qatar Computer Research Institute in Qatar, the Higher Institute for Applied Sciences and Technology (HIAST) in the Syrian Arab Republic and KACST in Saudi Arabia.

4. Arabic domain names

The development and implementation of the internationalized domain names (IDNs) will allow the use of Arabic on the Internet addressing scheme and is envisaged to help bridge the language gap and thus the digital divide, particularly when considering Arab communities that have limited second language capabilities and otherwise have limited or no capabilities in accessing the Internet using other languages. As at July 2013, twelve Arab countries have applied for their IDN ccTLD in Arabic as listed in table 47. Another milestone for the region is the successful evaluation by the Internet Corporation for Assigned Names and Numbers (ICANN) of the new Arab TLDs ".arab" and its IDN equivalent ".عرب". These new strings are owned by the League of Arab States and will be operated by the TRA of the United Arab Emirates. ESCWA played a valuable role by providing technical advice and guidance to all activities leading to the application of the new strings to ICANN. ICANN's new gTLD programme received several applications for such Arabic IDN gTLDs as ".موقع", ".موبايلي", ".اتصالات", and ".شبكة", whereby the latter has already fulfilled its agreement requirements with ICANN and will soon be open for registrations.[219]

TABLE 47. Registered Arabic ccTLDs in the Arab countries

Country	ccTLD	Arabic ccTLD	Registration date
Algeria	.dz	.الجزائر	February 2011
Egypt	.eg	.مصر	May 2010
Jordan	.jo	.الاردن	August 2010
Morocco	.ma	.المغرب	February 2011
Oman	.om	.عمان	February 2011
Palestine	.ps	.فلسطين	August 2010
Qatar	.qa	.قطر	December 2010
Saudi Arabia	.sa	.السعودية	May 2010
Sudan*	.sd	.سودان	November 2012
Syrian Arab Republic	.sy	.سورية	February 2011
Tunisia	.tn	.تونس	August 2012
United Arab Emirates	.ae	.الإمارات	May 2010

Source: Compiled by ESCWA based on information available from http://www.iana.org/domains/root/db.
Note: * Arabic IDN ccTLD has not yet been assigned (on 8 July 2013).

B. Classification and ranking of ESCWA member countries according to maturity level

1. Maturity level 1: Iraq, Libya, the Sudan, and Yemen

Countries at this maturity level have limited possession and contribution to DAC and have made very little effort towards using ICT for linguistic diversity and preserving cultural identity. The political and social instability in Iraq, the Sudan and Yemen as well as a lower development level in all four countries were the main obstacles towards the use of ICT for preserving cultural identity, linguistic diversity and the development of local digital content, which is not listed as a national strategic priority. There are a few commendable efforts on the institution and individual level in the Sudan and Yemen for digital archiving and documenting national and cultural information. Furthermore, the presence of the private sector in content development is low or absent. None of the countries at this level have obtained their Arabic ccTLD except for the Sudan, which has applied for its Arabic ccTLD but is not yet assigned.

2. Maturity level 2: Lebanon, Morocco, Oman, Palestine, and Tunisia

Countries at this level have a number of initiatives to preserve cultural and linguistic diversity, and a growing development of and contribution to Arabic content. Oman has shown serious efforts to digitally preserve and archive its historical manuscripts, and Tunis similarly provides an online national library. Despite is limited contribution to Arabic websites and its government's limited attention to supporting DAC, Lebanon has an advanced entrepreneurial and start-up support ecosystem that is starting to shape a DAC industry and is maintaining cultural online content, mainly for tourism purposes. However, the support of the Government in Lebanon to DAC remains limited. As for Palestine, it remains at this maturity level but has very positive prospects for moving one level up in light of the government's attention to digital content in its 2011-2013 strategy in addition to a growing industry in this domain and a considerable contribution to Arabic websites. Although Morocco has listed the development of online Arabic content as a national priority and is contributing well to online websites, it still lags behind in terms of the industry development. All countries at this maturity level have obtained their Arabic ccTLD, except for Lebanon.

3. Maturity level 3: Bahrain, Egypt, Jordan, Kuwait, Qatar, and the Syrian Arab Republic

These countries have listed the development of online Arabic content as a national priority and continue to exert efforts in the digital preservation of cultural identity, heritage and national archives. In this group, Jordan leads the way with a growing DAC industry, an increasing number of globally successful enterprises developing applications and e-services in the DAC field as well as the availability of a developed entrepreneurial and start-up support ecosystem. Bahrain, Qatar and Kuwait are showing serious interest in DAC through national initiatives and recognition of success stories. However, in the case of the Syrian Arab Republic, although the country was once one of the pioneers in DAC development, content development has been drastically affected by the instability in the country. The situation has slowed down progress in almost all national initiatives for promoting DAC and weakened the private sector, except for a few ongoing projects to develop tools for natural language processing. Should the implications on DAC continue, the Syrian Arab Republic might risk a drop to maturity level 2. In this level, Egypt, Jordan, Qatar, and the Syrian Arab Republic have assigned their Arabic ccTLDs. The absence of an advanced DAC industry and the limited spending on research and development programmes in DAC applications and tools are hindering the progressing of these countries to maturity level 4.

4. Maturity level 4: Saudi Arabia and the United Arab Emirates

The United Arab Emirates remains in maturity level 4 for this year because of its advanced DAC industry, particularly in the development of mobile applications and e-services. The United Arab Emirates has also seen increased support from the Government for the

Arabic language and preserving national heritage. The Government of Saudi Arabia is also a strong supporter of DAC. The country is on top in terms of developing tools for Arabic NLP. Both countries at this maturity level lead in terms of contributing to Arabic websites and have assigned their Arabic ccTLDs.

C. Suggestions and recommendations

(a) Set up strategies/action plans for the development and enrichment of DAC and its industry at the national and regional levels;

(b) Accelerate the implementation of e-government and e-services projects in Arabic by allocating additional funds and resources, which should dramatically increase online Arabic content;

(c) Launch and support governmental and regional initiatives as well as support endeavours taken by the private sector, individuals and civil society for digitization and digital archiving of cultural heritage;

(d) Facilitate the establishment of a national entrepreneurial and start-up support ecosystem,

TABLE 48. Ranking of ESCWA member countries by maturity level in cultural and linguistic diversity and local content

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain				■				■	■			
Egypt							■	■	■			
Iraq	■	■	■									
Jordan				■				■	■			
Kuwait							■	■	■			
Lebanon				■	■	■						
Libya*			■									
Morocco*						■						
Oman				■	■	■						
Palestine				■	■	■						
Qatar							■	■	■			
Saudi Arabia							■				■	■
Sudan	■	■	■									
Syrian Arab Republic							■	■	■			
Tunisia*						■						
United Arab Emirates							■				■	■
Yemen	■	■	■									

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2011, which only joined ESCWA in 2012.

including incubators, accelerators, mentorship, investments, and venture capital, focusing on DAC applications and emphasizing such recent technology trends as mobile devices, tablet computers and cloud computing;

(e) Enhance the enabling environment needed for a flourishing private sector by facilitating access to national and regional funds and making these funds available, providing such facilities as the simplification of processes to establish a business, and providing such incentives as tax exemptions for start-ups and SMEs in the field of DAC development;

(f) Enhance cooperation among Arab countries by launching regional initiatives in the field of DAC, facilitate inter- and intraregional knowledge-sharing and technology transfer in content development and strengthen cooperation with international organizations working in this field;

(g) Streamline DAC initiatives and programmes launched and/or implemented by different international and regional organizations, including the League of Arab States, ESCWA, ITU and the Arab ICT Organization (AICTO);

(h) Integrate concepts and the building of high skills for digital content development into higher education IT curricula and encourage the establishment of specialized training centres that provide hands-on education in software development, as well as technologies and such platforms needed for the distribution of content as e-books, smart phone applications and social networks;

(i) Introduce interdisciplinary post-graduate programmes by combining ICT with linguistic knowledge, to provide the necessary skills for DAC development and strengthen the links between universities, higher education institutions and research centres with the private sector on developing and commercializing tools and applications for Arabic language processing;

(j) Develop region-wide standards for developing digital content specific to the Arabic language which will enhance quality, interoperability and interregional collaboration;

(k) Set a framework for measuring DAC and develop a list of digital content indicators to be adopted at the regional and then global levels.[220]

IX Media

IX. Media

A. Overview of the role of the media in building the information society in the Arab region

The convergence between media systems and the Internet makes the media sector blend in the digital world and increasingly emphasizes the important role of this sector in the information society. The wide reach of the media outlets constitutes a key contributor to the freedom of press and information, and it requires attention at the level of public policy in order to ensure the independence, pluralism and diversity of media systems. Through the media channels, citizens can access information, knowledge and educational resources, and this access needs to be more inclusive and equally reachable in remote as well as urban areas and developing as well as developed countries. In the media sector, ICTs facilitate the use of different formats for the provision of content, and support the provision of diverse means of access to content and the participation of the people in the production and dissemination of information.

With the right of every person to freedom of opinion and expression outlined in article 19 of the Universal Declaration of Human Rights, and having communication and participation as core basis in the information society, the importance of the media sector was emphasized at the WSIS that allocated an action line to follow up on media development. The WSIS outcomes promoted, among others, the independence, plurality and diversity of media through legislation, the professional partnerships and networking, especially in the field of training, a balanced media portrayal of both women and men, balanced media compatibility in terms of technological resources, the use of traditional and digital media for enhanced access to information, and bridging of the knowledge and digital divides in rural areas and for promoting multilingualism online.[221]

The media sector in the Arab region faces numerous challenges related to its existing governance systems and the existing tools and technologies that support and enable interactivity, social engagement and networking. Updated legislations are needed for better governance of media systems for open information in the digital age, and for enhanced professionalism in the media sector.

1. Status of the media sector in the Arab region

The Arab region has witnessed a significant shift in the media sector since the start of uprisings that swiped through the region, starting from Tunisia in late 2010, to Egypt, followed by Libya, Syrian Arab Republic, Yemen, and Bahrain. These events resulted in regime changes in Tunisia, Egypt and Libya. After the revolutions, despite continued restrictions of the freedom of expression in the region, on both online and offline media, there has been significant increase in the use of social media and in engagement in online platforms.

Media ownership in the Arab region is mostly state-owned, and governments and official bodies seek to control media outlets to make sure that they

go in line with their interests, goals and directives. However, according to the 2013 Federation of Arab Journalists (FAJ) report on freedoms, there is less political control over the way journalists can work in their profession and over the ownership of media outlets, which was coupled with the start of new private media institutions that provide support in the diversification of journalism and the media sector.[222] This positive change was not coupled with changes in laws and legislations that still encompass many restrictions on journalism and press freedom. Therefore, the Arab region continues to urgently need to take action in order to protect journalists and press freedom in society through making the right amendments to the existing regulatory and governance mechanisms. Currently, journalists in the Arab region can almost be compared to warriors working in danger zones possibly jeopardizing their lives, freedom and wellbeing while they deliver news to the public.

TABLE 49. Media ownership in selected Arab countries, 2013

Country	Newspaper ownership				Radio and television ownership				Electronic newspapers	News Agencies
	Private	Mixed	Government	Foreign	Private	Mixed	Government	Foreign		Private
Algeria	x		x		x		x		x	
Bahrain	x						x		x	x
Egypt	x	x	x		x		x		x	x
Iraq	x	x	x	x	x	x	x	x	x	x
Jordan	x	x			x		x		x	x
Kuwait	x	x			x		x	x	x	x
Lebanon	x				x		x		x	x
Libya	x		x		x		x	x	x	x
Morocco	x	x	x		x	x	x	x	x	
Oman	x		x		x		x		x	
Palestine	x		x	x	x		x		x	x
Qatar	x		x				x		x	x
Saudi Arabia	x				x		x		x	
Sudan	x				x	x	x	x	x	x
Syrian Arab Republic	x		x		x		x		x	
Tunisia	x		x		x		x		x	x
United Arab Emirates	x	x	x	x	x	x	x	x	x	
Yemen	x	x	x	x	x	x	x		x	x

Sources: ESCWA, 2013, and BBC country profiles available from http://news.bbc.co.uk/2/hi/middle_east/country_profiles/.

The report also dealt with developments concerning the rights of individuals to own and publish newspapers under the administrative and legal control systems of Arab governments; these control systems that govern new media ownership were considered by the report to be constraining to private media ownership. The report further pointed out diverse patterns of ownership of newspapers, which is mostly by governments (27.6 per cent), followed by individuals (24.1 per cent), shareholding companies, and political parties (20.7 per cent each), and mixed (5.2 per cent) as well as foreign ownership.[223]

Based on the draft national profiles of the information society, and BBC Media country profiles, the media ownership in selected countries, as shown in table 49 below, indicates that governments have significant influence on audio-visual media outlets and are the owners of most news agencies.

The support of governments to the media sector starts by investing in the telecommunications infrastructure that enables Internet access and extends to the support of an environment that allows media professionals to work independently from government control and within the basic values of press freedoms, rights of access to information and media diversity. While investments in the telecom infrastructure will follow the global wave of networking and connectivity, although without uniformity in the coverage of rural and urban areas, government support is crucial to media institutions in terms of rights to own and establish media institutions, laws and legislations governing the work of media professionals and the financial support to institutions. The government support, whether financial or through the legislations governing the sector, needs to be managed so that it does not influence the independence and freedom of the press.

The government provides financial support to media institutions, according to the FAJ 2013 report, in Egypt, Kuwait, Lebanon, Libya, Palestine, the Sudan, Tunisia, United Arab Emirates, and Yemen, either directly through advertisements, grants, price support, or soft loans, or indirectly through tax exemptions, price reductions, training grants, and project funds. In Palestine, Egypt and Yemen, it seems that such government support influences the editorial policies of newspapers, and, in many of the analysed countries, government financial support goes mostly to the newspapers that are supportive of the government.

Looking at the level of freedom of the media sector, this section overviews the Press Freedom Index (PFI) published by Reporters Without Borders (RWB) that ranks countries around the world according to the level of freedom that the media enjoys and respect by the authorities for this freedom.[224]

The PFI is based on a number of criteria, including pluralism, media independence, environment and self-censorship, legislative framework, transparency and infrastructure, andviolence against journalists. The PFI ranking is not directly attributed to the type of political systems; however, freedom of press tend to be more protected in democratic systems than in authoritarian ones where human rights are breached. The "worldwide media freedom" indicator, newly introduced by RWB,was released in the 2013 edition of the PFI report.Iit is presented as "a new analytic tool measuring the overall level of freedom of information in the world and performance of governments in their entirety as regards this key respecting these freedoms".[225] In fact, the "worldwide media freedom" is simply the addition of the PFI value of all countries, which stood at 3,395 in 2013. The higher the contributing value, the worse the situation as regards freedom of press in the given country. Accounting for the demographic weight among world regions as regards their contribution to this global index, the MENA region, despite the Arab Spring, has the highest value with a score of 48.5, compared to Europe, with 17.5, and the Americas, with 30.0.

The global ranking of selected Arab countries according to the 2013 PFI is shown in table 50, together with the change in global ranks compared to the previous PFI for 2011-2012. Standing first among Arab countries, Kuwait has a global ranking of 77 and is the only Arab country in the top 100 ranking countries. Kuwait is followed by Lebanon, Qatar and United Arab Emirates, at ranks 101, 110 and 114, respectively. As for the bottom ranking Arab countries, Syrian Arab Republic stands at position

176 among 179 surveyed countries, and is followed, in descending order, by the Sudan, Yemen, Bahrain, and Saudi Arabia at ranks 170, 169, 165, and 163, respectively.

The change in global ranking in the 2013 PFI compared to the previous edition was significant for Oman, whose ranking dropped by 24 places because "50 netizens and bloggers were prosecuted on lèse-majesté or cybercrime charges in 2012",[226] and for Libya, whose rank has increased by 23 places "due to the overthrow of Muammar Gaddafi's 42-year regime and its positive impact on freedom of information";[227] the report, though, adds a word of caution as "improvements nonetheless need to be confirmed by the inclusion of freedom of information in the constitution and the adoption of laws guaranteeing this freedom and providing real protection for journalists and safeguards for media pluralism and independence".[228]

Countries that showed slight improvement in the ranking compared to the previous edition are Bahrain (+8), Egypt (+8), Palestine (+7), Qatar (+4), Yemen (+2), Morocco (+2), and Iraq (+2). Egypt marginally recovered from the steep fall in 2011 when "violence against media personnel caused the country to plummet 39 places".[229] The report is still treats Egypt cautiously as the "constitution adopted at the end of 2012 contains vaguely-worded provisions that clearly threaten freedoms" and "news media can still be closed or seized on the orders of a judge".[230]

Lebanon (-8), Jordan (-6), Saudi Arabia (-5), Tunisia (-4), Algeria (-3), and the United Arab Emirates (-2) lost ranking positions. The Sudan and Syrian Arab Republic, already at very low positions, stayed stable. Another Arab Spring country that saw a regime change, namely Tunisia, fell by four ranks after gaining more than 30 places in 2011; this is due to "an increase in attacks on journalists in the first quarter

TABLE 50. Ranking of selected Arab countries on the Press Freedom Index, 2012-2013

Rank	Country	Index value		Global ranking		Change in global rank
		2011/2012	2013	2011/2012	2013	
1	Kuwait	28,00	28,28	78	77	+1
2	Lebanon	31,50	30,15	93	101	-8
3	Qatar	46,00	32,86	114	110	+4
4	United Arab Emirates	45,00	33,49	112	114	-2
5	Algeria	56,00	36,54	122	125	-3
6	Libya	77,50	37,86	154	131	+23
7	Jordan	56,80	38,47	128	134	-6
8	Morocco	63,29	39,04	138	136	+2
9	Tunisia	60,25	39,93	134	138	-4
10	Oman	55,00	41,51	117	141	-24
11	Palestine	76,00	43,09	153	146	+7
12	Iraq	75,36	44,67	152	150	+2
13	Egypt	97,50	48,66	166	158	+8
14	Saudi Arabia	83,25	56,88	158	163	-5
15	Bahrain	125,00	62,75	173	165	+8
16	Yemen	101,00	69,22	171	169	+2
17	Sudan	100,75	70,06	170	170	0
18	Syrian Arab Republic	138,00	78,53	176	176	0

Source: RWB, 2013.

of 2012 and because the authorities have maintained a judicial void by delaying the implementation of decree-laws regulating the media".[231]

2. Social media in the Arab region

By enabling people to socialize, engage in daily life activities, and create and disseminate content, social media tools have facilitated the ability of Arab citizens to participate in and influence activities at the social, economic, cultural, and political levels. Social media platforms allowed Arab users to speak out their views and demands for change, and offered communities, businesses and governments new opportunities in managing their activities. The most popular social networking sites worldwide are Facebook, Twitter and LinkedIn, with an estimated number of 750, 250 and 110 millions of unique monthly visitors, respectively.[232]

In the Arab region, the use of social media platforms has significantly increased since the start of Arab revolutions/uprisings that commenced in Tunisia in late 2010 and swept through the region to Egypt, Libya, Syrian Arab Republic, Yemen, and Bahrain. According to a recent report of the Dubai School of Governance that considered trends in the use of social media in the region in terms of access, quality and quantity, frequency, and attitudes and trends, there are 53 million active users of social media platforms from among the 125 million Internet users in the Arab region.[233]

The DSG report based its analysis on a survey of 3,373 primarily Internet users conducted in 22 Arab countries in March 2013. As regards social media users in the Arab region, they mostly use Facebook (54 per cent), Google+ (30 per cent), Twitter (14 per cent), and LinkedIn (7 per cent) more than once a day.

The survey also shows that 29 per cent of Internet users in the region rely on social media sources for the news, 28 per cent uses traditional media sources and 36 per cent of users rely on online news and portals. Furthermore, most respondents to the survey considered that social media has facilitated their social activity, making it more virtual, with online communication replacing traditional channels, and that the Internet has facilitated interaction with the government and provided more learning opportunities.

The 2013 Fifth Arab Social Media Report, which focused on education in the Arab region, has provided statistics on social media use in the Arab region, including Facebook, Twitter and LinkedIn. On Facebook, the number of users was around 54.6 millions in May 2013, with a 21 per cent increase in one year compared to June 2012, and with Egypt alone registering one-quarter of these users and the highest number of new users since January 2013. The penetration rate of Facebook in the region was 19 per cent in May 2013, showing an increase up from 12 per cent in June 2012; and the Facebook penetration as a percentage of population was the highest in United Arab Emirates (41 per cent), followed by Jordan (39 per cent), Lebanon (35 per cent), Qatar (34.5 per cent), and Tunisia (34 per cent).

Furthermore, the percentage of females using Facebook in the region remained at 33.4 per cent in May 2013, which is still low compared to the percentage of female users globally of approximately 50 per cent. The Arab countries with the highest gender balance in Facebook users are Lebanon (45 per cent), followed by Tunisia (42 per cent), Jordan (42 per cent) and Palestine (41 per cent). Concerning languages, the use of Facebook in Arabic is highest in Yemen (81 per cent), followed by Palestine (75 per cent) and Libya (71 per cent), and is lowest in Tunisia (4 per cent), United Arab Emirates (9 per cent), Qatar (11 per cent), and Lebanon (13 per cent). The population of Facebook users in the Arab countries is predominantly young (between ages of 15-29), spanning from as high as 82 per cent in Somalia to 49 per cent in Kuwait; countries representing large Facebook population like Morocco (79 per cent), Egypt (73 per cent) or Saudi Arabia (62 per cent) have predominantly young users; and in 12 out of the 20 surveyed countries, young users make up between 69 and 82 per cent.

On the use of Twitter, the report indicates that the number of active users in the Arab world reached 3.7 millions in March 2013, with Saudi Arabia having the highest number of active Twitter users and tweets (1.9 million users, 47 per cent of tweets),

followed by Egypt (0.5 million users, 12 per cent of tweets) and United Arab Emirates (0.4 million users, 11 per cent of tweets). The Twitter penetration rate is highest in Kuwait (7.6 per cent) and Saudi Arabia (6.5 per cent), with a rate of use of more than 5 per cent, which is considered high compared to other countries, and considered medium (ranging from 1 to 5 per cent) in the United Arab Emirates, followed by Bahrain, Qatar, Lebanon, Jordan, and Oman. Similar to Egypt, the number of tweets in Kuwait makes up 12 per cent of tweets in the Arab world. The tweeting is mostly done in Arabic, with Saudi Arabia leading with 90 per cent of the tweets in Arabic, then Kuwait (83 per cent), Qatar (70 per cent), Egypt (65 per cent), and United Arab Emirates (51 per cent).

The LinkedIn statistics for the Arab countries, according to the same report, give a total number of 4.7 million users in May 2013, with an increase of approximately 10 per cent in one year compared to June 2012, and a penetration rate of 6 per cent, which increased from 2 per cent in June 2012. This increase was highest in the United Arab Emirates and Qatar, where the penetration rates were approximately 16.5 and 13 per cent, respectively, in May 2013. The female users on LinkedIn were approximately 26 per cent in May 2013, which decreased from 28 per cent in June 2012 and is also much lower than the world average of 43 per cent. The most gender-balanced country in terms of LinkedIn users is Lebanon, followed by Morocco, Jordan and Tunisia. It should be noted that the median age of users of LinkedIn, being primarily a professional social network, is higher than the one of Facebook. Out of twelve Arab countries for which a detailed breakdown was provided, seven had nearly 40 per cent and above (up to 69 per cent in Oman) of LinkedIn users in the above-35-years category; only in Lebanon (28 per cent) and four other countries were these percentages lower.

The penetration rates of social media platforms in Arab countries show that Facebook is the most popular, followed by Twitter and LinkedIn. The United Arab Emirates is the Arab country with the highest Facebook and LinkedIn penetration rates at 42 per cent and 16.5 per cent, respectively.

3. Media sustainability in the Arab region

The sustainability of media systems in the Arab region is examined through the Media Sustainability Index (MSI) of the International Research and Exchanges Board (IREX). Developed in 2000, this index measures the strength and viability of the media systems of countries through assessing five objectives: free speech, professional journalism, plurality of news sources, business management, and supporting institutions. The MSI score is the average of scores of the five objectives, and it ranges from zero to four; it indicates one of four levels of media sustainability in a country and is interpreted by IREXas follows: [234]

MSI 0-1: Unsustainable, anti-free press.

The objectives are not met or only minimally met in a country, and the development of free media is impeded by government and the laws, with low professionalism and minimal activity of the media industry.

MSI 1-2: Unsustainable mixed system.

The objectives are minimally met in the country, and the free media is opposed by parts of the government and legal system. The progress in advocacy of free press and professionalism and in new media businesses could be too recent to consider sustainable.

MSI 2-3: Near sustainability.

Meeting multiple objectives increased in a country, where independent media is supported by legal norms, professionalism and the business environment. This progress survived changes in government and was codified in law and practice; however, time will shows whether changes last and the enhanced professionalism and media business environment is sustainable.

MSI 3-4: Sustainable.

The objectives are approached in a country where media is "generally professional, free and sustainable", and the systems that support "independent media have survived multiple governments, economic fluctuations and changes in public opinion or social conventions".

Table 51 shows the MSI overall scores and ranking for the ten ESCWA member countries that were

covered in the 2010-2011 IREX study. Only the overall MSI scores of Egypt and Lebanon put them in the MSI ranking of near sustainability level (MSI 2-3); eight other Arab countries are ranked in the unsustainable mixed system (MSI 1-2), namely Jordan, Iraq, Tunisia, Palestine, the Sudan, Morocco, Yemen, and the Syrian Arab Republic. The MSI average score of 1.69 for the selected countries puts the region within the unsustainable mixed system level (MSI 1-2).

Comparing the MSI scores of 2009 to 2010-2011 for these countries, the change in MSI scores is shown in figure 13 below, namely that the average MSI score decreased by 7 per cent (1.83 to 1.69) within the same level of sustainability. The change in the MSI index was positive for four of the ten selected countries, and this change has only reflected a change in the level of sustainability for Tunisia and the Syrian Arab Republic, namely from the unsustainable level (MSI 0-1) to the unsustainable mixed system (MSI 1-2), with an MSI increase by 166 per cent for Tunisia (0.68 to 1.81)[235] and by 31 per cent for the Syrian Arab Republic (0.94 to 1.23), where, according to IREX, "the revolution underway in 2011 was a time of immense repression as the regime sought to crush its opponents, including journalists, by force. State-controlled media shed its mask, revealing itself as a vehicle for lies and incitement. While many remained intimidated, however, some journalists flourished in the space opened up by the regime's loss of control, as secret police redeployed from monitoring interviews in cafés to battling for control of the streets."[236]

B. Classification and ranking of ESCWA member countries according to maturity level

ESCWA member countries are categorized in relation to media development, with the first maturity level being the lowest and the fourth maturity level the highest. This categorization in maturity levels is based on the aforementioned overview, especially the recent reports of the RWB PFI, which provides press freedom ranking for the 17 member countries, and the IREX MSI, which provides media sustainability ranking for ten member countries.

1. Maturity level 1: The Sudan, Syrian Arab Republic and Yemen

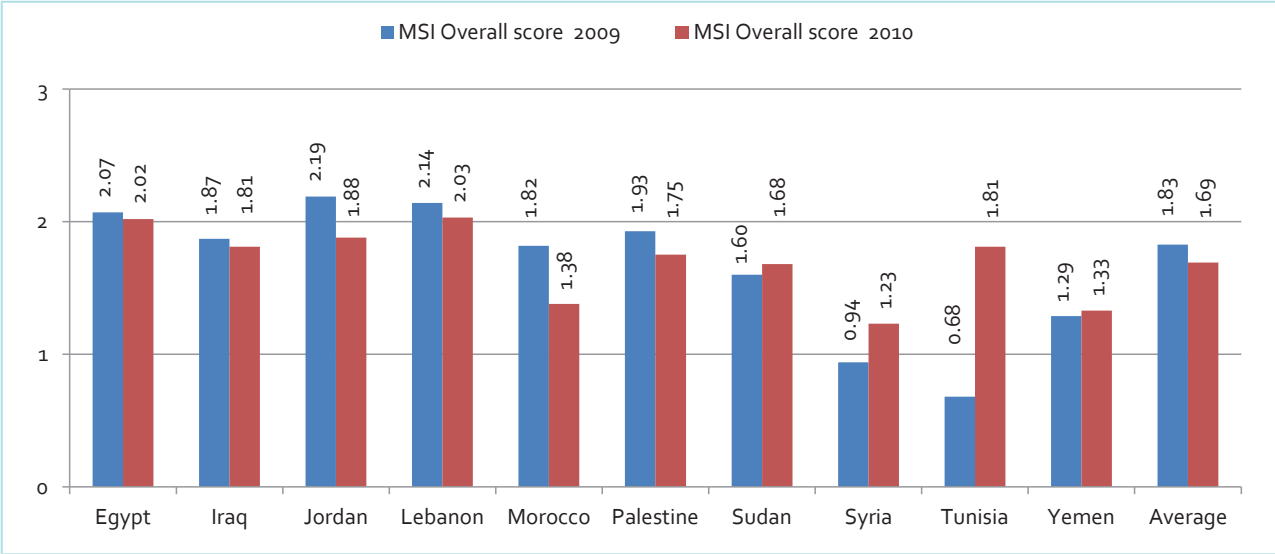
Countries ranked at this level have laws that restrict press freedom and hinder independent

TABLE 51. Ranking of selected Arab countries on the Media Sustainability Index (MSI), 2010-2011

Country	Free speech	Professional journalism	Plurality of news sources	Business management	Supporting institutions	Overall score	MSI ranking
Lebanon	1.99	2.04	2.41	2.05	1.64	2.03	2-3 near sustainability
Egypt	1.62	2.09	2.21	1.89	2.27	2.02	
Jordan	1.84	1.79	2.45	1.35	1.94	1.88	1-2 unsustainable mixed system
Iraq	1.76	1.98	2.20	1.37	1.75	1.81	
Tunisia	1.89	1.71	2.06	1.33	2.06	1.81	
Palestine	1.62	1.84	2.10	1.41	1.80	1.75	
Sudan	1.66	1.75	1.89	1.47	1.61	1.68	
Morocco	1.10	1.54	1.40	1.35	1.49	1.38	
Yemen	1.34	1.55	1.19	1.07	1.51	1.33	
Syrian Arab republic	0.97	1.76	1.21	1.16	1.05	1.23	
Average	**1.58**	**1.81**	**1.91**	**1.45**	**1.71**	**1.69**	

Source: IREX, 2010.

FIGURE 13. Ranking of selected member countries based on the MSI overall score, 2009-2010



Source: IREX, 2009.

press and have weak professional journalism and business management. The MSI scores of the two countries in this level, namely Syrian Arab Republic and Yemen, are at the bottom of the list of the MSI score 1-2. Despite the slight increase in the MSI score for Syrian Arab Republic in 2010/11, which was designated to maturity level 2 in the previous profiling, the current conflict situation in the country repressing media and restricting free press was mainly behind its ranking at this level.

2. Maturity level 2: Bahrain, Egypt, Iraq, Libya, Morocco, Oman, Palestine, Saudi Arabia, and Tunisia

Countries attaining this maturity level have some laws and legislations that go against press freedom in spite of relative improvements in media freedom and journalistic professionalism. Overall, the MSI score for Iraq increased from 2008 to 2009, and the rise in MSI was evident in four of the five objectives of the Index, mainly professional journalism, supporting institutions and plurality of news sources.

Libya, Morocco and Tunisia joined ESCWA in 2012 and were considered in this report and allocated to this level based on their scores in the RWB PFI. Egypt was kept at this level in view of its RSF PFI rank and in spite of its MSI rank of near sustainability.

3. Maturity level 3: Jordan, Kuwait, Lebanon, Qatar, and United Arab Emirates

This maturity level indicates clear improvements made towards an independent media and its governing laws, as well as existence of legal and professional standards that define a general framework of freedom for the media. The countries at this maturity level have an overall MSI score that ranks them within the near sustainability level (MSI 2-3). Jordan was considered to be at this maturity level in view of the slight increase in two of the MSI objectives, namely plurality of news sources and business management.

4. Maturity level 4: None

None of the ESCWA members has been categorized at this level for 2013. This level indicates that countries have professional journalism and a high degree of press freedom

TABLE 52. Ranking of ESCWA member countries by maturity level of the Media

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain				■	■	■						
Egypt				■	■	■						
Iraq	■				■	■						
Jordan				■				■	■			
Kuwait							■	■	■			
Lebanon							■	■	■			
Libya*						■						
Morocco*						■						
Oman				■	■	■						
Palestine				■	■	■						
Qatar							■	■	■			
Saudi Arabia				■	■	■						
Sudan	■	■	■									
Syrian Arab Republic			■	■	■							
Tunisia*						■						
United Arab Emirates							■	■	■			
Yemen	■	■	■									

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2011 as they joined ESCWA in 2012

with existing laws that protect independent press.

Table 52 provides the records of maturity-level rankings of ESCWA member countries in the last three cycles of the report.

C. Suggestions and recommendations

(a) Call upon governments to amend the laws and legislations that govern the media sector and its professions in such a way to ensure that the press freedoms are well protected and the sector is governed in accordance to the international laws;

(b) Build the capabilities of unions in the media sector so that they have better stand in opposing the violations against journalists and lobbying for freedom of expression and against censorship and government control over the free Internet resources;

(c) Empower women to take part and have a more influential role in the media sector through promoting equal professional job and training opportunities;

(d) Promote periodic field research that analyses the media sector and shares the results of

this research with the public in order to raise awareness on the best means and practices needed for the development of a free and professional media system that has a key role in the information society;

(e) Strengthen access to both traditional and new media systems in remote areas and for marginalized communities, and support this access with educational programmes that complement education services in rural areas.

X

Regional and international cooperation

X. Regional and International Cooperation

When addressing regional and international cooperation in the field of ICT, one must be aware that some ICT issues have to be addressed in a cross-border fashion, as opposed to nationally. By definition, such issues as ICT superstructure, namely satellite technologies and peaceful uses of outer space, and digital content on the Internet must be tackled in a cooperative manner, transpassing national borders and jurisdictions. The successful implementation of the information society, for example, requires cooperation among all stakeholders at both international and regional levels, especially in operations, financing and implementing ICT development and in devising plans of actions for building the information society. The objective of this chapter is to shed light on existing levels of regional and international cooperation in the ICT field, and to provide some recommendations on how to boost such cooperation for the betterment of societies in order to reach the noble goals of knowledge economy and knowledge society.

To achieve such objectives, it is important first to outline the key players of such cooperation. The key players are the Arab countries operating through their national and regional governments who also utilize the services of many regional and international organizations specialized in the various economic, social and political arenas. It also includes cooperation with such key players as national NGOs, unions, associations, and leagues, in addition to private sector institutions. Chief examples of such entities operating at the regional level are the League of Arab States, GCC, the Islamic Development Bank (IDB), Arab development funds, and professional associations.

To this end, one of the primary missions of ESCWA is to promote regional and international cooperation in the various ICT accounts. Much of the work done nationally is entrusted to the national governments, as it falls under national jurisdictions and national sovereignty. The following describes the type of initiatives and activities that ESCWA is presently undertaking to promote cooperation among Arab countries in the ICT arena.

A. ESCWA initiatives towards cooperation and regional integration

Ten years separate the preparation and writing of this report from the first phase of WSIS in Geneva. The 2003 Summit set forth the principles of a just, equitable and inclusive information society and identified international and regional cooperation as one of its mainstays. The main insight of the eleventh principle of the Geneva Declaration is that humanity is interdependent and that cooperation is mutually beneficial to the donor and the receiver. It entices governments, the private sector, civil society, international financial institutions, and other stakeholders to fund and cooperate on initiatives that would result in the transfer of knowledge, more specifically, knowledge that is related to ICTs, to developing countries, LDCs and countries with economies in transition.

TABLE 53. ESCWA regional activities and initiatives in the field of ICT4D in the Arab region

Activity/initiative	Current and potential partners
Global Internet Governance Forum (IGF) and ESCWA involvement	IGF, League of Arab States, NTRA of Egypt
DAC	League of Arab States, Arab countries
Cyberlegislation	League of Arab States, Arab Administrative Development Organization (ARADO), Economic Commission for Africa (ECA), United Nations Office on Drugs and Crime (UNODC)
Profiling the information society in the Arab region	Partnership on Measuring ICT for Development, Arab countries
Networking science, technology and innovation (STI) in the Arab region	ESCWA Technology Centre (ETC), Arab countries, Royal Scientific Society (RSS) Jordan
Academy of ICT Essentials for Government Leaders in the ESCWA Region (AIGLE)	Economic and Social Commission for Asia and the Pacific (ESCAP), ECA
Arab e-Government Council	League of Arab States, Arab e-government programmes
Space and satellite technologies for development (SST4D)	United Nations Office of Outer Space Affairs (UNOOSA), Academia

Source: ICT Division, ESCWA.

Many ESCWA initiatives are carried out in cooperation with regional and international entities. The main partners of ESCWA are the governments of the Arab region, the League of Arab States, other United Nations regional commissions, United Nations specialized agencies and programmes, national and regional NGOs, as well as a host of players and stakeholders from the private sector. The sections below list the main ESCWA activities in the ICT for development (ICT4D) field and describe the regional cooperation component in it. This list covers the cooperative activities that were carried out in the Arab region during 2012 and 2013. These activities engage collaborators in combinations that include two or several of the players and stakeholders mentioned above.

1. Global IGF and ESCWA involvement

Realizing the importance of Internet governance issues that were not resolved during the two phases of the WSIS, the United Nations Secretary-General launched, in 2006, the IGF as a global multi-stakeholder platform for bottom-up policy dialogue on key global public policy. In light of the value brought forth by the IGF on the international, regional and national levels, the first IGF mandate of five years (2006-2010) was renewed for another five years (2011-2015).[237]

ESCWA has been active in the global IGF annual meetings (from 2006 to 2012) through organizing session and/or delivering presentations on ICT-related activities. In that context, ESCWA has been forging close collaboration with the League of Arab States in preparation for the fourth global IGF that took place in Sharm El-Sheikh, Egypt, in 2009, during which the ESCWA flagship publication on "Internet Governance: Challenges and Opportunities for the Arab region" was launched. Furthermore, this collaboration with the League of Arab States led to the development of the "Arab Dialogue on Internet Governance" (ArabDIG), a regional initiative for a multi-stakeholder dialogue on Internet governance issues that are most relevant to the region. ArabDIG resulted in the adoption of the joint ESCWA-League of Arab States "Arab Regional Roadmap for Internet Governance: Framework, Principles and Objectives" and the issuance of the "Call of Arab Stakeholders", both in Beirut in October 2010, requesting the League of Arab States and ESCWA to launch an "Arab IGF" process, similar to processes ongoing in other regions of the world.

(a) The establishment of the Arab IGF process

By 2011, more than ten regional IGFs were established in Europe, Asia, Latin America and

Africa and had proven to be valuable vehicles to reflect the regional position at the global level. Joint ESCWA-League of Arab States efforts to respond to the Call of Arab Stakeholders eventually led, in February 2012, to the establishment of the Arab IGF process, as a four-year process (2012-2015) in its first mandate, to act as a bottom-up decentralized platform for inclusive policy consultations that involve all relevant stakeholders.

In the first year of its establishment, the main partners convened the first annual Arab IGF meeting, Kuwait, 9-11 October 2012, that was held under the joint umbrella of ESCWA and the League of Arab States, and under the theme "Better Internet for a Better Arab World", which was attended by around 300 experts and participants from the Arab region. The meeting was widely acclaimed both at the global and regional levels and resulted in the establishment of several thematic regional dynamic coalitions on specific high-priority policy issues. These dynamic coalitions will meet yearly under the umbrella of the Arab IGF.

The annual Arab IGF meeting of 2012 was a milestone of the process followed by three more annual meetings from 2013 to 2015, of which the second took place between 1-3 October 2013 in Algeria. The agenda of the annual meetings is set by the bottom-up Arab Multi-stakeholder Advisory Group (AMAG) comprising around 30 renowned experts from the Arab region. Under the umbrella of ESCWA and the League of Arab States, periodical AMAG meetings are scheduled every year for the preparation of the annual Arab IGF meeting as well as for the follow-up on the process itself. AMAG is currently considered as an integral part of the process, while ESCWA and the League of Arab States are the founders and umbrella organizations for this process. To further support its efforts in the Arab IGF process, ESCWA adopted, at its 27th Ministerial Session, resolution 306 (XXVII), entitled "Development of the Arab IGF process and sustaining efforts in the Arabic domain names field".

(b) The Arab IGF as a platform for regional integration

The Arab IGF is by nature a non-decision based platform for open dialogue amongst stakeholders without the need for any binding recommendations. It falls within the frameworks of the ESCWA-League of Arab States Arab Dialogue on Internet Governance initiative as well as ESCWA's overall mandate to work towards the development of knowledge-based economies in the region and the formulation and implementation of related policies and strategies. The importance of the Arab IGF process to ESCWA is that it will facilitate implementing the programmes of the Arab Regional Roadmap for Internet Governance that identify the needs and priorities of the Arab region, and will seek to build capacity and raise awareness amongst the stakeholders in Arab countries on specific related thematic issues, including regional peering, Arab domain names, child online protection, as well as other topics where there is a considerable lack of relevant policies to govern.

2. Regional initiative on digital Arabic content

ESCWA realized the importance of the Arabic language online as one of the main pillars for building a knowledge-based economy and providing investment opportunities in the field of ICT in the Arab region. Accordingly, ESCWA launched the regional "Digital Arabic Content (DAC) Initiative"[238] in 2003, which led to a series of activities, including two studies: Enhancing Arabic Content on Digital Networks (2003); and Digital Arabic Content: Opportunities, Priorities and Strategies (2005). ESCWA also implemented, between 2008 and 2010, a project on the "Promotion of the Digital Arabic Content Industry through Incubation", which included organizing awareness campaigns on the importance of DAC and its industry and launching national DAC competitions for young entrepreneurs. A number of studies related to the status of the DAC industry, its future perspectives and the DAC business models were published in the framework of this project. These studies are highly relevant to entrepreneurs, government and private sector.

In 2012, ESCWA launched a new phase of its project on the "Promotion of the Digital Arabic Content Industry through Technology Incubators".[239] This project aims at increasing awareness on the importance and potential of DAC industry and encouraging young entrepreneurs to create start-up and SMEs in this field. It also aims at addressing the main challenges of DAC industry, especially those related to the ecosystem of innovation and entrepreneurship in the Arab countries. In the framework of this project, ESCWA published two studies, the first on "The Status of DAC Industry in the Arab Region"[240] and the second on "Business Models for Digital Arabic Content".[241] ESCWA, in collaboration with selected incubators in Arab countries, launched, in 2013, a number of national DAC competitions targeting entrepreneurs and university graduates aspiring to build novel DAC applications and products while paying attention to new trends and technologies. Winners of the competition will receive, as award, incubation at partner business incubators in the Arab region. ESCWA secured several partnerships with national business incubators, entrepreneurship and innovation centres, and universities in participating Arab countries, including the Palestinian Information and Communications Technology Incubator (PICTI) in Palestine, the Berytech incubator in Lebanon, the technology incubator at the University of Aden in Yemen, the iPARK Technology Hub in Jordan, the Syrian Computer Society – Information and Communications Technology Incubator (SCS-ICTI) in the Syrian Arab Republic, and the Mine Knowledge incubator in Oman. ESCWA's partners have themselves approached other national partners to form a multi-stakeholder partnership for implementing the initiative at the given country.

It is worth noting that DAC has been receiving notable attention in the past few years as evidenced by national and regional efforts for its enhancement and development. A few examples of regional cooperation are as follows:

(a) Events: The Connect Arab States Summit, which took place in 2012, included DAC as one of its priority areas for the Arab region;

(b) Government initiatives: National initiatives have had regional implications for developing and supporting DAC. Such initiatives include the King Abdullah Initiative for Arabic Content in Saudi Arabia[242] and the Arabic language initiatives in the United Arab Emirates;[243]

(c) Community: Community-driven DAC development has also been based on such multi-stakeholder partnerships as Taghreedat's activities and its wide network of partners; [244]

(d) Private sector: DAC applications and products are also quite evident in such entrepreneurship support platforms as the ArabNet[245] conference and Wamda.[246]

3. Regional harmonization of cyberlegislation to promote the knowledge society in the Arab world

Between 2009 and 2012, ESCWA implemented a project on the "Regional Harmonization of Cyberlegislation to Promote the Knowledge Society in the Arab World"[247] to enhance regional integration and strengthen the capacity of member countries in drafting and enacting comprehensive cyberlegislation. The project came at a point at which Arab countries were in need of modernizing their legal and regulatory frameworks to meet the requirements brought forth by adopting ICTs in various fields and the use of cyberspace in daily life. A number of activities took place during the project that serve this aim, including regional workshops, customized national capacity-building workshops, expert meetings, and seminars. The project also entailed the provision of relevant and customized advisory services to six Arab countries that had observable impact and results and required close collaboration with such government institutions as ministries of justice as well as ICT-relevant ministries and authorities.

The most prominent output of the project were the "ESCWA Cyberlegislation Directives", [248] which include

research papers, explanatory notes and cyberlaw models on the following six themes: e-communication and freedom of expression; e-signature and e-transactions; e-commerce and consumer protection; personal data protection; cybercrime; and intellectual property in the cyberspace. The Directives thus target governments and decision makers in the Arab countries, legal experts including lawyers and judges and academic and research personnel. The process during which the Directives were developed entailed collaboration with qualified legal experts and extensive research that covered the most notable regional experiences, including that of the European Union, as well as regional and international references which were customized to suit the Arab region. ESCWA also evaluated the status of cyberlegislation in 18 Arab countries and published four reports as well as six comparative tables summarizing this status in line with the ESCWA template for cyberlegislation[249] that was prepared earlier by ESCWA.

Collaboration with regional and international organizations was an essential aspect while implementing the project. The most notable is the collaboration with the League of Arab States on a number of activities and targeting the adoption of the Directives at the ministerial level. The Council of Arab Ministers of Justice recommended at its 27th session (Cairo, 2012) the continuation of cooperation between the Executive Bureau of the Council and ESCWA on legal matters for developing and harmonizing cyberlegislation in the region. One of the ESCWA workshops within this project was in collaboration with the League of Arab States, and it was implemented on 18-19 March 2012.[250] Furthermore, a Steering Committee was established to provide overall guidance to the project and its future aspirations. Through its membership, the Steering Committee reflected collaboration on the regional and international levels. Its members included the Council of Arab Ministers of Justice of the League of Arab States, ITU, ARADO, and ECA. The project also made way for collaboration with such sister United Nations organizations as UNODC doing similar or relevant work in the field of cyberlegislation and cybercrime.

It is worth noting that ESCWA collaborated extensively with its member countries in the area of cyberlegislation and provided many national customized workshops and advisory services based on ESCWA cyberlegislation directives to respond to the specific needs of these countries. ESCWA organized national workshops in collaboration with local partners in the following countries: Algeria, Bahrain, Lebanon, the Sudan, and United Arab Emirates. Furthermore, ESCWA provided advisory services to Algeria, Bahrain, Jordan, Oman, Palestine, and Syrian Arab Republic, and these advisory services were not limited to the revision of one law per country but rather covered several laws and provided beneficiary countries with a package of comments, analytical identification of gaps and room for improvement, and in some cases, draft legal texts. All the organized workshops and the offered advisory services were based on the ESCWA Cyberlegislation Directives.

To improve the international outreach of the project and share the Arab experience at the global level, ESCWA developed the Cyberlegislation Digest, in English, to summarize the project's activities and outcomes as well as give an overview of the ESCWA Cyberlegislation Directives,[251] and recently in 2013, ESCWA published a policy statement related to the development and the harmonization of cyberlegislation in the Arab countries.

4. Profiling the information society in the Arab region

Profiling the information society in the Arab region began in 2003 as a sequel activity to the Western Asia Preparatory Conference to the WSIS. The need to profile member countries in selected information society areas was deemed a prerequisite for establishing national and regional plans for building the information society. Since then, and over the course of ten years, two main activities were carried out every biennium, namely: preparing a set of national profiles of the information society in every member county in collaboration with a government national focal point; and publishing a regional profile report which has become the flagship

publication of the ICT division for the past ten years.[252]

Six editions of national and regional profiles of the information society have been published by ESCWA within the framework of follow-up activities to the WSIS outcomes and in accordance with its main action lines. These profiles describe the current situation and the progress made in every member country and the region in building the information society, and assist decision makers in devising information society strategies and laying out national plans of action. Moreover, the profiling exercise allows national authorities to compare their current status with that of other countries in the region in order to promote opportunities for cooperation and regional integration in an increasingly knowledge-based global economy.

5. Networking science, technology and innovation in the Arab region

In 2011, ESCWA established the ETC, a regional technology centre for development in Jordan, within El Hassan Science City in Amman as an incubator and host organization. It is the one and only duty station of ESCWA outside of Lebanon. The main objectives of ETC are to coordinate and network national centres of excellence in STI in the Arab region, and promote technology transfer to and among ESCWA member countries, aiming at eliminating any duplicate or redundant effort as well as identifying the gaps in the STI ecosystem at the regional level.

ETC is mandated "to foster synergy and complementarity at the regional level in the application of technology", among relevant institutions and stakeholders in the ESCWA member states. The following has been achieved since its inception two years ago:

(a) A study was conducted to analyse the strengths, weaknesses, opportunities, and threats (SWAT) of STI that is core to suggest and facilitate partnerships within the region based on evidence. This will help build strategies for complementary activities and find the right partnership opportunities within the area;

(b) Based on the Annual Ministerial Review Meeting 2013 of the United Nations Economic and Social Council (ECOSOC) on STI and the role of culture in sustainable development, and following the regional preparatory meeting ETC hosted in November 2012, a thematic group from such United Nations agencies as UNESCO, the Department of Economic and Social Affairs (DESA), the United Nations Environment Programme (UNEP), the United Nations Entity for Gender Equality and the Empowerment of Women (UNWOMEN), UNCTAD, and others was formed to align the outcomes of the regional meeting with the United Nations regional activities;

(c) ETC provided technical advisory services to SIRB, an Angel investors network establishd as an initiative of KACST in Saudi Arabia, through the El Hassan Business Park (EHBP) of Jordan;[253]

(d) In serving the Saudi Arabian advisory request for King Abdullah City for Atomic and Renewable Energy (KACARE), ETC reviewed the innovation hub track plans and injected proposed innovation relevant to KACARE energy plans from within the region, namely Jordan, Lebanon and others;

(e) Serving a request on the "Establishment of a Technology Transfer Office at the Sidi Mohammad Bin Abdulla University in Fes, Morocco" in May 2013, ETC deployed EHBP-relevant experiences;

(f) ETC facilitated the hosting of the Green Help Desk by theNational Energy Research Centre (NERC) at the Royal Scientific Society of Jordan implemented by the Sustainable Development and Productivity Division in ESCWA;

(g) ETC facilitated three intellectual property review contracts, two between the national Intellectual Property and Commercialization Office of Jordan and Khayal Production in Qatar, and one between the national Intellectual Property and Commercialization Office of Jordan and the Industrial Research Institute in Lebanon;

(h) ETC co-organized with EHBP and the Licensing Executives Society of Arab Countries a commercialization tour to match 34 local technology SMEs with 18 regional investors in Egypt, Jordan, Lebanon, and Palestine. Eleven business transactions were initiated at regional level.

6. Academy of ICT Essentials for Government Leaders in the ESCWA Region

The project of AIGLE was initiated and approved in 2011; it is aimed at building capabilities in the region. The implementation of the AIGLE project started in February 2013 for a three-year period. The Academy will help ESCWA member governments enhance capacities to create and sustain an environment that promotes the transition towards a knowledge-based economy.

For the implementation of this project, ESCWA is building upon lessons learned and the achievements of a similar academy by the United Nations Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT). ESCWA is developing a structured and comprehensive ICT training curriculum, consisting of core modules that will be disseminated to governments through their public training institutions.

7. Arab e-government council

ESCWA, through its ICT Division, is finalizing a proposal to establish a council for Arab e-government programme directors. The objective is to provide a platform to coordinate efforts of e-government programmes in the Arab countries and to synergize the know-how, expertise and success stories among them. The aim is to provide a forum for high-level policymakers in the area of national and regional e-government services in order to share knowledge and data. Historically, Arab countries were sharing databases on a bilateral mode only. Given the huge scale at which labour, goods and services cross borders among Arab countries, such a council, once established, shall render great services to government planners for improved government services and e-services for the well-being of citizens and netizens. At this time, the ESCWA ICT Division is finalizing a proposal for the Arab e-government council that will be discussed with all stakeholders, including heads of e-government programmes in the Arab countries, in an upcoming event that will be organized by ESCWA.

8. Cooperation on space and satellite technologies for development

The area of SST4D is a potential focus area of regional cooperation that could bring about benefits to sustainable development in the Arab region and enhance the life of its people. The area of space activities and peaceful uses of outer space (PUOS) is being addressed by the United Nations Office for Outer Space Affairs (OOSA)and has a unique platform for international cooperation that is represented by the Committee on the Peaceful Uses of Outer Space (COPUOS) and reports to the General Assembly. COPUOS consists of 74 members that include eleven Arab countries, namely Algeria, Egypt, Iraq, Jordan, Lebanon, Libya, Morocco, Saudi Arabia, the Sudan, Syrian Arab Republic, and Tunisia. Furthermore, the Centre for Space Science and Technology, which is affiliated with the United Nations, was established in Jordan in 2012.

Furthermore, the Arab region is in need to strengthen regional cooperation on SSTs amongst the various stakeholders towards developing an enabling environment that governs and facilitates the peaceful uses of space technologies and available information within the region's development process and efforts. To explore the opportunities available through space technologies, services and applications to the Arab region, ESCWA seeks to include in its 2014 work plan, and beyond, activities that follow up on recommendations by COPUOS and related conferences, enhance cooperation on SSTs and contribute to the region's efforts towards sustainable development and attainment of the development goals. The regional cooperation towards harnessing the information and services of outer space activities to the benefit of the Arab region could cover numerous topics. The table below provides an array of topics under the term PUOS.

B. Suggestions and recommendations

During the last decade, the Arab region has made tangible progress in the area of ICT. Yet, much needs to be done in light of the pace of technological advancement worldwide in the ICT field. More has to be done also to meet the huge demand for ICT services among the Arab citizens and contribute to the bridging of the digital divide. Following are some suggestions and recommendations for policymakers and other stakeholders in order to advance this important field of regional and international cooperation even further:

(a) Encourage the Council of ICT Ministers of the Arab League to take more bold steps to advance cooperation between the Arab countries in the ICT4D field; and take steps to strengthen regional cooperation in the field of ICT development through the involvement of such organizations as the League of Arab States and ESCWA;

(b) Attract the attention of Arab funds to invest in ICT-related projects and initiatives, especially those of regional nature, on the grounds that ICT is a key player in generating growth and providing Arab youth with employment opportunities;

(c) Develop a coordinated approach to regional issues of common concern among member countries, including the areas of international telecommunication, Internet governance, digital Arabic content, and cybersafety;

(d) Promote the establishment of a regional network for information-sharing by stakeholders in the region, creating communities of practice for sharing expertise, especially in education, ICT capacity-building and cyberlegislations and create new and advance already existing observatories on the various ICT issues related to policymaking;

(e) Establish an Arab e-government council composed of Arab heads of e-government programmes in order to provide a platform for cooperation and exchange of know-how and expertise;

(f) Develop an Arab scheme for cross-border Internet and mobile services with schemes for price levelling, especially pricing of roaming services; and develop a cross-border IXP that services the region and helps lower the cost of Internet traffic;

(g) Encourage Arab countries to fill, add and update their entries in the WSIS Stock Taking to reflect the progress made in building the information society.

Finally, it is important to indicate that many regions of the world have made substantive breakthroughs in the area of ICT regional cooperation. This was done on grounds of mutual interest, rather than national pride or ideological agenda. When it comes to ICT, progress is measured both at the national as well as the regional levels. Many of the Arab ICT files are better off if they are handled through regional cooperation, as was illustrated in this chapter.

TABLE 54. Selected examples of satellite technologies for development

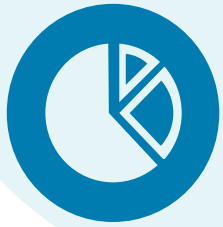
Early warning systems: hurricanes, tsunamis, earthquakes, etc.	Telecommunication services: radio, TV, VSAT, data, roaming	Online and transnational databases
Tele-education, Tele-health	Pandemic warning	Security alerts
Air and marine traffic control	Land and water management	Forestry and farming
Fire detection and mitigation	Location of fish and wildlife	Natural resources management
National defense	Location-based services	Weather and flood forecasts
Space photography and mapping	Land survey and land rights	Support to space programmes

Source: Compiled by ESCWA.

XI

Building the ICT sector

XI. Building the ICT Sector



The frequent advances and changes in the field of ICT require a periodical revision of the definition of the ICT sector in order to include new products, services and processes. In 1998, member countries of the Organisation for Economic Co-operation and Development (OECD) agreed to define the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically.[254] This activity-based definition of ICT is the most widely used in the ICT community, and it was reviewed in April 2002 to reflect the constantly changing nature of the sector. In this more recent definition, the ICT sector combines the manufacturing and provision of goods and services that are related to electronic data capturing, transmission and display, including, among others, computers, peripherals, software, radios, and televisions.

Compared to other economic sectors, the ICT sector in the Arab region is still considered as a young and primarily imports-driven sector: Arab countries are net importers of ICT goods and, despite some undeniable success stories, still marginal players in the worldwide IT services sector. Despite the fact that little is known about the ICT sector as a stand-alone economic sector in the region, its growth depends on enabling environment available to the whole economy, including public and private-sector facilitations and incentives.

A. Comparative analysis

1. Government facilitation

Generally speaking, the main challenges impeding the development of a competitive ICT sector include such barriers as the lack of government incentive programmes, uneven ICT access among areas and regions, inadequate ICT infrastructure, lack or weak regulatory environments, immature financing mechanisms, weak competitiveness, economic constraints, and overall weak conditions for doing business in the country.

To measure this environment, the World Bank and the International Finance Corporation (IFC) introduced the Ease of Doing Business Index,[255] to rank government economies and to compare rules and regulations among 185 economies each year (where 1 = most business-friendly regulations). Transparent and adequate rules and regulations are considered as prerequisite to any efficient economy and market activity.

The efficiency of such regulations is measured by their clarity which helps avoid any distortion leading to unreasonable costs on business, as well as by their capacity to protect public interests. Moving to such environment is still far from complete in the Arab world, as was mentioned clearly by the World Bank and the IFC in their special co-publication published in 2012,[256] comparing regulations for domestic firms in 20 Arab countries.

Using ten indicators, the publication built upon the Ease of Doing Business Index, which

TABLE 55. Ranking of selected Arab countries on the World Bank Ease of Doing Business Index, 2011-2012

Country	Rank 2011	Rank 2012	Net change
Saudi Arabia	23	22	1 ↑
United Arab Emirates	29	26	3 ↑
Qatar	40	40	0 ↔
Bahrain	39	42	3 ↓
Oman	47	47	0 ↔
Tunisia	45	50	5 ↓
Kuwait	77	82	5 ↓
Morocco	93	97	4 ↓
Jordan	105	106	1 ↓
Egypt	110	109	1 ↓
Lebanon	112	115	3 ↓
Yemen	101	118	17 ↓
Palestine	135	135	0 ↔
Yemen	140	143	3 ↓
Syrian Arab Republic	137	144	7 ↓
Algeria	150	152	2 ↓
Iraq	163	165	2 ↓

Source: http://data.worldbank.org/indicator/IC.BUS.EASE.XQ.

benchmarks economies and highlights changes in the regulations applying mainly to SMEs during their life cycle. The study highlighted that, against the backdrop of the Arab Spring, governments in 13 out of 20 Arab economies implemented regulatory reforms in the past year aimed at improving the business environment for local entrepreneurs. It also concluded that the Arab region breaks away from a general global trend where efficient regulatory processes often go hand in hand with stronger legal institutions and property rights protections. In the Arab region, regulatory processes have improved on average over time, particularly in such areas as business start-ups, but legal institutions which are expected to protect investors and enforce contracts are relatively weak compared to those in other regions. At the global level, six Arab countries, namely Saudi Arabia, United Arab Emirates, Qatar, Bahrain, Oman, and Tunisia are ranked among the top third in the Ease of Doing Business Index.

In this context, it is worth mentioning that in the last five years, Saudi Arabia has climbed from rank 67 to 22 due to the efforts exerted its Government to improve the business environment of its institutions, including reforms and regulatory improvements that have eased the doing-business climate for investors and firms. With respect to market efficiency, Qatar has also brought improvements in recent years in terms of the ease-of-doing business, with a new Commercial Companies Law aimed at simplifying the procedures required for the establishment of commercial enterprises.[257] In line with this, access to credit and trading across borders has improved over the past few years. At the lower end, a significant decrease in ranking has materialized in Yemen, due mainly to the fact that Yemen is one of the Arab Spring countries in the region that suffered and is still suffering from significant economic and political damage. This is also the case for the Syrian Arab Republic, which fell by seven ranks from 2011 to 2012, due to the political instability in the country.

At the regional level, while reforms carried out over the last years have improved the ease-of-doing business in selected, essentially high-income, GCC countries, market structure and institutional reforms still need to be accelerated to enhance competitiveness, efficiency and productivity. In this context, policies should focus more on improving governance and creating incentives for the private sector working in the ICT field, which would lead to a great increase in jobs and employment opportunities, particularly for young entrepreneurs in the ICT sector.

2. Contribution of the ICT sector in the national economy

In most advanced knowledge-based economies, the ICT sector is considered as one of the most dynamic economic sectors, and its importance does not stop to increase. The high potential for growth in this sector offers significant socioeconomic opportunities. Together with three other concurrent pillars, namely innovation, education and quality of institutions, the ICT constitutes one of the four founding pillars in any national economy in transition towards a knowledge-based economy.

The ICT sector in the Arab region has witnessed some progress in the past decade. However, despite great efforts made by governments and the private sector to develop the ICT sector as a stand-alone productive sector, reliable and consistent indicators to measure its contribution to the economic growth at national level are still missing.

(a) Telecommunications investments and revenues

Research shows that the impact of the ICT sector goes across all economic sectors, and the investment in ICT is currently associated with economic benefits including lower costs, better productivity, new and innovative economic opportunities, and job creation. This can be added to the positive social impact that the ICT can have on health, education and other sectors by providing better services and strengthening social cohesion. To illustrate the progress of this revolution, the "Little Data Book on ICT" of ITU and World Bank provides comparable statistics on the ICT sector

TABLE 56. Telecommunications revenues in selected Arab countries, 2010-2011

Country	GDP 2010 (Billions of US$)	Telecommunications revenue World Bank data 2010 (Ppercentage of GDP)	Telecommunications revenue World Bank data 2011 (Percentage of GDP)
Bahrain	22.95	4.4	4.2
Egypt	218.89	3.2	2.9
Jordan	26.43	5.9	5.9
Morocco	90.77	4.7	4.6
Oman	57.85	3.5	2.5
Qatar	127.33	1.6	1.1
Saudi Arabia	450.79	3.8	3.0
Sudan	64.79	11.7	2.9
Syrian Arab Republic	59.15	3.2	3.1
Tunisia	44.38	3.9	3.9
United Arab Emirates	297.65	3.6	2.1
Yemen	31.88	3.3	3.3
Arab average		**4.4**	**3.3**
World average		**2.7**	**2.6**

Source: World Bank, 2013a.

based on indicators covering the economic and social impact context. To measure the contribution of the ICT sector to the national economic growth, the analysis in this section will be based on two main indicators that measure the ICT sector efficiency and capacity, namely telecommunications revenue and investment.

During the 2010-2011 period, revenues from the telecommunication sector have witnessed an important growth in the majority of the ESCWA member countries, with an average increase from 3.5 per cent in 2008[258] to 4.4 per cent in 2010 as a percentage of the GDP. With this contribution, the average of the Arab region exceeds the world average estimated at 2.7 per cent in 2010. In this context, it is essential to notice that the main reason behind this high-level revenue is the proliferation of telecommunication services, including fixed line, mobile and data in the Arab region. It is also worth mentioning that mobile services, both voice and data, represent most likely the biggest share of this revenue in almost all Arab countries. This was confirmed by the data provided by the AAG in its national reports on "Telecommunications Market Indicators and Projections" published for the years 2012-2013.[259]

A closer look at the national level of most countries reveals a slight decrease in the telecommunications revenues as a percentage of the national GDPs, from 2010 to 2011. In 2011, Jordan was ranked first with nearly 6 per cent, followed by Morocco with 4.6 per cent and Bahrain with 4.2 per cent. It attracts attention that, in the Sudan, this rate dropped drastically from approximately 11.7 per cent in 2010 to 2.9 per cent in 2011, which is mainly due to the turbulence and political instability accompanying the independence of South Sudan in 2011 as a separate state.

With reference to the investment in the telecommunication sector, data for only nine ESCWA member countries is available in the World Bank databases. This data shows that the total budget invested in telecommunication in the nine countries reached US$5.6 billion in 2010 and decreased to US$3.5 billion in 2011. This decrease from 2010 to 2011 is due to the enormous reduction in invested budget in Egypt and Tunisia, which is mainly attributed to the uprisings and the political situation in the mentioned countries. Despite this decrease in invested budget, Egypt ranked first among the selected countries with a value close to US$1 billion invested in the telecommunication sector in 2011. In terms of evolution in the telecommunications investments between 2010 and 2011, table 57 shows a significant positive growth, namely by 519 per cent and valued at US$306 million, only in Yemen. In almost all other countries, investment in the telecommunication sector decreased.

It is worth mentioning that the Arab uprisings have had negative consequences on investments in general and investments in ICT and the telecommunication sector in particular.

TABLE 57. Telecommunications investments in selected Arab countries, 2010-2011

Country	Telecommunications investments 2010 (Thousand US$)	Telecommunications investments 2011 (Thousand US$)
Egypt	2,113,000	980,000
Iraq	456,000	385,600
Jordan	301,000	295,200
Morocco	1,124,000	802,700
Sudan	478,000	382,000
Syrian Arab Republic	65,000	75,000
Tunisia	966,000	181,300
Palestine	47,000	56,600
Yemen	59,000	365,100
Total	**5,609,000**	**3,523,500**

Source: http://databank.worldbank.org/data/home.aspx.

(b) ICT exports and imports

Other World Bank indicators, namely the ICT goods and services imports and exports indicators, are used to monitor the ICT sector contribution to the national economy. ICT goods include telecommunications, audio and video, computer and related equipment, electronic components, and other ICT goods, excluding the software industry, [260] while ICT services include computer and communications

services (telecommunications, postal and courier services) and information services (computer data and news-related service transactions).

Table 58 illustrates ICT goods and services exports and imports in selected Arab countries as recorded by the World Bank database for the period 2010-2011. The figures show that the contribution of the ICT industry to the national economy growth remains very modest in almost all ESCWA countries. In this context, ICT goods considered for exports and imports are those used to perform all tasks related to information processing, data storage and electronic communication, which include telecommunications equipment, computer and other related equipment. The ICT goods exports indicator includes re-exports of foreign goods in the same state as imported.

When comparing the rates of both import and export of ICT goods, it becomes evident that the region fared better on the former indicator signalling that ESCWA member countries should exert more effort to boost the ICT sector in the region. Except for Tunisia, ICT goods imports largely exceeded exports in all ESCWA countries. A closer look at the ICT goods imports and exports indicators reveals an even wider gap for the region: in 2011, it scored an average of 4.19 per cent of the total imports of goods for ICT goods imports, compared to 1.62 per cent of the total of goods exports for ICT goods exports. The 2.75 point imbalance between ICT goods imports and ICT goods exports could be attributed to the weakness of the ICT sector in the region and even the absence of its related industry. In general, the

TABLE 58. ICT goods and services imports and exports in selected Arab countries

	Goods				Services	
	ICT exports (Percentage of total goods exports)		ICT imports (Percentage of total goods imports)		ICT exports (Percentage of total services exports)	
Country	2010	2011	2010	2011	2010	2011
Bahrain	0.25	1.83	2.81	5.79	23.11	27.97
Egypt	0.14	0.16	3.75	3.46	8.77	7.04
Iraq	..	..	..	..	4.51	4.36
Jordan	1.29	1.47	4.26	4.09	..	..
Kuwait	0.30	0.30	6.40	6.40	38.15	35.33
Lebanon	7.11	0.95	2.79	2.34	26.54	47.78
Libya	..	..	..	..	..	..
Morocco	3.77	3.80	5.87	5.90	20.15	20.11
Oman	0.10	0.14	2.40	2.91	24.66	15.01
Palestine	1.35	1.30	2.75	2.80	6.01	6.00
Qatar	..	..	4.28	4.28	..	..
Saudi Arabia	0.11	0.10	7.17	7.20	3.39	2.92
Sudan	..	..	3.30	3.30	25.80	6.28
Syrian Arab Republic	0.02	..	1.10	2.20	1.90	2.50
Tunisia	6.53	7.38	6.31	6.63	8.22	10.76
United Arab Emirates	2.00	2.00	4.50	4.50	..	..
Yemen	0.04	0.01	1.34	0.99	6.66	8.65
Average	**1.77**	**1.62**	**3.94**	**4.19**	**15.22**	**14.98**

Source: http://databank.worldbank.org/data/home.aspx.
Note: Two dots (..) indicate that data are not available.

Arab region as a whole appears as a net importer of ICT goods.

It can be noticed that Tunisia continues to have substantially higher ICT goods export rates than other Arab countries, with a rate of 7.38 per cent in 2011, with a significant increase from 6.53 per cent in 2010.

In Lebanon, a huge decrease in the ICT goods export rate from 2010 to 2011was registered , with a drop from 7.11 per cent to 0.95 per cent, which could be owed to the political situation in Lebanon as well as in the region. For the same indicator, Morocco occupies the second rank in the region, after Tunisia, with a 3.8 per cent rate followed by the United Arab Emirates, with 2 per cent. An important share of ICT goods exports of these three countries includes mainly computers, hardware components, mobile phones, and other peripherals. In the same context, it is worth mentioning that in a number of countries, re-exports are included in the value of exports, and this might explain the relatively high amount of ICT goods exports in Tunisia and the United Arab Emirates due to their role as regional hubs for distribution of ICT products in Africa and the Middle East, respectively.

With regards to the ICT services exports, the situation appears to be in better as the average of ICT services exports for the Arab region is around 15 per cent of the total services exported for 2010 and 2011. It is worth mentioning that tremendous efforts are exerted in some countries in the region to promote the exports of ICT services, including telecommunications services, business network services, teleconferencing, support services, and postal services, as well as computer and information services, which include databases, data processing, software design and development, information systems maintenance, and news agency services. For instance, in 2011, the ICT services exports have been doubled (in one year) to constitute approximately 48 per cent of total Lebanese exported services. In other member countries, the ICT services exports rates continue to make up a significant proportion of the total services exports. This is the case in Kuwait, with 38 per cent for 2010 and 35 per cent for 2011, and in Bahrain, with 23 per cent for 2010 and 28 per cent for 2011. However, in the Sudan, this rate has known a dramatic decrease, from approximately 26 per cent in 2010 to 6.28 per cent in 2011, and this is mainly owed to the political situation and to the secession of South Sudan in 2011.

(c) Employment in the ICT sector

The data available on the employment in the ICT sector refers to the ITU database that provides data related to full-time employees in the telecommunication sector only. However, it is worth mentioning that the figures provided by ITU are rather conservative as they only refer to staff directly employed by the telecommunication operators, without including other employments related to telecommunication services development and distribution, including pre-paid cards distributors and operators of networks. In this context, ITU data will be used as a proxy to analyse the situation of employment related to the telecommunication operators. Table 59 shows that in 13 Arab countries, the number of employees working full time in the telecommunication sector had reached 170,000 recruits in 2010, with almost no growth compared to 2009. Egypt remains at the top of this list with 66,000 employments generated by the telecommunication sector. Saudi Arabia ranked second, despite generating only around 23,000 jobs in the field, followed by Iraq and Morocco, with 17,000 and 13,000 workers, respectively.

From a gender perspective, the available data shows that women in the region are starting to take the ICT leap and are gaining entry into service sector employment. In the Arab region, in 2010, the percentage of women employed in the telecommunication sector achieved an average of 24 per cent of the total of full-time workers in the sector. This average is relatively similar in many Arab countries, with such exceptions as Tunisia, where the rate of female employees in the telecommunication sector in 2010 achieved 35 per cent, while in Yemen, it did not exceed 8 per cent for the same year.

TABLE 59. Full-time employment in the telecommunication sector in selected Arab countries, 2010

Country	Female employees		Male employees		
	Number of employees	Percentage of total employees	Number of employees	Percentage of total employees	Total number of employees
Bahrain	700	27	1,870	73	2,570
Egypt	15,551	24	50,405	76	65,956
Iraq	5,497	31	11,967	69	17,464
Jordan	1,171	25	3,568	75	4,739
Oman	866	23	2,967	77	3,833
Qatar	658	26	1,844	74	2,502
Saudi Arabia	..	..	..	..	23,406
Sudan	..	..	..	..	5,700[a/]
Syrian Arab Republic	6,100	..	..	..	6,100
United Arab Emirates	1,841	16	9,496	84	11,337
Tunisia	3,450	35	6,350	65	9,800[b/]
Morocco	3,291	26	9,610	74	9,800[b/]
Yemen	721	8	8,811	92	9,532
Total	**39,846**	**24**	**106,888**	**76**	**175,840**

Source: ITU, 2013.
Notes: [a/] Value from 2008.
[b/] Value from 2009.
Two dots (..) indicate that data are not available.

With reference to the whole number of employments generated by all ICT subsectors, Egypt reported, in 2012, a total number of 215,440 workers with a 4.26 per cent annual growth. This number refers to all workers directly employed by the ICT sector, including employees at Telecom Egypt, Smart Village and Maadi Technology Park, but does not include indirect employees in Internet cafes, IT clubs and workers in special communications centres.[261]

Based on the 2013 National Profile of the Information Society in Yemen, the number of employees in the country is approximately 29,000.[262] Based on the ICT landscape published in 2013,[263] Qatar employed an estimated 27,000 ICT specialists across all sectors, representing 2 per cent of the total workforce in the country. This study also reveals that businesses in Qatar plan to increase this number by 8 per cent in 2013 in an effort towards achieving the goal of doubling the ICT workforce to reach 40,000 employees in 2015.

3. The role of research, development and innovation in the ICT sector

In an effort towards building a competitive ICT sector, ESCWA carried out a flagship study in 2013 that sheds light on innovation and investment in this sector and explores policy measures that could be adopted to improve competitiveness in the region. The publication entitled "Competitiveness of the ICT Sector in the Arab Region: Innovation and Investment Imperatives" looks at innovation as an integrated ecosystem including all main actors, including entrepreneurs, companies, incubators, venture capitalists, business angels, and government agencies. In parallel, the ICT ecosystem is divided into several layers, going from the physical to the logical and from the services to the content layer. A

TABLE 60. World and regional performance on the World Bank innovation system

Region	Innovation System
North America	9.45
Europe and Central Asia	8.28
East Asia and the Pacific	7.43
World	**7.72**
Middle East and North Africa	6.14
Latin America	5.8
South Asia	4.23
Africa	3.95

Source: http://info.worldbank.org/etools/kam2/KAM_page5.asp#c104.

successful policy for RDI in ICT must take in all the players and layers of these two ecosystems.

One of the main findings of this publication is that the Arab region still lags behind with regard to RDI, which remains an area for improvement, especially in the ICT sector. One of the challenges hindering the development of the ICT sector in the Arab region is the modest number of researchers and developers per capita, which is among the lowest in the world. In addition, spending on RDI is still dominated by governments. In general, data in this field remains insufficient to draw significant conclusions; however, available indicators reveal that the Arab region exhibits comparatively low levels of innovation, with the regional Innovation Index[264] around 6.14, which is still below the world average of 7.72 and most other regions. The Innovation Index is a subindex of the World Bank Knowledge Index (KI) and reflects performance and developments in variables related to innovation, namely royalty payments and receipts, patents count and journal articles.

Promoting RDI in the ICT sector needs investments but no data is available measuring the financial amounts invested in the field. Only few countries in the Arab region provide information related to their expenditures in the field of research and development in all sectors, including the ICT field. When analysing the data available for some Arab countries, their levels of investment show that Tunisia, with a rate of 1.10 per cent of all investment in 2009 going into the ICT sector, has the largest proportion of GDP in research and development activities, followed by Jordan and Egypt with rates at 0.43 per cent and 0.27 per cent, respectively. This also demonstrates that such countries with modest GDP as Tunisia and Jordan are investing much more in research and development than countries with higher GDP, including Saudi Arabia and Kuwait, which spend only a proportion of 0.08 per cent and 0.11 per cent, respectively.

Nowadays, it is generally agreed that RDI is the key for enhancing total factor productivity and an integral part of the development progress in modern economies. In this context, the 2011 Arab Knowledge Report considered that creativity, innovation and invention represent the essence of the knowledge society, hence new Arab generations must possess these qualities through the provision of enabling as well as conducive and supportive environments.[265]

TABLE 61. Research and development expenditure as a percentage of GDP in selected Arab countries

Country	Percentage of GDP on research and development 2008	Percentage of GDP on research and development 2009	Percentage growth
Egypt	0.27	0.21	-21
Jordan	0.43	..	..
Kuwait	0.09	0.11	31
Saudi Arabia	0.05	0.08	56
Tunisia	1.03	1.10	7

Source: http://databank.worldbank.org/data/home.aspx.
Note: Two dots (..) indicate that data are not available.

Therefore, as a matter of public investment decisions, it would be strongly recommended that, despite notable achievements, wealthier Arab countries would be advised to devise appropriate policies to carefully re-evaluate the level and nature of their investments in RDI. Without a change at this level, it is unlikely that the Arab region will be able to effectively compete with other regions in the world.

B. Classification and ranking of ESCWA member countries according to maturity level

Four maturity levels have been established to classify the status of the ICT sector among countries in the Arab region, with the first as the lowest and the fourth as the highest. Based on the above overview and comparative analysis, we can safely state that the status of the ICT sector in the region did not witness important progress during the last two years, partially due to turbulence and uncertainty associated with the Arab Spring. In this context, although numerous initiatives to promote the ICT sector have been launched and implemented by a number of countries in the region, this sector remains underdeveloped and immature, preventing any ESCWA member country from reaching maturity level 4.

1. Maturity level 1: Iraq, Palestine, the Sudan, Syrian Arab Republic, and Yemen

This maturity level depicts a low level of investment in the ICT sector and a limited facilitation role played by the government in this context. Despite the efforts deployed by a number of the countries at this maturity level, more work is needed at all levels to build a robust ICT sector.

2. Maturity level 2: Bahrain, Kuwait, Lebanon, Morocco, Oman, and Qatar

Countries at this level focused mainly on extending telecommunications services and disseminating e-government services through upgraded ICT infrastructure. However, investment in the ICT sector is still limited, and more governmental incentives should be put in place, in order to stimulate the process of technological innovation and facilitate the growth of a flourished ICT market.

3. Maturity level 3: Egypt, Jordan, Saudi Arabia, Tunisia, and United Arab Emirates

This maturity level includes countries having adopted policies to promote the ICT sector and its contribution mainly to the national economy to advance the development of technological innovation in the ICT fields. In addition, almost all those countries provide an adequate enabling and regulatory environment stimulating the growth of the sector significantly and increasing the investment level.

4. Maturity level 4: None.

C. Suggestions and recommendations

Based on the analysis provided above, it is worth mentioning that many challenges and problems are hindering the expansion of a competitive ICT economic sector in the Arab region. Although a number of strategies and initiatives have been initiated in a good number of ESCWA member countries, the majority of them remain importers and consumers of ICT products and services rather than technology producers. The ICT sector in the Arab region remains undersized and immature, and extensive work is needed to match the levels achieved by advanced economies. Moreover, despite the boom witnessed in the telecommunications sector in the region during the last decade, mainly driven by mobile infrastructure, and to a lesser extent the development of Internet access, the essential drivers for an ICT-driven transformation that brings socioeconomic benefits are still lacking in a large majority of countries despite initiatives taken by some governments.

In this section, selected recommendations and suggestions will be provided to boost a robust, stand-alone and competitive ICT sector and to increase its contribution to socioeconomic

TABLE 62. Ranking of ESCWA member countries by maturity level in building the ICT sector

Country	Maturity level 1			Maturity level 2			Maturity level 3			Maturity level 4		
	2009	2011	2013	2009	2011	2013	2009	2011	2013	2009	2011	2013
Bahrain				■	■	■						
Egypt							■	■	■			
Iraq	■	■	■									
Jordan							■	■	■			
Kuwait				■	■	■						
Lebanon				■	■	■						
Libya*			■									
Morocco*						■						
Oman				■	■	■						
Palestine	■	■	■									
Qatar				■	■	■						
Saudi Arabia							■	■	■			
Sudan	■	■	■									
Syrian Arab Republic	■	■	■									
Tunisia*									■			
United Arab Emirates							■	■	■			
Yemen	■	■	■									

Source: Compiled by ESCWA.
Note: * No assessment was provided for Libya, Morocco and Tunisia prior to 2011 as they joined ESCWA in 2012

development. Those recommendations are deducted from the main findings provided in this chapter as well as those produced in the recently published ESCWA study on "Competitiveness of the ICT Sector in the Arab Region: Innovation and Investment Imperatives" in order to achieve the following:

(a) Promote the development of the ICT sector as a key enabler for the transition to a knowledge-based economy in the Arab region;

(b) In partnership with national stakeholders, governments are advised to devise a separate national strategy to develop a competitive economic ICT sector as a core of the national sustainable development master plan and commit necessary resources for implementation;

(c) Improve the legal and regulatory frameworks required to build a healthy environment for a competitive ICT sector;

(d) Ensure an adapted enabling environment to promote business in the ICT sector through developing incentives for investment in this industry, including tax reduction and/or protection of national products/services;

(e) Encourage a more active involvement of the banking sector and other financial and investment institutions in the development of new and innovative sources of funding for start-ups as well as modern financing mechanisms in order to attract investments in ICT activities;

(f) Improve regional cooperation among research institutions and teams working in the ICT field and encourage networking with the industry and with similar institutions in developed countries;

(g) Support the development of mature financial institutions and capital markets as an essential precondition for a sustainable, innovative ICT sector.

XII

Regional and global comparative analysis

XII. Regional and Global Comparative Analysis

A. Performance of the Arab region in building the information society

In order to portray the current status of the information society in the Arab region and measure the progress made in realizing it, this regional profile of the information society has been divided into eleven related chapters each dedicated to one particular component. With the exception of chapter X on regional and international cooperation, member countries were evaluated on every component based on a four-level maturity scale, with level one indicating the lowest level of maturity and level four the highest. While the analysis and maturity ranking in this report included three new member countries, which joined ESCWA in mid-2012, the ongoing political transition and security situation in Libya rendered this task unsuitable. Libya was ranked at the first maturity level in almost all information society areas evaluated in this report due to data scarcity. For this reason, the average score of the Arab region on each information society component is calculated by adding up the respective point scores of every member country excluding Libya, and then dividing this total by 16 (see table 63).

TABLE 63. Average scores of the Arab region in selected information society components, 2009-2013 ***(Ranked from lowest to highest based on 2013 scores)***

Information society component	Average score 2009	Average score 2011	Average score 2013
Building confidence and security in the use of ICTs	1.29	1.29	1.75
Building the ICT sector	1.93	1.93	2.00
Media	2.07	2.21	2.06
ICT applications	2.21	2.29	2.12
Enabling environment	2.21	2.43	2.31
Access to information and knowledge	2.21	2.43	2.37
ICT capacity-building	2.29	2.43	2.50
Cultural diversity and identity, linguistic diversity and local content	2.21	2.50	2.50
ICT infrastructure	2.43	2.50	2.50
Role of governments and stakeholders	2.50	2.64	2.62
Overall average*	**2.13**	**2.26**	**2.27**

Source: Compiled by ESCWA.
Note: * The average score of the "Millennium Development Goals" and "Regional and international cooperation" components were excluded from the calculation of the overall average scores for 2009 and 2011.

It is noteworthy to reiterate, as stated in the introduction, that the four subjective maturity levels adopted by this report cannot be directly translated into comparable statistical indicators. Hence, the maturity level assessment results provided in each chapter should be used by member countries as a guide or a tool aimed at identifying gaps and assisting policymakers in outlining corrective measures, rather than merely becoming the focus of national efforts dedicated to improving the individual country's rank.

Table 63 depicts the average scores of the Arab region in various information society components. While a fair comparison cannot be established between the scores of 2009 and 2011 compared to 2013 owing to the inclusion of Morocco and Tunisia in the maturity level ranking, this table presents a time series. In addition, the average score of the "Millennium Development Goals" and "Regional and international cooperation" components were excluded from the calculation of the overall average score of 2009 and 2011 for the following two reasons: first, the chapter on Millennium Development Goals was not covered in this edition of the regional profile report; an extensive coverage of the issue, however, can be found in the "Arab Millennium Development Goals Report" prepared jointly by the United Nations and the League of Arab States; [266] and, second, no maturity levels were provided for the "Regional and international cooperation" component presented in chapter X of this report due to a lack of data.

The overall average of the information society in the Arab region remains unchanged in 2013 compared to 2011. The biggest improvement, namely a 35 per cent growth, was seen in the component on "Building confidence and security in the use of ICTs" owing to the strong progress in the enhancement of capacities to respond to emerging cyberthreats, particularly in the form of CERTs. Nevertheless, the region scored lowest on this same component as a result of a lack of cybersecurity, and a dearth of laws and regulations aimed at ensuring the privacy and confidentiality of people online. The region also scored low on "Building the ICT sector" due to a shortage of finance and venture-capital mechanisms, rendering it a consumption-based and not a production-based sector. In addition, the ICT sector is not a standalone economic productive sector in most Arab countries, with low competitiveness and a weak RDI ecosystem, thereby contributing to a low regional score of 2.00 points attained by that sector.

The components on the "Role of governments and all stakeholders", "Cultural diversity and identity, linguistic diversity and local content", "ICT capacity-building", and "ICT infrastructure" registered the highest average scores of 2.62 for the first and 2.50 points for the latter three, as shown in table 63. This is reflective of the effective roles played by governments and all stakeholders in the region in building the information society, sustained by high ICT-penetration rates, and improved uptake of related services, especially attained by GCC countries.

B. Performance of the Arab region compared with other countries and regions

1. Performance of the Arab region in the role of governments and all stakeholders

Despite the formulation of national ICT strategies in line with the WSIS objectives, which call for the integration of ICT-related programmes within national and regional development strategies, it is difficult to establish a common standard that can be used to measure or quantitatively compare performance. In this regard, a number of countries in the region have drafted good comprehensive ICT strategies; however, they ended up getting sidestepped because of a dearth of funds, the non-existence of a realistic implementation plan, the lack of a monitoring and evaluation process, and more pressing national priorities.

Nevertheless, while efforts in this regard differ from one country to another, depending on national

circumstances, the region has witnessed, year after year, a greater participation of governments and all stakeholders in building the information society. However, the challenge in the region remains in the successful implementation of such ICT-related policies and strategies.

2. Performance of the Arab region in ICT infrastructure

Most countries in the Arab region have sought to focus on improving their ICT infrastructures and taking measures to promote competition in their telecom sectors. Across the region, a significant positive correlation has been perceived between the liberalization of telecommunication services and a higher uptake of ICTs. Mobile and Internet penetration rates, in particular, have witnessed considerable increase in the region. As competition enters the market, the quality of services increases and costs are reduced. These conditions have shown to promote the development of the information society.

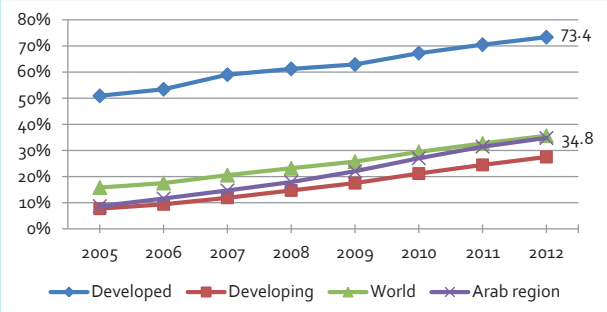
(a) Internet penetration

While the Internet users penetration rate in the Arab region registered a compound annual growth rate (CAGR) of 21.9 per cent during the period 2005-2012 (the world rate registered 12.4 per cent during the same period), the current penetration rate at 34.8 per cent remains slightly lower than the world average at 35.7 per cent. With 27.5 per cent, the Arab region lags behind developed countries in Internet penetration, but comfortably overtook the average of developing countries (see figure 14).

(b) Mobile phone penetration

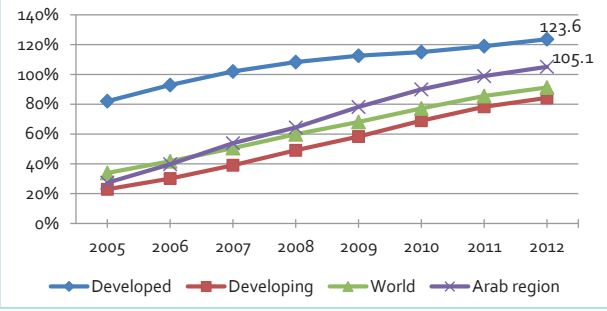
Mobile service markets are the forte of ICT infrastructure in the region; they have gone a long way in terms of competition and sophistication. A notable CAGR of 21.4 per cent was observed between 2005 and 2012, overtaking the global CAGR of 15.2 per cent during the same period. When comparing regional mobile phone penetration rates, it is evident that the Arab region surpasses the mobile penetration rate of developing countries by a good margin (with 84.3 per cent), while still trailing behind developed countries (with 123.6 per cent). While the average in the Arab region is higher than the world average, the sector is expected to grow further as more Arab countries shun duopoly and opt out for competitiveness (see figure 15).

FIGURE 14. Internet users penetration rates in selected regions, 2005-2012



Source: Compiled by ESCWA, based on data from ITU, 2012.

FIGURE 15. Mobile phone penetration rates in selected regions, 2005 - 2012

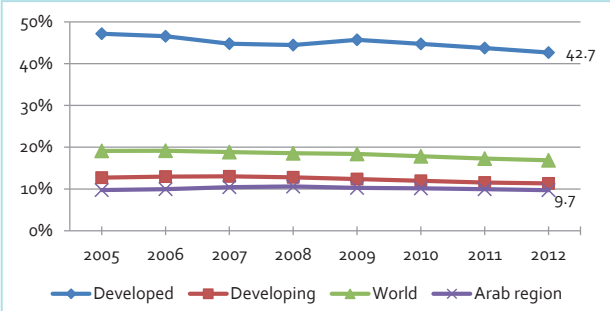


Source: Compiled by ESCWA, based on data from ITU, 2012.

(c) Fixed-line penetration

Arab fixed-line markets are becoming more competitive, albeit far less competitive than mobile and Internet markets. However, they continued their decline, a global trend seen as well in other regions of the world. The fixed-line penetration rate in the Arab region remains low, slightly less than10 per cent in 2012, which is well below the world average of 16.5 per cent, and even below the average of developing countries of around 11 per cent (see figure 16).

FIGURE 16. Fixed-line penetration rates in selected regions, 2005-2012



Source: Compiled by ESCWA, based on data from ITU, 2012.

(d) Fixed broadband penetration

Fixed broadband penetration has been traditionally low in the Arab region owing mainly to a stagnating and low penetration of fixed-line services. In 2012, the penetration rate of fixed broadband remained below 3 per cent, well under the average rate of developing countries and the world rate of 5 per cent and 9 per cent, respectively. Yet, the surge in mobile broadband penetration seems to suggest that this technology is a strong alternative to fixed broadband, particularly in lower income countries (see figure 17).

(e) Mobile broadband penetration

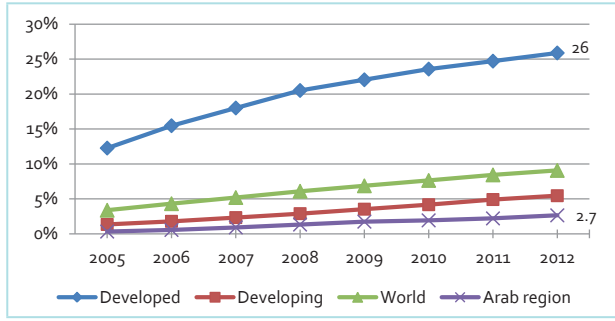
Wireless broadband is the most dynamic ICT service in the Arab region, in alignment with a similar global trend. Most of the growth seen in terms of wireless broadband penetration rates owes to the high penetration rate of mobile telephony and a surge in the uptake and use of smartphones.

The penetration rate of wireless broadband in the Arab region reached a value of 15.9 per cent in 2012 – nearly six times higher than the region's fixed broadband penetration rate, still shy of the world average of 22.1 per cent but ahead of the average of developing countries of 13.3 per cent. As of mid-2013, all countries of the Arab region but three, namely Iraq, Algeria and Palestine, had rolled out 3G services, and the shift to 4G networks, which has already started, is expected to fuel further growth in the near future (see figure 18).

3. Performance of the Arab region in access to information and knowledge

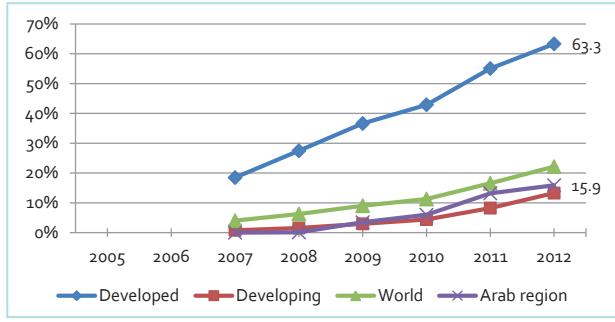
Access to information and advocating knowledge-sharing remain a challenge in the Arab region. While progress has been noted in most countries, a gap in the level of information availability and access remains evident between and within countries. Access disparities between Arab countries owes to a disparity in the availability of advanced ICT infrastructure, low broadband Internet penetration rates, unaffordable access costs, and the absence of RTI and FOI legislations which guarantee the right of free access to information, especially public domain information. While the region is making some progress in this regard, efforts are still needed to further enhance accessibility to information and local digital content.

FIGURE 17. Fixed broadband Internet penetration rates in selected regions, 2005-2012



Source: Compiled by ESCWA, based on data from ITU, 2012.

FIGURE 18. Wireless broadband Internet penetration rates in selected regions, 2005-2012



Source: Compiled by ESCWA, based on data from ITU, 2012.

One of the main impediments to access in the Arab region remains the unaffordable cost of some ICT services as compared to income levels that limits the uptake of theses services. For international benchmarking and comparison purposes, the IPB provides an indication of how affordable services are compared to income. Figure 19 highlights that the Arab region is the third most expensive region in terms of ICT cost, only ahead of Africa and Asia-Pacific. Moreover, the figure reveals that the monthly cost of fixed broadband Internet is the highest of all services in the region, at around 16 per cent of the monthly GNI per capita, compared to 4 per cent in the Commonwealth of Independent States (CIS) and 2 per cent in Europe.

4. Performance of the Arab region in ICT capacity-building

Measuring the performance of the Arab region in ICT capacity-building mainly reflects the use of ICT in education, training and literacy programmes, the status of research and development and the development of an enabling environment for innovation. To illustrate the situation in the Arab region, a number of criteria have been selected for comparison with other regions and countries of the world.

Illiteracy is still widespread in the region, especially among youth and women in the less-developed Arab countries. Despite great strides in fighting illiteracy, the region has one of the highest rates in the world, demonstrating that these countries have yet to benefit from the use of ICT to reduce the prevailing high illiteracy rates.

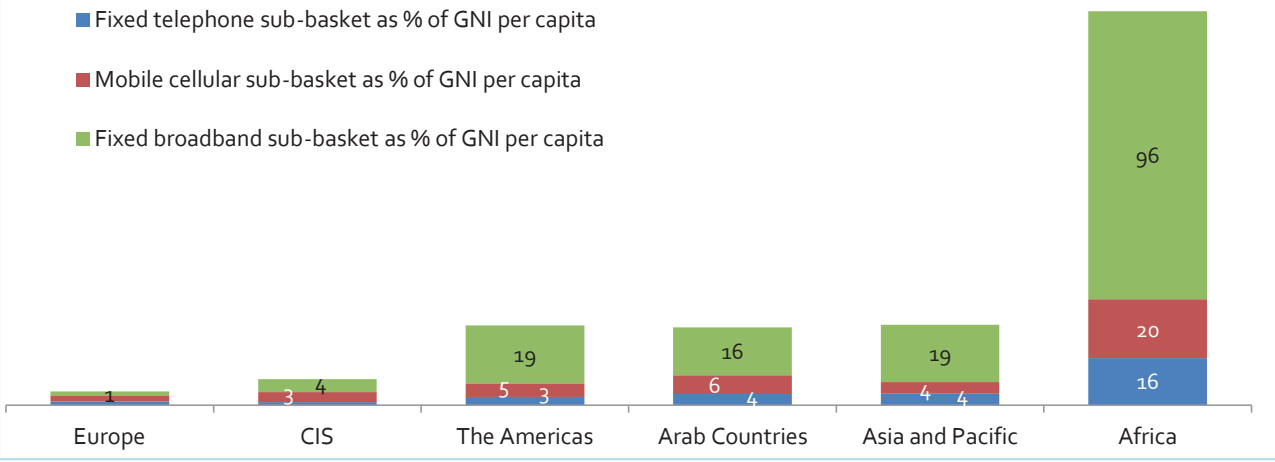
Furthermore, spending on research and development and innovation in the region remains very limited and far below the world average. Assessing innovation through the number of PCT international filings reveals that the Arab region comes ahead of Africa but lags behind Asia and Europe (see table 64). While the number of PCT filings in the Gulf subregion exceeds that of the Arab region, the latter comes ahead of Malaysia and Turkey, but lags dramatically behind Israel.

5. Performance of the Arab region in building confidence andsecurity in the use of ICTs

Most countries in the Arab region are working towards promoting and building confidence and security in the use of ICTs. While tangible progress has been achieved in some countries, disparities exist among others and initiatives remain scarce, insufficient and inefficient in most countries.

Nevertheless, the Arab region has witnessed significantly greater momentum in efforts to formulate and adopt cybercrime laws or to amend the penal code to include articles related to

FIGURE 19. ICT price sub-baskets by region and by level of development, 2011



Source: Compiled by ESCWA, based on data from ITU, 2012.

cybercrime. Strong progress has been seen in the enhancement of capacities to respond to emerging cyberthreats, particularly in the form of CERTs. Important steps have also been taken in the area of protection of children online. At the national level, impressive initiatives have been launched by some countries to promote privacy and the protection of personal data. Despite the progress exhibited, the region lags behind developed countries in terms of building confidence and security in the use of ICT.

6. Performance of the Arab region in establishing an enabling environment

Most developed countries as well as some developing countries have already modernized their legal and regulatory frameworks to meet new requirements brought forth by the advent of ICTs and their applications. While several Arab countries have already started to enact cyberlaws covering e-signature, e-transaction and cybercrimes most are still at an early stage, lacking in the implementation of these laws.

Despite the exceptional performance of some Arab countries in combating software piracy, the region still suffers from high software piracy rates. The 2011 Global Software Piracy Study published by the Business Software Alliance (BSA) and International Data Corporation (IDC) indicates that pirated software accounts for 66 per cent of software in use in the Arab region, which is roughly 1.5 times higher than the world average, at 42 per cent, and 3.5 times higher than the corresponding rate in North America (see table 65). Meanwhile, the software piracy rate of the GCC subregion was lower than the Arab region. While a recent drop in rates has been witnessed in the region compared to previous years, the software piracy rate in almost every Arab country exceeded the world's average, with the exception of the United Arab Emirates, which registered the lowest rate, at 37 per cent.

7. Performance of the Arab region in ICT applications

The development, adoption and use of ICT applications in the Arab region has been steadily evolving in the past couple of years driven by the growing number of Internet users, improved access to broadband networks, the rapid uptake of smartphones and mobile devices, and the spread of social media providing more ubiquitous channels for interaction. Governments and business

TABLE 64. Number of PCT international filings in selected regions and countries, 2012

Country or region	Number of PCT international filings
Arab region	495
GCC subregion	401
World	**194,400**
Africa	433
Asia	78,800
Europe	57,904
Israel	1,377
Malaysia	292
Turkey	451

Source: Compiled by ESCWA, based on data obtained from WIPO Statistics Database, available from http://ipstatsdb.wipo.org.

TABLE 65. Software piracy rates in selected countries and regions, 2011

Country or region	Software piracy (Percentage)
North America	19
Western Europe	32
GCC countries	52
Malaysia	55
Asia and Pacific	60
Latin America	61
Central and Eastern Europe	62
India	63
Arab region	66
China	77
World average	**42**

Source: BSA and IDC, 2012.

enterprises have started to provide e-services allowing for online transactions and cloud computing. In addition, the region is witnessing a shift towards e-learning; however, the majority of Arab countries have not yet undergone any paradigm transformational move towards the new trends in education and learning.

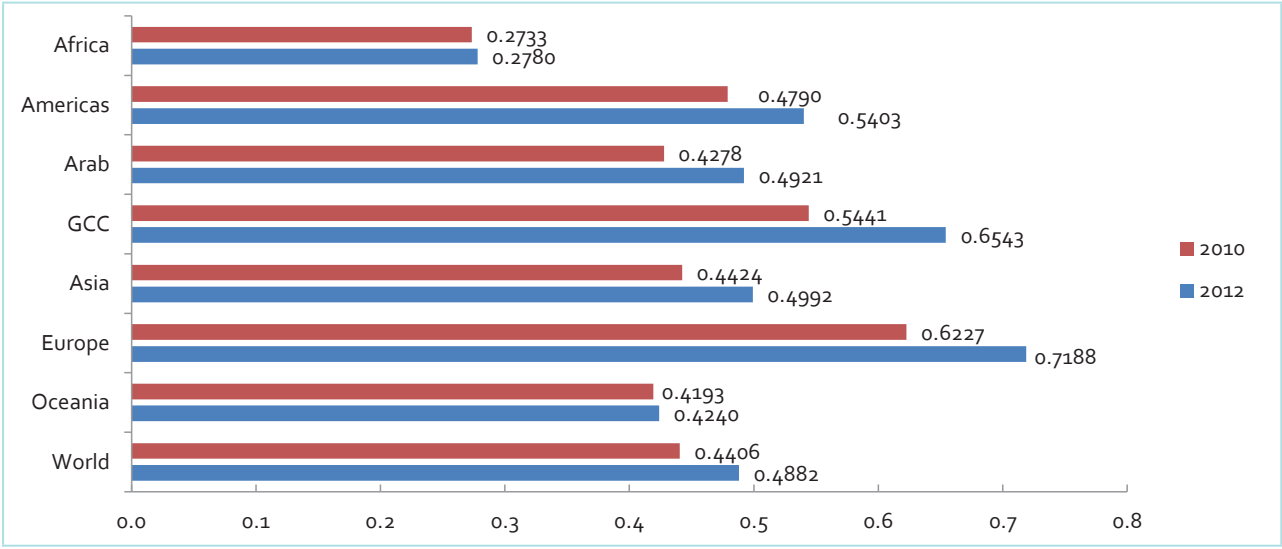
The most notable and measurable efforts of the region in this regard focus on e-government implementation; governments are providing information and services to their citizens through advanced delivery platforms, namely dedicated web portals. All countries in the region have now dedicated and interactive government web portals, though at different levels of development and sophistication, supported by a growing use of such advanced online participation tools as blogs, forums and social media applications. The EGDI measures the willingness and capacity of governments to use ICTs to deliver public services. According to the 2012 figures shown in figure 20, the score of the Arab region of 0.49 surpassed the world average of 0.48, but is far lower than that of the Americas of 0.54. However, the GCC subregion, with 0.64, scored the second-highest average in the world and is only behind Europe, with 0.71.

8. Performance of the Arab region in cultural diversity and identity, linguistic diversity and local content

As more people in the region access the Internet, a key issue is the availability and accessibility of content, information and knowledge. Per capita, there are proportionally fewer sources of information available to Arab speakers than to other language groups in comparable regions. In order to empower the citizens of the region to make use of their growing capacity to communicate and develop content and knowledge, several initiatives to promote the use of Arabic online have been launched, including the ESCWA initiative on the "Promotion of the Digital Arabic Content Industry through Technology Incubators". Arabic content on the Internet has improved since 2008, when it accounted for only 0.3 per cent of total online content, to approximately 2 to 3 per cent in 2012, thereby signalling a significant growth in the Internet content in the region.

Figure 21 shows that the Arabic language made the top-ten languages used on the Internet in 2012. While 3.6 per cent of people on the web use Arabic, the Arabic language was ranked sixth worldwide overtaking German for the first time, which fell down

FIGURE 20. EGDI scores in selected regions, 2010-2012



Source: DESA, 2010; and DESA, 2012.

to seventh place. Despite the improvement, these numbers indicate that relative to the growing size of online content, not much Arabic content has been created, particularly content that is of quality.

9. Performance of the Arab region in the media

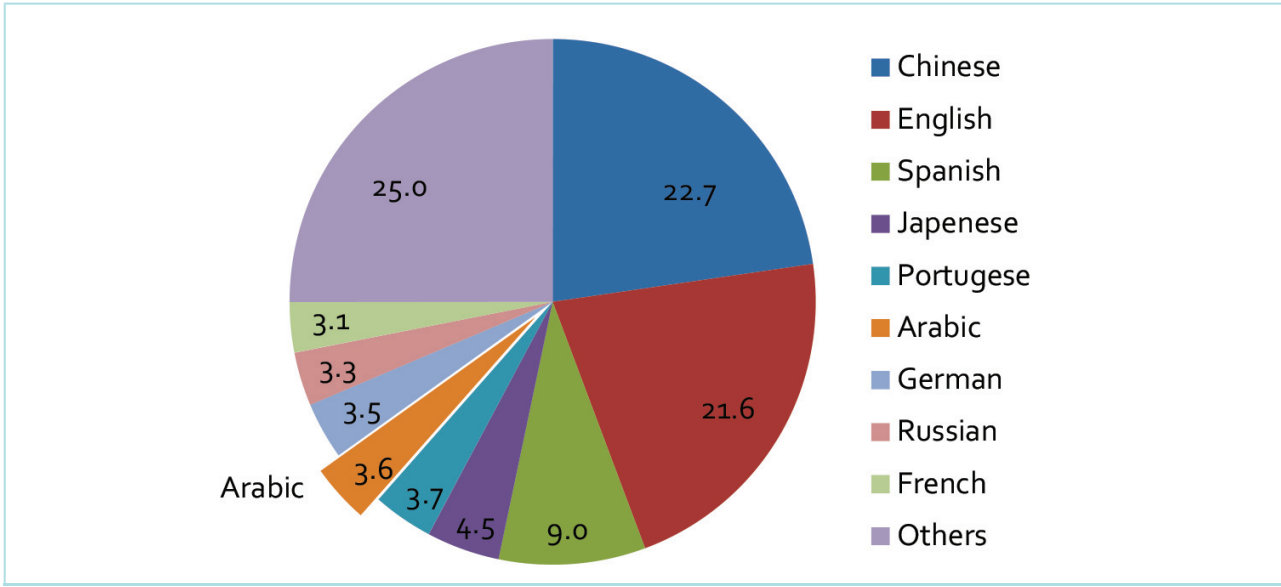
Despite the diversity of the media in the Arab region, its role remains limited in developing information societies. One of the findings of the report is that media freedom in all countries of the Arab region is at its lowest level compared with developed countries. According to the 2013 PFI, all Arab countries trailed behind other such developing countries as Mauritius, but some scored better than Malaysia and Turkey. Social issues continue to be portrayed in a stereotypical way by most media outlets in the Arab region, unlike their coverage in developed countries of the world. However, the rise of social media applications in the region and their potential impact on the civil movement has been phenomenal. The quick adoption of such applications as Facebook and Twitter is expected to be an agent of change, advancing such issues as the freedom of expression, the participation of citizens and democracy (see table 66).

10. Performance of the Arab region in regional and international cooperation

Despite the importance of international and regional cooperation, it is difficult to measure what has been achieved in this regard by different countries and regions. Consequently, it is difficult to make quantitative comparisons between the level of cooperation in the Arab region and that in the rest of the world.

Enabling regional and international cooperation calls for forging partnerships for development. Such partnerships depend on developing strategies to create decent and productive job opportunities for youth, spread the benefits of modern technology, address the needs of LDCs, and increase official aid for development. Despite falling into the LDC category, Libya, Yemen and the Sudan receive very little aid relative to other Arab countries, especially Jordan, Iraq and Egypt, and not nearly enough to meet their dire need for development. Hence, it is necessary to increase the amount of aid pledged to LDCs and to intensify projects and initiatives, especially regional ones, in order to help the development of these countries.

FIGURE 21. Percentage of online users by language, 2012



Source: Ow.ly, available from http://ow.ly/i/OGva/original.

TABLE 66. Ranking of selected Arab countries on the Press Freedom Index, 2013

Country	Global ranking	Selected countries	Global ranking
Kuwait	77	Finland	1
Lebanon	101	Switzerland	14
Qatar	110	USA	32
United Arab Emirates	114	Hong Kong	58
Algeria	125	Mauritius	62
Libya	131	Israel	112
Jordan	134	Malaysia	145
Morocco	136	Turkey	154
Tunisia	138		
Oman	141		
Palestine	146		
Iraq	150		
Egypt	158		
Saudi Arabia	163		
Bahrain	165		
Yemen	169		
Sudan	170		
Syrian Arab Republic	176		

Source: Reporters Without Borders, 2013.

11. Performance of the Arab region in building the ICT sector

The ICT sector in the Arab region lacks its own autonomy given that it is still largely considered part of other such economic and service sectors as transport or media. Additionally, this sector remains a consumption-based rather than a production-based sector. It relies heavily on telecommunications, especially mobile and Internet markets, with very minimal contribution from software or professional service industries. Consequently, no real value added exists that encapsulates a genuine competitive advantage.

A major challenge facing most Arab countries is that ICT is not yet mainstreamed into the region's economies, even among the richest GCC countries. Investments in this sector are still largely driven by the telecommunication sector (particularly mobile) and not by long-term investments in a national IT industry – driven by young entrepreneurs and supported by an RDI ecosystem - aimed at mainstreaming ICT into all economic and social endeavours.

Despite an economic slowdown climate, this sector is positioned to enjoy high growth potentials, especially if oil-producing countries seek to reduce their dependency on oil and invest massively in building an ICT industry.

C. Regional outlook and the way forward

1. The outlook of the Arab region

The development of the information society in the Arab region encompasses many different facets and variables. Broad trends seen are very hopeful; most countries are performing better today than following the conclusion of the second phase of WSIS that was held in Tunis 2005.

The Arab region has taken significant steps towards bridging the digital divide and building

the information society. The prominence of ICTs has grown across the region, with dramatic increases in ICT adoption and use rates, and mounting adoption of fixed and wireless broadband technologies. Access costs are lower and more attention is being focused on building confidence and security in the use of ICTs and building the ICT sector. Consequently, the region has witnessed an increasing adoption and use of ICT applications and e-services and a greater participation of the governments and all stakeholders in building the information society. These efforts will make it easier for member countries to address such issues as access to information and knowledge, building capacity for regional integration and the availability of digital Arabic content.

Despite the commonality of countries in the region, there are divergent economic and social differences which distinguish the GCC subregion from the rest. Non-GCC countries suffer from poverty and high unemployment rates, especially among women and youth. However, most countries in the region face a number of other serious issues of detrimental effect on development, including economic and political uncertainty, civil wars, occupation, civil unrest, and terrorism.

Challenges facing the realization of the information society and the transition to a knowledge-based economy in the Arab region persist. Such challenges should be addressed in the coming years through a joint collaboration by all stakeholders, which are governments, the private sector and civil society, while strengthening the important role the youth and digital natives could play as the main actors of an ICT-driven transformation. These challenges differ from one country to another; however, they all have to be addressed with almost equal priorities. The list of challenges includes, but is not limited to, the following:

- Low ICT readiness and utilization in some member countries;
- Broadband penetration and affordability;
- Lack of confidence and security in the use of ICTs;
- Weak, and sometimes incomplete, legal and regulatory ICT framework;
- Freedom of access to information and privacy issues;
- Fragmentation of ICT applications and services for socioeconomic development;
- Limited production of substantive digital Arabic content;
- Inadequate production of accurate and timely statistics for ICT measurement and analysis for policymaking and decision support purposes;
- Human skills gap, in ICT-related fields.

Consequent to the publishing of the first edition of this regional profile in 2003, ESCWA has been carrying out regional and national profile assessments on a biennial basis. Lessons learned from this exercise have been of immense benefit in the formulation of the regional and national outlook of the region and laying down the way forward.

2. Beyond WSIS and the way forward

While bright spots have been observed in realizing the information society in the region, the analysis presented in this report clearly indicates that GCC countries have made greater strides than the rest of ESCWA member countries in building information societies. Nevertheless, all ESCWA member countries, including the most advanced ones, still need to exert considerable efforts before reaching the levels attained by developed countries in this regard.

While ICT has a key role to play in creating job opportunities and alleviating poverty, the difficulties of development in conflict-prone areas preclude any role for ICT for development, and require different priorities and focus. While much remains to be done, realistic options exist for making concrete improvements throughout the Arab region.

The WSIS Forum 2012, held in Geneva in May, identified a number of emerging trends in the information society and a vision beyond 2015. These were captured by the eleven WSIS action lines, both in terms of policy and technology.[267] Furthermore,

the emerging trends were echoed in May 2013 by the UNGIS, which issued a joint statement on the Post-2015 Development Agenda.[268] The joint statement stressed the following two points:

(a) The potential of ICTs as key enablers of development, and as critical components of innovative development solutions, is fully recognized in the Post-2015 Development Agenda;

(b) The Post-2015 Development Agenda reflects lessons learned during the past decade in the implementation of WSIS outcomes.

Based on the analysis and findings of this report, using the action lines of the WSIS as reference would result in a framework which countries in Arab the region could use as guidelines for formulating policies and strategies beyond 2015. Some actions could belong to more than one action line, which is an expected and natural occurrence in the real world.

Within that context, ESCWA will continue to provide countries in the region with the support and advisory services required to ensure synergy with the global trends of ICT and the development of the information society in line with the WSIS processes and beyond 2015.

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ENDNOTES

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2 The term Arab region used in this report refers to a sub-set of Arab countries located in North Africa, the Levant and the Arabian Gulf; these include Algeria in addition to all 17 ESCWA member countries, namely, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, the Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen.
3 Based partially on the 2013 country profile reports of ESCWA member countries, which were prepared by national consultants and ESCWA staff and are available from http://www.escwa.un.org/wsis/profiles.html.
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5 UNDP and Syrian Arab Republic MoCT, 2004.
6 Supreme Council of Information and Communication Technology, 2011.
7 See: http://www.facebook.com/groups/345953445471238/.
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18 World Bank. Four Pillars of the Knowledge Economy.
19 See: http://www.tra.gov.eg/english/News_NewsDetails.asp?PID=36&ID=146.
20 AAG, 2013 (1 May).
21 See: https://itunews.itu.int/En/3741-Mobile-subscriptions-near-the-78209billion-markbrDoes-almost-everyone-have-a-phone.note.aspx.
22 AAG, 2013 (21 January).
23 The number of Internet users out of the total population is estimated by ITU based on national household surveys. This includes those having used the Internet from any device, including mobile phones, in the last twelve months. In situations where surveys are not available, an estimate is derived based on the number of Internet subscriptions multiplied by a variable, which might be different for various countries.
24 AAG, 2013 (11 March).
25 AAG, 2013 (16 January).
26 AAG, 2013 (26 May).
27 Mobitel in the Kurdish zone holds a 3G licence; in the rest of Iraq, 3G deployment is hindered by security issues related to the jamming of mobile phone frequencies.
28 GSMA and Deloitte, 2013.
29 Ibid.
30 This is a marketing term for the provisioning of two bandwidth-intensive services, namely high-speed Internet access and television, and a less bandwidth-demanding (but more latency-sensitive) service, the telephone, over a single broadband connection. Triple-play services were already introduced with DSL technology (mainly in its

advanced variants ADSL2 and VDSL) but FTTH will provide a new dimension to triple-play with very high speed Internet access (more than 20 Mbit/s) and high-definition television. However, operators are still looking for the appropriate business model for the large-scale deployment of FTTH – even in many developed countries – primarily due to infrastructure deployment costs and legacy DSL offering decent service quality.

31 According to ITU, LTE-Advanced introduced in 2011 by Release 10 of 3GPP is considered a true 4G technology.

32 The perimeter includes 21 countries: 16 ESCWA member countries (except Palestine which is not connected to any submarine cable system) in addition to Algeria, Comoros, Djibouti, Mauritania, and Somalia.

33 AAG, 2012d.

34 See: http://www.submarinecablemap.com.

35 AAG, 2012d.

36 See: http://academy.itu.int/index.php/topics/item/967-internet-exchange-points.

37 See: http://www.unctad.org/en/docs/iteipc20065_en.pdf.

38 Broadband Commission for Digital Development, 2012.

39 For more details, see: http://www.bbc.co.uk/news/world-middle-east-22806848, http://www.thenational.ae/news/uae-news/phone-call-revolution-as-skype-is-officially-unblocked-in-uae, http://www.itp.net/588597-oman-government-unblocks-some-voip-services#.UhR2hX-0fLe, http://www.wired.co.uk/news/archive/2010-08/02/gulf-states-ban-blackberry, http://news.cnet.com/=8301-17938_105-57583342-1/syria-all-communications-reportedly-down, http://mashable.com/2011/01/27/egypt-protests, http://www.switched.com/2011/02/18/bahrain-blocks-internet-access, and http://www.telegraph.co.uk/news/worldnews/africaandindianocean/algeria/8320772/Algeria-tried-to-block-internet-and-Facebook-as-protest-mounted.html.

40 FOI is an integral part of the fundamental right of freedom of expression, as recognized by United Nations General Assembly resolution 59 adopted in 1946, as well as by Article 19 of the Universal Declaration of Human Rights (1948), which states that the fundamental right of freedom of expression encompasses the freedom "to seek, receive and impart information and ideas through any media and regardless of frontiers". For more information, see: http://www.unesco.org/new/en/communication-and-information/freedom-of-expression/freedom-of-information.

41 See: http://www.freedominfo.org/regions/global/foi-regimes.

42 Almadhoun, 2012.

43 "Forty two per cent of media personnel are unaware of the law guaranteeing access to information in Jordan", February 2009. Available from http://www.amanjordan.org/articles/index.php?news=3379 (Arabic).

44 See: http://www.worldbank.org/en/news/feature/2012/04/18/tunisias-next-revolution-open-government.

45 See: http://www.article19.org/resources.php/resource/2207/en/tunisia:-new-decree-on-access-to-administrative-documents-rolls-back-culture-of-secrecy#.

46 ESCWA, 2013b.

47 See: http://www.rti-rating.org/country_data.php.

48 See: http://www.transparency.org/news/feature/lebanon_stopping_secrecy_one_law_at_a_time.

49 Almadhoun, 2012.

50 See: http://www.dailynewsegypt.com/2013/06/26/egypts-right-to-information-law.

51 The IPB is a composite basket that includes three tariff sets, referred to as sub-baskets: fixed telephone, mobile and fixed broadband Internet services. Its value is calculated by adding the value of the price of each sub-basket as a percentage of a country's monthly gross national income (GNI) per capita, divided by three. The IPB does not consider as yet the mobile broadband cost in its calculation though some efforts in that direction have already started.

52 See: http://www.ictqatar.qa/en/news-events/news/ictqatar-introduces-national-e-accessibility-policy.
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55 See: http://www.mcit.gov.eg/Media_Center/Press_Room/Press_Releases/2689.
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58 See: http://موقع.وزارة-الاتصالات.مصر/MediaPressSer_Details.aspx?Type_ID=1&ID=2038.
59 See: http://www.egyptictindicators.gov.eg/en/Publications/PublicationsDoc/Publications_1172013000_Indicators_in_Brief_June.pdf.
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61 See: http://goo.gl/hH4oiR.
62 See: http://www.owam.net.
63 See: http://www.ita.gov.om/ITAPortal/Pages/Page.aspx?NID=791&PID=3235&LID=157.
64 See: http://www.ks.gov.jo.
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66 See: http://www.blind.gov.qa.
67 See: http://www.ictqatar.qa/en/news-events/news/new-computer-labs-blind-be-created-qatar-social-centre-blind.
68 See: http://ma3bar.org.
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70 See: http://www.kacst.edu.sa.
71 See: http://fossc-oman.net.
72 See: http://mirror.squ.edu.om.
73 ESCWA, 2013 (Oman).
74 See: http://www.opensource.tn.
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78 See: http://www.tagorg.com/ServicesGroup.aspx?id=450&lang=en.
79 The Sudan and Syrian Arab Republic remain on this list. See: https://community.mcafee.com/docs/DOC-1239.
80 UNDP, 2011.
81 International Finance Corporation and Islamic Development Bank, 2011.
82 In this context, an adult is a person who is older than 15 years.
83 UIS, 2012.
84 UNESCO's definition of Arab region includes 20 Arab countries and does not include Somalia and the Comoros.
85 UNDP, 2011.
86 UNESCO, 2012a.
87 A young person is between 15 and 24 years old.
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89 UNESCO, 2012b.
90 UIS Data Centre (accessed 10 June 2013).

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92 See: http://www.imn.iq/news/view.17677/ (accessed 10 June 2013).
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94 ESCWA, 2013 (Yemen).
95 ITU, 2011b.
96 UNDP, 2011.
97 UNESCO, 2011b.
98 For instance, the low percentage of Lebanon, notwithstanding its good education system, can be explained by the importance of private institutions within its education system.
99 UNDP, 2011.
100 Ibid.
101 In this education level, age issues are more important, which explains the usage of GER.
102 UNESCO, 2012b.
103 INSEAD and WIPO, 2012.
104 UNESCO, 2012b.
105 DSG, 2013b.
106 UNESCO, 2011a.
107 UNESCO, 2013.
108 UNESCO, 2013.
109 DSG, 2013b.
110 ESCWA, 2013 (Oman).
111 ESCWA, 2013 (Yemen).
112 DSG, 2013b.
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114 UNESCO, 2013.
115 Ministry of Education, Sultanate of Oman, 2008.
116 UNESCO, 2012b.
117 WEF, 2013.
118 UNDP, 2011.
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127 See: http://www.lpi.org (accessed 20 June 2013).
128 See: http://www. nti.sci.eg (accessed 20 June 2013).
129 ESCWA, 2013a (Oman).
130 ESCWA, 2013a (Palestine).

131 INSEAD and WIPO, 2013.
132 IER is the ratio of the Output Sub-Index of the GII over its Input Sub-Index. It is indicative of the efficiency of such innovation inputs as human capital and research, infrastructure, business, and market sophistication for the attainment of knowledge and technology and creative outputs.
133 WEF, 2013b.
134 AAG, 2012e.
135 Pew Research Center, 2011.
136 See: http://www.ita.gov.om/ITAPortal/MediaCenter/NewsDetail.aspx?NID=476.
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138 Batchelder et al., 2012.
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140 See: http://cyberlegislation.escwa.org.lb (2013).
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142 See: http://www.ipsos-na.com/download/pr.aspx?id=12693.
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144 The infrastructure pillar which was part of the environment subindex until 2011 became part of the readiness subindex in 2012 and 2013.
145 WEF, 2013a.
146 See: http://www.wipo.int.
147 BSA, 2012.
148 See: http://isper.escwa.un.org/Portals/0/Cyber%20Legislation/Documents/Models%20for%20Cyber%20Legislation%20in%20ESCWA%20region%20.pdf.
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155 INSEAD and WIPO, 2012, p. 32.
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157 See: http://www.berytech.org.
158 See: http://beirutdigitaldistrict.com.
159 See: http://www.un.org/en/development/desa/publications/connecting-governments-to-citizens.html.
160 For a summarized definition of the four stages of online service development, please see ESCWA, 2011a, box 11.
161 Except for Palestine, which is not covered in the e-Government Survey, and Libya, due to the lack of data in 2012.
162 See: https://www.wto.org/english/tratop_e/devel_e/wkshop_apr13_e/fredriksson_ecommerce_e.pdf.
163 See: http://www.arabianbusiness.com/e-commerce-in-middle-east-virtual-gold-rush-475229.html?page=0.
164 Sambidge, 2013.

165 Hossain, Bala and Bhagwatwar, 2011.
166 WEF, 2012a.
167 Ibid.
168 booz&co. and Google, 2012.
169 See: http://www.undp.org/content/ahdr/en/home/resources/knowledge-reports.html.
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173 See: http://www.ictqatar.qa/en/department/digital-society/ict-skills-development.
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176 WHA, 2005.
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184 Angel-Urdinola, Kuddo and Semlali, 2012.
185 ILO, 2008.
186 All figures were calculated by ESCWA based on the United Nations Population Division, World Population Prospects: the 2012 Revision, available from http://esa.un.org/wpp/unpp/panel_population.htm.
187 Angel-Urdinola, Kuddo and Semlali, 2012.
188 LMIS are mainly based on statistics and aim at measuring the involvement of individuals, households and businesses in the labour market. They cover short-term and structural aspects of the labour market in monetary and non-monetary terms.
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191 League of Arab States and ITU, 2012.
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196 ESCWA, 2013 (Syrian Arab Republic).
197 Arab Thought Foundation, 2013.

198 ESCWA, 2013 (Oman).
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220 The list of indicators on digital content developed by different organizations during the Connect Arab Summit 2012 is a good starting point. See: ITU, 2012b.
221 Outcome documents of the WSIS 2003, Geneva Declaration of Principles and Plan of Action; and 2005 Tunis Agenda for the Information Society, available from http://www.itu.int/wsis/index.html.
222 FAJ, 2013.
223 Ibid.
224 Reporters Sans Frontières (in French), available from http://fr.rsf.org.
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226 Ibid.
227 Ibid.
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229 Ibid.
230 Ibid.
231 Ibid.
232 See: http://www.ebizmba.com/articles/social-networking-websites (retrieved on 19 July /2013).
233 DSG, 2013b.
234 See: http://www.irex.org/resource/media-sustainability-index-msi-methodology.
235 This increase is consistent with the jump of this country in the PFI ranking for the same reference years as discussed above.

236 It is really interesting to observe how this polarization – considered a rather positive development by IREX – is differently treated by the PFI: evoking the same dramatic events in Syrian Arab Republic and their impact on neighbouring Lebanon, the PFI report downgraded Lebanon by eight ranks "after its media became more polarized by neighbouring Syria's civil war", among other reasons.
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267 Refer to the introduction section for additional information on the WSIS action lines.
268 See: http://www.ungis.org/Portals/0/documents/JointInitiatives/UNGIS.Joint.Statement.pdf.

The information society, in which information is processed efficiently, including the production, exchange, adaptation and use of information, is the appropriate environment for achieving sustainable development and enhancing the quality of life for all citizens. However, the move towards the information society constitutes a real challenge to developing countries, particularly in view of the expanding digital divide with developed countries, thus rendering them increasingly vulnerable to a reduction of their productive and economic capacities.

Given the importance of information societies as a path for achieving sustainable development and achieving internationally agreed development goals, and in the process of following up on the World Summit on the Information Society, the Economic and Social Commission for Western Asia (ESCWA) prepared this regional profile, which is the sixth in a series on the information society in the Arab region. The present report provides essential information on the status of the information society in ESCWA member countries. It aims at assisting decision makers and researchers by providing them with reference information for analysis and planning. It also allows national authorities to compare the current status of their information society with that of other countries in the region and the world, thereby promoting opportunities for cooperation and regional integration in an increasingly knowledge-based global economy.

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