Economic and Social Commission for Western Asia (ESCWA)

WSIS-SDGS LINKAGES ON EMPLOYMENT, INDUSTRY & ECONOMIC GROWTH

United Nations
Beirut, 2017

17-00776

EXECUTIVE SUMMARY

This study aims at linking Sustainable Development Goal 8 and 9, with the WSIS Agenda Action Lines. It explores the role of digital technologies in economic growth through industrialization as a driver for development and creator of job opportunities that leads to full and productive employment and decent work for all, in an ecosystem of knowledge-based digital economy.

Today, the Arab Region is not in the best position for economic growth, industrialization and full employment. Present studies show that the region has the highest unemployment rate when compared to other economies of the world, and has insignificant indigenous industrial added value to contribute to its GDP, especially when oil and gas production is excluded. The region has less than modest achievements in research, development and innovation and linkages between universities and industry are low.

Section I outlines SDG 8 and 9 sub goals. Section II deals with WSIS action lines. The linkages between SDG sub goals and the WSIS action lines are detailed in Section III.

Section IV, highlights some of the findings of the ESCWA Arab Development Outlook: Vision 2030 Report published in 2015. The report advocates a development vision that assumes peace and stability, based on stronger and better institutions, which can lead to more inclusive and sustainable growth patterns that include structural transformation, employment generation and resource sustainability. This will, in turn, increase opportunities for investment in human development. Such issues are essential for achieving SDG 8 and 9 sub goals by implementation of WSIS action lines.

The macroeconomic model used in ESCWA's Arab Development Outlook Report produced two scenarios; *business-as-usual*, and *vision*. The *business-as-usual* (pessimistic) scenario assumes that the region's lack of political stability and security will continue, negatively affecting production, governance and public investment. The *vision* (optimistic) scenario assumes conditions that will enable an economic disruptive take-off. The report also assumes that armed conflict *would cease in 2016*, *governance will improve, and regional integration will deepen*. These assumptions, turned out to be optimistic, as the region continues to be in conflict in 2017 and most likely for an unpredictable number of years to come.

The present available official data on the contribution of digital technology to economy in the Arab Region is not sufficient to carry out situation analysis studies on its impact on economic growth, employment and industry. In addition, the state of technologies associated with digital economy is fast changing and disruptive, making it doubly difficult for planners and decision makers to predict convincing scenarios for action lines within the WSIS Agenda to meet SDGs targets.

Several recommendations are drawn out, in Section IV, based on the present state of economic growth as related to digital technologies. They include, increasing the percentage share of digital contribution to GDP, increasing the utilization of digital potential, the share of companies which deal with digital technologies and applications, and venture capital funding for digital projects.

In Section V, issues which constitute barriers for change in employment and employment structure such as reskilling, lifelong learning and retaining talents are addressed. Gender parity as part of future workforce strategy should be considered seriously. For longer term focus, children and youth should be focus, and the need for rethinking the education system in line with technological trends of the fourth industrial revolution is a must. The core curriculum content of many disciplines, at all levels, both academic and professional are becoming out of date by the time entrants graduate.

The fourth industrial revolution and future technologies are discussed in Section VI. The term disruptive technologies truly reflect the unpredictable and fast-changing nature of the state of digital technologies. Coupled with the absence of detailed and timely statistics on the contribution of digital activities in the economy of Arab countries make predictions a mere guesswork exercise. Therefore, one can only highlight qualitative trends as to where solutions for economic growth, employment and industry could lead by 2030.

The wider digital landscape also offers many opportunities for media players in the region to extend their existing content to new platforms and develop new opportunities for local players. Localizing the content as much as possible and having an open environment to operate in, are two of the key success factors for the rise of successful online companies in the region, bearing in mind that online and mobile devices can provide new platforms for regional developers for the exploitation of existing content.

Finally, a set of qualitative recommendations are drawn in Section VII. It includes, amongst others, raising the percentage share of digital contribution to GDP, better utilization of digital potential, increasing the share of companies that deal with digital technologies, and promoting venture capital funding for digital projects. Issues which constitute barriers for change such as reskilling and retaining talents, gender parity are also covered. Section VII also provides a simple model for planners and decision makers to follow when reising their vision 2030 strategy to include digital technologies and their future impact on economic growth, industry and employment.

CONTENTS

FIGURES

Tables

INTRODUCTION

The Arab countries share a common language, culture and history. Its record of cooperation and collaboration goes back to the 1950s, earlier than in any other developing region. The region has always faced common challenges, but in recent years, new and more serious challenges prevailed. They include, expanding populations, a growing youth bulge and high unemployment, rapid urbanization and crowding cities, large flows of immigrants, and shortages of arable land, food and water[1], and above all, lack of security, ethnic, religious and sectarian antagonism and disintegration threats.

However, there are also global opportunities, such as those offered through the technology facilitation mechanism and the planned technology bank for LDCs that can be taken into consideration by countries in the region.

To reduce the region's dependence on global markets, the transformation of Arab countries to a knowledge based economy requires a revisit to the existing modalities for technology transfer, including North-South and South-South partnerships and models. This should be complemented by a commitment to regional horizontal solidarity for sciences, technology and innovation, as well as knowledge-sharing between countries of the region[2].

In 2001, the UN General Assembly Resolution 56/183 endorsed the holding of the **World Summit on the Information Society (WSIS)** in two phases. The first phase took place in Geneva from 10 to 12 December 2003 and the second phase in Tunis, from 16 to 18 November 2005. The objective of the first phase was to develop and foster a clear statement of political will and take concrete steps to establish the foundations for an Information Society for all, reflecting all the different interests at stake. The objective of the second phase was to put Geneva's Plan of Action into motion as well as to find solutions and reach agreements in the fields of Internet governance, financing mechanisms, and follow-up and implementation of the Geneva and Tunis documents[3].

In 2000, the Millennium Development Goals (MDGs), the predecessor of SDGs, established eight international development goals for the year 2015. Information and communication technology had hardly any direct reference within the eight goals. After the announcement of the WSIS Agenda in 2003, ITU and other UN agencies did have quite a struggle linking WSIS Action Lines to MDGs[4].

The **Sustainable Development Goals** (**SDGs**) is a set of 17 "Global Goals" with 169 targets. It is spearheaded by the United Nations through a deliberative process involving its 193 Member States, as well as the global civil society. The goals are contained in paragraph 54 United Nations Resolution A/RES/70/1 of 25 September 2015. The Resolution is a broader intergovernmental agreement that acts as the Post 2015 Development Agenda[5].

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[1]E/ESCWA/SDPD/2013/Technical Paper.8, "SDG Priority Conceptual Issues: Towards an Arab Approach for the
Sustainable Development Goals", October 2013
[2] E/ESCWA/SDPD/2015/3, "Arab Sustainable Development Report". 2015.
[3] http://www.itu.int/net/wsis/basic/about.html
[4] https://en.wikipedia.org/wiki/Millennium_Development_Goals
[5] https://en.wikipedia.org/wiki/Sustainable_Development_Goals

The main goal of the study is an attempt to identify the links WSIS Agenda Action Lines have with two specific SDG's, 8 and 9, as related to economic growth and industrialization as drivers for development and creators of job opportunities leading to full and productive employment and decent work for all in an ecosystem of a knowledge-based digital economy.

The sections in this report cover the following topics:

I. Sustainable Development Goals 8 and 9;

II. WSIS and WSIS+10: Agenda and Follow-Up;

III. WSIS Linkages with SDG 8 and SDG 9;

IV. The ESCWA Arab Region Vision 2030 as related to economic growth;

V. Digital Technology and Economic Growth;

VI. Employment and Employment Structure in the Digital Environment;

VII. Industrialization and Digital Technologies;

VIII. Recommendations for Vision and Policy Changes

The study has four appendices on SDGs, WSIS, Networked Readiness Index Radar Diagrammes for selected countries from the region and ICT related statistics for the Arab Region.

I.   SUSTAINABLE DEVELOPMENT GOALS 8 AND 9

The Sustainable Development Goals (SDGs) are a set of 17 intergovernmental aspirational goals with numerous targets and indicators, covering a broad range of economic, social, environmental and governance issues. Annex I is a brief list of the 17 goals.

SDGs are vastly interlinked to other economic, environmental, fiscal and social variables. Some variables are linked to the sectoral structure of the economy[6].

Out of the 17 Sustainable Development Goals, this section focuses on Goal 8 and Goal 9 targets in preparation for the establishment of linkages with the WSIS Agenda and the Arab Region's Vision for 2030.

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all[7].

8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries;

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[6] E/ESCWA/EDID/2017/Technical Paper.1, "Prototype model for Sustainable Development Goal simulation", 2017

[7] https://sustainabledevelopment.un.org/sdgs

8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor-intensive sectors;

8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services;

8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead;

8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value;

8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training;

8.7 Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms;

8.8 Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, women migrants, and those in precarious employment;

8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products;

8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all;

8.a Increase Aid for Trade support for developing countries, least developed countries, including through the Enhanced Integrated Framework for Trade-Related Technical Assistance to Least Developed Countries;

8.b By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization.

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation[8].

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[8] 7

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all;

9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries;

9.3 Increase the access of small-scale industrial and other enterprises, in developing countries, to financial services, including affordable credit, and their integration into value chains and markets;

9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries acting in accordance with their respective capabilities;

9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending;

9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States;

9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities;

9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020.

II.   WSIS AND WSIS+10: AGENDA AND FOLLOW-UP

The 2003 WSIS Agenda issued in the WSIS Geneva meeting with its Action Lines, and endorsed in the WSIS meeting in Tunis in 2005 are listed in Appendix II.

The year 2015 marked the endpoint for achieving the targets of the WSIS outcomes within the framework of the *Plan of Action* for the WSIS overall review (WSIS+10). It was prepared specifically for the WSIS+10 High Level Event, which was *"... designed to review the progress made in the implementation of the WSIS outcomes under the mandates of participating agencies, and to take stock of achievements in the preceding ten years, 2005 - 2015."*

In 2014, a report was issued by the Partnership on Measuring ICT for Development entitled **"Final WSIS Targets Review Achievements, Challenges and the Way Forward"[9]**. A set of conclusions and recommendations was made for each target, highlighting the key findings on progress achieved. Recommendations are made on the relevance of the targets, and the availability of indicators and their ability to track the target. Depending on target and indicators, more appropriate targets and indicators, in the context of the post-2015 development agenda and possible ICT monitoring framework, are proposed and discussed.

The latest WSIS Stocktaking report was issued in June 2017[10]. It provides an overall picture of progress in the latest WSIS-related activities. It also focuses on contributions by stakeholders worldwide to WSIS and Sustainable Development Goals. The Report provides key findings on emerging trends in the development of the Information Society, and references major activities being implemented in the eighteen areas covered by the eleven WSIS Action Lines and seventeen SDGs.

III. WSIS LINKAGES WITH SDG 8 AND SDG 9

The ITU publication entitled *"Advancing Sustainable Development Through Information and Communication Technologies: WSIS Action Lines Enabling SDGs"*, is based on the contributions provided by stakeholders in response to the ITU official call for update and new entries. The full descriptions of the activities are available at an accessible online database[11]: www.wsis.org/stocktaking.

Table 1 details the links for Goal 8 and Goal 9 to the related WSIS Action Lines. One must point out here that some of the linkages between action lines and Goals are not as strong or as relevant as others.

Table 1. Detailed links of Goals 8 and 9 with WSIS Action Lines	
GOAL 8	**RELATED WSIS ACTION LINES**
Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. The following targets have been identified by WSIS Action Line Facilitators as those being mostly supported by WSIS Action Lines RELEVANT TARGETS: 8.1 Sustain per capita economic growth in accordance with national circumstances	C2: Information and communication infrastructure: an essential foundation for the Information Society; C3: Access to information knowledge; C5: Building confidence and security in the use of ICTs; C6: Enabling environment; C7: ICT Applications: e-business;

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[9] ITU, Partnership on Measuring I C T for Development, Final WSIS TARGETS REVIEW, (www.itu.int) 2014.
[10] ITU, "Report on the WSIS Stocktaking 2017", June 2017.
[11] https://www.itu.int/net4/wsis/sdg/Content/Documents/wsis-sdg_booklet.pdf

and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries;	e-employment; e-agriculture; C8: Cultural diversity and identity, linguistic diversity and local content; C10: Ethical dimensions of the Information Society.
8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors;	
8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services;	
8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value;	
8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products;	
8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all.	
GOAL 9	RELATED WSIS ACTION LINES
Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. The following targets have been identified by WSIS Action Line Facilitators as those being mostly supported by WSIS Action Lines RELEVANT TARGETS: 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all; 9.3 Increase the access of small-scale industrial and other enterprises, in	C2: Information and communication infrastructure: an essential foundation for the Information Society; C3: Access to information knowledge; C5: Building confidence and security in the use of ICTs; C6: Enabling environment; C7 ICT Applications: e-government; e-business; e-environment; e-agriculture; C9: Media;

developing countries, to financial services, including affordable credit, and their integration into value chains and markets;	C10: Ethical dimensions of the Information Society.
9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with countries taking actions in accordance with their respective capabilities;	
9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States;	
9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020.	
Source: ITU	

IV.   THE ESCWA ARAB DEVELOPMENT OUTLOOK: VISION 2030

In 2015, an important visionary study for the Arab Region entitled "**Arab Development Outlook - Vision 2030**" was issued by ESCWA**.** It advocates five critical areas for achieving a 2030 vision for the Arab Region. These are: political transformation, good governance, structural economic change, human development and regional integration[12].

The report contains policy recommendations that hold promise as levers of change for the region. It identifies two issues that will frame the debate on the future of development in the Region:

1. **Democracy and development:** Evidence suggests that economic growth and social development can be sustained by a variety of political systems, including autocracies. It argues that development depends on institutional and governance reform, and diverges from other analyses by focusing on indicators related to the rule of law and the legitimacy of institutions.

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2. **A virtuous cycle:** A development vision that assumes peace and stability, based on stronger and better institutions, which lead to more inclusive and sustainable growth patterns that include structural transformation, employment generation and resource sustainability and, in turn, increase opportunities for investing in human development.

The Arab region needs to focus on employment, as the lack of decent work is a main economic development problem. One of the key issues is a sound social policy on mass quality education. The developmental scene must be characterized by a combination of *"capacities, visions, norms and/or ideologies"* that will lead to structural transformation and industrialization. In partnering with the private sector, governments should identify projects in which the profit motive is in line with national developmental goals[13].

According to the ESCWA report, Arab countries are expected to have achieved, or be on course to achieving, the following five strategic goals, or pillars[14]:

1) Peace and security;
2) Governance;
3) Structural transformation and resource sustainability;
4) Human development and social justice; and
5) Regional integration.

The SDGs are broadly in line with the goals and targets of the ESCWA report, but in some cases, the report is more ambitious. Strategic goals 3 and 4 are relevant to the study in hand and this report will attempt to harmonize the challenges and policy recommendations of WSIS, SDGs and the 2030 Arab Region Outlook.

Structural transformation and resource sustainability

The macroeconomic model used in ESCWA's Arab Development Outlook Report produced two scenarios; *business-as-usual*, and *vision*. The *business-as-usual* scenario assumes that the region's lack of political stability will continue, negatively affecting production, governance and public investment. The *vision* scenario assumes conditions that will enable an economic disruptive take-off. The report also assumes that armed conflict *would cease in 2016*, governance will improve, and regional integration will deepen. These assumptions, turned out to be too optimistic, as the region continues to be in conflict in 2017 and most likely for unpredictable number of years to come.

The recommended policy of the report addresses the following issues. For details, please refer to the referenced ESCWA Report.[15]:

a. Quality public investment, financial incentives and structural transformation policies;
b. Monetary policy;
c. Technology development and building productive capacities;

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[13] 12
[14] 12
[15] 12

d. Knowledge economy and growth;
e. Employment generation.

Present Status of National Visions Several national vision reports from EMCs were reviewed. Practically all of them did not realistically address employment opportunities and industrialization as related to digital economy[16,17,18,19,20,21,22,23,24,25,].

V. DIGITAL TECHNOLOGY AND ECONOMIC GROWTH

GLOBAL PERSPECTIVES

The impact of ICT extends well beyond productivity gains. In fact, ICTs are vectors of economic and social transformation. By improving access to services, enhancing connectivity, creating business and employment opportunities, and changing the ways people communicate, interact, and engage among themselves and with their governments, ICTs can transform the world in a major way. Only widespread and systematic use of ICTs by all stakeholders, individuals, businesses, and government can trigger such transformation. History reveals an almost perfect correlation between a country's level of ICT uptake and the economic and social impacts ICTs have on its economy and society[26].

PwC, a UK based consultancy group, issued a long-term outlook study entitled *"The World in 2050"*[27]. Although the accuracy of the prediction can be disputed, however, it presented economic growth projections for 32 of the largest economies in the world accounting for around 84% of global GDP. The results can only be considered as rough guidelines rather than precise prediction. Included in the outlook study from the Arab Region are Egypt and Saudi Arabia. The study highlighted the following predictions:

– Growth of world economy will be at an average of just over 3% per annum in the period 2014 – 50, doubling in size by 2037 and nearly tripling by 2050;
– Global growth will slow down in after 2020, as the rate of expansion in China and some other major emerging economies moderates to a more sustainable long-term rate, and as working age population growth slows in many large economies;

[16] Digital McKinsey, "Digital Middle East: Transforming the region into a leading digital economy", October 2016.
[17] http://bahrainedb.com/about-us/economic-vision-2030/
[18] http://sdsegypt2030.com/?lang=en
[19] https://search4dinar.wordpress.com/2017/07/16/the-vision-of-iraq-2030-will-create-economic-and-social-well-being/
[20] http://inform.gov.jo/en-us/By-Date/Report-Details/ArticleId/247/Jordan-2025
[21] http://www.un.org.lb/english/agenda-and-the-sdgs
[22] https://www2.deloitte.com/content/dam/Deloitte/xe/Documents/About-Deloitte/mepovdocuments/mepov12/dtme_mepov12_Oman2020vision.pdf
[23] http://www.mdps.gov.qa/en/qnv1/Pages/default.aspx
[24] http://vision2030.gov.sa/en
[25] http://www.tunisia2020.com/en/plan-2016-2020/
[26] WEF, "*The Global Information Technology Report*", www.weforum.org/gitr, 2015
[27] http://www.pwc.com/gx/en/issues/economy/the-world-in-2050.html

- The global economic power shift away from the established advanced economies in North America, Western Europe and Japan will continue over the next 35 years;
- China has already overtaken the US in 2014 to become the largest economy in purchasing power parity (PPP) terms;
- In market exchange rate (MER) terms, it is projected that China is to overtake the US in 2028 despite its projected growth slowdown;
- India has the potential to become the second largest economy in the world by 2050 in PPP terms (third in MER terms), although this will require a sustained programme of structural reforms;
- New emerging economies like Mexico and Indonesia will become larger than the UK and France by 2030 (in PPP terms) while Turkey could become larger than Italy;
- Nigeria and Vietnam could be the fast-growing large economies over the period to 2050;
- Colombia, Poland and Malaysia all possess great potential for sustainable long-term growth in the coming decades;
- Relatively rapid growth is not guaranteed for emerging economies, as indicated by recent problems in Russia and Brazil, for example, but requires sustained and effective investment in infrastructure and improvement in political, economic, legal and social institutions. It also requires remaining open to the free flow of technology, ideas and talented people that are key drivers of economic catch-up growth;
- Overdependence on natural resources could impede long term growth in some countries (e.g. Russia, Nigeria and Saudi Arabia) unless they can diversify their economies.

Four main mechanisms dictate the process by which ICTs contribute to economic growth by affecting inputs to GDP growth[28]:

1) ICTs contribute to GDP directly through the production of ICT goods and services as well as well as through continuous advances in ICT-producing sectors;
2) ICTs contribute to total factor productivity growth through the reorganization of the ways goods and services are created and distributed;
3) ICT industries generate positive employment effects; and
4) Increasing applications of ICTs (capital deepening) leads to rising labor productivity.

New Job Trends in the Digital Economy

Digital Gig Jobs: From a work and labour viewpoint, the nearest term would be "online labour", or "online outsourcing" and the total domain would be "(digital) gig economy". Online labour is defined as intangible work delivered digitally and done for money, organised through online outsourcing platforms that can be considered as marketplaces getting buyers and sellers together.

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[28] 2627

According to Richard Heeks of the Centre for Development Informatics at the University of Manchester in the UK, the size of the digital gig economy cannot be precisely quantified. Rough estimates suggest that is worth nearly US$5bn and involving around 60m workers. There is a general agreement that online labour is growing fast as an economic phenomenon, and that it will thus be an increasingly important model in the future of work and the future of economic development.

Online labour can be divided into two categories:

Crowd work: In this category, tasks are not assigned to a specific individual. Many can compete for the task but "only one result is used and paid for". Examples of microwork include data entry, tagging or interpretation of content, completion of surveys, and finding of information. Contest-based work may include creation of a design of a company logo.

Online freelancing: In this category, a more substantial task is given to a specific individual as for Upwork or Freelancer. Online freelancing work may include software development, web development, translation, transcription, data analytics, design, administrative support, and sales and marketing[29]

REGIONAL PERSPECTIVES

The ESCWA Information Portal is a platform for statistical output on the Arab region. It offers a variety of statistical services and products covering social and economics areas, and facilitates access to statistical data, analysis, and information on EMCs. The overall GDP performance of the ESCWA member countries has been inconsistent, with the growth rate falling from 6.1 per cent in 2012 to 1.6 per cent in 2014, then increasing to 2.5 per cent in 2015. It is also to decrease to 1.9 per cent in 2016. While the world has been experiencing a growth pattern of real GDP growth rate averaging at 2.4 per cent during the period 2012-2016. The GDP growth rate of developing countries has been following a downward trend from 4.7 per cent in 2012 to 3.8 per cent in 2016[30].

Table 2 shows GDP related indicators for the Arab region and three main neighbouring economies. It also shows the aggregated data for the MENA region and the world.

Table 2. MENA GDP Data					
Country		**Value added (% of GDP)**			
	GDP ($Billion)	**Industry***	**Manuf'ing****	**Services**	**GDP per capita ($)**
	2016	**2015**	**2016**	**2016**	**2016**
Algeria	156.1	38.9	…	51	1.8
Bahrain	31.9	40.3	…	58	-0.1
Comoros	0.6	…	…	…	…
Djibouti	1.7	…	…	80 (2005)	…
Egypt	336.3	36.2	17	55	2.2
Iraq	171.5	…	…	…	7.8
Jordan	38.7	29.6	18	67	-1.2

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[29] https://www.gdi.manchester.ac.uk/research/publications/di/di-wp71/
[30] ESCWA, national-accounts-studies-arab-region-35_0

Kuwait	114.0	51.1		48	…
Lebanon	47.5	20.9	5	81	-0.9
Libya	47.3 [(2005)]	…	…	22 [(2005)]	…
Mauritania	4.6	28.6		43	-0.8
Morocco	101.4	29.2	18	57	-0.3
Oman	66.3	52.4		50	…
Qatar	152.5	58.5	8	48	-1.3
Saudi Arabia	646.4	45.3	13	54	-0.5
Somalia	6.2	…	…	…	…
Sudan	95.6	2.6		58	2.2
Syria	28.9 [(2005)]	…	…	44 [(2005)]	…
Tunisia	42.1	28.2		61	0.0
UAE	348.7	…	…	…	1.8
WB & G	13.4	22.5		73	1.2
Yemen	27.3	48.1	11	42	-12.0
Iran	393.4		8 [(2005)]	55	…
Israel	318.7	…	…	…	2.0
Turkey	857.7	32.4	3.9	61	1.3
MENA	**3,111.5**	**4.1**	**14.5** [(2000)]	**53**	**1.5**
World	**75,543.5**	**2.3**	**15.3**	**69**	**1.2**

The general growth rate of the Arab region, without taking ICT into consideration, is shown in Figure 1a for the non-oil producing countries and Figure 1b for the oil-producing countries based on the two scenarios of business as usual (pessimistic) and the vision (optimistic), as formulated in the ESCWA Report on Arab Development Outlook – Vision 2030[31]. From the same reference, Figure 2 compares productivity growth of the Arab region with other regions of the world scoring the lowest productivity growth for all measurement periods covered.

Figure 1. Growth rate in the Arab region, 2015-2025
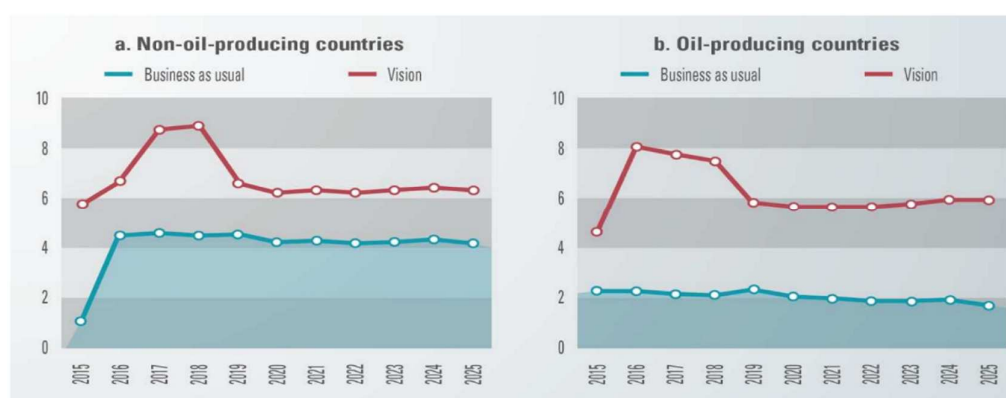
Source: E/ESCWA/EDID/2015/3, "Arab Development Outlook - Vision 2030", 2015

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[31] 12

Figure 2. Productivity growth rate (percentage)

ICT Related Indicators for the Arab Region

ICT Import – Eport and Services

On the issue of ICT related related activities, data were extracted from the World Development Indicators database[32]. Detailed results are listed in Appendix IV. It shows modest inconsistent achievements in ICT related activities for practically all countries in the region.

The Networked Readiness Index (NRI) for country assessment

Digital penetration in a society has tremendous impact on economic growth. Therefore, to help assess the status of digital technology for economic growth in the region, the WEF/INSEAD Network Readiness Index (NRI) has been used to assess the status of readiness in selected countries in the region. NRI consists of 10 pillars arranged into 4 major categories as explained in the reference[33]. Radar diagrammes representing the status of some countries in the region are shown in Appendix III. The radar diagramme is a useful tool for strategists and planners when formulating national outlooks and visions. The following ten tests of strategy can be helpful in determining whether a national digital strategy covers all critical elements and overcome the gaps that can be detected in the radar diagrammes[34]:

    (1)   Will the strategy beat the market—Does the nation's digital strategy address real market needs and overcome pain points?

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[32] World Development Indicators. Last Updated: 10 October 2017

[33] 26
[34] 26

(2) Does the strategy tap a true source of advantage—What is the nation's digital competitive edge compared with its peers?

(3) Is the strategy granular about where to compete—Does the national digital strategy have a granular sector view?

(4) Does the strategy put you ahead of trends—Is the national digital strategy anticipating the most relevant digital innovations?

(5) Does the strategy rest on privileged insights—Does the national digital strategy build on local insights?

(6) Does the strategy embrace uncertainty—Does the national digital strategy consider scenarios?

(7) Does the strategy balance commitment and flexibility—Does the national strategy focus on a few crucial, high-commitment initiatives while maintaining flexibility to make other choices over time?

(8) Is the strategy biased—Does the national digital strategy consider all stakeholders?

(9) Is there conviction to act on the strategy—Is the national digital governance in place to successfully implement the strategy?

(10) Has the strategy been translated into an action plan—Does the national digital strategy have a clear road map of target-based initiatives?

VI. EMPLOYMENT AND EMPLOYMENT STRUCTURE IN THE DIGITAL ENVIRONMENT

GLOBAL PERSPECTIVES

In a research conducted by the World Economic Forum, 13 million employees across 9 broad industry sectors in 15 developed and emerging economies and regional economic areas were surveyed. The target pool of respondents comprised, as the primary selection criterion, the 100 largest global employers in each target industry sectors, classified by the World Economic Forum as follows:

- Basic and Infrastructure;
- Consumer;
- Energy;
- Financial Services & Investors;
- Healthcare;
- Information and Communication Technology;
- Media, Entertainment and Information;
- Mobility;
- Professional Services.

A total of 371 individual companies from these industries and regions responded to the survey over the first half of 2015, providing 1,346 detailed occupation-level data points on mass employment, specialist and newly emerging occupations based in specific geographic locations across these companies' global operations[35].

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[35] http://reports.weforum.org/future-of-jobs-2016/

The significance, timeframe and definitions of global drivers for change are shown in Table 3.

Table 3. Significance, timeframe and definition of global drivers of change			
Demographic and socioeconomic drivers for change			
Driver of change	**Rating**	**Timeframe**	**Definition**
Changing work environments and flexible working arrangements	**44%**	already felt impact	New technologies are enabling workplace innovations such as remote working, co-working spaces and teleconferencing. Organizations are likely to have an ever-smaller pool of core full-time employees for fixed functions, backed up by colleagues in other countries and external consultants and contractors for specific projects.
Rise of the middle class in emerging markets	**23%**	already felt impact	The world's economic centre of gravity is shifting towards the emerging world. By 2030, Asia is projected to account for 66% of the global middle-class and for 59% of middle-class consumption.
Climate change, natural resource constraints and the transition to a greener economy	**23%**	already felt impact	Climate change is a major driver of innovation, as organizations search for measures to mitigate or help adjust to its effects. Yet as global economic growth continues to lead to demand for natural resources and raw materials, over-exploitation implies higher extraction costs and degradation of ecosystems.
Rising geopolitical volatility	**21%**	already felt impact	The geopolitical landscape is constantly changing, with far-reaching implications for global trade and talent mobility, requiring industries such as Oil and Gas or Aviation and Tourism to react and adapt faster than ever before.
New consumer concerns about ethical and privacy issues	**16%**	2015–2017	In many economies consumers are increasingly concerned about a range of issues related to their purchasing decisions: carbon footprint; impact on the environment; food safety; labour standards; animal welfare; and a

			company's record on ethical trade. Additionally, internet users have increasingly become aware of issues around data security and online privacy.
Longevity and ageing societies	**14%**	2015–2017	Over the next decade, advanced economies will see the effects of an ageing population. Increasingly, people will work past age 65 to secure adequate resources for retirement. At the same time, serving the needs of an older society will create opportunities for new products, services and business models.
Young demographics in emerging markets	**13%**	already felt impact	Much of the developing world is experiencing rapid population growth and faces a very different demographic challenge than advanced economies: devising appropriate education and training systems to prepare an overwhelmingly young population for the workplace. Leading emerging nations continue to move up the skills ladder and improve access to high-quality education, contributing to a dramatic rise in the number of the college-educated and a shift in the global distribution of talent.
Women's rising aspirations and economic power	**12%**	2015–2017	Women have made significant gains in labour force participation and educational attainment, resulting in an increasingly important role in the economy as both consumers and employees.
Rapid urbanization	**8%**	already felt impact	The world's urban population is set to double between 2010 and 2050, from 2.6 billion to 5.2 billion. This rapid and unprecedented pace of urbanization, especially in markets such as China and Sub-Saharan Africa, brings with it many opportunities as well as challenges.
Chronological drivers of change			
Mobile internet and cloud technology	**34%**	2015–2017	The mobile internet has applications across business and the public sector, enabling more efficient delivery of services and opportunities

			to increase workforce productivity. With cloud technology, applications can be delivered with minimal or no local software or processing power, enabling the rapid spread of internet-based service models.
Advances in computing power and Big Data	**26%**	2015–2017	Realizing the full potential of technological advances will require having in place the systems and capabilities to make sense of the unprecedented flood of data these innovations will generate.
New energy supplies and technologies	**22%**	2015–2017	New energy supplies and technologies, such as renewables and hydraulic fracturing (fracking), are shaking up the global energy landscape and disrupting powerful players at least as much as yesterday's oil price crises did, with profound and complicated geopolitical and environmental repercussions.
The Internet of Things	**14%**	2015–2017	The use of remote sensors, communications, and processing power in industrial equipment and everyday objects will unleash an enormous amount of data and the opportunity to see patterns and design systems on a scale never possible.
Crowdsourcing, the sharing economy and peer-to-peer platforms	**12%**	already felt impact	With peer-to-peer platforms, companies and individuals can do things that previously required large-scale organizations. In some cases the talent and resources that companies can connect to, through activities such as crowdsourcing, may become more important than the in-house resources they own.
Advanced robotics and autonomous transport	**9%**	2018–2020	Advanced robots with enhanced senses, dexterity, and intelligence can be more practical than human labour in manufacturing, as well as in a growing number of service jobs, such as cleaning and maintenance. Moreover, it is now possible to create cars, trucks, aircraft, and boats that are completely or partly autonomous, which could revolutionize

			transportation, if regulations allow, as early as 2020.
Artificial intelligence and machine learning	**7%**	2018–2020	Advances in artificial intelligence, machine learning, and natural user interfaces (e.g. voice recognition) are making it possible to automate knowledge-worker tasks that have long been regarded as impossible or impractical for machines to perform.
Advanced manufacturing and 3D printing	**6%**	2015–2017	A range of technological advances in manufacturing technology promises a new wave of productivity. For example, 3D printing (building objects layer-by-layer from a digital master design file) allows on-demand production, which has far-ranging implications for global supply chains and production networks.
Advanced materials, biotechnology and genomics	**6%**	2018–2020	Technological advances in material and life sciences have many innovative industry applications. Recent breakthroughs in genetics could have profound impacts on medicine and agriculture. Similarly, the manufacture of synthetic molecules via bio-process engineering will be critical to pharmaceuticals, plastics and polymers, biofuels, and other new materials and industrial processes.
Source: http://reports.weforum.org/future-of-jobs-2016/			

Global Employment Trends in Digital Technology

According to the WEF report, the ICT job family is anticipated to experience very high growth centered on data analysts and software and applications developers, not just within the Information and Communication Technology industry, but across a wide range of industries, including Financial Services & Investors, Media, Entertainment and Information, Mobility and Professional Services. Computing power and big data analytics constitutes a significant driver of employment growth in each of these sectors. In fact, employment growth for ICT is expected to be least pronounced in the information and communication technology sector itself, indicating the accelerated demand for data analysis skills and ICT literacy by other industries. For example, the media, entertainment and information industry are expecting a flat employment outlook about its core arts, design, entertainment, sports and media job family, combined with high growth in the computer and mathematical field, as the industry fully embraces its digital transformation. On this same track, solid job growth is expected for architecture

and engineering roles, particularly in the consumer, information and communication technology and mobility industries. By contrast, demand for additional engineering talent in its traditional core Basic and Infrastructure and energy industries is flat[36].

Global Skills Outlook

The accelerating pace of technological, demographic and socio-economic disruption is transforming industries and business, changing the skills that employers need and shortening the shelf-life of employees' existing skill sets in the process. For example, technological disruptions such as robotics and machine learning—rather than completely replacing existing occupations and job categories are likely to substitute specific tasks previously carried out as part of these jobs, freeing workers to focus on other tasks and leading to rapidly changing core skill sets in these jobs. Even those jobs that are less directly affected by technological change and have a largely stable employment outlook like marketing or supply chain professionals may require completely different skill sets a few years on.

Global Barriers to Managing Change

Reskilling and retraining efforts may not yield the desired outcome if they are not made with the understanding of disruptive change. The main perceived barriers to a more decisive approach would include a lack of understanding of the disruptive changes ahead, resource constraints and short-term profitability pressures from management, and lack of alignment between workforce strategies and firms' innovation strategies. However, there are significant differences between industries in this regard. The ICT sector reports a relatively good understanding of drivers of change, and instead sees resource constraints as its main barrier whereas the media, entertainment and information industry, the sector that has seen the largest scale of disruption of its traditional business, reports a good understanding of the nature of disruptive changes ahead and is mainly concerned about short-term shareholder pressures[37].

For governments, it will entail innovating within education and labour-related policymaking, requiring skills evolutions of their own. For the education and training sector, it will mean vast new business opportunities as it provides new services to individuals, entrepreneurs, large corporations and the public sector. The sector may become a noteworthy new source of employment itself. For businesses to capitalize on new opportunities, they will need to put talent development and future workforce strategy as a priority to their growth. Firms can no longer be passive consumers of ready-made human capital. They require a new mindset to meet their talent needs and to optimize social outcomes. This entails several major changes in how business views and manages talent[38].

Gender Parity as Part of Future Workforce Strategy

 Over the past 10 years, the World Economic Forum's Global Gender Gap Report has been tracking the economic gender gap across the world[39]. Progress has been uneven

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[36] 35

[37] 35

[38] 35

[39] http://reports.weforum.org/future-of-jobs-2016/future-workforce-strategy/

and slow. Only 3% of the global economic gender gap has been closed so far. There is an economic need for including women more fully into society and the workplace, in addition to a values-based case for gender equality. Female talent remains one of the most under-utilized business resources. Although women are, on average, more educated than men globally and now participate more fully in professional and technical occupations than before, their chances to rise to positions of leadership are only 28% of those of men. Women continue to make up less of the overall labour force than men, and where they participate in the formal economy their earnings for similar work are usually lower. The talents of a good part of the world's potential workforce are thus often wasted or underutilized due to barriers on the path to women's successful workforce integration[40].

Employing and promoting more women is one accessible way companies can bring more diverse voices into their decision-making and business development, allowing fresh thinking and disrupting business models from within before they are disrupted from without. The dividends of those diverse voices are best reaped when inclusion is not predicated on pure assimilation. Similarly, companies in which women are more strongly represented at the board and at senior management levels have been shown to outperform male board members[41].

Longer Term Focus

A long-term focus on children and youth is one of the main issues, and thus the rethinking of the education system in line with the technological trends of the fourth industrial revolution is a must. Lifelong learning should be made attractive for present day workforce. Ageing countries won't just need lifelong learning, they will need wholesale reskilling of existing workforces throughout their lifecycle. Governments and businesses have many opportunities to collaborate to ensure that individuals have the time, motivation and means to explore retraining opportunities.

Cross-industry and public-private collaboration is essential. Businesses should work with industry partners to develop a clearer view on future skills and employment needs, to maximize benefits, and work more closely with governments to map a future view of skill demand versus supply. Resources should then be put into place regionally to upskill those out of work to fill high priority employment gaps.

Impact of Disruptive Change on Skills

Building training systems and labour market institutions may be needed for major newly introduced skills. Such process often takes decades. However, given the upcoming pace and scale of disruption brought about by the *Fourth Industrial Revolution*, this is no longer an option because of the effect of the disruptive change which will require fast response for the new skills.

The current technological trends are bringing about an unprecedented rate of change in the core curriculum content of many fields, both academic and professional, with an

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[40] 39
[41] 35

estimated 50% of subject knowledge acquired during the first year of a four-year technical degree outdated by the time students graduate.

Employers are equally concerned about the work-related practical skills or competences that current employees, or prospective ones, can use to perform new job tasks successfully. The core set of work relevant skills and abilities that are widely used across all industry sectors and job families are shown in Figure 3. These practical skills will be subject to change and significant disruption in the coming years.

At an industry level, the highest level of skills stability over the 2015–2020 period is expected to be found in the Media, Entertainment and Information sector, which has already been transformed profoundly in recent years, while the largest amount of skills disruption is expected to occur in the Financial Services & Investors industry.

Figure 3. Core Set of Work Relevant Skills and Abilities

Abilities	Basic Skills	Cross-functional Skills	
Cognitive Abilities » Cognitive Flexibility » Creativity » Logical Reasoning » Problem Sensitivity » Mathematical Reasoning » Visualization	**Content Skills** » Active Learning » Oral Expression » Reading Comprehension » Written Expression » ICT Literacy	**Social Skills** » Coordinating with Others » Emotional Intelligence » Negotiation » Persuasion » Service Orientation » Training and Teaching Others	**Resource Management Skills** » Management of Financial Resources » Management of Material Resources » People Management » Time Management
Physical Abilities » Physical Strength » Manual Dexterity and Precision	**Process Skills** » Active Listening » Critical Thinking » Monitoring Self and Others	**Systems Skills** » Judgement and Decision-making » Systems Analysis **Complex Problem Solving Skills** » Complex Problem Solving	**Technical Skills** » Equipment Maintenance and Repair » Equipment Operation and Control » Programming » Quality Control » Technology and User Experience Design » Troubleshooting

Source: World Economic Forum, based on O*NET Content Model.
Note: See Appendix A for further details.

Drivers and Skills in Digital Employment

The *Fourth Industrial Revolution* is interacting with other socio-economic and demographic factors to create a perfect storm of business model change in all industries, resulting in major disruptions to labour markets, production and services. The world Economic Forum (WEF) divided the industry profile into the following tracks[42]:

According to the WEF survey, the top drivers for change for ICT workforce are:

- − Mobile Internet, cloud technology (69%);
- − Processing power, big data (44%);
- − Changing nature of work, flexible work (36%);

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[42] 35

– Internet of Things (33%)
– Consumer ethics, privacy issues (31%);
– New energy supplies and technologies (17%);
– Longevity aging, societies (14%);
– Sharing economy, crowd sourcing (11%).

And the skills required are:

– Technical skills;
– Social skills;
– Cognitive abilities;
– Process skills;
– Resource management skills;
– Content skills;
– Complex problem-solving skills;
– Systems skills;
– Physical abilities.

Emerging Job Family in Focus is: <u>computer and mathematical</u>

Occupations	Key skills for 2020	Skills family
Software and Applications Developers and Analysts	Complex Problem Solving	Complex Problem-Solving Skills
Information Security Analysts	Critical Thinking	Process Skills
	Cognitive Flexibility	Cognitive Abilities
Data Analysts	Mathematical Reasoning	Cognitive Abilities
	Active Learning	Content Skills

And for the top drivers for change for <u>media, entertainment and information workforce</u> are:

– Mobile Internet, cloud technology (57%);
– Processing power, big data (36%);
– Ongoing nature of work, flexible work (36%).

And the skills required are:

– Social skills
– Process skills;
– Resource management skills;
– Technical skills;
– Cognitive skills;
– Content skills;
– Complex problem-solving skills;
– Systems skills.

Emerging Job Family in Focus: <u>Management</u>

Occupations	Key skills for 2020	Skills family
Managing Directors and Chief Executives	Critical Thinking	Process Skills
Organizational Development Specialists	People Management	Resource Management Skills
	Complex Problem Solving	Complex Problem-Solving Skills
General and Operations Managers	Monitoring Self and Others	Process Skills
	Management of Financial Resources	Resource Management Skills

REGIONAL PERSPECTIVES

Figure 4 shows unemployment rates across regions of the world for different years extending from 1992 to 2013. Both the Asian side and the African side of the Arab region have the highest percentages of unemployment throughout the measured years compared with other regions.

The unemployed is further categorized in the Arab region according to skills in both oil-producing and nonoil-producing countries, Figures 5 and 6. It is interesting to note that both *business as usual* and *vision* scenarios for both skilled and unskilled employment, and in both oil and non-oil producing countries are surprisingly close.

An interesting comparison is made in McKinsey's "Digital Middle East: Transforming the region into a leading digital economy" report between percentages of digital talent out of the total workforce. Figure 7 shows that the Middle East has a percentage of 1.7 compared with 3.7 and 3.8 for Europe and the United States respectively. Amongst the Arab countries measured, it is surprising to note that Saudi Arabia had the lowest percentage in digital talents. Equally surprising, Kuwait had the highest percentage in digital talents.

Figure 4. Unemployment rate across regions, 1992-2013 (percentage)
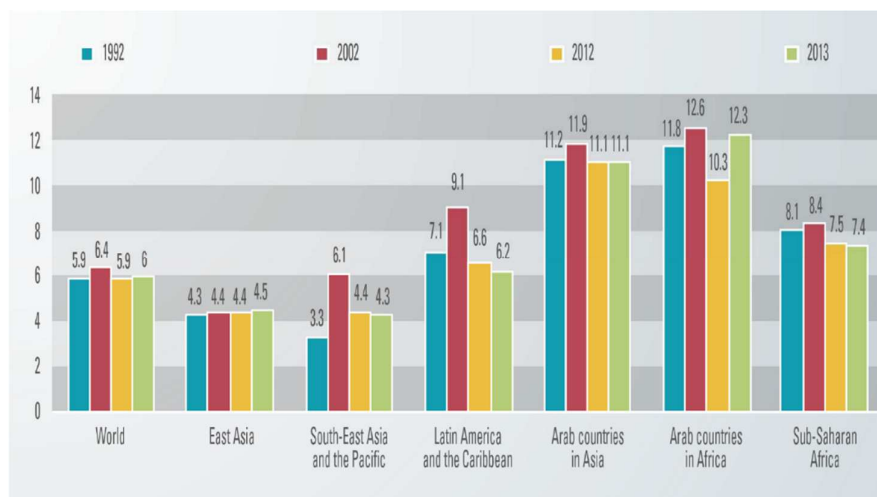
Figure 5. Unemployment rates for non-oil-producing countries
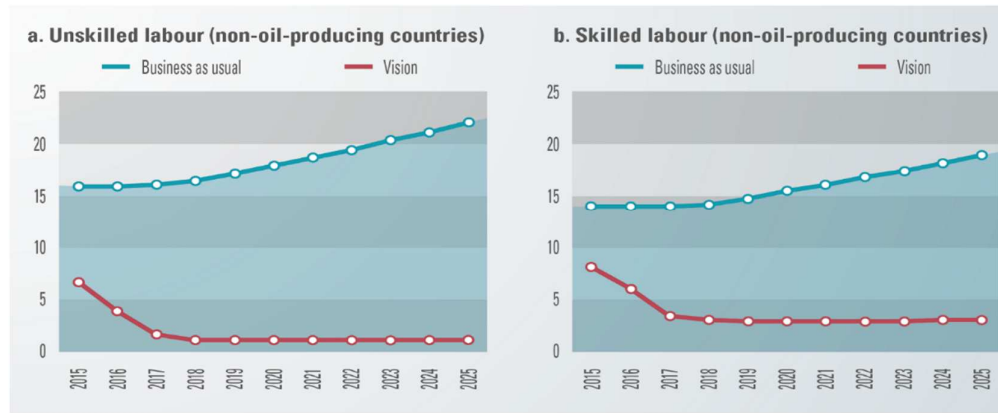
Figure 6. Unemployment rates for oil-producing countries
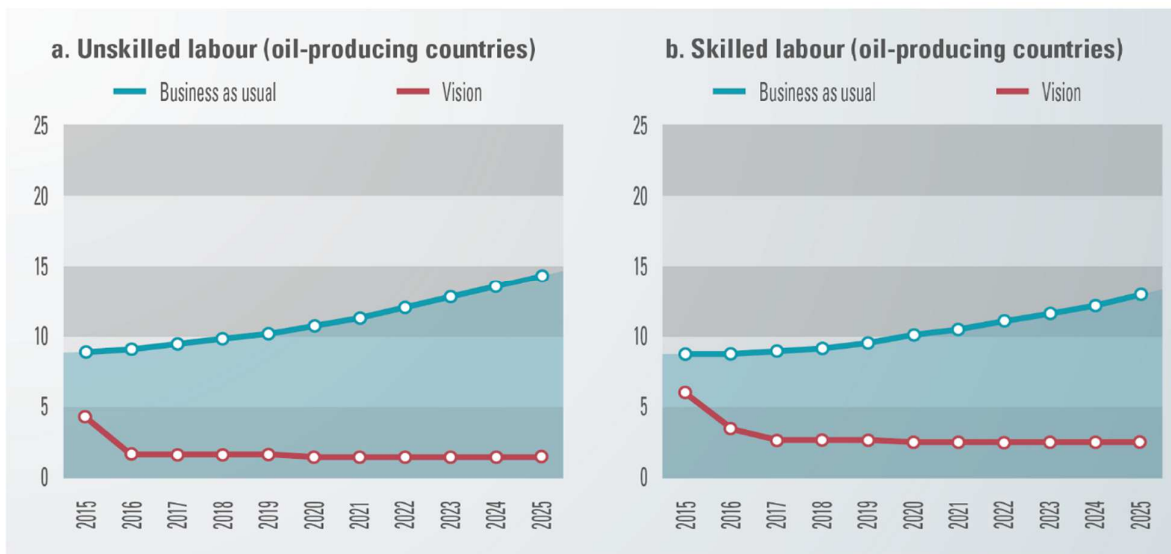
Figure 7. Percentages of Digital Talents in Selected Regions and Arab Countries

Just 1.7 percent of the Middle East workforce is digital talent
Digital talent as share of total FTEs,%

3,8	3,7	1,7	2,2	2,0	1,9	1,9	1,6	1,6	0,9
United States	Europe[1]	Middle East[2]	Kuwait	United Arab Emirates	Egypt	Bahrain	Qatar	Oman	Saudi Arabia

>50%
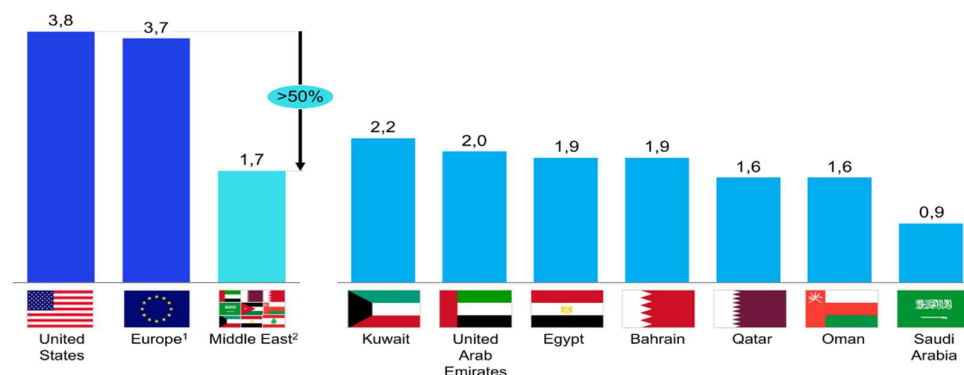
[1] Europe includes France, Germany, Italy, Norway, Spain, Sweden, United Kingdom.
[2] Middle East includes Egypt, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, United Arab Emirates.
SOURCE: US Bureau of Labor Statistics; Oxford Economics; McKinsey analysis

VII. INDUSTRIALIZATION AND DIGITAL TECHNOLOGIES

GLOBAL PERSPECTIVES

The Fourth Industrial Revolution

The *Fourth Industrial Revolution* has already started. Developments in genetics, artificial intelligence, robotics, nanotechnology, 3D printing and biotechnology, to name just a few, are all building on, and amplifying one another. This will lay the foundation for a revolution more comprehensive and all-encompassing than ever seen. Smart systems for homes, factories, farms, grids or cities will help tackle problems ranging from supply chain management to climate change[43].

One can distinguish four stages in the ongoing process called the *Industrial Revolution*. The first acceleration occurred toward the end of the 18th century characterized by mechanical production based on water and steam. The second industrial revolution started at the beginning of the 20th century. Its main achievements were the introduction of the conveyor belt and mass production. The third industrial revolution is the digital automation of production by means of electronics and IT. Figure 8 shows the successive waves of innovation that have shaped digital economy worldwide for more than half a century.

At present, the world is at the beginning of the fourth revolution, characterized by the so called "*Cyber-Physical Systems*" (CPS). CPS are the consequence of the integration of production, sustainability and customer-satisfaction forming the basis of intelligent network systems and processes. Factory floors are already crowded with Internet "things". One can think of microprocessors, which are the brains of digital devices and systems which interfaced smoothly with conventional components, such as i/o modules

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[43] 35

and electromechanical subsystems. But the Internet acceleration of industry comes from the growth of digital devices from other disciplines. Video cameras, RFID readers, tablets, entrance tickets, etc. – all these kinds of Internet devices improve the quality, efficiency and security of production and process operations. It is becoming easier to connect appliances, machines, things, factories and other industrial facilities and processes to the Internet.

Despite all the benefits of the Internet, there are still plenty of separate application networks active in the world of industrial automation which require connection. Keeping special networks up, including the hardware needed to enable them to communicate with the Internet, costs time, money and manpower. And these three costs increase, along with the complexity of the total network. A single system, the Internet, seems to be preferable in this context, from a viewpoint of scalability and flexibility.

A new phase of robots and robot-like things are present today in large numbers mainly in industry. But industry without robots is now almost unthinkable. They deal with the dirty, dangerous and dull tasks at work. Robots can do these tasks tirelessly, and function with precision and often power, which is of major importance to the durability and quality of a wide range of products. In such tasks, robots are better than humans.

Systems, processes and people within Information Technology (IT) and Operational Technology (OT) have been traditionally managed, controlled and governed independently of one another. The Internet of Things (IoT) has brought greater interdependence and convergence between the two domains. It has accelerated the development in which information systems are becoming direct extensions of operational systems, and vice versa. Today, there are still barriers between the two.

The paradigm in every automation is limiting human intervention as tasks are assigned to machines, appliances and systems. In the era of microelectronics, sensors and actuators, fixed and wireless networks, machine-to-machine (M2M) is the most suitable term. This digital interaction between and within machines and systems is the cyber-physical heart of the *Fourth Industrial Revolution*[44].

There are several applications providing support to consumers and business professionals. Some focus on health, healthcare and energy. They can also allow other specialists to watch during delicate interventions, such as surgical operations. Such combinations belong to the Internet of Things and its services.

Global Media and Content Industry

The United States alone accounts for roughly 30% of Media and Entertainment industry revenues. But there are many other historically strong regional media ecosystems, including London, Berlin, Toronto and Mumbai. These regional media ecosystems, especially in emerging markets, are likely to become more important due to their above average growth in media spending. These ecosystems have benefited from favourable

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[44] https://www.fr.sogeti.com/globalassets/global/downloads/reports/vint-research-3-the-fourth-industrial-revolution

regulations and incentives for conducting business, sufficient facilities and infrastructure, development of supportive technology, and access to talent and capital.

A successful media ecosystem can provide a wide-range of direct and indirect benefits to its home market. Direct benefits include significant impact on GDP and rise in employment opportunities. Indirect benefits range from technology and knowledge transfer, to growth in tourism and social benefits, through the creation of a creative social class. Key requirements for developing healthy Film and TV production ecosystems include locations, production infrastructure and support, incentives and investment returns, infrastructure and safety and access to talent[45].

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[45] www.dmc.ae/wp-content/uploads/2016/05/production-market-english.pdf

Figure 8. Technologies and their impact on business and people over half a century

Successive waves of innovation have shaped the worldwide digital economy

1960s	1970s	1980s	1990s	2000s	2010s

Mainframes and databases

Desktop and personal computing

Business software

Internet and e-commerce

Mobile broadband

Social media

Big data and Interr

VR, artif

Assets/technologies

• Modem programming languages • Algorithmic advancement	• Desktops and PCs • Basic office software • Games and visual graphics	• Enterprise software	• Internet technologies • Personal computing	• GPS • Wi-Fi, 2G/3G • Laptops • Mobile phones	• Social media • Smartphones and apps	• Smart devi and sensor • Real-time analytics

Business impact

• Business calculations, analyses • Database management systems	• Document processing • File storage	• Efficiency and automated business processes	• B2B and B2C e-commerce • E-mail, chat	• Remote work and 24/7 connectivity	• Digital advertising and marketing	• Big data • Predictive analytics • Internet of Things • Industry 4.(

People impact

• Limited	• Individuals with computers in larger firms • Gaming and document processing	• Creative destruction of jobs	• Email, e-chatting, and VoIP[1] • E-commerce • Remote work via VPNs[2]	• Connected anytime, anywhere	• Multiple devices per person • Individuals as content creators	• Data generation, content cre • Digital devi everywhere consuming hours each

[1] Voice over internet protocol.
[2] Virtual private networks.
[3] Virtual reality and augmented reality.

SOURCE: McKinsey Global Institute analysis

Human Machine Interface (HMI)

Three Human Machine Interface (HMI) with respect to engagement and collaboration are highlighted below[46]

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[46] 35

1) The *Fourth Industrial Revolution* covers more than cyber-physical systems. Intelligent data gathering, data storage and data distribution via artefacts and humans are essential;
2) Production and knowledge workers will collaborate increasingly closely via their IT and OT systems;
3) Production personnel will be increasingly concerned with elements of product development.

Digital economy enjoys myriads of economic and social benefits as in Table 4.

Table 4. Economic and social benefits of digital economy

Economic Impact	Social Impact
Economic Growth: Increased digital penetration	**Poverty:** Digital can be a tool for inclusion and increased income among the disadvantaged.
Job Creation: Multiplying effect. Studies show each digital job creates 2-4 jobs in the economy. They are usually high-level job with wages about 30% above average.	**Healthcare:** **e-health enables new forms of health management and provision, increasing patient coverage and improving quality.**
Productivity: Industries that harness digital technology experience the highest productivity increases. SMEs that utilize digital technology grow faster.	**Education:** Education can be provided to the masses at low cost and good quality using e-education tools.
	Environment: Digital can make enormous contribution to the environment, contributing to reduction of CO_2 emission using smart grids, for example.
	Other: Crime reduction, increasing road safety, enhancing financial inclusion, and improving farming.

Source: Digital McKinsey, "Digital Middle East: Transforming the region into a leading digital economy", October 2016.

Looking at the converging worlds of IT and OT, one can see not only an increase in opportunities but also an increase in risks. How big is the risk of being hacked in IT/OT systems? However, problems do not always arise on the side of the things connected to the Internet. Human beings, too, make errors. A major turnaround is taking place. The world of machines and appliances, artefacts and the corresponding processes is about to receive an enormous Internet impulse that will have great impact on human-machine interaction.

REGIONAL PERSPECTIVES

- Digitization is transforming the Arab region, Figure 9. The trends are also reflected in the high scores of data flows connecting the Arab region to other regions of the world. McKinsey Global Institute (MGI), analyzed connectedness as measured using cross-border bandwidth. The analysis shows that data flows in the Middle East have increased by more than 150 times in the past decade, Figure 10.

- The Arab region is behind other regions in ICT supply and innovation, especially in digital creation. For example, the Arab region has just one-thirtieth the ICT patents per million population compared with the United States. And compared with other emerging market players in BRIC (Brazil, Russia, India, and China), the region has one-third fewer ICT patents overall.

- The gap between consumer adoption and digitization among business and government as well as ICT supply and innovation imply strong growth potential, as consumers are ready to embrace new digital offerings. Given the demographics in the region (50 percent of the population is under the age of 24), the tech-native and savvy youth in the Middle East will only further boost the digital adoption rate in the coming years[47].

- Digital economy accounts for 4.1 percent of the Arab countries' GDP, as measured by digital share in private consumption, private investment, government expenditure, and imports and exports, Figure 11. Digital's contribution to GDP in the Middle East is 50 percent that of the United States. The region's average conceals a great deal of variation among countries of the region. Some GCC countries have generally more digitised economies than the rest of countries in the region; the digital economy accounts for 8.0 percent in Bahrain and 5.1 percent in Kuwait, but less than 1 percent in both Oman and Qatar. Bahrain's high score is mainly driven by that country's high digital exports to neighbours in the region.

- Analysis and estimates show that the Arab region's economy has realized only 8.4 percent of its digital potential. By comparison, Western Europe has achieved an estimated 15 percent of its digital potential, and the US economy 18 percent, Figure 12.

- Among the top 1,000 ICT companies by annual revenue in the world, only 1 percent are in the Arab region, Figure 13. Digital unicorns, are start-up digital

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[47]**Error! Bookmark not defined.**

companies that have a market capitalization of more than USD 1 billion. Unicorns are underrepresented in the region. Currently, only Souq.com, in the United Arab Emirates qualifies as a unicorn, and one company that almost qualifies as a digital unicorn is Fumia, in Egypt.

- Comparing digital venture capital (VC) funding of the Arab region with other regions of the world, reveals that more than 1,000 start-ups are active across the GCC, but the region's VC funding is only 10 percent of its relative GDP, Figure 14.

In the Harvard Business Review, Professor Daniel Isenberg outlined key tips for governments seeking to support innovation and entrepreneurship in digital economy[48]:

- Do not emulate success stories from other parts of the world without taking the local and regional socioeconomic and cultural values into consideration;
- Shape the ecosystem around local conditions;
- Engage the private sector from the start;
- Favour the high potentials;
- Get a big win on board;
- Tackle cultural change head on;
- Stress the roots;
- Do not overengineer clusters; help them grow organically;
- Reform legal, bureaucratic, and regulatory frameworks.

Figure 9. Status of Digitization in the Arab Region

Though Middle Eastern businesses lag behind in digitisation, consumers are leadin the charge
Middle East average, %

Category	Value
SMEs with an online presence[1]	15
Individuals participating in social media	36
Social media users who use Arabic	45
People watching online videos daily[2]	47
Households with Internet access	50
Individuals who are regular Internet users	61
Users that go online daily[2]	
Facebook subscribers accessing daily[3]	
3G network coverage	
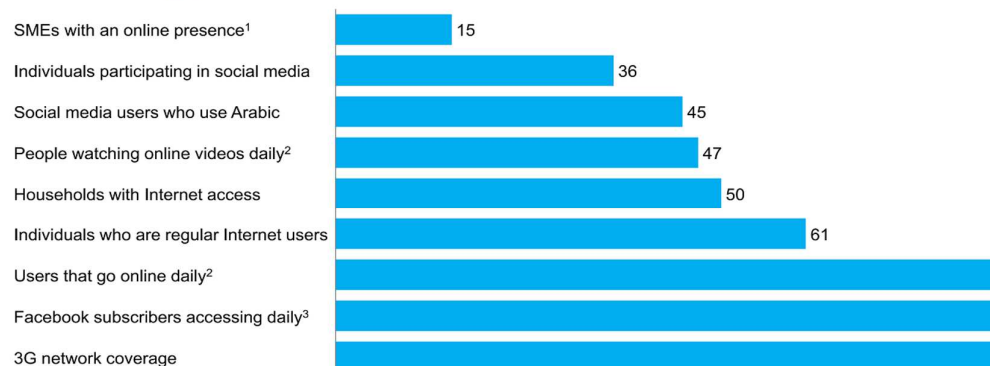
[1] Saudi Arabia only.
[2] Google Consumer Barometer 2015 for the United Arab Emirates and Saudi Arabia only.
[3] Middle East, North Africa, and Levant, based on *Arab Social Media Report 2015*, launched at Arab Social Media Influencers Summit 2015.
SOURCE: *Networked Readiness Index 2015*, World Economic Forum; *2016 Digital Yearbook*, We Are Social; Digital Adoption Index, World Bank; *The Connected Consumer Survey 2015*, Google; McKinsey analysis

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[48] **Error! Bookmark not defined.Error! Bookmark not defined.**

Figure 10. Dataflow in the Arab Region

Cross-border flows have increased by more than 150-fold in the past decade
Used cross-border bandwidth

Regions	NA: United States and Canada	EU: European Union	AS: Asia	LA: Latin America	ME: Middle East	AF: Africa	OC: Oceania

| Bandwidth Gigabits per second (Gbps) | <50 | 50–100 | 100–500 | 500–1,000 | 1,000–5,000 | 5,000–20,000 | >20,000 |

2005
100% = 14.5 Gbps

2015
100% = 2182.2 Gbps   **150 times larger**
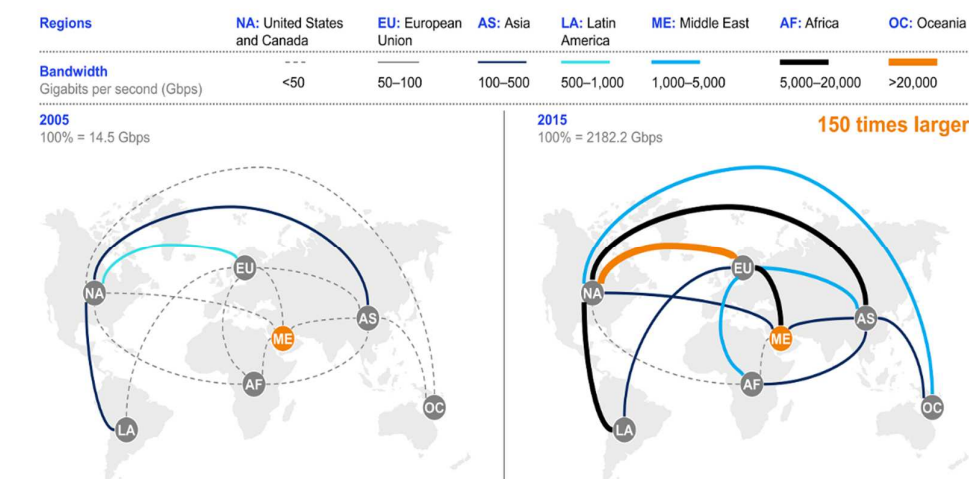
Note: Lines represent interregional bandwidth (e.g., between Europe and North America) but exclude intraregional cross-border bandwidth (e.g., connecting European nations with one another).
SOURCE: Global Internet Geography, TeleGeography, McKinsey Global Institute analysis

Figure 11. Digital Contribution to Economy

Digital contribution to Middle East economy is low compared with benchmarks
Share of digital contribution to GDP, %
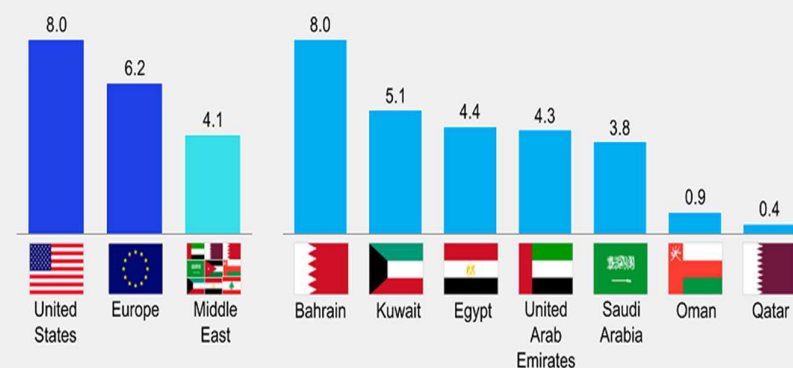
	United States	Europe	Middle East	Bahrain	Kuwait	Egypt	United Arab Emirates	Saudi Arabia	Oman	Qatar
	8.0	6.2	4.1	8.0	5.1	4.4	4.3	3.8	0.9	0.4

Source: Digital McKinsey, "Digital Middle East: Transforming the region into a leading digital economy", October 2016.

Figure 12. Capturing the digital potential

The Middle East captures just a fraction of its digital potential

Captured digital potential by country, %

	United States	Europe	Middle East	United Arab Emirates	Qatar	Bahrain	Saudi Arabia	Jordan	Oman	Kuwait	Egypt	Lebanon
Value	18.0	15.2	8.4	16.4	14.9	13.6	11.5	8.5	8.2	7.6	6.6	4.7

>50%

Figure 13. ICT companies and unicorns*

The region lags behind in share of ICT companies and number of unicorns, %

Share of revenues, 2015

Share of revenue in top 1,000 ICT companies

4
1
15
44
36

Number of unicorns

Number of unicorns

1
4
20
57
106

Legend:
- APAC
- United States
- Europe
- Middle East
- Other

* A **unicorn** is a startup company valued at over $1 billion. The term was coined in 2013 by venture capitalist Aileen Lee, choosing the mythical animal to represent the statistical rarity of such successful ventures.
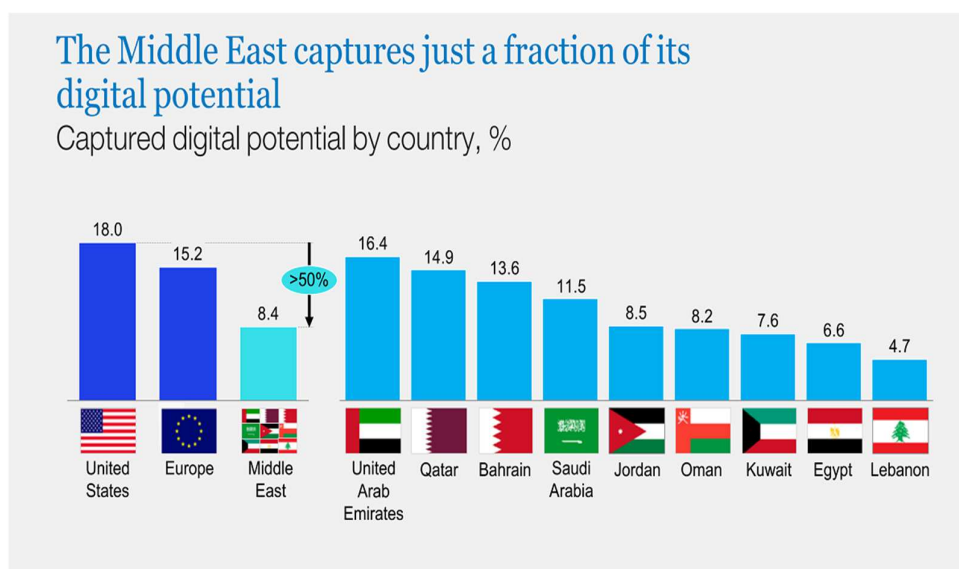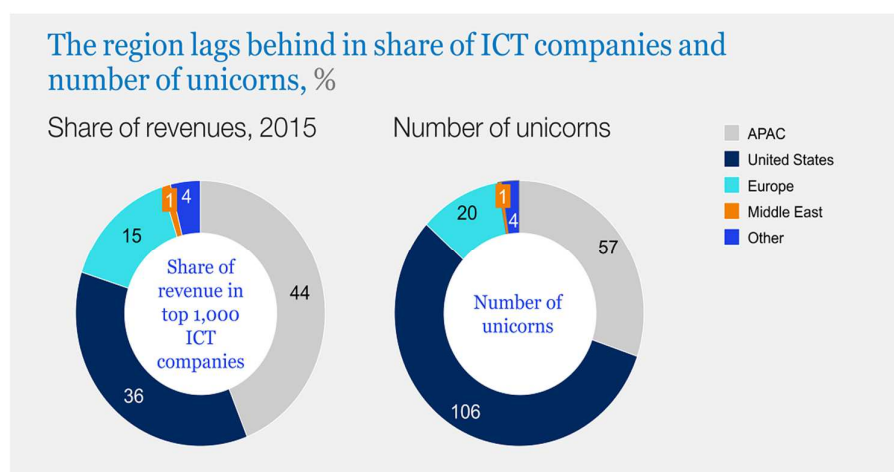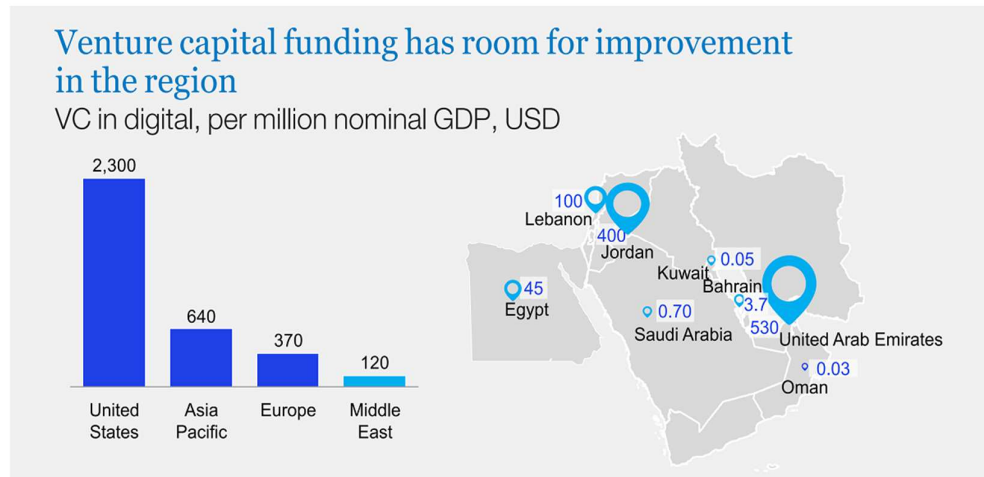
Source: Digital McKinsey, "Digital Middle East: Transforming the region into a leading digital economy", October 2016.

Figure 14. Venture Capital

Source: Digital McKinsey, "Digital Middle East: Transforming the region into a leading digital economy", October 2016.

Demand for Media and Digital Content

The Arab countries share the same language and culture. The demand for Arabic content extends to cover the region, as well as other countries of the world that have sizable Arab communities. The entry of major international players into the region, such as Yahoo!'s acquisition of regional player Maktoob, Google's increasing presence in the UAE, Egypt and Saudi Arabia confirm the existence of significant opportunities in the market[49].

Saudi Arabia is one of the largest markets for YouTube playbacks on mobile worldwide. Recent research confirms that the usage of social media was already particularly high in the region, with nearly 70% of consumers in key Arab markets using social networking sites.

Not only social media, but the wider digital space, offers many opportunities for media players in the region to extend their existing content to new platforms and to develop new opportunities for local players. The online world has historically, been fuelled by entrepreneurs in many international markets and the Arab region has some examples of successful online start-ups. These success stories present a good opportunity to draw valuable lessons from the regional online market. Localizing the content as much as possible and having an open environment to operate in are two of the key success factors for the rise of successful online companies in the region. Furthermore, online and mobile devices can provide new platforms for the exploitation of existing content.

The Arab region has many established and emerging media ecosystems. Market is now shifting from established ecosystems in Egypt, Jordan, Lebanon, and Syria to the Gulf,

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[49] https://www2.deloitte.com/content/dam/Deloitte/xe/Documents/About-Deloitte/mepovdocuments/mepov7/dtme_mepov7_media.pdf

where governments are taking a more pro-active role in facilitating and supporting media ecosystem development. This trend by the Gulf countries is part of their efforts to diversify their economies and to help promote sectors which will attract youth employment.

Although collectively the Arab region has been active in film and TV production development, none of the local ecosystems have yet to truly meet global standards. As media production grows, it will justify the extra investment in production infrastructure and content development, and draw in the talent required to support it. The media industry is undergoing a fascinating transformation. Cultural shifts among the region's young people have spawned a tremendous creative energy. Untapped demand for local, Arabic content will spur regional media to grow by leaps and bounds.[50].

VIII RECOMMENDATIONS FOR VISION AND POLICY CHANGES

Today, the Arab Region is not in the best position for economic growth, industrialization and full employment. Present studies show that the region has the highest unemployment rate when compared to other economies of the world, and has insignificant indigenous industrial added value to contribute to its GDP, especially when oil and gas production is excluded. The region has less than modest achievements in research, development and innovation and linkages between universities and industry are low.

The information obtained for this report on unemployment, industrialization, the digital economy and awareness of the region about the seriousness of these issues is alarming. Looking through national vision documents prepared by countries in the region, one can cannot see these issues addressed with sufficient care and seriousness.

The present available official data on the contribution of digital technology to economy in the Arab Region is not sufficient to carry out situation analysis studies on its impact on economic growth, employment and industry. In addition, the state of technologies associated with digital economy is fast changing and disruptive, making it doubly difficult for planners and decision makers to predict convincing scenarios for action lines within the WSIS Agenda to meet SDGs targets.

The following recommendations are based on estimates and suggestions obtained from studies used in the report to come up with guidelines and suggestions for EMCs in their endeavour to seriously consider the role of digital technology in the formulation of their national 2030 visions.

1) Increase percentage share of digital contribution to GDP. The present low share of 4.1% consists mainly of telecom revenues with little attributed to other digital activities. Figure 11;

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[50] http://www.admediasummit.com/en/Images/How-Young-Arabs-are-Fuelling-the-MENA-Media-Market-English_tcm30-22790.pdf

2) Increase utilization of digital potential. Jobs available in the digital workspace in the region are predominately in operating services with relatively limited room available for design, development and innovation. Today, most of university and technical institute output are obliged to take jobs that do not match the learning they went through and their potentials, or seek opportunities outside the region. The low value of 8.4% for the region indicated in Figure12 reflects the current state of low utilization of digital potential;

3) The region lags in their share of companies that deal with digital technologies and applications. Most of the big players in the region are international companies with local sleeping partners, or partners involved in public relations or management activities rather than technical and developmental work. Figure 13;

4) Venture capital funding for digital projects has much room for improvement. The region has the lowest value when compared to other world economies. Figure 14;

5) The wider digital space, offers many opportunities for media players in the region to extend their existing content to new platforms and to develop new opportunities for local players. The online world has historically been fuelled by entrepreneurs in many international markets and the Arab region has some examples of successful online start-ups. Localizing the content as much as possible and having an open environment to operate in, are two of the key success factors for the rise of online companies in the region. Today, online and mobile devices can provide new platforms for the exploitation of existing content;

6) Innovation within education and labour-related policymaking, requiring skills evolutions of their own. For the education and training sector, it will mean vast new business opportunities to provide new services to individuals, entrepreneurs, large institutions and the public sector. The digital sector may become a new source of employment itself. For businesses to capitalize on new opportunities, they will need to put talent development and future workforce strategy as a priority to growth. Organizations can no longer be passive consumers of ready-made human capital. They require a new mindset to meet the talent needs and to optimize social outcomes. This entails several major changes in how business views and manages talent;

7) Employment and employment structure must be addressed in line with Section VI. Issues such as reskilling and retaining talents constitute barriers for change. Gender parity as part of future workforce strategy should also be considered. For longer term focus, children and youth are focus and the need for rethinking the education system in line with technological trends of the fourth industrial revolution is a must. These days, many core curriculum content of many disciplines, at all levels, both academic and professional are becoming out of date by the time entrants graduate;

8) Lifelong learning and training should be made attractive for present day workforce. Building training systems and labour market institutions may be

needed. Top drivers for change and the skills required to meet them, as discussed in Section VI must be taken into consideration for future job titles and employment requirements;

9) Online freelancing is one way of contributing to work opportunities. In this category, a more substantial task is given to a specific individual. Online freelancing work may include software development, web development, translation, transcription, data analytics, design, administrative support, and sales and marketing.

10) Formulating a National Digital Vision begins with answering questions about where we are and where we are going in SDG 8 and SDG 9 as well as the WSIS Agenda (i.e. digital economy/technology). The gaps in sub-goals for SDG 8 and SDG 9 should be identified and preferably quantified with indictors and targets. The same process should be followed for WSIS Action Lines associated with SDG sub-goals.

Decision makers and planners should bear in mind the following key tips quoted earlier in Section VII of the report[51]:

− Do not emulate success stories from other parts of the world without taking the local and regional socioeconomic and cultural values into consideration;
− Shape the ecosystem around local conditions;
− Engage the private sector from the start;
− Favour the high potentials;
− Get a big win on board;
− Tackle cultural change head on;
− Stress the roots;
− Do not overengineer clusters; help them grow organically;
− Reform legal, bureaucratic, and regulatory frameworks.

Successful digitization is the ability of a country and its people to conceive, design, implement and operate digital technologies to generate, process and share information. It is also related to the concept that describes the social, economic and political changes associated with the mass adoption of digital technologies, and in harmony with the related SDGs.

Digital technologies provide a strong impetus for the adoption of new, more efficient means of production. Moreover, it is closely linked to innovation, and encourages a more intelligent and ecological use of human, natural and economic resources.

The potential for digital technologies, as a tool for development, is a result of its ability to affect every area of a country's life, such as poverty alleviation, quality of education, health services, government service delivery, economic activities, and citizens' everyday lives. It is therefore essential to devise a strategy that will make technological developments available to everyone. The strategy should later be transformed into a plan of action with projects defined in terms of parameters reflecting cost, timeline,

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[51] 16

resource allocations and KPIs. It is a strategy document comprising actions the government will take over the next fifteen years for the adoption and development of digital technologies to transform a country and its population into an Information and Knowledge Society and achieving SDGs at the same time.

The policy change document is a key document to guide government's actions regarding digitization and employment creation, from which progress, achievements and challenges can be measured.

The tests for the formulated strategy prior and during implementation can be helpful in determining its coverage to all critical elements. The following question will help to ensure coverage[52]:

1) Will the strategy beat the market? Does it address real market needs and overcome pain points?
2) Does the strategy tap a true source of advantage? What is the nation's digital competitive edge compared with its peers?
3) Is the strategy granular about where to compete? Does the national digital strategy have a detailed sector view?
4) Does the strategy put you ahead of trends? Is the national digital strategy anticipating the most relevant digital innovations?
5) Does the strategy rest on privileged insights? Does the national digital strategy build on local insights?
6) Does the strategy embrace uncertainty? Does the national digital strategy consider scenarios?
7) Does the strategy balance commitment and flexibility? Does the national strategy focus on a few crucial, high-commitment initiatives while maintaining flexibility to make other choices over time?
8) Is the strategy contaminated by bias? Does it consider all stakeholders?
9) Is there conviction to act on your strategy? Is the national digital governance in place to successfully implement it?
10) Have you translated the strategy into an action plan? Does it have a clear road map of target-based initiatives?

The SDGs/WSIS Matrix Exercise

To plan for projects which meet SDGs for Vision 2030 using their linkages to WSIS action lines, the matrix shown in Table 5 can be used to ensure that the projects selected satisfy both SDGs and WSIS targets. Projects can be defined using the following parameters:

1) Present status;
2) Defined gap;
3) Targeted status;
4) Estimated duration;
5) Estimated cost;
6) Required human resources;
7) Stakeholders;
8) KPIs.

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[52]16

Table 5. SDGs/WSIS Linkages Matrix

	WSIS Action Lines						
SDG8	C2	C3	C5	C6	C7	C8	C10
8.1							
8.2							
8.3							
8.5							
8.9							
8.10							
SDG9							
9.1							
9.3							
9.4							
9a							
9c							

For example. To achieve sub-goal SDG 8.2, which states:

> Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high value added and labour intensive sectors.

One may consider projects that fall in the following action lines are pertinent:

C2: Information and communication infrastructure: an essential foundation for the Information Society;

C3: Access to information knowledge;

C5: Building confidence and security in the use of ICTs;

C6: Enabling environment;

C7: ICT Applications: e-business; e-employment; e-agriculture;

C8: Cultural diversity and identity, linguistic diversity and local content.

The same exercise can be made for SDG 9.3 which states:

> Increase the access of small scale industrial and other enterprises, in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

One may consider projects that fall within the following action lines are pertinent:

C3:	Access to information knowledge;
C5:	Building confidence and security in the use of ICTs;
C6:	Enabling environment;
C7:	ICT Applications: e-business; e-environment; e-agriculture;
C9:	Media;
C10:	Ethical dimensions of the Information Society.

The total cost of implementing all projects, the human resources required and the time taken can be calculated.

Summary High-level Recommendations

The following high-level recommendations are jointly developed with a consultancy report which this report provided complementary input with regards to economic growth, future employment and industrialization related to the ICT sector[53]:

– Develop digital strategies that address framework conditions and issues related with skills, enabling economic environment and nurturing of innovation to enhance the ICT sector share in the economy;

– Develop national innovation and digital strategies in close coordination and with consistent approaches under the remit of a high-level authority;

– Remove online content restrictions and filtering and support all actors that provide factual and checked information;

– Establish a media regulatory authority, media sector liberalization, and digital policies addressing in a unified manner the telecom and media sectors;

– Support initiatives related to the development of relevant infotainment or edutainment content on media predominantly used by youth;

– Enhance digital jobs available for youth both quantitatively and qualitatively;

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[53] ESCWA, TDD, ICT Section, "Arab Horizon 2030: Digital Technologies for Development", Draft Report, 29 November 2017.

- Governments should introduce incentives for small local companies in the digital sector to merge with other companies to make up larger enterprises that can compete with companies from outside the region;

- Arab businesses should invest in developing employees' career by funding further education for employees; introduce career development programs and rewards for young employees to meet the needs of digital economy;

- Transform employment structure to be in line with the growing importance of digital economy;

- Governments and major employers should consider the variety of new job families such as Gig economy jobs and crowd work and incorporate them in the strategy vision for 2030;

- Governments and major employers in the region should pay attention to lifelong learning and training.

APPENDICES

APPENDIX I. The 17 Sustainable Development Goals[54]

Goal 1. End poverty in all its forms everywhere;

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture;

Goal 3. Ensure healthy lives and promote well-being for all at all ages;

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;

Goal 5. Achieve gender equality and empower all women and girls;

Goal 6. Ensure availability and sustainable management of water and sanitation for all;

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all;

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

Goal 10. Reduce inequality within and among countries;

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable;

Goal 12. Ensure sustainable consumption and production patterns;

Goal 13. Take urgent action to combat climate change and its impacts;

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;

Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

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[54] 6

APPENDIX II. WSIS Action Lines[55]

To assist you in selecting the WSIS action lines, the following keywords are provided to show some of the themes covered under each of the WSIS action lines. The full text of each action line is available at www.itu.int/wsis/PoA.

1) The role of governments and all stakeholders in the promotion of ICTs for development

• Cooperation among stakeholders • Millennium Declaration • Mainstreaming ICTs • Multi Stakeholder Partnership (MSP) • Multi-stakeholder portals for indigenous peoples • National e-strategies • Public/Private Partnerships (PPP).

2) Information and communication infrastructure: an essential foundation for an inclusive information society

• Access • Accessibility • Affordability • Assistive technologies • Broadband network infrastructure • Digital inclusion • Enabling and competitive environment • ICT backbone • ICT connectivity • ICT equipment • ICT services • Infrastructure • Internet exchange points • Investment • Satellite • Traditional media • Remote and marginalized areas • Ubiquitous computing/communications • Universal access/service • Wireless.

3) Access to information and knowledge

• Access to public official information • Access to scientific knowledge • Digital public libraries and archives • ICTs for all • Multi-purpose community public access points • Open source, proprietary and free software • Public access to information • Public domain information.

4) Capacity building

• Basic literacy • Distance learning • Education/training • E-literacy • Gender • Combating illiteracy • Life-long learning • Research and development (R&D) • Self-learning • Teacher training • Training ICT professionals • Volunteering • Youth

5) Building confidence and security in the use of ICTs

• Authentication • Building confidence and security • Consumer protection • Countering misuse of ICTs • Countering spam • Cyber-crime, • Cyber-security • Data protection • Information security and network security • Network integrity • Online transaction security • Privacy • Real-time incident-handling and response • Secure and reliable applications.

6) Enabling environment

• Consumer protection • Dispute settlement • Domain name management • E-commerce • E-government strategy • Entrepreneurship • ICT forums • Intellectual

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[55] www.itu.int/wsis/PoA

property • Internet governance • Legal, regulatory and policy environment • Privacy • Radio frequency spectrum • Regional root servers • Secure storage and archival • Small and medium sized enterprises (SMEs) • Standardization

7) ICT applications: benefits in all aspects of life

• Disaster recovery • E-applications • E-agriculture • E-business • E-commerce • E-employment • E-environment • E-government • E-health • E-publishing • E-science • ICT waste disposal • Sustainable production and consumption • Teleworking • Transparency.

8) Cultural diversity and identity, linguistic diversity and local content

• Cultural diversity • Cultural exchange and information • Cultural heritage • Cultural industry • Cultural policy • Digital archive • Disadvantaged and vulnerable groups • Indigenous peoples • Internationalized domain names • Language-related ICT tools • Linguistic diversity • Local languages • Traditional knowledge.

9) Media

• Combatting illegal and harmful content in the media • Diversity of media ownership • Gender portrayal in the media • Media independence and pluralism • Reducing international imbalances • Role of media in the Information Society • Traditional media • Training of media professionals.

10) Ethical dimensions the Information Society

• Common good • Ethics • Human rights • Preventing abusive uses of ICTs • Values.

11) International and regional cooperation

• Financing of ICT networks and services • Infrastructure development projects • International mechanisms • Progress evaluation • Regional action plan • UN global compact.

12) Achieving the WSIS targets (Plan of Action, Section B)

• To connect villages with ICTs and establish community access points; • To connect universities, colleges, secondary schools and primary schools with ICTs; • To connect scientific and research centres with ICTs; • To connect public libraries, cultural centres, museums, post offices and archives with ICTs; • To connect health centres and hospitals with ICTs; • To connect all local and central government departments and establish websites and email addresses; • To adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances • To ensure that all of the world's population have access to television and radio services; • To encourage the development of content and to put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet; • To ensure that more than half the world's inhabitants have access to ICTs within their reach.

13) Digital solidarity agenda (Plan of Action, Section D)

• Debt burden • Digital divide • Digital solidarity fund • Financing mechanisms • Monterrey Consensus • National e-strategies • Poverty reduction strategies • Technology transfer

14) Follow-up and evaluation (Plan of Action, Section E)

• Benchmarking • Community connectivity indicators • Gender-specific indicators • ICT Development Index • Information Society indicators • International performance evaluation • Monitoring the digital divide • Statistics • Success stories

15) Towards WSIS Phase 2 (Tunis) (Plan of Action, Section F)

• Elaboration of final appropriate documents • Partnerships among stakeholders • Preparatory process • Stocktaking • Task Force on Financial Mechanisms • Working Group on Internet Governance.

APPENDIX III. Radar Diagrammes of Selected Countries from the region[56]

Algeria	Bahrain	Egypt
Jordan	Kuwait	Lebanon

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[56] 26 **Error! Bookmark not defined.**

Libya

Morocco

Oman

Qatar

Saudi Arabia

Tunisia
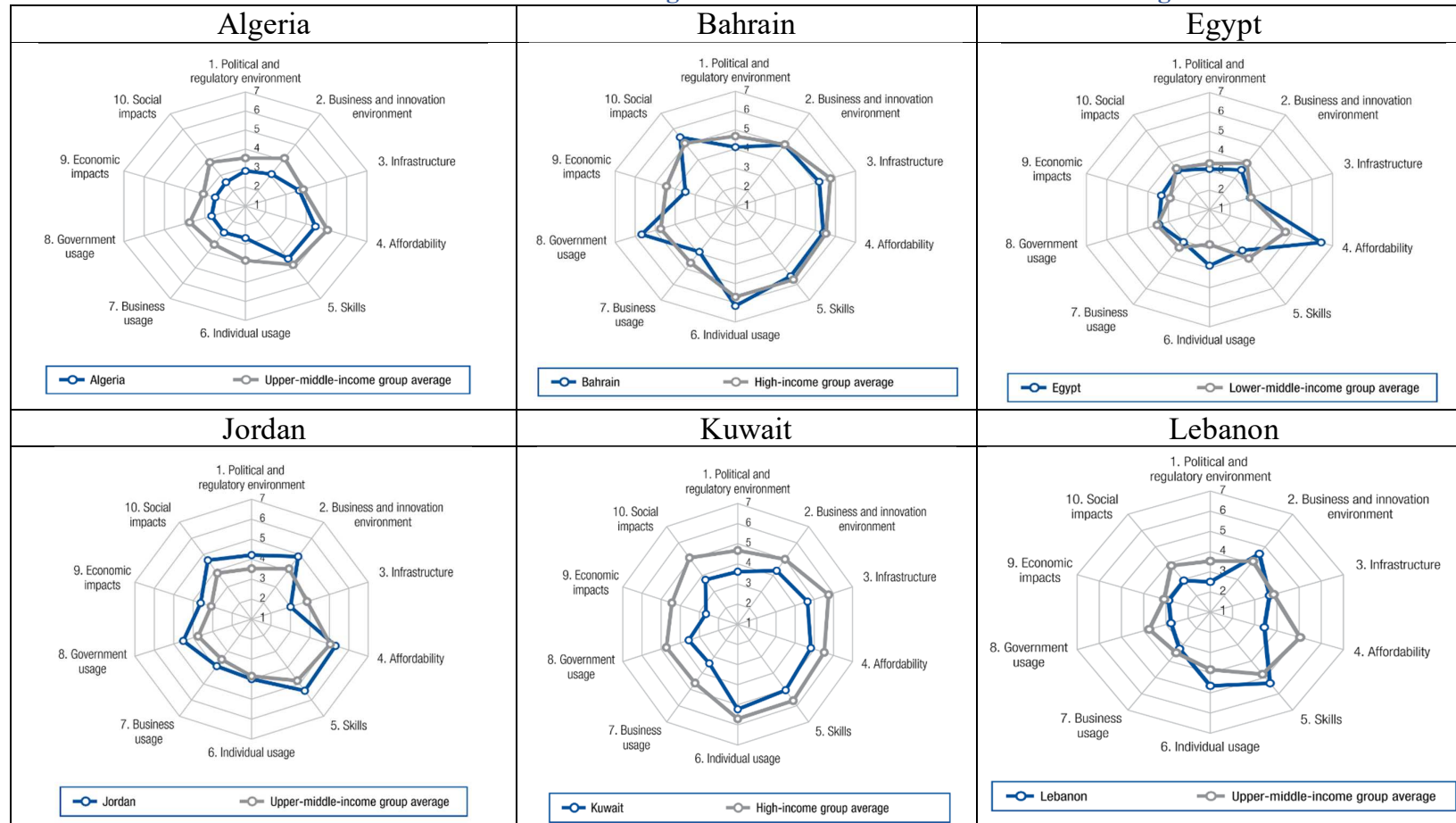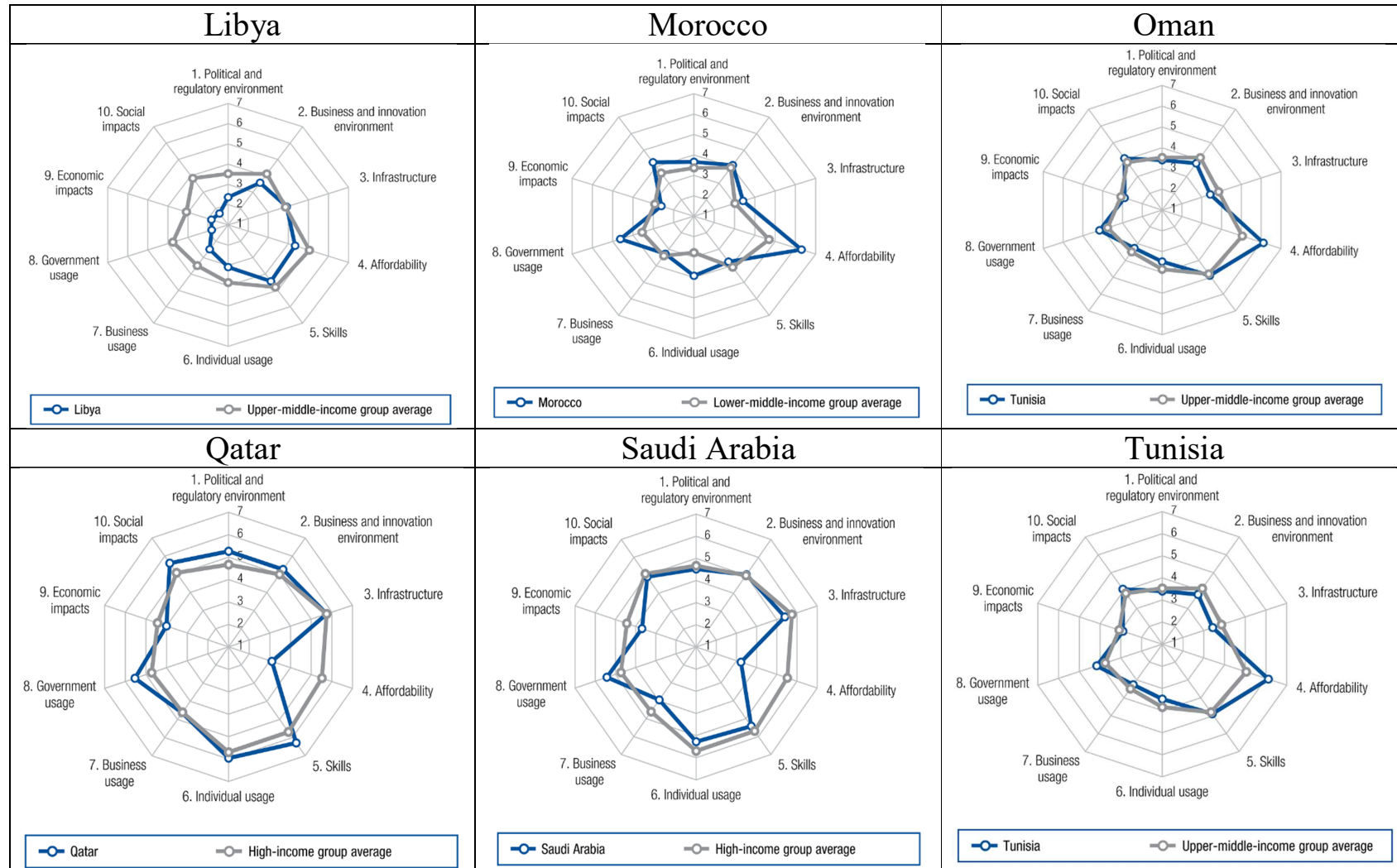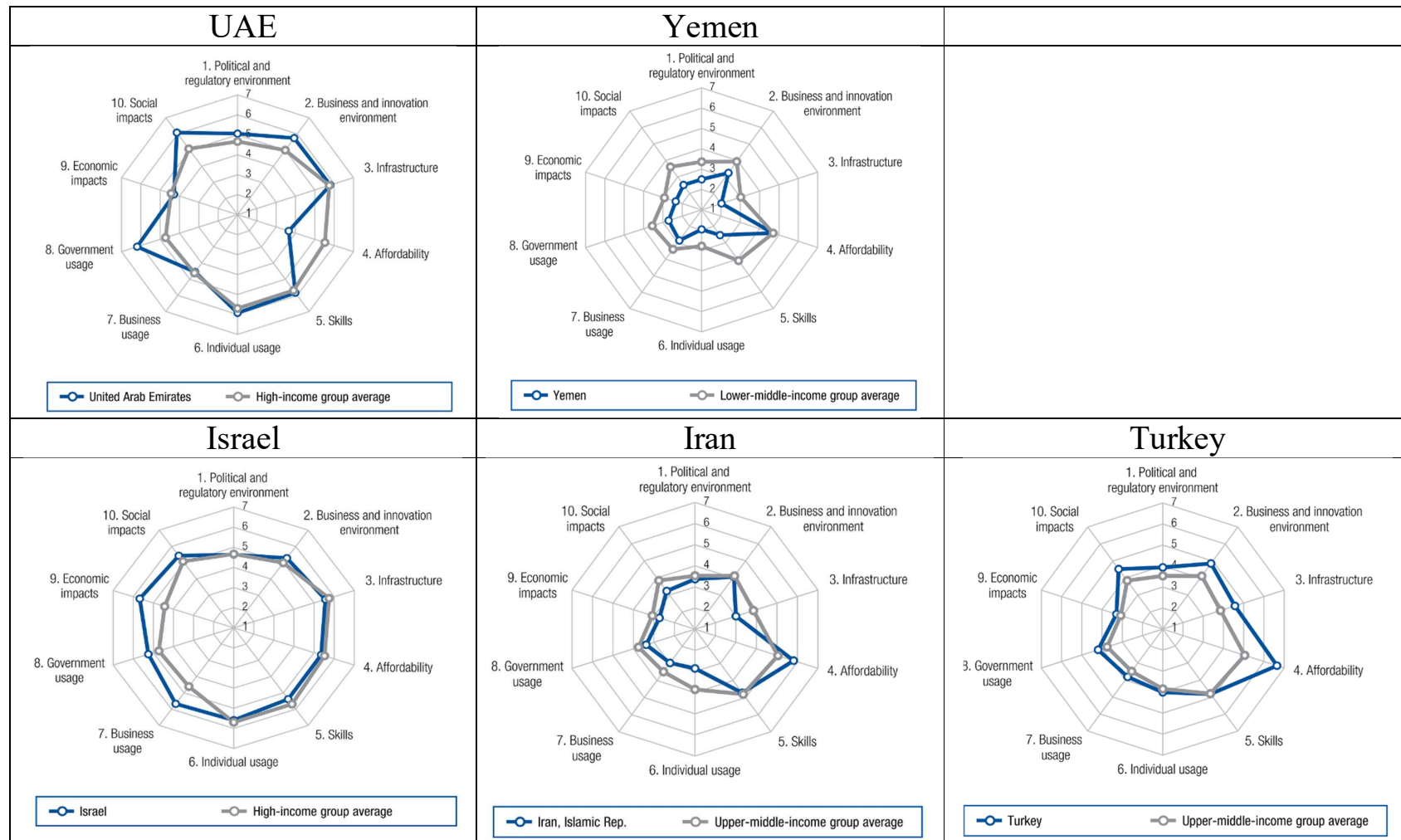
APPENDIX IV. ICT Related Statistics for Selected EMCs

ICT service exports (% of service exports, BoP)									
Country Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Algeria	39.50932	43.00136	43.70813	56.6529	60.20678	57.86179	59.23771	49.55884	50.66597	..
Bahrain	23.11416	22.91653	24.2277	23.11365	27.96966	22.84483	21.62881	21.57097	..	..
Comoros	25.89014	18.47025	25.00859	24.29141	24.24504	22.24822	..	..	..	..
Djibouti	5.616069	4.918219	4.831129	4.734531	5.016435	5.455359	5.812147	6.374508	6.940442	..
Egypt, Arab Rep.	10.23847	14.52398	13.00756	8.768009	7.044034	7.278975	7.090327	10.46918	6.916957	..
Iraq	5.012098	1.483561	2.899608	4.510164	4.358611	11.96611	19.63918	27.62043	20.21151	..
Jordan	12.71121	12.07417	10.46858	9.033639	9.549293	8.107397	8.035774	6.754651	5.562537	..
Kuwait	52.16082	50.77846	60.0608	39.49714	35.68417	38.99998	54.61386	49.32337	45.02618	46.85738
Libya	8.387097	5.344247	2.597403	2.926116	25.37313	6.636005	7.003891	..	..	..
Lebanon	51.55659	61.66245	55.35751	26.73664	48.12881	27.8397	34.23484	24.77486	23.21228	..
Mauritania	..	..	..	..	..	46.848	50.45119	64.91092	56.85177	..
Morocco	17.17077	18.21324	19.06469	20.14605	20.10682	21.79599	22.68236	17.44732	19.23551	20.33242
Oman	38.02164	29.77208	21.34831	26.18705	16.75211	16.26574	17.67698	17.41882	18.51386	..
Qatar	..	..	..	..	1.542006	4.139325	2.143823	2.800796	3.616113	4.180018
Saudi Arabia	48.38226	2.734914	2.684624	3.386067	2.915781	3.590032	3.264484	3.595743	1.855022	1.839969
Somalia	..	..	..	..	..	..	..	..	..	..
Sudan	6.308731	7.372875	7.224705	30.95231	6.323693	4.195235	9.080052	8.451705	5.681926	..
Syrian Arab Republic	8.261363	5.457949	4.50115	2.455679	..	..	..	..	..	..
Tunisia	5.661673	5.80638	7.292216	8.22448	10.75581	9.562125	10.52853	10.10278	12.17134	..
United Arab Emirates	..	..	..	..	..	..	..	..	..	..
West Bank and Gaza	37.49835	26.34249	27.28565	9.084673	5.560554	18.25114	26.62704	28.4697	28.17081	..
Yemen, Rep.	14.88906	9.040078	8.633344	7.270194	10.26833	20.78212	22.00478	13.05122	17.7107	..
Arab World	**29.25275**	**26.05182**	**25.46774**	**16.82809**	**21.01295**	**16.97487**	**18.65919**	**16.04605**	**14.68245**	**..**
World	**27.70203**	**28.05874**	**29.35802**	**28.04595**	**29.88671**	**30.38801**	**30.45834**	**31.22776**	**31.51808**	**31.41826**

ICT goods imports (% total goods imports)									
Country Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Algeria	4.60173	4.665525	3.719238	2.963291	3.352263	4.025826	4.151619	5.078891	5.380112	..
Bahrain	1.394443	2.172264	2.811989	2.813256	3.340348	4.608569	3.370715	3.772911	4.602918	..
Comoros	4.192909	2.654233	6.748551	1.78853	1.925753	4.618757	5.882778	..	..	..
Djibouti	..	..	5.407392	..	..	..	..	..	..	..
Egypt, Arab Rep.	4.288663	3.698969	3.22559	3.74802	3.542543	3.42974	3.551582	4.222405	4.473625	..
Iraq	..	..	..	..	..	..	..	0.455005	..	..
Jordan	7.896545	6.441777	4.638344	4.259289	4.091324	3.630486	3.451864	3.171782	4.399505	..
Kuwait	5.027675	6.420187	..	6.602456	7.999741	..	6.843033	7.208062	7.63258	..
Libya	4.834814	4.003778	4.505334	3.584927	..	..	..	..	..	..
Lebanon	3.006532	2.591527	3.188105	2.792161	2.339595	2.180238	3.13775	2.521142	..	..
Mauritania	2.144866	1.395262	1.383122	0.944187	1.427962	1.237261	0.712578	0.787693	..	..
Morocco	6.128102	4.718051	5.355135	5.866303	4.776566	3.510357	3.611015	3.79586	4.104706	..
Oman	3.302737	2.163396	2.241155	2.398704	2.909509	2.977362	2.377548	3.01075	3.130641	..
Qatar	3.340098	3.635293	..	4.279488	..	..	5.569788	5.573165	5.766857	..
Saudi Arabia	6.830783	6.474974	7.494382	7.346242	8.181264	7.43705	7.428002	7.445341	7.768645	..
Somalia	..	..	..	..	..	..	..	..	..	..
Sudan	..	..	..	..	..	3.796432	..	..	2.218812	..
Syrian Arab Republic	1.566667	1.061808	1.488989	2.215266	..	..	..	..	..	..
Tunisia	4.323453	4.366531	5.965466	6.306072	6.625126	5.793142	4.960599	4.725054	5.595341	..
United Arab Emirates	4.96399	4.498092	..	..	..	10.9911	12.32068	13.95397	4.896528	..
West Bank and Gaza	2.344197	2.236019	3.208343	2.752552	3.119826	2.53922	2.579555	2.622445	3.474313	..
Yemen, Rep.	2.893425	1.170356	1.982572	1.342564	0.994449	1.03446	1.155261	1.327672	1.131965	..
Arab World	**4.9249**	**4.515944**	**..**	**..**	**..**	**6.768577**	**7.145112**	**7.253395**	**5.380614**	**..**
World	**12.65485**	**11.49632**	**12.5449**	**12.62451**	**11.24264**	**11.21889**	**11.32578**	**11.51938**	**12.72985**	**..**

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ICT goods exports (% of total goods exports)									
Country Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Algeria	0.002058	0.003804	0.001196	0.001799	0.003046	0.001186	0.000822	0.002037	0.002003	..
Bahrain	0.063115	0.114142	0.392265	0.254636	0.572224	1.438193	2.387289	1.712698	4.025532	..
Comoros	..	0.547333	0.965227	0.085366	0.039145	0.079746	0.018403	..	..	..
Djibouti	..	..	0.147955	..	..	..	..	..	..	..
Egypt, Arab Rep.	0.032327	0.338879	0.166407	0.135055	0.226807	0.239719	0.423877	2.838077	3.695358	..
Iraq	..	..	..	..	..	..	..	..	..	..
Jordan	6.876913	3.769392	1.558023	1.293959	1.471554	1.61203	1.385219	1.887486	1.777281	..
Kuwait	0.161162	0.177209	0.288289	0.155939	0.101086	..	0.053152	0.062923	0.162269	..
Libya	..	..	..	..	..	..	..	..	..	..
Lebanon	1.217337	1.14144	2.860336	7.114319	0.94985	0.645749	0.864658	1.038402	..	..
Mauritania	..	..	..	..	..	..	..	..	..	..
Morocco	5.129497	3.239594	4.121369	3.772115	3.258272	3.077903	2.867267	2.709857	2.166501	..
Oman	0.282062	0.270143	0.277325	0.095414	0.142685	0.105799	0.085793	..	0.16033	..
Qatar	0.041782	..	0.035439	..	..	..	1.23E-07	1.59E-05	0.076406	..
Saudi Arabia	0.077878	0.08119	0.184496	0.112123	0.110019	0.123429	0.218516	0.115743	0.161175	..
Somalia	..	..	..	..	..	..	..	..	..	..
Sudan	..	..	..	..	..	0.006059	..	..	0.005297	..
Syrian Arab Republic	0.00311	0.007886	0.012145	0.022108	..	..	..	..	..	..
Tunisia	3.143306	3.862617	4.663502	6.526179	7.376833	6.702142	5.845752	5.756868	5.413085	
United Arab Emirates	2.717851	1.950909	..	..	..	7.492709	8.890908	8.873671	2.264911	..
West Bank and Gaza	0.53994	0.632518	0.878014	1.349065	0.968725	0.725801	0.584535	0.421046	0.351885	..
Yemen, Rep.	0.046806	0.052799	0.049194	0.037659	0.006342	0.010953	0.013532	0.075005	0.075739	..
Arab World	**1.015877**	**0.847238**	**..**	**..**	**..**	**2.769622**	**2.715689**	**2.875263**	**1.050223**	**..**
World	**12.22437**	**11.27986**	**11.97749**	**11.74729**	**10.64316**	**10.50716**	**10.44631**	**10.61236**	**11.09068**	**..**

Figure 15. ICT goods imports (% total goods imports)
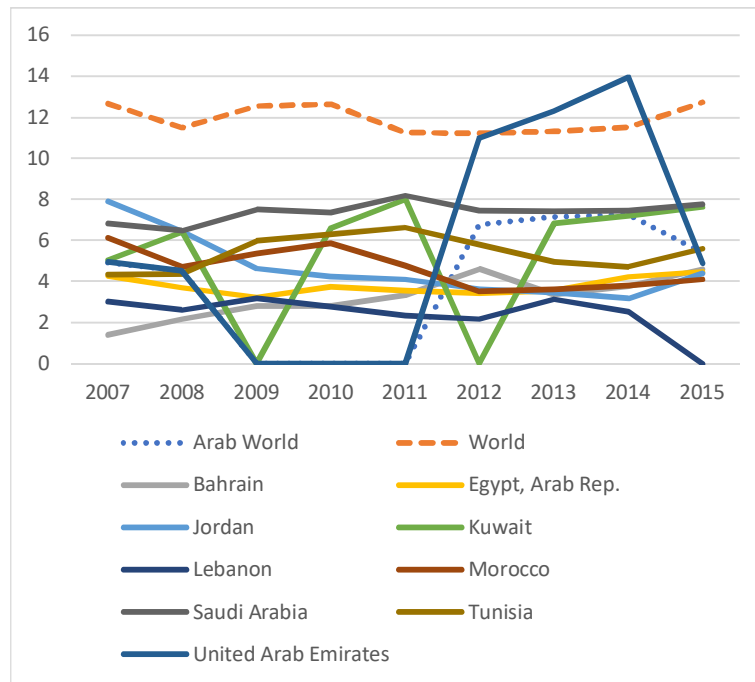
Figure 16. ICT goods exports (% of total goods exports)
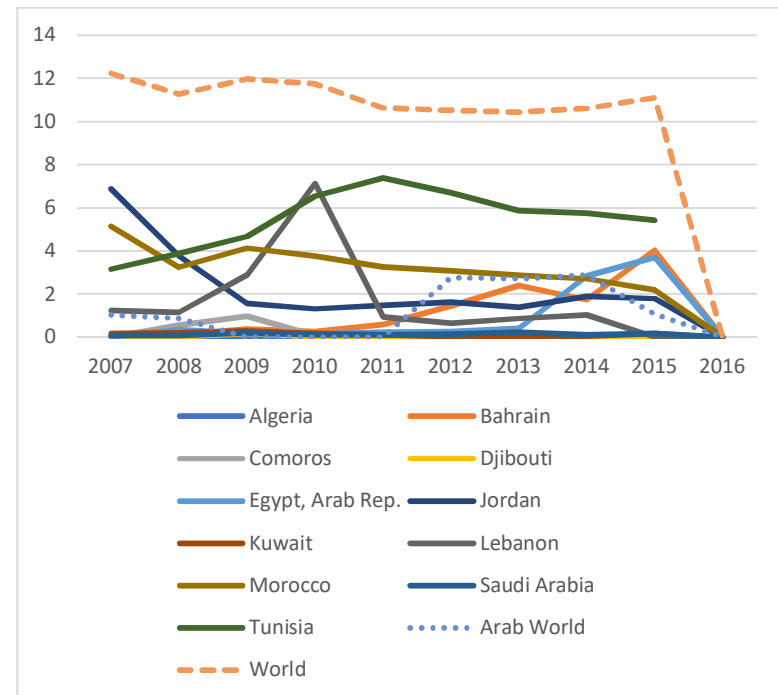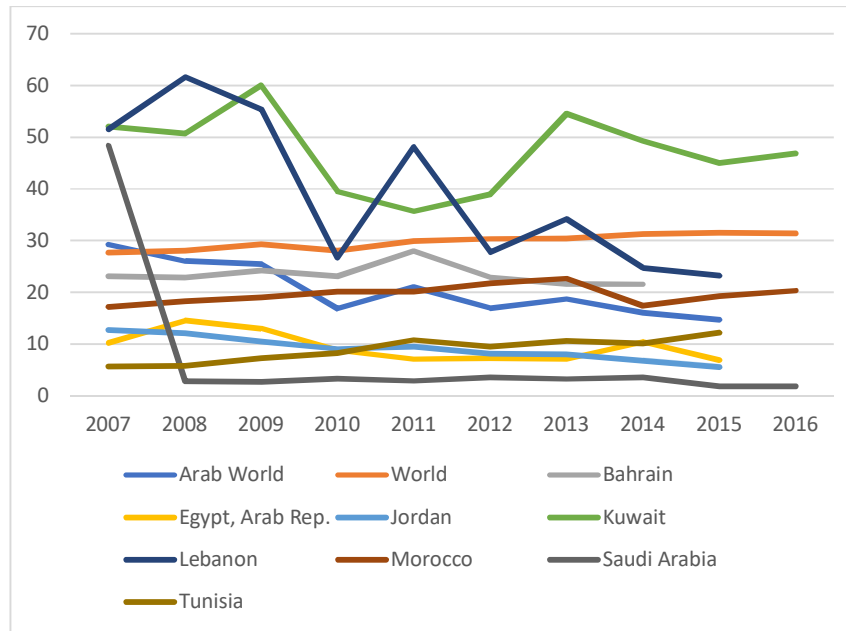
Figure 17. ICT service exports (% of service exports, BoP)

Source: Data from database: World Development Indicators. Last Updated: 10/12/2017