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Growth, Employment, Poverty, Inequality, and Digital Transformation in the Arab Region:

How Can the Digital Economy Benefit Everyone?

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Acronyms

3D Printing	3D printing or additive manufacturing is the construction of a three-dimensional object from a computer-aided design (CAD) model or a digital 3D model.
ADB	Asian Development Bank
AfDB	African Development Bank
AI	Artificial Intelligence
ATM	Automatic Teller Machine
AUC	African Union Commission
B2B	Business-to-Business
B2C	Business-to-Consumer
BIS	Bank for International Settlements
BPO	Business Process Outsourcing
CBE	Central Bank of Egypt
CBEL	(new) Central Banking (of Egypt) Law
CISCO	Computer Information System Company
COVID-19	Corona Virus Disease 2019
DEI	Digital Evolution Index
EBRD	European Bank for Reconstruction and Development
EGDI	e-Government Development Index
ERF	Economic Research Forum
ESCWA	Economic and Social Commission for West Asia
EU	European Union
FDI	Foreign Direct Investment
FRA	Financial Regulatory Authority (Egypt)
G20	Group of 20 countries
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GVC	Global Value Chains
ICT	Information and communications technology
IBRD	International Bank for Reconstruction and Development also known as the World Bank
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IMF	International Monetary Fund
IoT	Internet of Things
ITU	International Telecommunications Union
MENA	Middle East and North Africa
MSMEs	Micro, Small, and Medium Enterprises
NRI	Network Readiness Index

Acronyms

OECD	Organization for Economic Cooperation and Development
OSI	Online Services Index
R&D	Research and Development
SDGs	Sustainable Development Goals
SME	Small and Medium Enterprise
UAE	United Arab Emirates
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
VAT	Value Added Tax
VC	Venture Capital
WDR	World Development Report
WTO	World Trade Organization.

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Summary

This report provides a policy-relevant summary of the main findings of a 2020–21 research project by the United Nations Development Programme (UNDP) and the Economic Research Forum (ERF) on digitalization, growth, employment, and inequality in the Arab region. Building on the key findings of in-depth thematic studies and eight country case studies, the report assesses the actual and potential benefits and risks of digitalizing the economy. It examines the channels of impact and reflects on how they could be improved. The report provides a consolidated overview of key regional trends, elicited primarily from case studies of eight countries (Algeria, Egypt, Jordan, Lebanon, Morocco, Oman, Saudi Arabia, and Tunisia). The case studies take stock of research on the extent of progress of digitalization and affiliated new technologies, including automation, robotics, artificial intelligence (AI), cloud computing, and blockchain; examine their economic and social impacts; identify the policy challenges each country faces; and propose sets of policies customized for countries that share similar challenges.

The findings and policy lessons of this report are also based on five thematic background papers prepared for this project. These papers summarize knowledge and reflect on the implications for the Arab region of the links between digitalization and each of the themes (globalization, inequality, e-commerce, fintech, and the repercussions of the COVID-19 pandemic and the early global effects of the Russian invasion of Ukraine.).

Digitalization is the foundation of the ongoing digital transformation of the global economy. New technologies are bringing about massive shifts in both the sectoral and geographical composition of global output, trade, and employment. The structural transformations are fueled by globalization and technological change, which is underpinned by the spread of information and communication technology (ICT) and the rapid expansion of the Internet since the late 1990s. The ICT revolution has evolved into digitalization, which has led to the ability to read, collect, use, and analyze massive amounts of digital data (machine readable). Digitalization has led to the digital transformation of both advanced and developing economies, as well as to their global and regional economic and financial linkages. These processes have in turn affected both globalization and the nature of global and regional value chains.

1. The digital divide between advanced countries and developing countries—as well as within countries—is large

The Covid-19 pandemic shock has affected nearly every economic sector, in both advanced and developing economies. It has led to an acceleration in the process of digital transformation in both public and private-sector activities. These transformations have required improving broadband connectivity, shifting private firms to online business models, facilitating online payments, and accelerating the provision of digital government services. But countries have adapted at different paces, possibly widening the already large digital divides between advanced and developing economies as well as within countries, between rural and urban dwellers, between genders, and between income groups.

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As of 2021, 37 percent of world population or more than 2.9 billion people remained offline, 96 percent of whom were living in developing countries. In the Arab region, 32 percent of population or about 142 million persons, mainly in low- and middle-income Arab countries, remain offline.

2. Nearly all of the case study countries have developed national strategies—but the impact has been limited

Nearly all of the case study countries have developed national strategies—as well as the supporting policy frameworks and digital regulatory authorities—for the digital transformation of their economies. To varying degrees, all eight have invested in the development of digital infrastructure and connectivity, improved digital access, and narrowed the digital divides across and within countries.

These efforts have encountered challenges, and the understanding of the impact of digitalization on the Arab economies remains very limited. Little research has been conducted to systematically assess the implications for labour markets, productivity, inequality, and poverty.

Three stylized findings emerge from the analysis of the eight case studies:

- Countries in the Gulf Cooperation Council (GCC) have made the most progress in digitalizing their economies. Access to, penetration of, and use of digital technology in these countries is at or exceeds the levels in successful advanced economies and the best-performing upper-middle-income countries (China, Chile, and Malaysia). In the most digitally advanced GCC countries (the United Arab Emirates and Qatar), the index of digitalization is almost as high as in advanced economies.
- In the five middle-income Arab countries studied (Egypt, Jordan, Morocco, Lebanon, and Tunisia), the level of digitalization is lower than in the GCC group. These countries fare poorly compared with the most successful upper-middle-income countries, performing more like low-income countries.
- Algeria, Comoros, Djibouti, Iraq, Libya, Mauritania, Palestine, Syria, and Sudan lag far behind other economies in the Arab region. Except for Algeria, this report does not examine the experience of these countries, because of lack of sufficient data and information. Digitalization is likely to be challenging in these settings unless investments in digital infrastructure and in human capital and digital skills are scaled up and access to financing, which is very limited in these countries, increases. Many will lag even farther behind as they fail to harness the potential from digitalization, although under favorable conditions and improved polices, some may be able to narrow the existing gap and even catch up.

The impact of digitalization on the economies of Arab countries has been limited so far. It has failed to have the transformative impact it has had in other developing regions, where improvements in business climate and digital connectivity have unleashed economic activity and employment generation, as well as improvements in delivery of public services. The Arab region continues to lag most other regions in both the digitalization of public services and the use of digital technology by business enterprises and in the financial sector.

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All Arab countries, including the GCC countries, need to move quickly from e-government to digital government (i.e., engineering a user-driven public administration in which public services are digitally designed to maximize the efficiency and quality of public services for all citizens) rather than just introducing digital technology ex post (i.e., by making it available only on an online platform). Lack of progress in e-government will continue to be a major constraint to progress in digitalization. Tackling the problem is critical, because global experience shows that digitalization of public services has played a leading role in the digital transformation.

Adoption of digital technology by business enterprises in the region has been low. Businesses in Jordan, Saudi Arabia, and the United Arab Emirates have adopted digital technologies; businesses elsewhere in the region have been slow to do so. Weak progress is evident in the two most important areas of digitalization, e-commerce and fintech, where the region is far behind much of the rest of the world.

3. Digitalization creates both opportunities and risks

Digitalization can raise productivity, increase growth, reduce inequality, and change the lives of people throughout the region. Recent empirical studies that cover the Arab region show that increases in the Internet access and use, particularly in productive digital services (business, finance, and government) and increased participation in Global Value Chains (GVCs) in services trade, can lead to significant increases in economic activity and welfare in the region. But digitalization of economies also brings risks. Perhaps the greatest risk is that of being left behind, which policy makers in the region must recognize.

Digital transformation can also have significant and unpredictable impacts on income and wealth inequality, employment, trade and investment, supply chains, migration, service delivery, and environmental and climate-related challenges. It is therefore critical that policy makers (i) address the implications of such transformations early on, through appropriate policy interventions to spur private and public investments in digital technology infrastructure, and (ii) invest in human capital to help realize and strengthen the economic and social benefits and mitigate the downside risks, including widening digital divides and increased income inequality.

Policy makers should ensure that the transition to the digital economy is conducive to achievement of the Sustainable Development Goals (SDGs) and leaves no one behind, particularly in the aftermath of the COVID-19 pandemic, which struck in early 2020 and has exacted massive human toll and caused unprecedented reversals in poverty reduction. Increases in food and fuel prices caused by supply chain disruptions have led to further increases in poverty and inequality in many developing countries.

In 2021, 97 million more people were in extreme poverty because of the pandemic while income inequality, both between and within countries, have worsened significantly. The health and economic impacts of the COVID-19 pandemic increased the pre-existing income and social inequalities in both developed and developing economies. Large divides in digital literacy, infrastructure, and affordability have led to highly unequal economic opportunities and outcomes during the pandemic. Digital technologies, which have played a critical role

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in sustaining economic activity during the pandemic, have also tended to magnify those inequalities caused by the pandemic due to the existing digital divides within and across countries.

4. Policy actions can spur digitalization in the region

This report reviews the impact of digitalization on seven economic and social variables within each country: productivity growth, jobs and labour markets, self-employment and the expansion of new ICT–enabled services (start-ups), diversification and structural transformation, trade in services, women in the labour market, and income inequality. It identifies bottlenecks and presents policy recommendations for addressing them.

The review of global experience identifies three sets of actions Arab countries need to make:

- Craft, issue, and enforce regulations to ensure competitive markets and combat abuse of monopolistic market power.
- Work together to improve digital-specific regulatory regimes. Adoption of common or harmonized regulatory regimes would reduce the burden and cost for firms of meeting regulatory requirements when engaging in cross-border activities. Standardization could be achieved through bilateral and multilateral trade agreements or participation in plurilateral digital economy agreements, as has been happening in East Asia and the Pacific. Arab countries have not been active or engaged in such efforts.
- Improve cybersecurity. Cyberattacks are increasing in frequency and sophistication, with ominous implications for peace, security, human rights, and development. Arab countries need to introduce and/or upgrade their programs, laws, and regulations to safeguard data.

The case studies identify three main bottlenecks:

- the lack of digital skills and human capital related to digitalization
- the presence of large digital divides (differential access to and use of digital infrastructure by certain groups, such as women and the poor)
- the taxation of digital services, which makes the cost of adopting digital technologies prohibitive in some countries.

Addressing all of these issues requires changes in the institutional and regulatory environments. Every Arab country needs to carefully chart its own course to benefit from digitalization, based on its national strategies and development goals. Every country should launch country-specific policy and investment initiatives that lead to universal connectivity, enhance digital skills, and encourage investments in intangibles that complement the digital infrastructure of the knowledge economy and lead to improved market conditions and increased competition.

A major success factor outside the region has been the ability and determination to develop strategic and comprehensive approaches to digitalization. Such approaches typically start with a broad country vision of development and view digitalization as a coherent set of policies and programs that fit into such a vision. Digitalization is not just about infrastructure or ICT; it is also about human capital, skills and training, education, governance of the digital economy,

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laws and regulations governing the use and exchange of data, and cybersecurity. Progress has to be achieved on all fronts. Governance of the digital economy is crucial for success, as it allows for continuous monitoring and evaluation as well as for making corrections.

A more competitive labour market with reduced frictions is likely to increase employment, particularly at more dynamic firms, which tend to have higher productivity growth. Workers displaced by technology are likely to face costly transitions to other occupations and sectors. In the context of the massive adverse effects of the pandemic on economic activity and employment, the ensuing sharp increases in food and fuel prices, and to ensure that digital transformation does not lead to further increases in inequality, poverty, or social tensions, countries should strengthen social protection program and invest in retraining displaced workers.

Seven policy areas are critical for harnessing the potential of digitalization. The first four issues are particularly important in Arab countries:

1. Revamp education and training programs to meet the requirements of the digital age, and encourage the acquisition of skills that complement the new technologies by both young and older workers, with an emphasis on women and disadvantaged groups.
2. Strengthen trust and confidence in digital technologies by improving cybersecurity and adopting and enforcing appropriate rules and regulations.
3. Improve the investment climate:
    - Adjust taxation, so that it does not penalize or create unfair advantages for certain operators.
    - Simply procedures for creating and expanding businesses, with a focus on facilitating the use of digital services and technologies.
    - Increase access to finance by businesses.
    - Make the business environment more competitive, in order to allow innovation to prosper and avoid market concentration and dominance.
4. Engage at the international level to address the cross-border dimensions of digitalization and competitiveness. Arab countries need to be more active in participating in international efforts to identify and adopt good regulatory practices and facilitate digital trade and e-commerce through cooperation with trading partners. They need to engage in international efforts to define rules and procedures that enable firms and consumers to engage in digital transactions across borders, both within and outside the World Trade Organization.
5. Increase investment in digital infrastructure, to make it more affordable for all segments of the population, in order to narrow digital divides. These efforts should go hand in hand with efforts to address digital divides caused by skills deficiencies.
6. Increase support to (i) spur the adoption of digital technology, including by easing access to intangibles, especially by small and low-productivity firms, and (ii) eliminate skills shortages, which would boost aggregate growth while reducing the wide dispersion across firms and workers in productivity and wage levels. Support for patent systems and research and development is needed to spur innovation and technological advances, the benefits of which should be broadly shared.
7. Strengthen social protection systems and align them with the rapidly changing economy, the nature of work that could result from digitalization of the economy and widening skill gaps.

1. Introduction

The digitalization of production and consumption is bringing about massive shifts in the sectoral and geographical composition of global output, trade, and employment. The ongoing structural transformations have been fuelled by globalization and technological change, which have been underpinned by the spread of information and communication technology (ICT) and the rapid expansion of the Internet since the late 1990s. The rapid expansion of the ICT sector across both advanced and developing countries has evolved into digitalization – the ability to read, collect, use, and analyze massive amounts of digital data (machine readable) concerning all activities in an economy. It is the process of using digital data and applying digital technology and capabilities to perform tasks more efficiently and obtain improved outcomes.[1] This ongoing process is causing digital transformations of both advanced and developing economies. Digitalization is the foundation for digital transformation.

A recent research by the World Bank (2021) documents the huge increase in digital use:

- Internet data usage increased from 4.6 to 13 gigabytes per person per month between 2012 and 2017.
- The number of Internet users grew from one-third of the world's population in 2010 to more than half today.
- The number of connected devices on the Internet of Things (IoT) now exceeds the number of human users around the world.
- Internet speeds have been rising to support the growing data traffic volumes.
- Video traffic accounts for about 60 percent of Internet traffic, and further increases in video data traffic are likely, thanks to quality improvements.

Although much data traffic continues to be carried over fixed networks, the share of traffic carried over the wireless networks has soared, from about 3 percent in 2012 to a projected share of about 20 percent in 2022, a shift that is driven primarily by the greater prevalence of mobile traffic in emerging economies and developing countries. As of 2018, China and India accounted for more than 40 percent of the world's mobile data traffic. However, low-income individuals in most places and most people living in low-income countries have no or only limited access to the Internet and the data infrastructure it supports, access to which is critical for participation in the emerging global digital economy (World Bank 2021). Economists define digitization as the process by which technology lowers the costs of storing, sharing, and analyzing data (Goldfarb and Tucker 2019). This process has changed how consumers behave, industrial activity is organized, and governments operate.

The massive amounts of data generated by digital economic activities require new methods and algorithms to (i) analyze emerging economic questions, such as how firms conduct their business via digital and intelligent technologies and their impact on the economy and society, and (ii) study the evolution of the global workforce in a rapidly changing digital economy. The economics of digitization is the field of economics that studies how digitalization and digital transformation affects markets and how digital data can be used to study economics.[2] This new field involves new economic models, as many traditional assumptions about information and how it affects personal and business decision-making no longer hold in a digitalized economy, and new analytical and empirical methods are required to assess the new types of data generated by digitalization of economies.

Research on the economics of digitalization touches on several fields of economics, including industrial organization, labor economics, international finance, international trade, and intellectual property. An underlying theme in much of the new work in the field of intellectual property is that existing government regulation of copyright, security, and antitrust is inappropriate in the digital world. Information goods, such as news articles, books, and movies, now have zero marginal costs of production and sharing unlimited times, which has made the reproduction and redistribution without permission common and led to increased competition between providers of information goods. Research in digital economics studies how regulation and competition policies should adapt in response to these changes. Digitalization of economic activities, production processes, social support, and social service delivery are among the key factors affecting the nature of economic growth, employment generation, and development progress at both the county and global levels.

[1] The digital economy continues to evolve rapidly, driven by the ability of digital technologies to collect, use, and analyze massive amounts of machine-readable information (in the form of digital data) on practically any subject in any field. The collected information represented in the form of digital data arises from the 'digital footprints' of personal, social, business, and political activities taking place on the digital platforms that underpin social media. Global Internet Protocol traffic, a proxy for digital data flows, grew from about 100 gigabytes per day in 1992 to more than 45,000 gigabytes per second in 2017. Despite this increase , the world is only in the early days of the data-driven economy as further increases are likely to be fuelled by more and more people coming online for the first time and by the expansion of the Internet of Things (UNCTAD 2019).

[2] For a comprehensive review of economics of digitalization see Goldfarb and Tucker (2019).

The digital transformation is an outgrowth of general-purpose technology – technology with the power to affect an entire economy. Previous episodes of general-purpose technological change – – the steam engine, the electricity generator, the printing press – brought about massive economic benefits over the long term. But change was highly disruptive in the short term. The size, timing, and distribution of the gains (as well as costs) will depend not just on how disruptive technology is adopted but on how it is adapted as well.[3]

The world is facing a multipronged technological revolution that is fundamentally altering the development pathways that have brought about decades of progress in reducing poverty and addressing inequality in many developing countries, especially very populous countries, such as China and India. In response, the international development community has been trying to assess whether and how the ongoing technological revolution (also called the Fourth Industrial Revolution) can be harnessed to accelerate progress towards achievement of the Sustainable Development Goals (SDGs) (United Nations 2019).

General-purpose technologies can significantly boost productivity.[4] But it is uncertain whether the economies that are rapidly digitalizing and adopting Artificial Intelligence (AI), automation, and robotics will be able to accelerate productivity growth and achieve commensurate rises in workers' wage rates. The labor-saving and skill-biased nature of these new technologies and their high skill requirements could cause dislocation of large segments of the workforce during a transition period that could last several decades.

For the Arab region, the potential of digitalization to produce economic gains appears large, particularly over the longer term. Many studies have been published about the digital economy in Arab countries in recent years.[5] This work has come mainly from international organizations, such as the Economic and Social Commission for West Asia (ESCWA) and the World Bank (and to a more limited extent from the OECD, AfDB, AUC, and IDB), as well as from private consulting firms. Many of the studies cover the Gulf Cooperation Council (GCC) countries; most are about the entire Arab region. Some cover specific topics, such as jobs and employment; others focus on benchmarking progress in digitalization. Most of them present policy recommendations for stimulating and enhancing technological progress.

A key theme in these studies has been that digitalization presents a unique opportunity for Arab countries to 'leapfrog' to a new industrial/services economy, overcome the middle-income trap[6] and create jobs and increase productivity (see, for instance, World Bank 2019a). The studies explore the potential for digitalization as well as potential new opportunities and/or present views or scenarios through which aspirations for better development outcomes can be achieved by harnessing the digitalization potential in order to reach development objectives.

This report builds on these studies, but it takes a different approach. It focuses on the economic impact and implications of digitalization, by looking at the channels of impact and how they can be improved.

Digital transformation could have significant and unpredictable impacts on income and wealth inequality, employment, trade and investment, supply chains, migration, service delivery, and environmental and climate-related challenges. It is important to address the implications of such a transformation on poverty and inequality by making sure that the transition is conducive to the achievement of the Sustainable Development Goals and leaves no one behind, particularly in the aftermath of the COVID-19 pandemic shock, which has moved many developing countries off-track in terms of achievement of their goals while accelerating the process of digital transformation, particularly in high- and middle-income countries, in both public and private sector activities. Progress has included improvements in broadband connectivity, the shifting of private firms to online business models, the growing adoption of online payments, and the enhancement of digital government services. But as the pandemic enters its third year, large digital divides persist between advanced and developing

[3] OECD (2018a) and Muhlesien (2018).

[4] For example, a recent study by JP Morgan indicates that under certain assumptions, new technologies (mainly digitalization, Artificial Intelligence, automation, and robotics) could increase total factor productivity growth by as much as 1 percentage point a year in the United States, the Eurozone, Japan, and emerging market economies over the next 15 years. See http://www.jpmorganassetmanagement.be/dms/JPM50455%20LTCMA%202018%20-%20TECHNOLOGY.pdf.

[5] See Digital/McKinsey (2016), Deloitte (2017), McKinsey Global Institute (2018), World Bank (2018b), AfDB/ADB/EBRD/IDB (2018), ESCWA (2018), World Bank (2019a), ESCWA (2019a), ESCWA (2019b), ESCWA (2019c), Langendorf (2020), AUC/OECD (2021), ITU (2021b), Cusolito et. al. (2022), de Melo and Solleder (2022) and Atiyas and Dutz (2022).

[6] The middle-income trap is a state of economic development in which a country that attains a certain level of per capita income gets stuck at that level unless it undertakes economic and institutional reforms. The term was coined by the World Bank in 2006; it has been elaboated upon by Indermit Gill and Homi Kharas in an update of their original work (see https://documents1.worldbank.org/curated/en/291521468179640202/pdf/WPS7403.pdf.)

economies; between urban and rural areas and large and small enterprises within countries; and between individuals.

The content of this report is based on the background papers that independent researchers produced as part of the joint research project by the UNDP and Economic Research Forum (ERF) titled "Growth, Employment, Poverty, Inequality, and Digital Transformation in the Arab Region: How Can the Digital Economy Benefit Everyone?" It draws together the findings from five thematic papers and eight country papers. The five thematic papers summarize the state of global knowledge and explore the implications for the Arab region of the links between digitalization and globalization (Hoekman 2021), inequality (Yusuf 2021), e-commerce (Mahroum 2021), fintech (Allen 2021), and the global COVID-19 pandemic (Fardoust 2022). The eight country case studies take stock of the progress of digitalization and its economic and social impact, as well as the policy challenges in each of the following countries: Algeria (Belaid et. al. 2021), Egypt (Kamel 2021), Jordan (Gomes and Mahroum 2021c; Dibeh 2021), Lebanon (Dibeh 2021) Morocco (Abdelkhalek, et al. 2021), Oman (Gomes and Mahroum 2021a), Tunisia (Ben Youssef 2021), and Saudi Arabia (Gomes and Mahroum 2021b). Based on this research, this policy report provides descriptions of major trends in digitalization across countries in the Arab region, their impacts and policy implications.

Section 2 of the report provides the broad global context for digitalization and its impact on the global economy in terms of productivity growth, employment, and inequality. It also discusses the pandemic and its implications and the role of digitalization in mitigating its adverse impacts. Section 3 provides a benchmarking of progress and the dynamics of digitalization in Arab countries for which data are available. It considers six dimensions of digitalization: (i) connectivity and digital infrastructure, (ii) digital public services, (iii) digitalization and individuals, (iv) adoption of digital technology by businesses, (v) fintech and e-commerce, and (6) governance of the digital economy.

Section 4, considers the social and economic impact of digitalization in Arab countries. It looks at three dimensions of social impact: jobs and labor markets, women in the labor market, and income inequality and poverty. The main economic impacts explored are: productivity growth, self-employment and the expansion of the new ICT enabled services, diversification and structural transformation, and trade and exports of services.

Based on the findings from the country studies, Section 5 identifies eight bottlenecks and policy challenges of digitalization:

- human capital, skills, and labor markets
- digital divides and differences in access
- the challenge of e-government
- digital technology adoption by businesses and innovation
- regional and global regulatory challenges
- taxation and regulation of digital transactions
- competition and regulations
- cybersecurity, privacy, and data protection

Section 6 builds on the previous sections to consider the prospects for digitalization in Arab countries and their policy implications. It addresses four themes: (i) the prospects for digitalization and development pathways in Arab countries; (ii) approaches, strategies, and priorities; (iii) how to harness the potential of digitalization for development; and (iv) how to manage the risks of increased inequality and poverty. Section 7 provides suggestions on future research.

2. Digitalization and the Global Economy: Lessons from Global Experience

The global economy performed relatively poorly in the aftermath of the Great Financial Crisis (GFC) of 2008–9. By 2019 the average growth rate of the world economy over the decade since the GFC had slowed to 3.3 percent a year, about 1.2 percentage points lower than its average GDP growth over the preceding decade. Much of this decline was due to a sharp slowdown in the average growth of developing countries, which as a group experienced a significant slowdown in the pace of growth of their exports, as well as a marked deterioration in their terms of trade, largely due to declines in the prices of the commodities they exported. Growth in advanced economies also slowed.

Even before the pandemic shock of 2020, both advanced and developing economies had thus been facing headwinds, partly because of the aftereffects and scars left by the GFC, which resulted in lower investment levels in many advanced and developing economies. Additional factors causing sluggishness in output and productivity growth rates during this period stemmed from rising income and wealth inequality in many advanced and emerging economies, which tended to suppress both private consumption and private investment, and the emergence of new technologies. At the same time, the process of digitalization had already started rendering manufacturing

more capital intensive and skills biased than before, particularly in advanced economies. These changes had started to have profound effects on global trade, supply chains, growth and employment generation well before the COVID-19 pandemic.

Digitalization at the global level

Internet usage soared over the last decade, but it continues to vary widely across countries. In 2021 the proportion of individuals accessing the Internet averaged 90 percent in advanced economies, 57 percent in developing countries, and only 27 percent in the least developed countries (ITU 2021b). These figures were 67 percent, 21 percent, and 6 percent, respectively, in 2010.

Internet use has become an everyday habit for most people in advanced economies and middle-income countries, regardless of age. In 2019 in advanced economies and a number of upper-middle income countries, about 58 percent of people aged 55–74 used the Internet frequently, about twice the rate in 2010. The rate is much higher among people16–24, at 95 percent (OECD 2021b).

For most people in many countries, smartphones are the most frequently used device for Internet use. In 2019, 93 percent of enterprises in advanced economies and a number of upper-middle income countries had a broadband connection, up from 85 percent in 2010. Even the gap between large and small business firms has narrowed, to less than 7 percentage points, on average, down from 15 percentage points in 2010.

The gap remains much larger in some lower-income countries. In 2019, the gap in high- speed broadband penetration rates between the top five advanced economies and the bottom five economies (comprising upper-middle income countries) in the OECD, was more than 20 percentage points (OECD 2021b).

In most low- and middle-income countries, mobile broadband is the main important way people and businesses connect to the Internet. In 2021, about 95 percent of the world's population had access to mobile broadband network. Connectivity through 4G networks reached 88 percent of the world's population, about double the coverage in 2015 (ITU 2021a). 4G connectivity in developed and developing countries reached 99 percent and 83 percent, respectively. Among developing regions, the Arab states and sub-Saharan Africa had lower 4G connectivity rates than regions, at 70 percent and 49 percent, respectively.

Urban-rural disparity

Globally, 95 percent of urban areas have access to 4G broadband network. Coverage is much lower in rural areas. In Asia and Pacific and Europe, the gaps in access between urban and rural areas are about 11 and 6 percentage points, respectively. At 31 percentage points, the gap in 4G coverage between rural and urban areas in the Arab states is the highest in the world after Africa (Figure 1).

At the global level, about 72 percent of households in urban areas had access to the Internet at home in 2019, almost twice the access rate in rural areas of about 38 percent. The urban rural gap in access to the Internet at home was relatively small in developed countries. In contrast, in developing countries urban access to the Internet was 2.3 times as high as rural access.

In Africa, only about 28 percent of households in urban areas had access to the Internet at home, 4.5 times higher than the rate of Internet access in rural areas. By comparison, in the Arab region, 58.9 percent of households had Internet access at home and 54.6 percent of individuals were using the Internet in 2019 (ITU 2021b).

At the end of 2019, just over half of the world population or 4.1 billion people was using the Internet (Figure 2). Between then and 2021, the number of Internet users jumped by 800 million to 4.9 billion people, or 63 percent of the world population. The sharp increase in the number people using the Internet, the largest in a decade, reflected the impact of Covid-19 pandemic, which made digital connectivity a critical necessity for tele-working, distance-learning, accessing basic services and keeping in touch with the rest of the world (ITU 2021b).

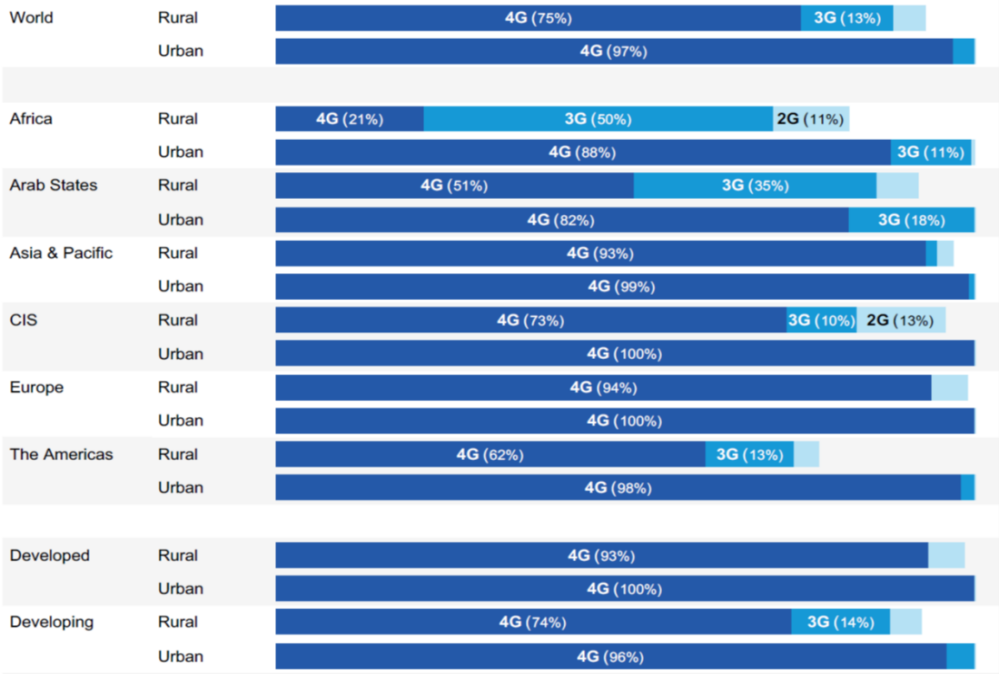
Nonetheless, still some 2.9 billion people remained offline, 96 percent of whom lived in developing countries. Some 390 million people were not even covered by a mobile broadband signal (ITU 2021b). In the Arab region, about 5 percent of the population or about 22 million people are not yet covered by a mobile broadband signal.

Age disparity

In 2020, the proportion of the global population that used the Internet was 14 percentage points higher for youth (15-24) than the average for the rest of the population, which was only 57 percent. In developed countries, where 90 percent of the population was already online in 2020, this gap in favor of youth in using the Internet was 11 percentage points. In developing countries,

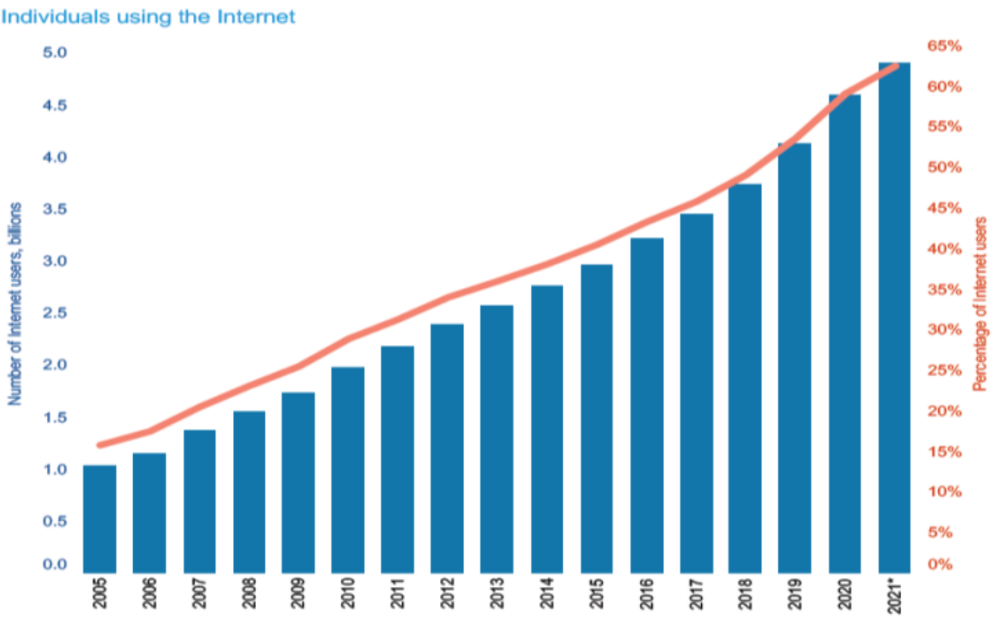
Figure 1: Share of population covered by 2G, 3G, and 4G mobile broadband networks covered in urban and rural areas, by region, 2021.

*Population coverage by type of mobile network and area, 2021**



*Source: International Telecommunications Union, 2021b. Measuring Digital Development: Facts and Figures 2021 (Geneva), https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf. CIS= Commonwealth of Independent States. *ITU estimate.*

Figure 2: Number and share of world population using the Internet, 2005–21



Source: International Telecommunications Union, 2021b. Measuring Digital Development: Facts and Figures 2021 (Geneva), https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf.

where 67 percent of youth were using the Internet, this gap in favor of youth was 16 percentage points. In the Arab region, nearly 73 percent of youth were using the Internet compared with only 60 percent of the rest of the population. An important implications of the greater uptake among young people is its positive impact on the development prospects of those countries whose demographic profile is skewed toward the younger age group 15-24 (ITU 2021b).

Gender disparity

In 2020, about 62 percent of the world's male population and about 57 percent of female population used the Internet, implying a gender parity core of 0.91 (female to male ratio). (Figure 4). Despite some progress in narrowing the gender gap in Internet use in recent years, some 234 million fewer women than men used the Internet in 2020. In the Arab region, only about 56 percent of women were online, compared with 68 percent of men (Figure 3).

Fixed broadband versus wireless broadband

The number of mobile-cellular telephone subscriptions declined for the first time in history in 2020 (Figure 4). In mid-2020 there were an estimated 105 mobile-cellular subscriptions per 100 inhabitants, a decline of about 2.5 percent compared with 2019. This decline was driven by developing countries, where the number of subscriptions fell about 4 percent between 2019 and mid-2020; in developed countries the upward trend continued in 2020. The penetration of mobile subscription world-wide rose again in 2021, to nearly 110 subscriptions per 100 inhabitants.

COVID-19 pandemic appears to have fuelled demand for high-quality connectivity. Internet operators experienced as much as a 60 percent increase in Internet traffic in the OECD area during the first few months of 2020, as the virus began to spread rapidly around the world. Online-platform use increased by about 20 percent in the area during the first six months of 2020, allowing businesses and households (as well as some government services in some countries) to continue to provide services during lockdowns (OECD 2021a, OECD 2021b).

COVID-19 slowed the number of new network launches in 2020, but 5G activities started to pick up pace. In the Arab region, 5G networks are being rolled out. The GSM (Global System for Mobile Communication) Association estimates that 5G adoption in the region is likely to reach 8 percent (or 58 million 5G connections) by 2025 (ITU 2021b).

The push for higher quality connection and faster speed has led to a significant increase in the share of fibre in all fixed broadband subscriptions in advanced economies. In the OECD area, the share of fibre in fixed broadband increased to 27 percent by mid-2019, up from just 12 percent in 2011. Moreover, in several advanced economies, high-speed fiber accounts for as much as half of all fixed Internet connections. In recent years fixed broadband networks have increasingly met rising demands on wireless networks, as cellular Internet Protocol (IP) traffic is being offloaded onto fixed networks through Wi-Fi systems (OECD 2021c).

Gaps in digital skills

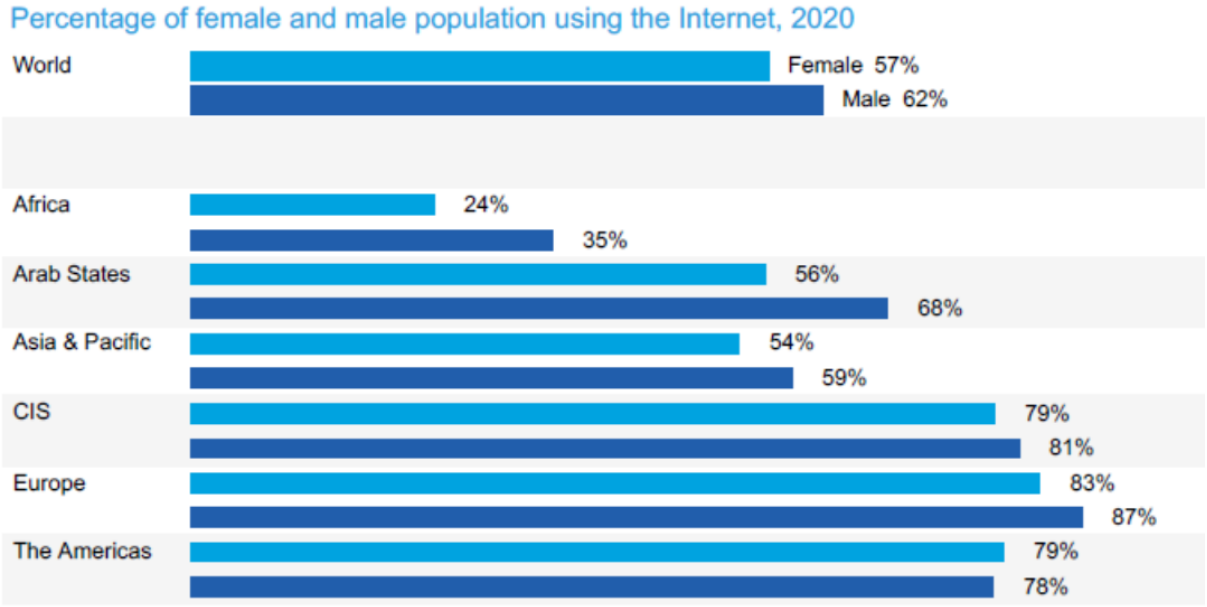
Insufficient skills are often cited as an impediment to Internet use. In about 40 percent of countries for which up to date data are available, fewer than 40 percent of individuals who had access to the Internet reported have carried out a digital activity, such as preparing and sending an email with an attachment. In 70 percent of the countries included in the survey, fewer than 40 percent of individuals had carried out one of the standard digital skills, such as creating an electronic presentation using a presentation software (e.g., PowerPoint); in only 15 percent of countries had more than 10 percent of individuals written a computer program using a specialized programming language in the last three months. Recent data continue indicate that there are large differences in basic digital skill levels across age groups and occupations (ITU 2021b).

According to household surveys conducted in 22 developing countries in 2017-18, the reasons people cited most frequently for not accessing the Internet and engaging with data services were related to digital literacy (69 percent) followed by affordability (15 percent) (Figure 5A). Many users in developing countries limit their mobile data or fixed broadband connection and data usage because of affordability constraints. The World Development Report 2021[7] carried out a survey in 11 emerging market economies. It found that a median of nearly 50 percent of respondents had difficulty paying for their mobile data usage.

The demand for mobile digital data is lowest among low-income countries (Figures 5B). Affordability can be approximated by the ratio of the price of an Internet connection to the gross national income per capita of the country or country group (Figures 5C).

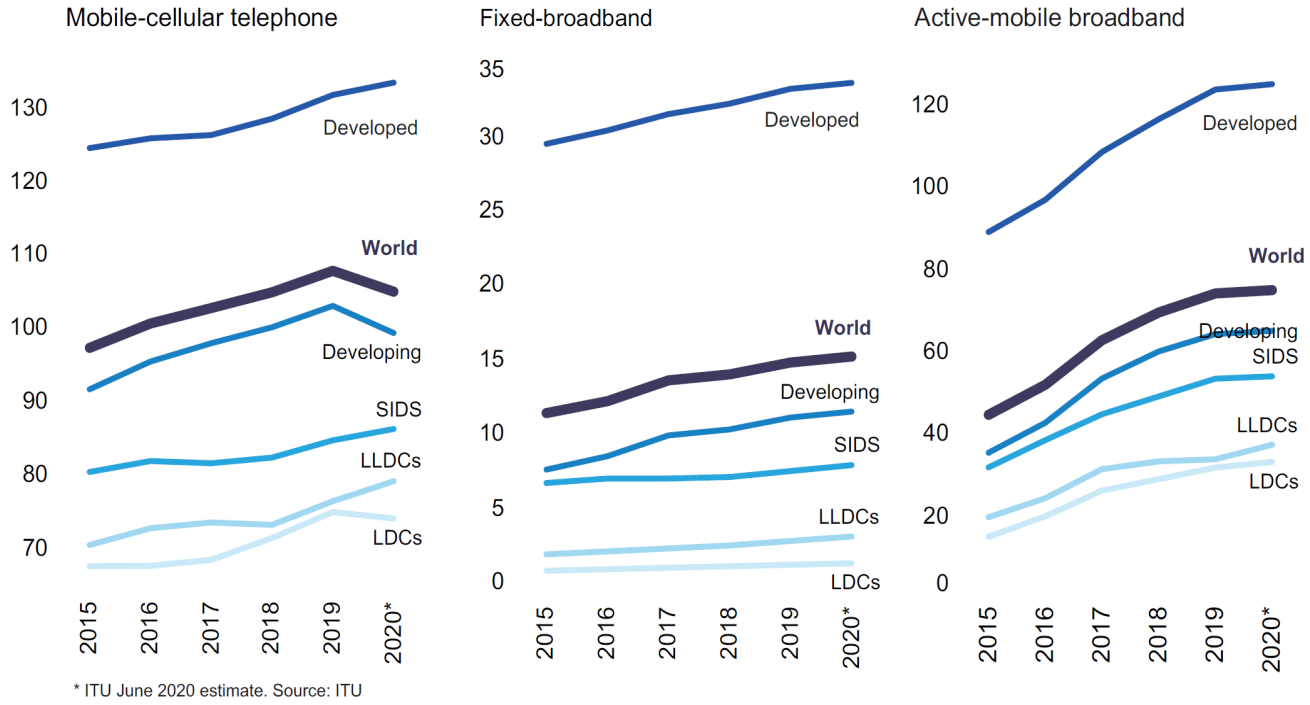
[7] https://wdr2021.worldbank.org/

Figure 3: Share of world's population using the Internet, by gender, 2020



Source: International Telecommunications Union, 2021b. Measuring Digital Development: Facts and Figures 2020 (Geneva), https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf.

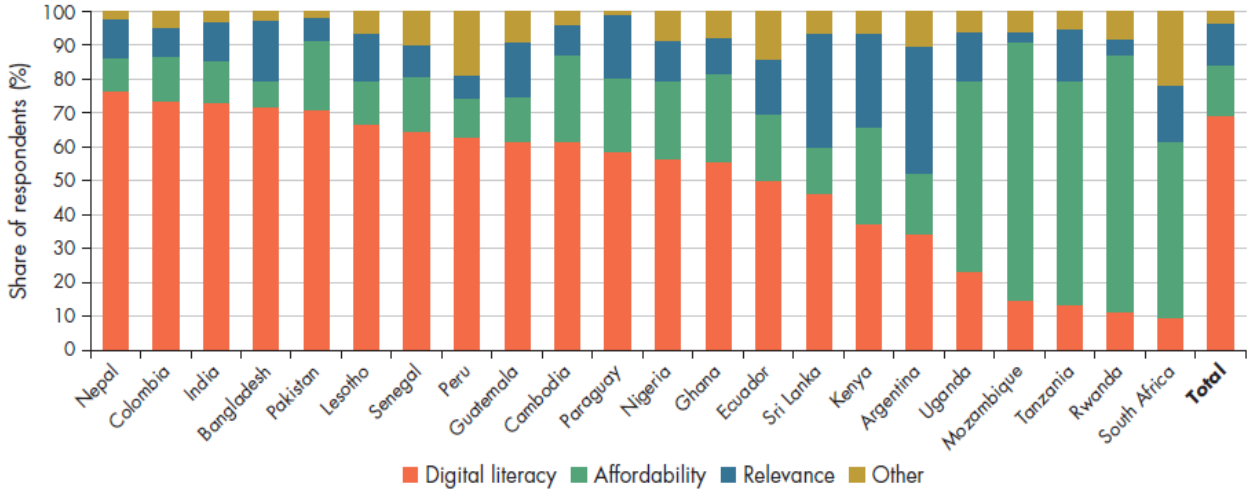
Figure 4: Mobile-cellular and fixed-band subscriptions per 100 inhabitants, 2018–20



* ITU June 2020 estimate. Source: ITU

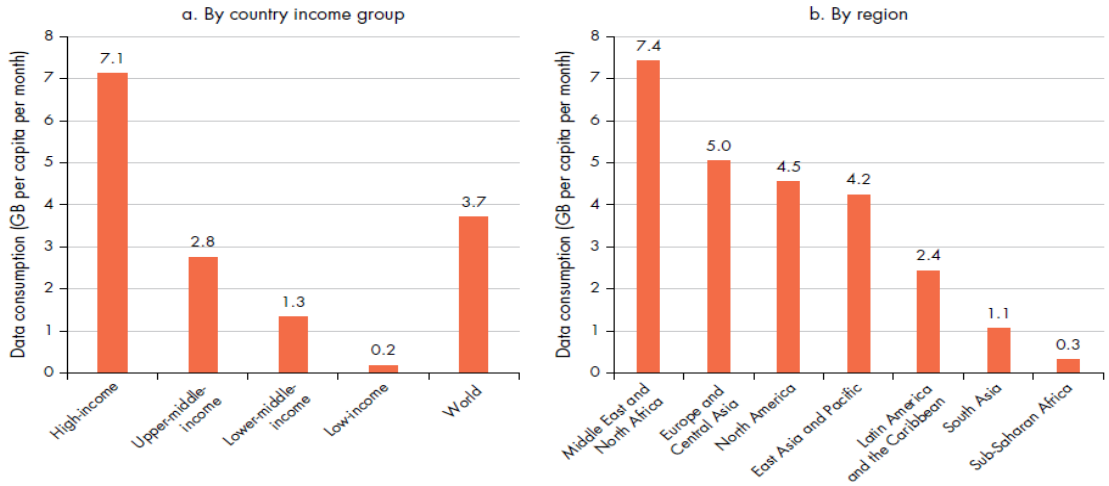
Source: International Telecommunications Union, 2020b. Measuring Digital Development: Facts and Figures 2020 (Geneva), https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2020.pdf.
Note: SIDS =Small Island developing state; LLDC = landlocked developing country; LDC = least developed country.

Figure 5A: Reasons for not using the Internet in selected emerging and developing economies (Based on 2017-18 survey data)



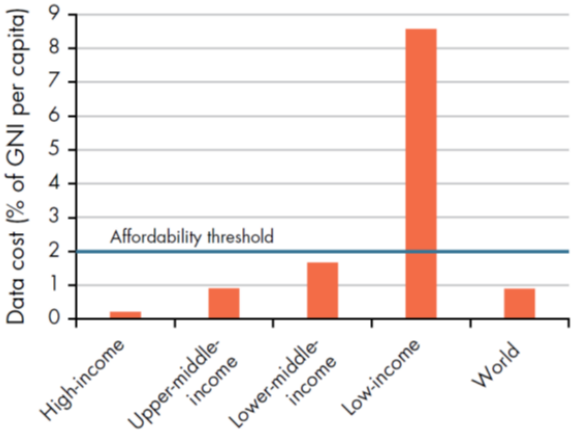
Source: World Bank, World Development Report 2021. (For details, please refer to the background research paper prepared for the Word Development Report at https://documents.worldbank.org/en/publication/documents-reports/documentdetail/492871616350929155/a-demand-side-view-of-mobile-internet-adoption-in-the-global-south)

Figure 5B: Average data consumption, by country income group and region, (2018 data)



Source: World Bank, World Development Report 2021.

Figure 5C: Cost of 1 gigabyte of data as share of gross national income per capita, by country income group, (2018 data)



Source: World Bank, World Development Report 2021.

Size of the digital economy

Estimates of the value of the global digital economy range between 4.5 percent and 22.5 percent of world GDP, depending on the definition of the digital economy used. At the market exchange rate, this puts the global digital economy at $3.8- to $19.1 trillion in 2019.[8] The lower figure refers to the narrowest definition of digital economy, which focuses on the ICT sector's value-added, and which according the United Nations Conference on Trade and Development (UNCTAD 2019), using a narrow definition of digital economy (ICT sector), constituted a stable share of about 4.5 percent of world GDP during 2008–2018 (Herbert and Loudon 2020). Using a broader definition of the digital economy, researchers estimate that the digital economy was worth about $11.5 trillion globally, equivalent to 15.5 percent of global GDP in 2016. The higher estimate is based on models that include spill-over effects of ICT on other parts of the economy.[9]

The global digital economy has grown 2.5 times faster than the global GDP since the early 2000s (Huawei and Oxford Economics, 2017). Developing countries are estimated to have contributed about 27 percent of the global digital economy.[10]

Two countries-- the United States and China—dominate the digital economy. Developing countries other than China represent a relatively small portion of the digital economy. The combined digital economies of the United States and China may account for as much as 44 percent of the global digital economy (Knickrehm et al 2016) and for 75 percent of all patents related to blockchain technologies, 50 percent of global spending on Internet of Things, more than 75 percent of the world market for public Cloud Computing, and 90 percent of the market capitalization value of the world's 70 largest digital platforms (UNCTAD 2019).

UNCTAD (2021b) estimates that the global value of e-commerce sales including both business-to-business (B2B) and business-to-consumer (B2C) amounted to $26 trillion in 2018 or about 30 percent of world GDP. The United States was by far the largest market. Before to the pandemic shock, e-commerce represented a relatively small proportion of sales for business firms. In 2019 e-commerce generated less than 20 percent of total turnover on average. For firms using e-commerce, up to 90 percent of revenue came from B2B transactions. Large firms tend to use e-commerce more than small ones. E-commerce accounts for an average 24 percent of large firms' turnover, compared with only 9 percent in small firms.

More recent, albeit incomplete data, shed some light on the impact of the pandemic on e-commerce. According to UNCTAD (2020), 10 of 13 global e-commerce companies in 2020 were from China and the United States. E-commerce platforms selling merchandise, such as Alibaba, Amazon, eBay, and Walmart, registered increased sales volumes in 2020 relative to their respective level of sales in 2019, while services e-commerce companies, such as Uber, Expedia, and Airbnb suffered sharp declines in their gross sales.

Rising inequality and poverty

Over the past two decades, globalization and the rapid pace of technological change have affected income and wealth inequality across the world. Inequality is largely the result of long-term structural forces that are independent of short-term macroeconomic policies, such as monetary policy. The labour-saving and skill-biased nature of digital technologies have increased the real wages of highly skilled workers relative to those of less skilled workers. While globalisation and the resulting rapid growth in international trade led to some reduction in between-country income inequality, largely due to the rapid growth of real income in large developing countries, such as China and India, relative to those in advanced economies, within-country inequality has been rising in most advanced and developing countries since the 1990s (Figure 6A).

However, since the 2008-09 global financial crisis, financial factors have emerged as a major force in amplifying business cycle fluctuations, with financial recessions tending to become deeper longer, and more costly in terms of increased inequality. Financial crises tend to force the monetary authorities to keep interest rates low and for longer to strengthen and sustain an incipient economic recovery. But low interest rates boost asset prices, including real estate and equity, thereby exacerbating both income and wealth inequalities, as ownership of these assets is increasingly concentrated among the wealthier segments of society (Figure 6B).

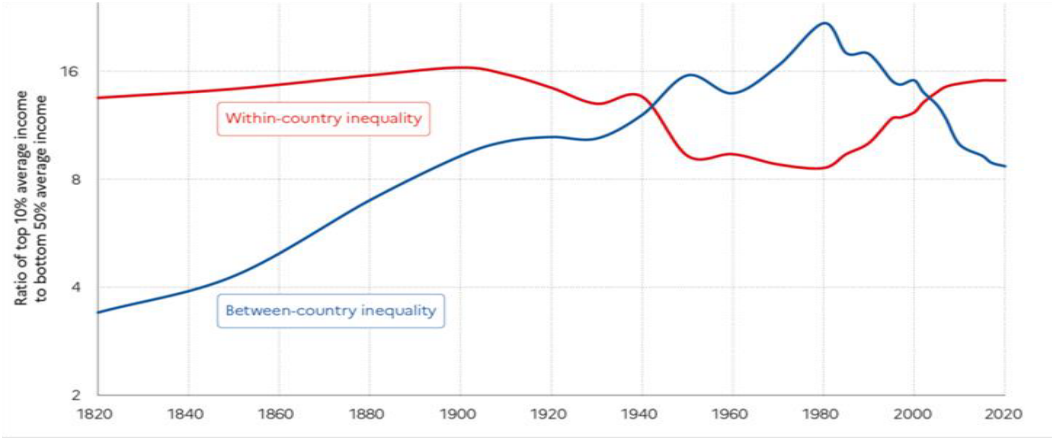
[8] According to the IMF (2021a), Statistical annex, world GDP at market exchange in 2019 rates was $84.4 trillion.

[9] Using a similar methodology, Huawei and Oxford Economics (2017) estimated that the global digital economy was worth about 15.5 percent of world GDP. Knickrehm et al (2016) estimated that in 2015 the world's digital economy contributed 22.5 percent of global GDP.

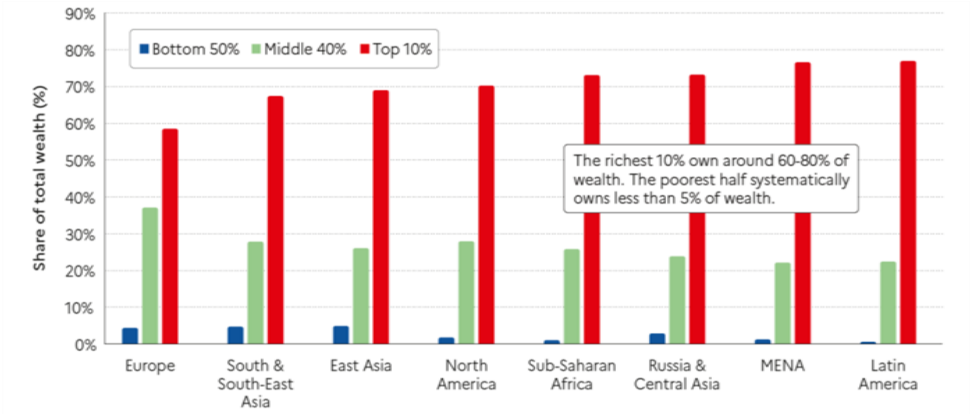
[10] A 2018 IMF study on measuring the digital economy focuses on the digital sector, defined as comprising online platforms, platform-enabled services, and suppliers of ICT goods and services. E-commerce can also be used as a proxy to estimate the size of the digital economy.

Figure 6. Changes in global income and wealth inequality over time

A. Global income inequality: between-country vs within-country inequality (ration T10/B50), 1820-2020



B. Global wealth inequality - share of total wealth held by top 10%, middle 40% and bottom 50%, by regions, 2021



Source: World Inequality Report 2022. https://wir2022.wid.world

Technological progress, particularly in the form of digitalization that is highly skill-biased, has increased the productivity of highly skilled workers more than low-skilled workers, increasing the income gap between the two groups. Automation and the digital economy have played a major role in this process. (BIS 2021, p. 43 and OECD 2020c).

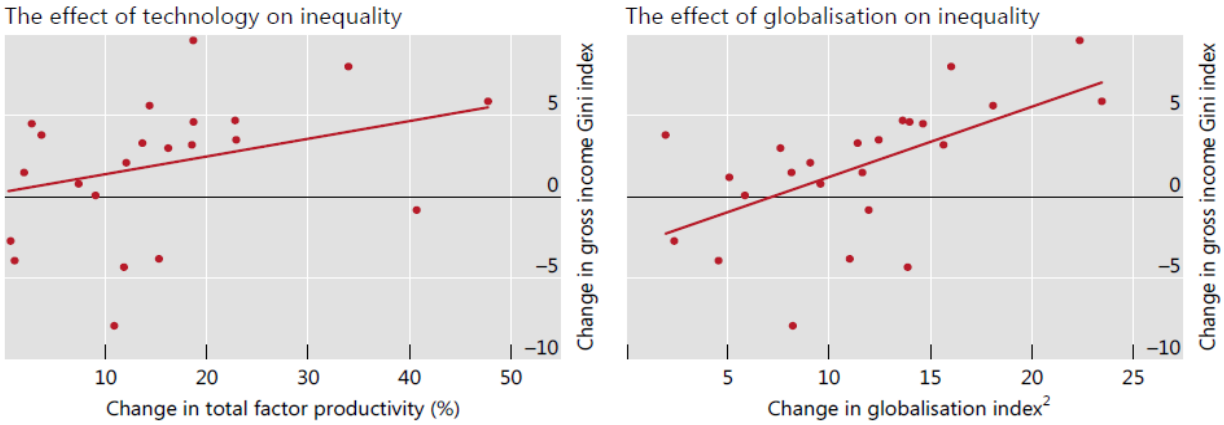
Over the past three decades an increase in total factor productivity growth – a proxy for the impact of technology on the production process has been associated with an increase in the Gini Index of income inequality (Figure 7). Globalization and the associated increase in trade interconnectedness have also contributed to higher within-country inequality, by disproportionately rewarding better educated and higher-skilled workers relative to middle-skilled and lower-skilled workers. Outsourcing (or even the threat of it) may have substantially weakened the bargaining power of low-skilled workers. In the mid-2010s the top 10 percent of the income distribution earned about 10 times the income of the bottom 10 percent, up from seven times in the mid-1980s. The Gini coefficient for the OECD area increased over the same period.[11]

While income inequality has been rising in advanced economies, in emerging economies the picture has been more mixed. During the last two decades income inequality rose sharply in India, China and South Africa, for example, but it declined in several large Latin American economies as a result of policy actions. Non-income inequalities (including non-income dimensions of poverty, such as health, education, nutrition) remain high or are rising, particularly between the poorer and the wealthier segments of population in developing countries (UNDP 2019).

According to recent studies concerning advanced and emerging economies, the risk that technological change could further increase inequalities is exacerbated by the

[11] For a detailed analysis of the implications of digitalization and inequality, see Bourguignon (2022); for an indepth review of the available evidence concerning the Arab region, see Yusuf (2022).

Figure 7: Effects of technology and globalization on income inequality



[1] The sample includes 15 AEs and nine EMEs; changes are computed over the period 1981–2015 (or shorter, depending on country-level data availability). [2] Based on the KOF Globalisation Index.

Source: Bank for International Settlements, Annual Economic Report (June 2021, Basel), page 43, https://www.bis.org/publ/arpdf/ar2021e.pdf. (Source of original data: UNU-WIDER, World Income Inequality Database (WIID); Penn World Table; KOF Swiss Economic Institute; BIS calculations).

fact that many of the workers employed in occupations at high-risk of automation tend to be low-skilled or older workers who are not likely to have received the required retraining (OECD 2019, 2020b). Such increases in inequality could cause more poverty, other things being equal, but little is known on how digitalization actually impacts poverty, independent of changes in inequality.

Meanwhile, monetary policies followed by the largest advanced economies were exceptionally accommodative since the global financial crisis of 2008-09 until early 2022. Large liquidity and lending support programmes were announced early on in the crisis caused by the pandemic, and many central banks implemented various measures in order to support increased liquidity in the financial sector.[12] The combined effects of the central banks' asset purchases and liquidity and lending support measures in advanced economies, particularly in the US, Japan, the UK and the EU, has resulted in a massive increase in total assets of many central banks. For some, the increase has been between 10 to 25 percent of GDP, significantly larger than during the global financial crisis in 2008-09. (BIS 2021).

Most experts expect a rise in long-term bond yields in advanced economies over the next two years as central banks in advanced economies, particularly the US and the EU, unwind support for their economies and tighten monetary policy, putting upward pressure on long-term interest rates. But there are serious concerns over the risk of a rapid increase in long-term interest rates, which could in turn trigger volatility in equity markets and in international capital markets, thereby exerting further financial pressures on developing countries at a time when the pandemic crisis has substantially raised the risks of debt distress for many of them.

Effect of the COVID-19 pandemic on poverty and inequality

Since early 2020, inequality has been rising in many developing countries, as low-skilled workers, minorities, and women have been hit hardest by the COVID-19 pandemic shock. The pandemic hit while the global economy was already grappling with a persistent productivity slowdown.

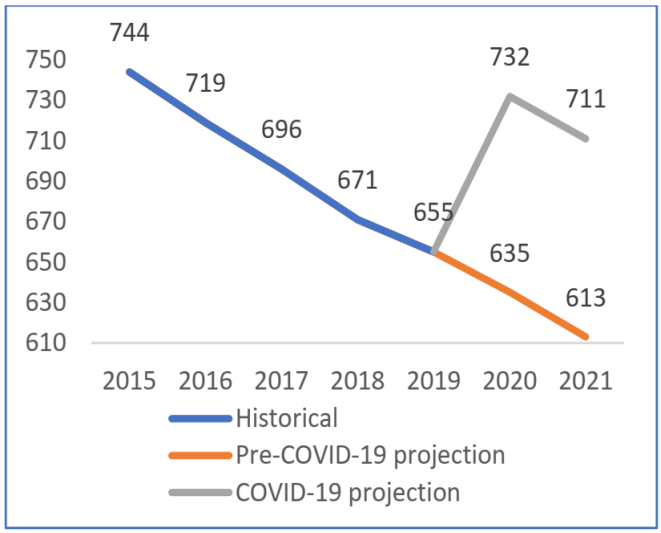
According to World Bank estimates for 2020, the decline in the average income of developing countries has translated into a sharp increase in global poverty, with about 97 million more people living on less than $1.90 a day because of the pandemic, increasing the global poverty rate from 7.8 to 9.1 percent (Figure 8A). Another 163 million more people are living on less than $5.50 a day.[13]

[12] Access to existing liquidity facilities for eligible financial institutions was improved and the costs of these facilities were reduced. Monetary authorities also provided large liquidity injections for commercial banks at long maturities and at low costs, and provide incentives to support lending to businesses and households adversely affected by the pandemic (see IMF 2021b).

[13] See https://blogs.worldbank.org/developmenttalk/covid-19-leaves-legacy-rising-poverty-and-widening-inequality (6 October 2021).

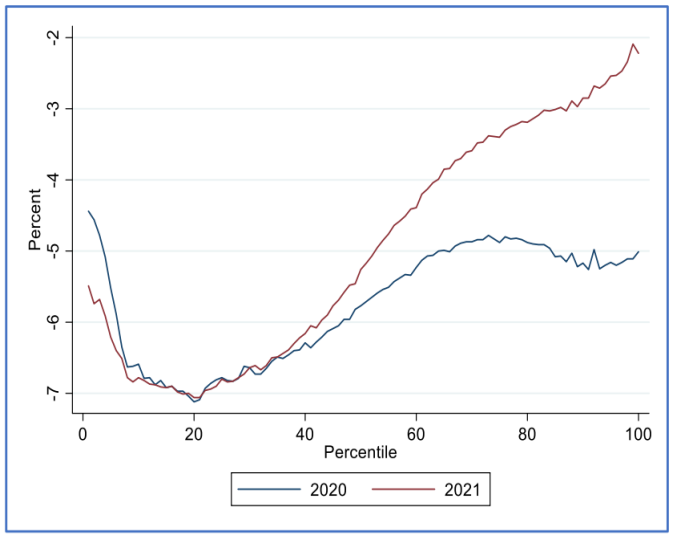
Figure 8: Number of $1.90 poor (millions) and percentage change in welfare due to COVID-19 (by global percentile)

A. Extreme poverty (millions)



Source: Lakner et al (2020) (updated), PovcalNet, GEP.

B. Welfare change due to Covid-19, global percentile



Note: This figure reports the global welfare losses for each percentile in 2020-21 due to the pandemic. The loss is calculated as the percent difference between pandemic-affected welfare and counterfactual welfare without COVID-19. Source: Narayan et al. (2022).

Source: Yonzan, Nichant, Alexandru Cojocaru, Christoph Lakner, Daniel Gerszon Mahler and Ambar Narayan, 2022. « The Impact of COVID-19 on Poverty and Inequality: evidence from phone surveys", Development Data Blog https://blogs.worldbank.org/opendata/impact-covid-19-poverty-and-inequality-evidence-phone-surveys; Mahler, Daniel Gerszon, et. al. 2022. "Pandemic, poverty, and prices," April 13, World Bank, Washington, DC. https://blogs.worldbank.org/opendata/pandemic-prices-and-poverty

Due to rising inflation worldwide, which is likely to be exacerbated by the ongoing war in Ukraine, World Bank staff estimate that the combined crises are likely to lead to an additional 75 million to 95 million people living in extreme poverty in 2022, compared to pre-pandemic projections.[14]

Poverty in the Middle East and North Africa region is estimated to have increased in 2021 due to the pandemic and it remains a major concern in 2022, since many of the region's vulnerable population who have been disproportionately afflicted in the last two years are likely to be pushed into extreme poverty.

The population living in extreme poverty in the MENA region is estimated to increase by 9 million between pre-pandemic levels and the end of 2022.[15] Many MENA countries will see further food price increases and their populations will be at risk of food insecurity. Food price inflation has already been a major issue in Djibouti, Egypt, Lebanon, Syria and Yemen, which have experienced sharp increases in food prices across the board. Food and energy price increases disproportionately hurt the poor because they spend larger shares of their expenditure on food and energy. MENA population living in extreme poverty (at less than $5.50/day) is estimated to have increased from 176 million in 2019 to 192 million in 2022.

Uneven recoveries: growing gap between rich and poor countries

Fiscal measures that were announced by several advanced and emerging market economies during 2021 is estimated to have reached $16.5 trillion. Of this amount, about $4.6 trillion of advanced economies' pandemic-related revenue and expenditure measures are estimated to have been utilized in the latter half 2021 and in early 2022. In emerging market and developing economies, most measures were taken during 2020 and early 2021. The rapid deterioration of the fiscal situation and high levels of public sector and corporate debt have exposed many developing countries to the risk of a spike in their borrowing costs, tightening of credit conditions, and exchange rate depreciations.

A major concern about the impact of the pandemic on the global economy has been that economic recovery has taken

[14] See Mahler et.al. (2022).

[15] See World Bank. (2022b). This is measured by number of people living under $5.50 poverty line in 2022, compared to the same measure in 2019.

place very unevenly across countries and within countries across different income groups. Many governments, households, and firms were not well-prepared to deal with the immediate effects of the pandemic on their economies and health systems. Inadequate health support, particularly limited availability of effective vaccines, lack of adequate fiscal support and weak or nonexistent social safety nets, and relatively low rates of access to affordable and reliable digital infrastructure, particularly in low- and lower-middle income countries, have resulted in slower economic rebound by those segments of population who were affected most by the pandemic. In this context, income losses resulting from the pandemic crisis have been larger for women, youth, less educated and low-skill workers.

A recent study by the World Bank provides cross-country empirical support for these trends, which exacerbated the existing income and wealth inequalities.[16] According to this study, globally the recovery in 2021 appears to have been largely concentrated in the upper part of the global income distribution, while those in the lower end of the income distribution, who suffered the greatest welfare losses in 2020, fell further behind in 2021 (Figure 8B).[17] The top 60 percent of the global income distribution were projected to return to their pre-pandemic welfare levels by 2021, but those in the bottom 40 percent of the global income distribution, including much of the population in low-income countries, were projected to have their average income levels end up by about 2 percent below their pre-pandemic income levels.

COVID-19 has exacerbated the existing income and wealth inequalities due to its highly uneven impact. Moreover, from a sectoral point of view, the pandemic has disproportionately hit tourism, travel, and key service sectors, such as hospitality and restaurants, as well as the informal sector, thus affecting millions of low-income workers. Moreover, the pandemic has exposed the pre-existing vulnerabilities of the financial sector in many developing countries.[18]

On the other hand, availability of digital technologies has boosted e-commerce and allowed higher-skilled workers to retain their jobs by teleworking. These changes that favour digitalized firms and higher-skilled workers are likely to be long lasting.[19] Moreover, a wave of innovation in consumer payments and the emergence of crypto currencies have placed money and payment services at the forefront of digitalization.

Both advanced economies and developing economies, as groups, grew by more than 5 percent in 2021. However, due to rising inflation, less accommodative monetary and fiscal policies by advanced economies, and headwinds caused by Russia's military attack against Ukraine, economic growth in advanced and developing economies are projected to slow down sharply in 2022, to around 3 to 3.5 percent, and continued weak growth performance in many countries in 2023, as a result of the ongoing food and fuel crisis and tightening of monetary policy in advanced economies. The projections presented in Figures 9A-9D, do not take into account the full macroeconomic impact of the conflict in Europe.

Assuming that large segments of the global population will be vaccinated by the end of 2022 and the more deadly variants of the virus are contained internationally, and the conflict in Europe is contained, global economy could continue to grow in 2023, albeit at a slower pace than 2022. Alternatively, under a 'downside' scenario, failure to contain the virus and rising geopolitical risks in Europe and East Asia are likely to lead to risk repricing in financial markets and a significantly lower growth in output and trade worldwide, resulting in a prolonged and significantly weaker recovery.

The economic recovery, however, has been highly uneven both across and within countries. In many emerging market and developing economies, elevated levels COVID-19 of new infections, unavailability of vaccines or major weaknesses in the health infrastructure that prevents rapid vaccination of the population, and a premature withdrawal of fiscal and monetary policy support have offset some of the benefits of economic recovery that has been initiated by advanced economies and the rising commodity prices. The uneven recovery has led to increased uncertainties, particularly with the arrival of highly contagious variants of the Covid-19 virus, which has led to lockdowns in several major urban centres in China, which could potentially cause major disruptions in global supply chains.

[16] Narayan et.al. (2022).

[17] The evidence presented by Narayan et.al. (2022) is based on the early impacts within countries of the pandemics on the distribution of job and income losses, food insecurity, and continued learning, based on harmonized high-frequency phone surveys (HFPS) data from some 52 developing countries, 47,000 respondents.

[18] World Bank (2022).

[19] Findings of a recent study by the IMF, Alcedo et.al. (2022), which focuses on e-commerce across 47 economies and 26 industries during the COVID-19, indicate that the share of online transactions in total consumption increased more in economies with higher pre-pandemic e-commerce shares, which in in turn exacerbated the pre-existing digital divide across firms and economies. The study also found that while the initial spikes in online spending are beginning to dissipate, there is variations across sectors and industries. For example, the share of online spending in professional services and recreation has fallen below its pre-pandemic trend at the aggregate level, there appears to be a longer-lasting shift to digital in retail sales and restaurants.

In the Middle East and North Africa region, spillovers from tighter global financial conditions, sharp decline in tourism, and reduced trade with EU will contain growth, particularly for oil-importers, to about 4 percent in 2022-23. For oil exporters, higher oil prices is expected to provide some offsetting gains, including significant improvements in their fiscal and balance of payments situations. Nevertheless, the real GDPs of both oil exporters and importers are expected to remain well below their respective pre-pandemic levels by 2023 (Figures 9C and 9D).

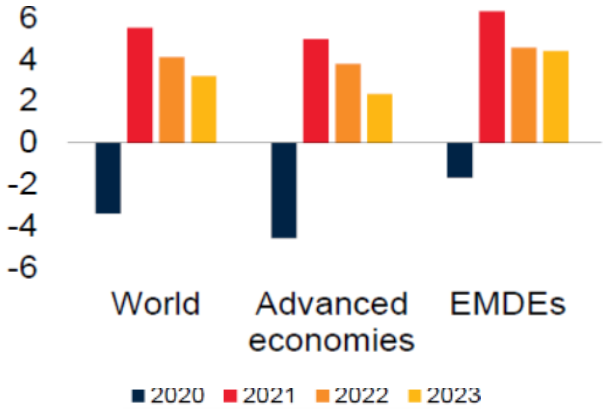
The pandemic, automation, and jobs

One of the major issues raised by the pandemic for policy makers in both advanced and emerging economies is whether jobs that before the crisis were expected to be facing possible displacement as a result of unprecedented technological change, particularly in the area of automation and robotics, have been hit even harder than other jobs during the pandemic-induced global recession. That is, whether the pandemic has indeed accelerated the pace of job losses associated with the digitalization of economic activities, where older technologies are being replaced by new technologies that are predominantly and strongly labour-saving and skill-biased.

Recent evidence shows that the adoption of digital technologies during the coronavirus pandemic has helped protect the jobs of millions of workers who were able to carry out their work-related activities remotely (from home), using the Internet and various electronic applications and programmes available on various digital platforms made available by employers (OECD 2020b).

However, while many businesses and their employees have used digital technologies to weather the pandemic crisis, many others have not been able to protect themselves mainly due to the lack of the necessary technological infrastructures, including high-quality connectivity to the Internet at their workplace or home and/or to the lack of adequate digital skills.

Figure 9A: Global GDP growth, 2020-23, Percent



EMDEs: Emerging market and developing economies

Figure 9B: MENA region, GDP, Percent

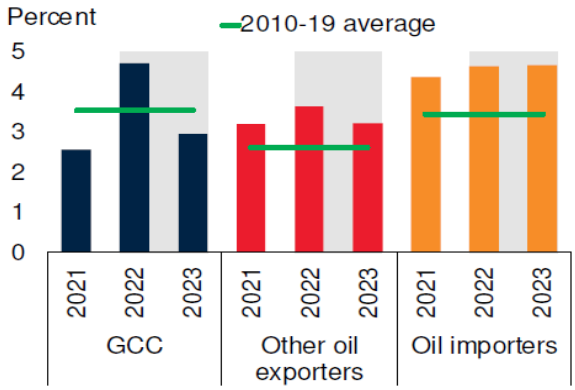


Figure 9C: MENA region, deviation of real GDP from pre-pandemic trend in 2023

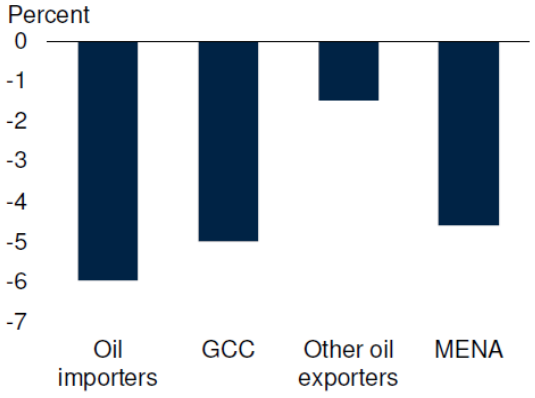
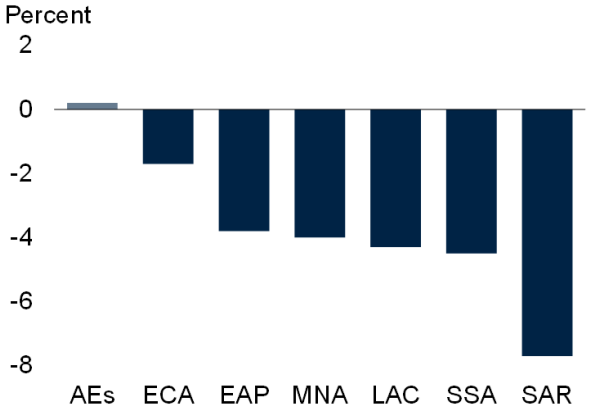
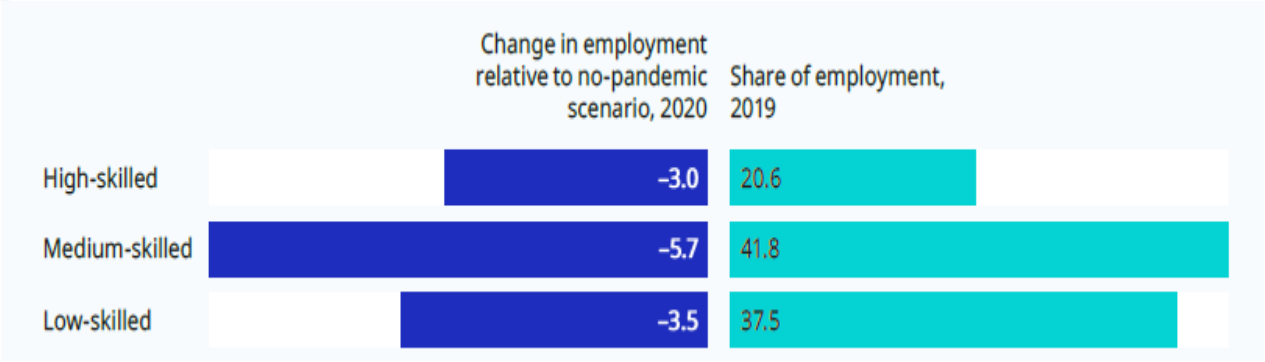


Figure 9D: Deviation of real GDP from pre-pandemic trend in 2023, by region



Source: World Bank. 2022. Global Economic Prospects. January, Washington, DC. https://www.worldbank.org/en/publication/global-economic-prospects

Figure 10: Impact of the COVID-19 crisis on global employment relative to the no-pandemic scenario in 2020 and pre-crisis distribution of employment, by occupational skill level (percentages)



Source: International Labor Organization, World Employment and Social Outlook – Trends 2021 (2021b, Geneva), https://www.ilo.org/wcmsp5/groups/public/—dgreports/—dcomm/—publ/documents/publication/wcms_795453.pdf.

Based on the available evidence as of mid- 2021, digital and distance learning solutions designed to mitigate learning losses among adult workers have tended to mainly benefit high-income countries and higher-income groups disproportionately, which implies that the existing inequalities may have been exacerbated by the combination of the pandemic and the digital divide (ILO 2021a).

Higher-skilled workers have incurred significantly lower employment losses as a result of the pandemic, which partly reflects their greater ability – both in terms of digital connectivity and digital skills – to work from home. Figure 10 shows that employment in all occupational groups was negatively impacted by the pandemic-induced global recession in 2020. However, the higher-skilled groups of professionals/technicians and associate professionals were least affected.

In effect, higher-skilled workers, which mainly consists of managers, professionals, and technicians, were far more likely to be able to telework from home during the pandemic than the lower skilled workers, which implies that telework during the pandemic crisis may have acted as a new channel through which new digital technologies are impacting workers differently depending on the skill content of their occupation.

3. Benchmarking Progress and the Dynamics of Digitalization in Arab Countries

While the dynamics of digital transformation has been rapid globally and even more rapid in the leading advanced economies, it has been less dynamic and much more uneven across developing countries, especially the Arab region and sub-Saharan Africa. In order to assess progress in digitalization in Arab countries, we focus on two of the most comprehensive digital indexes available and that cover a relatively large number of countries: the Network Readiness Index (NRI) and the Digital Evolution Index (DEI).[20]

While the indexes presented in Figures 11 and 12 provide an overall picture of the state and evolution of digitalization across countries in the Arab region, they are aggregates of a large number of indicators each of which is only partially related to digitalization, which is a multidimensional concept. Many of these indicators relate to factors affecting the ability of countries to access and use digital technology, such as literacy rates or enrolment rates in education, but they are imperfect measures of progress in digitalization. Other indicators are related to socio-economic impact or outcomes affected by digitalization, in many cases partially or only marginally, such as life expectancy or level of happiness, making it difficult to attribute them to digitalization.

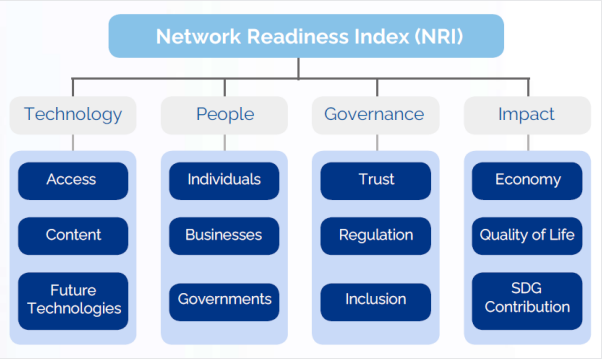
Figure 11 shows the level of the NRI and DEI for the 13 Arab countries[21] that are included in at least one of the two indices. For the purpose of benchmarking the Arab countries, we selected three groups of counties for comparison: i) four among the top 20 most advanced economies in terms of digitalization (Ireland, South Korea, Sweden, United States); ii) five high-income or upper-middle income countries that are relatively advanced in the

[20] Other comprehensive indexes include the *Inclusive Internet Index* (The Economist Intelligence Unit, 2020) and the *International Digital Economy and Society Index* or I-DESI (European Commission, 2020).

[21] These included the six Gulf Cooperation Council countries and Algeria, Jordan, Egypt, Lebanon, Morocco, Tunisia, and Yemen.

Box 1: The Network Readiness Index (NRI) and the Digital Evolution Index (DEI)

The NRI (Dutta and Lanvin 2020) is based on 60 indicators grouped into four pillars: Technology, People , Governance, and Impact.



The DEI (Chakravorti et al., 2020) is based on 160 indicators grouped also into four dimensions: Supply Conditions (access to communications infrastructure, access to financial transactions and digital payments, and quality of transportation and logistics infrastructure), Demand Conditions (consumer ability and willingness to spend, digital skills, digital payment uptake, device and broadband uptake, digital inclusion), Institutional Environment (institutions and business environment, digital ecosystem, institutional effectiveness index), and Innovation and Change.

digital transformation of their economies (Brazil, Chile, China, Malaysia, Turkey); and iii) four lower-middle or low-income countries that are considered to be among top achievers in digitalization (India, Kenya, Rwanda, Viet Nam).

The results and assessment are very similar for both indexes concerning the following key stylized facts about Arab countries:

- First, the group of Gulf Cooperation Council (GCC) countries has progressed the most in terms of digitization of their economies, in some areas reaching or exceeding the levels (in terms of digital infrastructure, access, penetration, use, and skills) reached by the more successful advanced economies and top performers among the upper-middle income countries. For the most digitally advanced GCC countries (UAE, Qatar) the index levels are almost as high as those for advanced economies.
- Second, Egypt, Jordan, Morocco, Lebanon, and Tunisia have reached very similar levels of digitalization, which are significantly lower than the most successful upper-middle income countries, and closer to that of the comparator among low-income countries.
- Third, one country for which we have a case study (Algeria) and one for which data are available (Yemen) are lagging very much behind other countries in the Arab region. Presumably, this third group of lagging countries would also include Iraq and Libya among the oil-exporters, and other countries that are fragile and low-income or are in conflict (Comores, Djibouti, Mauritania, Palestine, Sudan, Syria).

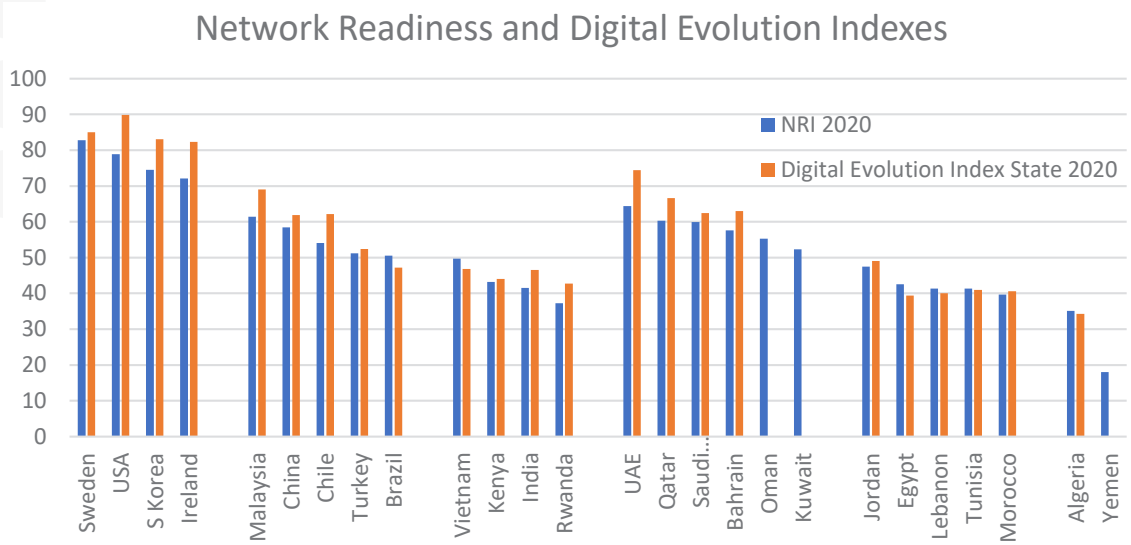
Nevertheless, given the lack of reliable and timely data on the third group and the availability of only one country among them, we have decided to compare the GCC countries to the rest of the Arab countries that this report covers.

The data presented in Figure 11 show the most recent state of digitalization at the country level as of 2018–19. Little information is available about time dynamics of digitalization, but the producers of the DEI index provide a measure of the "momentum" of digitalization based on the overall movement during the period 2008–19. Figure 12 shows both an index of the level or "state" of digitalization in countries as well as an index for "momentum." The data reveal clear and strong positive dynamics in the GCC, which are progressing at similar or even faster rates than most advanced and successful middle-income countries. On the other hand, the Arab middle-income countries are progressing much more slowly than any of the comparator emerging and developing countries. Finally, Algeria, which is lagging, has been making the strongest progress over the last decade. In the rest of this report we will discuss separately the GCC as a group and other Arab countries not belonging to the GCC as a second group. The GCC countries are leaders of the pack in the Arab region as they have achieved strong progress in their digitalization of society and the economy. The data and analysis in this section draw on two country studies undertaken for this project, on Oman and Saudi Arabia, as well as publicly available knowledge and data on this group.

This report explores specific dimensions, which are included in different ways in the overall indexes:

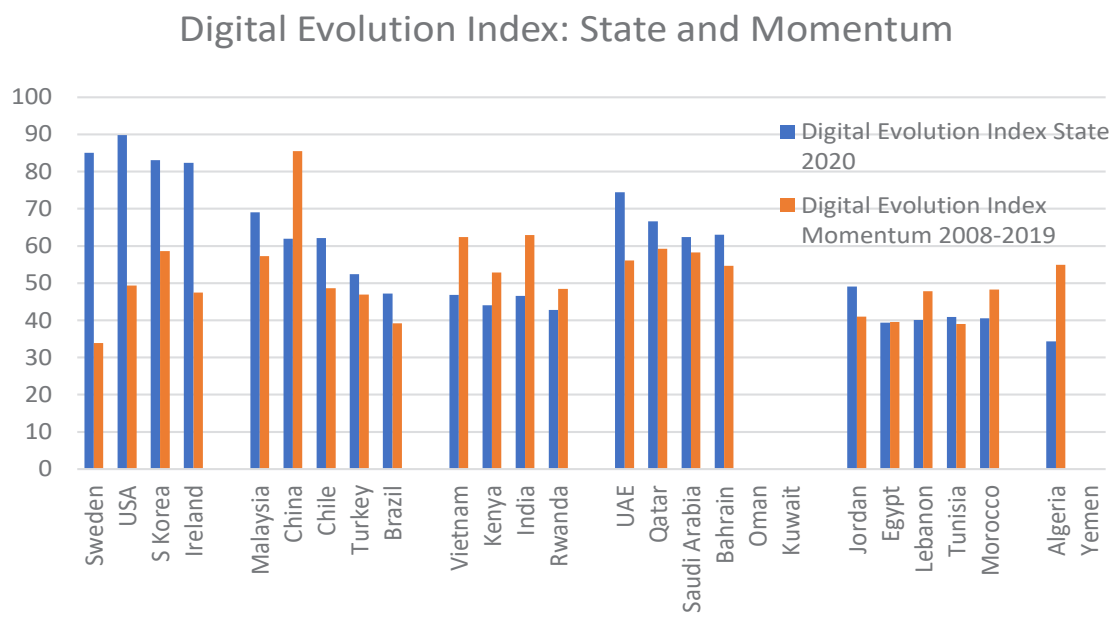
1. Connectivity and digital infrastructure
2. Digital public services
3. Digitalization and individuals
4. Adoption of digital technology by businesses
5. The two leading sectors of fintech and e-commerce
6. Governance of the digital economy.

Figure 11: Overall digitalization indexes, 2020



Source: Dutta and Lanvin (2020); Chakravorti et al. (2020).

Figure 12: Digital Evolution Index: Level and change over time, 2008–2019 and 2020



Source: Chakravorti et al. (2020).

Connectivity, affordability, and digital infrastructure

Table 1 reports a few indicators commonly used about the extent of connectivity and digital infrastructure, obtained from the International Telecommunications Union (ITU). Some indicators often used about the coverage of mobile networks are not reported in Table 1, as the numbers show almost universal coverage in Arab countries. It is more useful to consider both indicators about fixed and mobile broadband subscriptions. We also show one indicator about the quality (speed of download) of connectivity and two indicators about cost (of a fixed and a mobile basket of services).

Arab countries not part of the GCC have made much less progress in digitalization compared with the GCC. This set of indicators confirms this major difference between the GCC and other Arab countries, with the former having the most advanced connectivity and better quality.

Table 1: Connectivity, affordability, and digital infrastructure indicators, 2010 and 2019

Country	Fixed broadband subscriptions per 100 inhabitants	Fixed broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants	Average download speed for mobile networks (MBPS)	Mobile broadband basket as a % of GNI p.c	Fixed broadband basket as a % of GNI p.c
	2010	2019	2010	2019	2019	2019	2019
Sweden	31.9	40.2	42.2	128.8	70.43	0.4	1.0
USA	27.4	34.7	60.7	152.2	67.33	0.4	0.8
S Korea	34.7	42.8	95.5	114.9	169.03	0.4	1.1
Ireland	22.4	30.0	48.2	105.3	40.83	0.8	1.4
Malaysia	7.4	9.3	9.1	126.5	25.60	0.8	2.2
China	9.2	31.3	3.4	96.7	155.89	0.9	0.5
Chile	10.5	18.1	8.5	97.7	19.87	0.9	2.6
Turkey	9.8	17.1	10.0	74.8	34.79	1.0	1.8
Brazil	7.2	15.6	10.5	88.2	29.26	1.8	1.4
Vietnam	4.2	15.3	8.0	72.5	34.51	1.0	3.4
Kenya	0.0	0.9	0.2	41.1	25.06	3.4	16.9
India	0.9	1.4	0.0	47	12.91	0.8	2.9
Rwanda	0.0	0.1	0.0	42.3		8.8	119
UAE	9.2	31.2	13.2	239.9	177.52	0.8	0.5
Qatar	7.9	10.1	48.7	124.8	178.00	0.3	1.6
Saudi Arabia	6.2	19.8	25.5	116.9	109.48	0.9	1.2
Bahrain	12.5	8.6	3.7	122.6	74.05	1.5	1.5
Oman	1.9	10.2	24.1	109.1	46.86	1.0	3.1
Kuwait	1.5	2.0	58.1	131.8	110.59	0.6	0.3
Jordan	4.0	4.5	0.1	77.0	23.08	3.6	9.4
Egypt	1.8	7.6	16.0	59.3	20.42	1.1	3.1
Lebanon	6.7	6.1	0.0	42.8	40.23	3.3	2.8
Tunisia	4.5	10.2	0.9	77.8	29.80	1.3	3.6
Morocco	1.6	4.8	4.8	64.9	36.68	2.0	4.0
Algeria	2.5	8.3	0.0	96.0	13.23	0.8	4.1
Yemen	0.4		0.0			26.2	12.2
Iraq	0.0	11.6	0.0	42.1	14.39	4.4	4.4
Libya	1.2				19.50	1.8	2.3
Palestine		7.3		19.3		2.1	8.4
Syria	0.3	8.7	0.5	11.5			

Source: ITU (2020a) database

GCC countries

All GCC countries score highly in terms of connectivity and digital infrastructure, comparable to the levels achieved by advanced economies. They are relatively rich countries that are able to move quickly and put in place fairly advanced ICT infrastructure. A notable feature of broadband connectivity in the GCC is the comparatively (to the high-income group) strong predominance of mobile connections relative to fixed connections. The progress achieved by the GCC between 2010 and 2019 is much greater than in advanced economies (as measured by rate of change) and is similar to that achieved by emerging economies, especially on mobile connectivity. The cost of a fixed broadband connection is relatively low in all countries, except Oman.

The GCC countries seem to be among global leaders in terms of digital connectivity, with the UAE, Qatar, and Saudi Arabia at the top. Oman and Kuwait are somewhat lagging behind despite recent progress.

Even though, from Table 1, Oman has the lowest level of connectivity among the GCC, it has made great progress, but less than Bahrain or the UAE. This was the result of Oman's strategic policy planning and significant investment in telecommunications over recent decades. The Internet is accessible by the majority of its population through fixed lines and mobile telephones, with 4G penetration reaching 97.3 percent of the population. However, compared to other GCC countries the cost of access to Internet is relatively high at 3.1 percent of Gross National Income (GNI), while that of access to mobile devices is reasonable at 1 percent. Despite the government's goal of affordable Internet in its National Broadband Strategy, cost was cited by almost a quarter of respondents to the 2020 Ministry of Technology and Communications survey of ICT household use as the main reason for not using the Internet. This issue exposes Oman to the risk of creating a 'digital divide' in which the poorer segments of the population are excluded from the potential benefits of digitalization.

The study for **Saudi Arabia** (Gomes and Mahroum 2021b) shows, the fruits of the Kingdom's investment in telecommunications over the past 50 years, with above average progress in the *connectivity* category. Saudi Arabia has sound infrastructure in place for transmitting digital signals by cable or wirelessly, and it offers high-speed Internet that is also among the most affordable in the Middle East. With respect to quality and speed, the telecommunications infrastructure in Saudi Arabia is arguably even better than the comparator advanced and emerging countries. From Table 1 the average download speed for mobile networks is higher than in the Ireland, Sweden, or United States. According to the country's Communications and Information Technology Commission, it is now second only to Japan among G20 nations in terms of the amount of radio spectrum assigned to local telecommunication companies, allowing them to deliver vastly greater bandwidth and transmission speeds to end-users.

Other Arab countries

Arab countries not part of the GCC have achieved relatively high levels of connectivity and access to digital infrastructure (Table 1). There is little variation among the six countries, but they are all significantly below the GCC average and the comparator group of successful emerging economies, especially in terms of quality (speed of Internet). The cost of a fixed broadband connection is relatively high in these countries, and even extremely high in Jordan. Like the GCC, connectivity is also predominantly by mobile.

Tunisia and Morocco have the highest scores for digital infrastructure among Arab other than GCC countries.

Tunisia has been experiencing a rapid diffusion of digital technologies (Ben Youssef 2021). More significantly, Tunisia, like other Arab countries, is a mobile-focused country, with a much lower proportion of the population accessing the Internet through fixed connections. Almost 78 percent of the population have mobile broadband subscriptions (Table 1). It provides 3G and 4G, but 5G is not yet launched. The 4G speed is good compared to other lower-income countries, but digital infrastructure lags behind that in the more advanced comparators and needs investment. Internet speed and quality is better with mobile Internet than with broadband, and the average Internet speed is increasing. The ratio of the number of mobile connections to total population reached 151 percent in January 2020 (Data Reportal 2020 and 2021).

Jordan has relatively limited access to the Internet through fixed connections, but a higher one through mobile devices. There are telephone lines in only a quarter of Jordanian homes, and fixed-line broadband has not been an option for many. It is through mobile phones that access to the Internet is most achieved, despite the high costs of subscriptions (3.6 percent of GNI in 2019), which are well above the international median. The cost of a fixed broadband basket is even higher at 9.4 percent of GNI per capita (Table 1). More importantly the quality of access, in terms of speed of downloads, is below its comparators (Gomes and Mahroum 2021c). But there are initiatives to

improve access to the Internet,[22] and it is expected that the number of broadband subscribers in Jordan will rise in the near future.

Lebanon has the weakest connectivity indicators among the comparator Arab countries, with only 42.8 percent of the population having an active mobile broadband subscription. In addition, it has not delivered a good performance in terms of mobile tariffs, which are extremely high, or international Internet bandwidth. The country has made recent strides recently with the introduction of 5G services in 2019, and a fibre optics network is being implemented (Dibeh 2021).

Morocco has been also experiencing rapid development of its connectivity and digital infrastructure. Nearly 65 percent of households have Internet access through mobile phones, but fewer than 5 percent have access to fixed-broadband Internet. There has been strengthening of infrastructure in recent years by the launch of the 4G/4G+ networks and the introduction of very high-speed fibre-optic connections. The rate of active broadband subscriptions stood at a relatively high 64.9 percent in 2019 (Table 1). But the quality of access for networks remained limited for rural areas compared to urban areas (Abdelkhalek et al. 2021).

Egypt has also made great progress in connectivity and digital infrastructure, as the government has been heavily investing in upgrading the digital infrastructure to become more secured and resilient, and to ensure its performance and sustainability. Until recently rates of access to fixed and mobile broadband connections remained somewhat higher compared to other middle-income countries (Table 1). But the government recently launched several major projects to improve the quality of fixed broadband in Egypt to raise the efficiency of the Internet, and to accommodate the increase in the number of digital services offered and the volume of use by a growing young (and tech-savvy) population. This led to a higher average Internet speed of 34.88 Mbps in April 2021 compared to 26.5 Mbps in 2019 and 6.5 Mbps in 2018. The infrastructure build-up in recent years was boosted in 2017 with the introduction of 4G technology, and Egypt is taking the necessary steps for the introduction of 5G (Kamel 2021).

Similarly, **Algeria** made huge progress in connectivity through mobiles, with 96 percent of the population having a mobile broadband subscription in 2019. The fixed connections, however, remain very undeveloped, and the cost of access is relatively high compared to other middle-income countries (Table 1).

[22] For example, an innovative venture between a major electricity supplier and telecommunications company to deliver data along existing power lines will soon make 57 percent of homes Internet accessible.

Digital public services

The most widely used indicator for benchmarking the digitalization of public services is the UN e-Government Development Index (EGDI) (United Nations 2021). The data are presented in Figure 13.

GCC countries

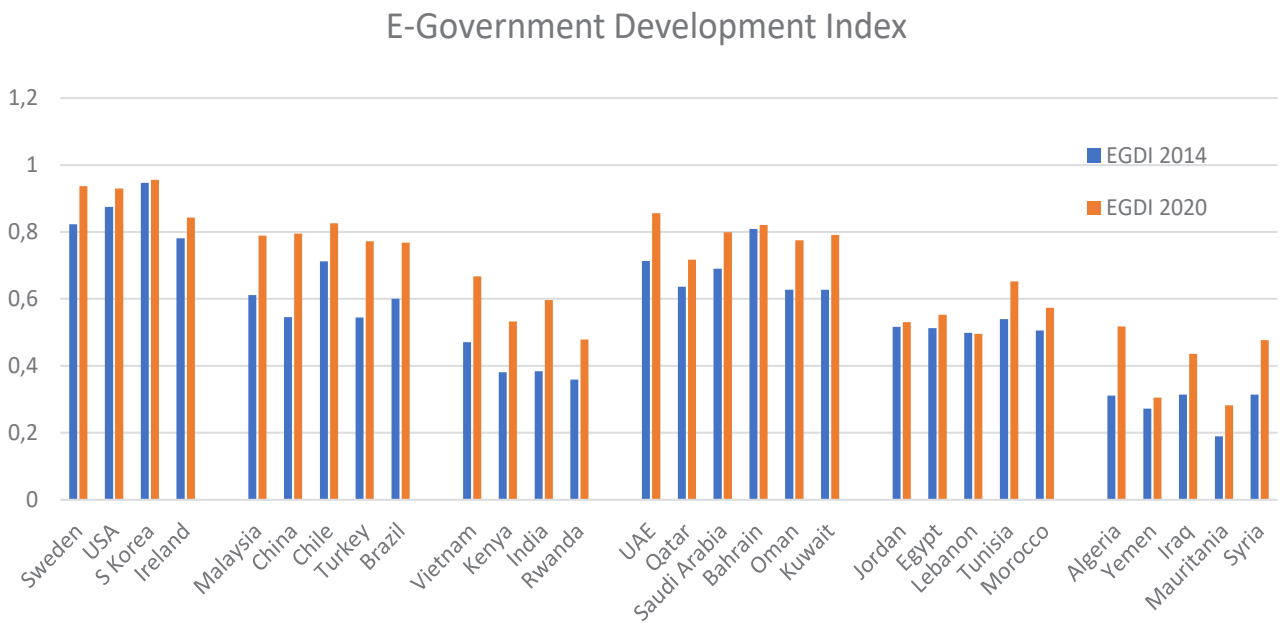
As shown in Figure 13, the GCC countries score highly in the EGDI, reaching a level somewhat between that of the most advanced developed countries and the most advanced emerging economies. Bahrain is the best performer, but all other countries have high scores. While all of them improved their scores between 2014 and 2020, they lagged in terms of progress: all, except the UAE, dropped in their ranking among the 193 benchmarked countries, moving slower than the rest of the world. This is the opposite of what happened between 2008 and 2014, when they all gained in their ranking, except the UAE, which remained the same (United Nations 2020 and previous years).

Box 2: The E-Government Development Index (EGDI)

The EGDI provides a comprehensive measure of country readiness for e-government services, it does not provide a good sense of the extent of availability and quality of public services for the citizen. The EGDI is a composite of three indexes (with a weight of a third for each) measuring communications infrastructure, human capital, and online public services. The first component relates to the overall connectivity to telecommunications infrastructure (Internet users, mobile subscribers, mobile- broadband subscription, fixed-broadband subscriptions), and the second one to the overall level of human capital in the country (extent of literacy, enrolment ratios, expected years of schooling, average years of schooling).

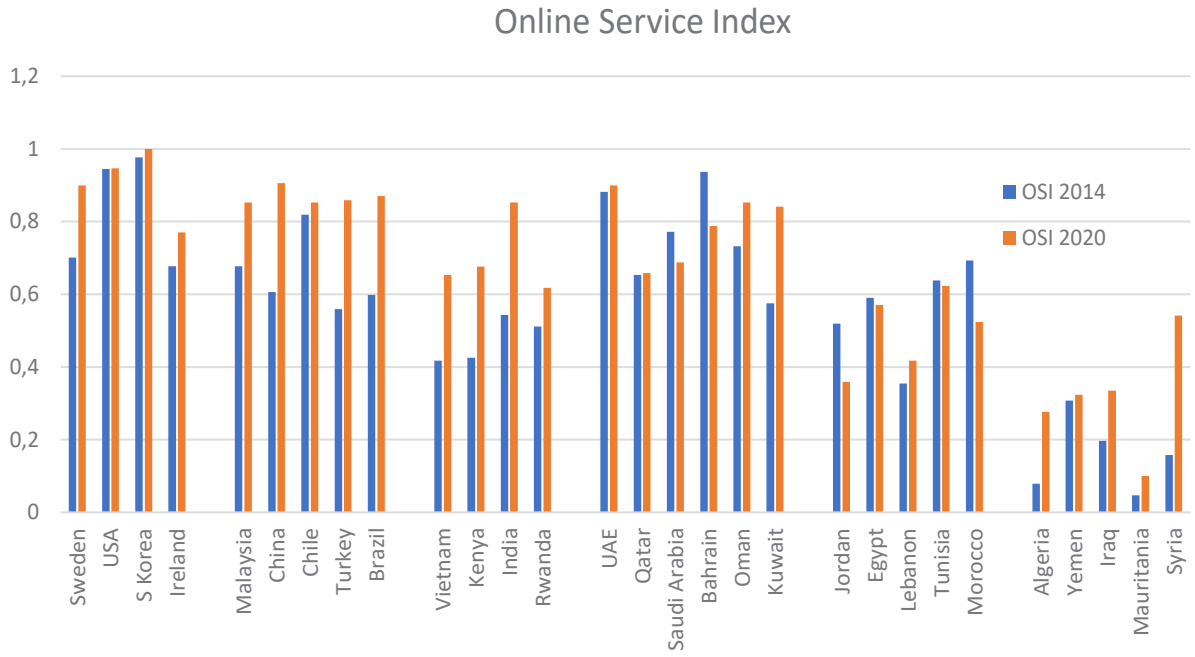
It is only the third component – the Online Service Index – that is a direct measure of the scope and quality of public online services. The data are based on a specific regular survey undertaken by the United Nations about a large set of public services and the availability online of information, existence of tools, and ability to make a transaction or access a service on the website. Data about the Online Service Index (OSI) for the years 2014 and 2020 are shown in Figure 14.

Figure 13: E-Government Development Index, 2014 and 2020



Source: United Nations, e-Government Knowledgebase (2021).

Figure 14: Online public services index, 2014 and 2020



Source: United Nations, e-Government Knowledgebase (2021).

The GCC countries exhibit also quite high OSI values, comparable or even higher than some of the best achieving developed countries, and better than the advanced emerging countries. However, their progress has stalled since 2014, with only Oman and Kuwait making significant progress.

Saudi Arabia's improved rankings and strong track record reflects a history of investment and development in e-government over recent decades. The EGDI shows that Saudi Arabia has climbed nine ranking places to 43 out of 193 countries since the launch of its Vision 2030, largely due to a 40-position improvement in its ranking on

the public infrastructure subcategory. The government's commitment to digitalization is reflected in the growing technical sophistication of its e-government services, and its establishment in 2019 of the Saudi Authority for Data and Artificial Intelligence, the National Centre for Artificial Intelligence, the National Data Management Office, the National Centre for Digital Certification, and the National Digital Transformation Unit to develop supportive policy frameworks to drive innovation and its digital transformation agenda. However, the Saudi Arabia score on the Online Service Index (Figure 14) is not high, and has been declining, while other countries are doing much better in this respect. The country also has a low score in terms of 'open data' (Gomes and Mahroum 2021b).

Oman has strategically focused on essential infrastructure for connectivity and on e-government. Its good EGDI score reflects the progress it has made in telecommunications infrastructure and online service delivery. Its relatively high score on the Online Service Index indicates a high level of online service delivery, innovation in government, and take-up of government services by end users. As of early 2021, 64 government entities are participating in a project to digitalize their services by 2023. The country ranks highly on the E-Participation Index and 'open data'. There are over 1,000 public services accessible online from 55 Omani Government agencies, permitting 285 different types of online transactions. Under its open data policy, 385 public data sets owned by 30 government agencies covering 28 policy sectors are available for direct download. All of these digital resources are in the Arabic language, with many also available in English.

The government's commitment to its open data policy has led to significant improvement in a relatively short period of time, as evidenced by the large and growing number of data sets and reports published on the websites of major government departments since 2017. Notwithstanding these noteworthy improvements, online access to important publicly relevant information is still lacking in some key areas, such as administrative boundaries, land ownership, draft legislation, air and water quality, and employment statistics (Gomes and Mahroum 2021a).

Other Arab countries

The commonly used E-Government Development Index (Figure 13) shows that non-GCC Arab countries lag significantly behind the GCC or advanced emerging countries. But they do score higher than other low-income countries. These differences are even greater when we consider the narrower Online Service Index in Figure 14. What is more striking is that the five Arab low-middle income non-oil exporting countries made little progress in the digitalization of their public services from 2014 to 2020. All of them dropped in their global rankings. The significant exceptions are Algeria and Syria, which achieved significant progress and improved their ranking, though they remain low.

Tunisia ranks highest among Arab countries not part of the GCC in terms of digitalization of public services. In 2020 it ranked 91 out of 193 countries in the EGDI Index. But despite opportunities to modernize public services and reap the benefits of ICT in the public sector, Tunisia has been lagging. E-services are scarce and undeveloped; public administration websites are mostly static and include few features. However, digitalization of public services and public administrations has accelerated since 2018, with a new e-gov strategy that includes adapting the infrastructures, fostering transversal projects, and promoting new applications for public services (Ben Youssef 2021). Several transversal projects are also under development. The first project is the unique e-identifier to link individual citizens to all public services, which is the most important and transformative project. The second project, Madaniya, aims to digitize all civic registration documents. The third, Tunisia On-Line E-Procurement Services, has been implemented and is used to facilitate the publication and submission of public tenders. Currently, 78 other projects are under revision or being implemented. On the other hand, the digitalization of public utilities is still lagging behind (electricity, water, and other public services, such as titling, judicial, identity, etc.) and must be considered imperative. Recently, Tunisia launched the GovTech project for citizen-oriented public services, but all these projects have not been implemented over the last decade and are still in their pilot stages.

In **Morocco** over the last two decades three strategies have been adopted to develop e-government: E-Maroc 2010 (for the period 2005–2010), Maroc Digital 2013 (2009–2013), and Maroc Digital 2020 (2015–2020). The objectives were to facilitate user access to public services, to dematerialize procedures, to improve services for citizens and businesses, and finally to create better communication among public administrations. The COVID-19 pandemic has induced a significant acceleration of e-government programmes.

While the overall EGDI shows Morocco achieving good progress, the Online Services Index shows the country lagging. The digitalization of public administrations is

constantly developing, but the pace varies considerably across agencies. Some of these services have achieved good levels of maturity based on best practices, such as taxation, customs, public procurement, research, and employment (Abdelkhalek et al. 2021). In response to the pandemic social protection schemes have benefited from digitalization programmes that cover the payment of cash transfers to beneficiaries of the Medical Assistance Scheme, job loss compensation for employees in the formal sector, and assistance to non-employees in the informal sector.

The EGDI shows that **Egypt** is among the better performing Arab middle-income countries. Digital Egypt offers a portfolio of over 100 services, including food subsidy, notarization, court filing, driver and car licenses, as well as services related to health, real estate, education, agricultural, and investments. In the second quarter of 2021 there are over 35 government-to-consumer services that have been rolled-out across the country, and around 150,000 Egyptians have already registered for digital identities to access them. Moreover, there are around 60 government-to-business services that are being rolled-out, including commercial registration. These services are accessed through several electronic platforms, including the government services portal,[23] which currently offers 75 online public services in both Arabic and English, with plans to add 25 more services. In addition, there is the ability to access more than 30 services through mobile platforms. In July 2019 a pilot programme was launched in the governorate of Port Said to digitize government services with a mandate to expand to the rest of Egypt and link 33,000 facilities with fibre optics via a secured and unified platform by 2021 (Kamel 2021).

Jordan's EGDI score and more significantly its OSI score lag behind those of comparator countries. According to Jordan's Department of Statistics, the share of e-government users increased from 3.9 percent in 2017 to 10 percent in 2018. The country has also low scores on other metrics, such as 'open data' or 'e-participation' (Gomes and Mahroum 2021c).

Lebanon has been lagging in the digitalization of public services. There has been a deterioration in the rank of Lebanon over the last 15–20 years in the overall EGDI as well as the Online Services Index (United Nations 2021). Although successive governments in Lebanon since the end of the civil war in the mid-1990s have publicized the project of administrative reform with e-government being at its heart, only slight progress has been made to date (Dibeh 2021).

[23] See www.egypt.gov.eg

Algeria is lagging in the provision of digital public services but has been making very strong progress. This progress was driven by an improvement in the supply of connectivity and infrastructure, as well as the increased intensity of their use. Among the public services provided digitally are a digital national register (birth certificate, etc.), a national database for vehicle registrations, biometric passports, biometric driving licenses and IDs, health insurance cards (Carte Chifa), social security information, and judicial services. However, there is still a large gap for the improvement of digital content and services in order to meet citizen expectations. The interaction with citizens remains weak, and the country is lagging in terms of 'e-participation' (Belaid et al. 2021).

A 2017 OECD report benchmarked six Arab countries (Egypt, Jordan, Lebanon, Morocco, Tunisia, and UAE) in terms of progress and effectiveness of their e-government strategies and policies. It noted that despite significant progress they needed to move from e-government to digital government, i.e., to engineer a user-driven public administration whereby public services are made digital by design. The countries in the region need to move beyond considering that digital technologies are support systems to deliver public services, and see them rather as a core component of public sector reform.

Digitalization and individuals

The supply of ICT infrastructure and access to digital services become effective once adopted by individuals as consumers and citizens, and by businesses as producers and suppliers of goods and services. Internet penetration and extent of use by individuals and businesses is critical for making growth in economically important areas such as e-commerce feasible and allowing governments to advance their e-government agendas. The Network Readiness Index (Dutta and Lanvin 2020) provides indicators about the adoption by individuals and businesses of digital technology. Figure 15 shows the results for Arab countries and the set of selected comparators. The NRI sub-pillar for individuals is based on six indicators: Internet use, active mobile broadband subscriptions, use of virtual social networks, tertiary enrolment, adult literacy rate, and ICT skills.

Table 2 shows more specific indicators about the extent individuals are connected and using the Internet.

GCC countries

A striking observation form Figure 15 is the extent of disconnect between adoption by individuals compared to businesses, which is very large in all Arab countries, unlike

Table 2: Digitalization and individuals (latest data as of January 2021)

Country	Internet connections	Active social media users	Mobile connections
	% of population	% of population	% of population
Sweden	98.0	82.1	141.6
USA	90.0	72.3	106.6
S Korea	97.0	89.3	118.3
Ireland	91.0	76.4	94.6
Malaysia	84.2	86.0	122.8
China	65.2	64.6	118.8
Chile	82.3	83.5	132.1
Turkey	77.7	70.8	90.8
Brazil	75.0	70.3	96.3
Vietnam	70.3	73.7	157.9
Kenya	40.0	20.2	108.9
India	45.0	32.3	79.0
Rwanda	31.4	6.5	73.9
UAE	99.0	99.0	171.5
Qatar	99.0	98.8	160.6
Saudi Arabia	95.7	79.3	112.7
Bahrain	99.0	87.0	128.9
Oman	95.2	80.2	110.7
Kuwait	99.0	98.8	161.4
Jordan	66.8	61.5	78.2
Egypt	57.3	47.4	92.7
Lebanon	78.2	64.3	67.3
Tunisia	66.7	69.0	150.0
Morocco	74.4	59.3	117.1
Algeria	59.6	56.5	105.8
Yemen	26.7	10.6	60.4
Iraq	75.0	61.4	98.3
Syria	47.0		79.6

Source: DataReportal 2021 January

in the comparator groups of countries. The disconnect is particularly striking for the case of the GCC countries. These countries score extremely highly in terms of adoption of digital technologies by individuals, reaching levels even higher than the most advanced countries in digitalization.

From Table 2 we observe that GCC countries are the most connected in the world in terms of number of mobile telephones and speed of access to the Internet. They are also the most connected to the Internet at 95–99 percent of the population, and as active users of social media at 80–99 percent of the population.

Other Arab countries

As with GCC countries, digitalization in other Arab countries has progressed much more for individuals than businesses, with the striking exception of Jordan (Figure 15). Arab countries achieve scores that are comparable to some of the emerging countries, such as Brazil. Even Algeria achieves a high score on digitalization for individuals.

The NRI scores in Figure 15 suggest that Lebanon and Jordan are even further ahead of other countries, with Algeria, Morocco, and Tunisia not far behind. The data in Table 2 are similar but with some differences, with Morocco and Tunisia leading and Lebanon lagging the most.

Egypt has been making progress, but is still lagging. The penetration rate stood at 92.7 percent in early 2021. The number of smartphones, which represents a good platform for digitalization and an enabler for higher levels of mobile Internet usage, has reached 38.7 million units in 2021 (30 percent of total mobile units), up 39 percent compared to 2019. As for the number of Internet users, it increased from 53% in 2015 to 57.3 percent of the population by January 2021.[24] The number of active social media users in January 2021 reached 47.4 percent of the population, with an increase of 16.7 percent compared to January 2020 (Kamel 2021).

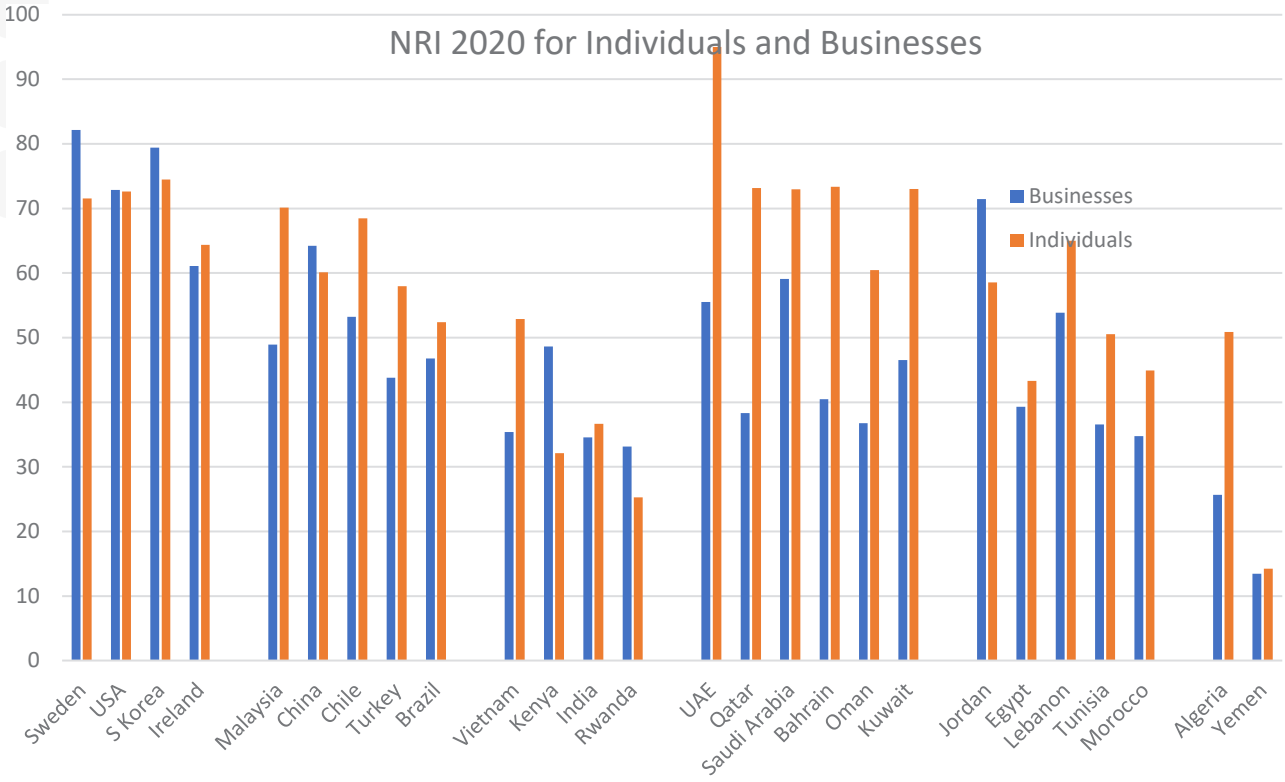
Gomes and Mahroum (2021c) for Jordan and Abdelkhalek et al. (2021) for Morocco argue that the rate of Internet penetration and use of social media are relatively low due to the lower connectivity rates, the high cost of Internet access, and the low proficiency in foreign languages.

Adoption of digital technology by businesses

One major dimension of digitalization is the adoption of digital technology in existing production and distribution processes by firms and businesses. Experience in developed countries shows great divergence in the extent and speed of digitalization by firms, with larger firms much

[24] The corresponding figures from the ITU show a much larger increase from 37.8% in 2015 to 71.9% in 2020.

Figure 15: Network Readiness Index, for Individuals and Businesses, 2020



Source: Dutta and Lanvin (2020).

more likely to adopt and embrace digital technologies, while small and medium sized firms tend to lag behind. This creates major differences, leading to divergent paths in terms of productivity and wages.

Figure 15 shows the NRI sub-pillar for businesses, which is based on six indicators: firms with a website, ease of doing business, professionals, technicians and associate professionals, business use of digital tools, and R&D expenditure.

As mentioned earlier, from Figure 15 it is easily observed that integration of digital technology by businesses lags considerably that of individuals in both GCC and other Arab countries. This is closely related to what a recent study by the World Bank, authored by Cusolito et. al. (2022), called the MENA region "digital paradox": that the countries in the region use their access to the Internet and mobile devices for social media at rates, which according to the study, are "high relative to what would be expected given their level of income per capita," yet their use of the internet for making payments remains low.

GCC countries

The integration of digital technology by businesses is strong compared to emerging economies. The UAE and Saudi Arabia are the leaders, while the other countries all lag behind.

According to Gomes and Mahroum (2021b), Saudi Arabia's performance is dragged down by the low percentage of Saudi firms using the Internet and social media to promote their products and services online, which may also be a factor in the country's low level of e-commerce penetration (see below). They observe that research with local firms finds that most firms are at an early stage of digital transformation, with few prepared to capitalize upon the marketing opportunities it presents. The available data show that firms in Saudi Arabia have access to the latest technology and that many are able to absorb it, and that the level of business-to-business transactions is also good. Oman is lagging behind Saudi Arabia, and its firms have not moved as quickly to access and absorb new digital technology or to use the Internet to engage other firms and to promote their products and services online

(Gomes and Mahroum 2021a). However, both country studies provide little information about how adoption of digital technology varies across sectors such as health, education, manufacturing, agriculture, and other services, or according to firm size.

Other Arab countries

As mentioned above, with the exception of Jordan the adoption of digital technologies remains weak in Arab countries not part of the GCC (Figure 15). The relevant index values are closer to those of low-income or low-middle income countries than to emerging economies.

Jordan has the highest score on integration of the digital technology by businesses in the Arab region, quite close to world best practice (Figure 15). It is the only Arab country with a higher score for uptake by businesses than by individuals. Local firms are being proactive in exploiting the innovations offered by digitalization and the marketing reach of the Internet to better promote their products and services to prospective customers. Jordan scores highly on most dimensions of the integration of digital technology, except for the low proportion of secure Internet servers. Survey results from the 2020 Global Entrepreneurship Monitor reveal that a quarter of entrepreneurs in Jordan used new technology and another quarter introduced innovative products and services (Gomes and Mahroum 2021c). This achievement can be explained by the high quality of leadership in Jordan's tech firms. According to a World Bank survey of 230 founders of tech start-ups, 94 percent of them possessed a tertiary degree. This survey also showed that 62 percent had 10 years of business experience prior to launching, and a fifth had at least six years' experience.

Lebanon shows a relatively high score, although lower than Jordan, on the adoption of digital technology by businesses (Figure 15). But the country case study provides no specific evidence on this aspect.

Tunisia ranks low on the integration of digital technology by businesses, but there is progress in many areas and sectors. The HUB I4.0 initiative was set up as part of the Digital Transformation Programme, which aims to accelerate the country's transition to Industry 4.0, which as a new industrial policy can promote huge changes in the productivity and competitiveness of key industrial sectors in Tunisia (Ben Youssef 2021).

Three sectors have been leading in the adoption of digital technologies: tourism, the press/media, and e-health. Tourism was among the first sectors to experience digital transformation in Tunisia, as it is linked to international value chains. Hotels, travel agencies, guest houses, tourist restaurants, marinas, and museums are all involved in the digitization of the tourism sector. E-travel agencies have been operating for over a decade in Tunisia. Online press and online media are the cornerstones of the media system in Tunisia fostered by intensive use of social media. Most traditional actors have adapted their content, channels of distribution, and format. E-health services use is increasing in Tunisia, as teleconsultations and remote diagnosis are becoming more common. The improvements to the e-health system are important to enable medical decision-making and offer better quality health care to patients.

Morocco has the lowest score in terms of adoption of digital technologies by businesses among the Arab low-middle income Arab countries (Figure 15). This is clearly the case for fintech and e-commerce (see below), but there is little evidence more generally (Abdelkhalek et al. 2021). An interesting facet of digitalization in Morocco, developed by the study, is the focus on digitalization of agricultural services as a component of the overall strategy to modernize agriculture. The digitalization of agriculture will assist agricultural governance for the implementation of the modernization plan, and to use it as a decision-making tool for farmers and agribusiness. All parts of the chain in agricultural production will be transformed to ensure real-time optimization, leading to greater food security, and improving the profitability and sustainability of the agricultural sector (World Bank 2019b). Digitalization should concern several areas of agriculture through various tools, including drones (to map plots, measure water needs, etc.), connected tractors, probes (to measure temperature, precipitation, humidity, etc.), as well as connected stables (automatic milking machines, supply of adapted food rations). These new data sources, combined with the connected networks and weather data, provide a flow of information that contributes to improving the efficiency of agricultural activities. These tools would help reduce risks and introduce automated monitoring by improving economic and environmental performance. According to the Ministry of Agriculture, the digitalization of agriculture will strengthen innovation and improve productivity, traceability, and marketing. In addition, it promotes social and financial inclusion of the rural world through mobile banking and new products that make banking and financial services accessible to the entire rural community.

The government has started implementing a number of programmes contributing to the digitalization of the agricultural sector, such as the Information System on the prices of agricultural products and the Crop Growth Monitoring System – the digital agricultural management service offered to large cooperatives or producers. The

Ministry of Agriculture's System of Agricultural Aid and Subsidies allows digital processing of files for all agricultural support programmes. It has also set up an international market monitoring system and an identification and traceability system. There are also initiatives from the private sector, such as electronic banking solutions, digital wallets and electronic payment services, and e-commerce platforms that increasingly integrate the agri-food sector (Abdelkhalek et Al. 2021).

Until now the Internet in **Egypt** has been mostly used for connectivity and entertainment, including social media platforms, and less to innovate and develop business opportunities. While small and medium enterprises (SMEs) must adapt and start investing in their digital transformation to remain not just competitive but also relevant in the digital economy, in fact most SMEs in Egypt do not take advantage of the Internet. The pandemic has added to the challenges facing the SMEs in Egypt given their limited presence online and the fact that only a handful of them had the vision to digitize their business model. It also demonstrated the vulnerabilities from the lack of digitization, as the difficulty of working remotely during the pandemic impeded business continuity for most of them.

This is illustrated by the results of a study addressing the impact of ICTs on SMEs in Egypt covering 105 enterprises from 37 industries and lines of business, including but not limited to agribusiness, food and beverages, health care, media, trade, textiles, education, and furniture. The study demonstrated the gradual transition in SMEs culture from being risk averse to pushing for ICT adoption.

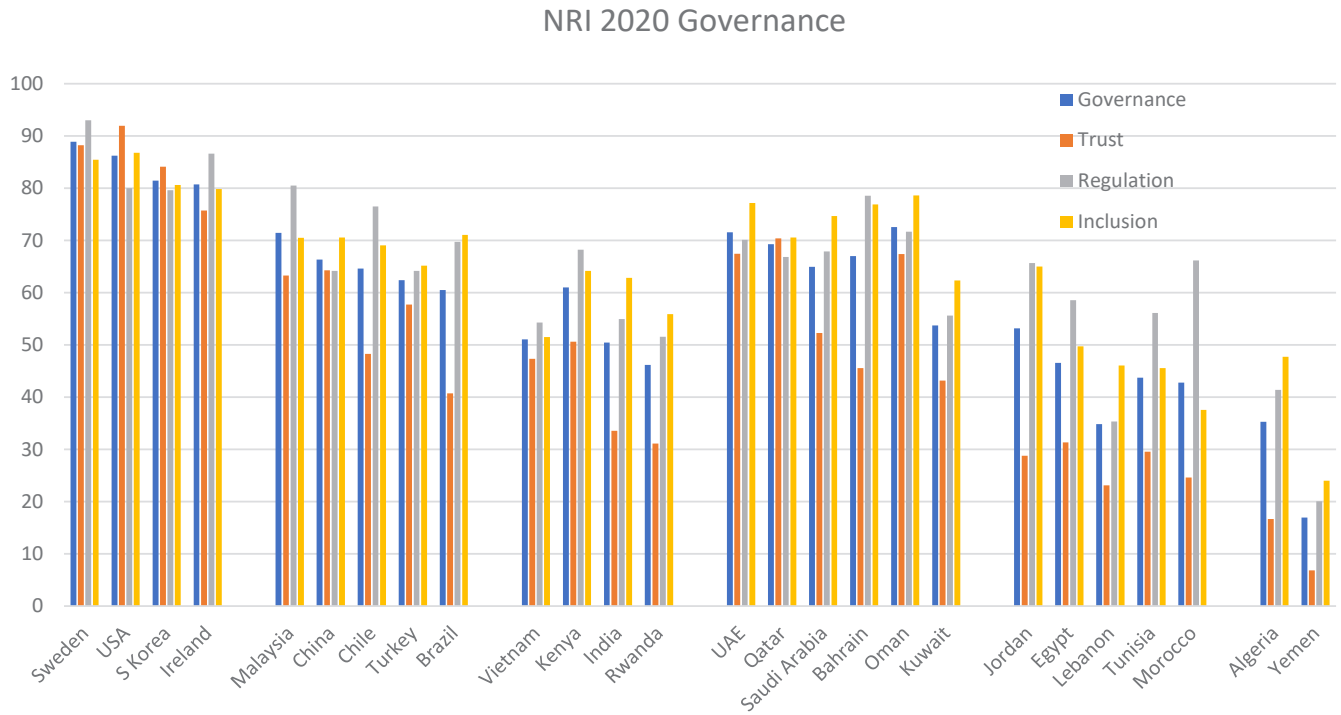
In terms of ICT infrastructure adoption, 51 percent had basic infrastructure, 25 percent had advanced infrastructure, 23 percent had full-fledged infrastructure with proper presence online, and 1 percent with poor or no ICT infrastructure. The degree of ICT adoption was mainly among executives and at the senior management level as opposed to staff and at the operational level. In general, the findings of the study demonstrated that the level of ICT adoption was in general relatively basic and many of the applications used, such as cloud computing, was more personalized rather than institutionalized, with limited or modest presence online for most of the SMEs covered by the study (Kamel 2021).

Finally, **Algeria** is clearly lagging in the adoption of digital technologies by businesses (Figure 15), particularly in the areas of fintech and e-commerce.

Governance of the digital economy

One of critical dimensions of progress in digitalization is the quality of governance of the digital technology sector. The governance pillar in the NRI considers three components: trust, quality of regulations, and inclusion. Figure 16 shows the scores of Arab countries for these dimensions and how they compare to other successful countries.

Figure 16: Governance of the digital economy, 2020



Source: Dutta and Lanvin (2020).

GCC countries

Except for Kuwait, the GCC countries have high scores for governance of the digital economy across all dimensions, especially the quality of regulation and inclusion. However, a few countries (Bahrain, Kuwait, Saudi Arabia) have relatively low scores for trust.

Other Arab countries

As with other dimensions of digitalization, Arab countries not part of the GCC rank quite low in terms of quality of governance of the digital economy (Figure 16). But the most important observation is the exceptionally low scores for the "trust" dimension for the Arab countries not part of the GCC, compared to all other groups of countries. This reflects the limited cybersecurity and secure Internet servers, and limited access to financial accounts and Internet shopping.

While it ranks very low on trust, **Jordan** scores high on both regulations and inclusion. According to the World Economic Forum's 2019 Global Competitiveness Report, Jordanian firms are positive about the government's efforts to develop regulations that support digitalization. It ranks 47 out of 141 countries for the burden of complying with regulations, 37 for the adaptability of its legal framework to digital business models, and 28 for its government's responsiveness to change. Local firms also indicate that Jordan's market is perceived as being reasonably competitive, with a ranking of 33 for competition in services and 31 for the extent of perceived market dominance. Jordan has also good protection of intellectual property under its copyright, trademark, patent, industrial designs, trade secrets, and competition laws, which form a comprehensive framework of protections in line with international trends. It is also a signatory to international treaties protecting intellectual property. Jordan is ranked a comparably high 35 out of 141 countries on its 2019 Global Competitiveness Report for this aspect of its regulations. Finally, while Jordan currently has no privacy or data protection laws, the country's constitution does include some related protections (Gomes and Mahroum, 2021c).

Lebanon scores very low on governance indicators for the digital sector (Figure 16). The lack of trust indicator is particularly low. The telecommunications sector is publicly owned by three companies, one running the fixed line services and two the mobile services. Plans for the privatization of the sector since 2002 never materialized. However, the sector's lagging status arises not from the ownership or market structure but from what we can call a 'fiscal burden' on the sector. The first element in this burden is that the sector is considered a source for revenue for the government even when the mobile sector was private (pre-2002). The government revenue from the sector in 2019 was $1.5 billion or around 9 percent of total revenues. The second element has been the lack of expenditures on investment (Dibeh 2021).

Egypt's ratings are weak for ICT-related governance. Its challenges include improving the legal and regulatory environment and ensuring equal universal access to digital technologies across the country, including remote and underprivileged locations in different governorates, which could also help support the private sector and improve its competitiveness (Kamel 2021). Like other countries in the region, the trust dimension is particularly weak.

The quality of governance in **Morocco** and Tunisia remains weak and characterized by a major disconnect between a relatively high score on regulations and very weak scores on trust and inclusion (Figure 16).

Algeria's digital initiatives seem scattered and are only embarked on by necessity rather than following a proactive vision of accelerating economic growth through digitalization. Governance is weak, lacking transparency and inclusiveness. The lack of trust is particularly acute (see Figure 16).

The two leading sectors of fintech and e-commerce

Among the sectors that have been most affected by digitalization worldwide are the financial sector and retail trade. Their adoption of digital technologies is leading to major disruptions in the business models and production processes, giving rise to the fintech and e-commerce sectors.

Fintech

Allen (2021) argues that the use of digital technologies is having a major impact on the financial sector, especially in interaction with the globalization of finance. The most important impact is on financial inclusion for both unbanked individuals and SMEs that have been neglected by traditional bank finance. Major innovations such as credit scoring using Artificial Intelligence/ Machine Learning and alternative data, digital banking and investment services, and peer-to-peer lending are changing the financial industry. Initial Coin Offerings and Central Bank Digital Currencies are also new technologies that can have a significant impact.

The evidence from Arab countries suggests that there has been only limited progress in the adoption of these technologies, with the GCC being the more active.

GCC countries

While the two country studies for Saudi Arabi and Oman have not provided us insights on how digitalization is affecting the financial sectors in the GCC, a recent study by the Milken Institute does so for Bahrain and the UAE. According to that study by Mueller and Piwowar (2019), the GCC countries have accelerated their efforts since 2017 to become major players in the fintech business by putting in place adequate regulatory regimes and attracting talent. Bahrain and the UAE have emerged as the leaders for developing ecosystems supportive of fintech development. The volume of venture capital investment in the Middle East is still at 1 percent of global investments but growing rapidly at 30 percent per year. The number of fintech firms has more than tripled between 2017 and 2019 from 30 to about 100 firms and investments rose from $78 million to $287 million. About 85 percent of the business has been in the payments and remittances area, but business is also growing in several other segments of fintech market: insurance, online banking, crowdfunding, blockchain, and cryptocurrencies.

The growth of fintech in both Bahrain and the UAE was driven by the nationwide visions and strategies to diversify and develop knowledge-based economies.

Bahrain's financial sector is the country's largest non-oil sector, and it has actively developed its regulatory framework since 2016 driven by the Central Bank of Bahrain, covering most areas of fintech.

The **UAE** has developed a fairly elaborate regulatory framework, and its approach has focused mainly on 'free zones', where specific rules and regulations are implemented for fintech. The UAE has even developed specific strategies, such as the Emirates Blockchain Strategy 2021 and the Artificial Intelligence Strategy 2031. By 2019 around 40 free zones were created in the country, with two major ones: the Abu Dhabi Global Market free zone (launched in 2015) and the Dubai International Financial Centre free zone (created in 2004) as the main competitors. They each have their own regulatory and judicial authorities.

Despite the strong progress achieved, Bahrain and the UAE are still at the early stage of becoming fintech hubs, with other emerging countries such as Egypt, Jordan, Kuwait, Qatar, Turkey, and Saudi Arabia catching up (Mueller and Piwowar 2019).

Other Arab countries

Fintech is becoming an important part of **Tunisia's** development, with a large potential for creating job opportunities for Tunisians. Three main technologies have helped the evolution of fintech in the country: Big Data, Artificial Intelligence, and blockchains. The speed of emergence of new firms linked to technology is triggering the formation of clusters. The banking and fintech cluster has been reactive and highly innovative during the COVID-19 crisis. While traditional banking operations have become difficult and more people are working from home, start-ups and fintechs have provided solutions and offered new organizational practices such as contactless payments, e-banking platforms, mobile payments, and loans for small businesses, all of which highlight the importance of fintechs and their innovativeness during this period. In 2020 the Central Bank of Tunisia launched its fintech website, which allows labelled start-ups to develop their activities in a more flexible regulatory framework, without being forced to leave the country to settle abroad. The main objective is to ensure inclusion and financial innovation, to change the banking model by moving towards the restructuring and digitalization of banks, and to change the financial ecosystem quickly (Ben Youssef 2021).

Fintech may contribute to the solution in **Lebanon** for both the dearth of credit to tech start-ups and to the banking crisis. The current crisis of the banking system in Lebanon translated into the total collapse of credit in the economy. It exacerbated the already difficult credit situation for financing innovation and start-ups in the areas relevant to the fourth industrial revolution. Fintech can form part of the restructuring of the banking system that was geared towards financing the state at high interest rates, and it can help relax financial constraints and form a new medium of capital intermediation outside the traditional banking system.

However, the current fintech landscape is weak, with most fintech solutions being a 'digital' complement to existing traditional banks. This is not the type of fintech that would fully exploit the potential for the financing of innovation. One of the main obstacles has been the lack of a legal and regulatory environment that governs fintech lenders. The Central Bank announced in November 2020 plans to issue a digital currency that will be traded locally and be

used as means of payment, stating that it would stimulate financial technologies and provide a savings vehicle to the consumer.

Fintech started growing in **Egypt** over a decade ago, providing electronic payments for peer-to-peer transfers and bills, payroll, pension, and social security payments; merchant and online purchases; and smart wallets. One of the early adopters, Fawry, was launched in 2008, which over a decade later, in 2020, became the first tech start-up in Egypt to reach a valuation of $1 billion and the first unicorn. Around six months later the market cap hit $2 billion. Fawry was a pioneer in the field and remains the leading digital and electronic payment platform in Egypt, offering a variety of financial services and electronic commerce solutions to individuals and enterprises through over 3 million daily transactions, serving 29.3 million consumers and businesses. These consumers and businesses are enjoying a portfolio of around 1,200 services delivered from 225,000 locations and service points nationwide as well as a variety of channels, including ATMs, mobile wallets, retail shops, post offices, and vendor kiosks – with a total collection value of $5.1 billion in 2020. Some of the other key players, such as Aman (established 2016) and Paymob (established 2015), are growing fast and gradually capturing a bigger market share and contributing to financial inclusion.

The Fintech start-ups represent one of the fastest growing segments among tech-enabled start-ups, with over 40+ new ones launched over the past few months. In 2016 the Central Bank of Egypt (CBE) started licensing mobile wallets, the first being Vodafone Egypt followed by other mobile operators. In March 2021, Egypt became home to more than 14.5 million mobile wallets and banks had issued more than 3.3 million credit cards, 17.3 debit cards, and 16.2 prepaid cards with 88.3 million Points of Sale and 13.3 million ATMs nationwide. Through a partnership between the public and private sectors, the CBE introduced in December 2018 the national electronic payment prepaid debit card Meeza reaching over 500,000 cards since its establishment, which should help facilitate higher banking penetration as Egyptians become more comfortable with the ease and security of cashless transactions. The CBE is also working on digitalizing the Village Savings and Loans Association, whose beneficiaries include 18,000 members (92 percent women). To date, through this institution 6,138 loans were given to members, of which 71 percent were used for income-generating projects and activities (Kamel 2021).

The pandemic has helped accelerate the use of online transactions, acting as a catalyst in this regard. According to the National Telecom Regulatory Authority, the monthly electronic transactions increased by approximately 156 percent between March and October 2020. The volume of electronic transactions between mobile wallets increased 224 percent to 3.8 million transactions, with an average transaction of $63. These digital payments trends are likely to be sustained beyond the pandemic, bolstered by the implementation of policies requiring government fees, taxes, and utilities to be paid electronically. On this note, during the period March-October 2020 the number of online transactions, including utility bill payments and online shopping, increased by 155 percent – reaching 370,000 transactions with an average transaction value of $12. All these developments are supported and encouraged by the large percentage of the population who are young, tech-savvy, and skilled. Today, the utilization of Fintech in the financial sector contributes to 1.6 percent of the GDP (Kamel 2021).

In **Morocco** fintech is lagging considerably. Among bank account holders, only 3 percent used a cell phone or Internet to access their account, compared with a fourth of account holders in the Middle East and North Africa (MENA) region. Only 17 percent of Moroccans have received or made a digital payment in a year, or 58 percent of account holders, compared to 80 percent in Tunisia, 70 percent in Egypt, and 93 percent in Turkey. Available data show that almost all utility bill payments (96 percent) are made in cash. There are many reasons for this lack of progress in fintech. One is the fact that 66 percent of private sector wages are paid in cash, and virtually no Moroccans have their wages paid into a cell phone wallet. This has to be contrasted with 77 percent of unbanked adults owning a cell phone, 42 percent owning a smartphone, and 91 percent of adults in Morocco with a dormant account having a cell phone. The low penetration of financial services among households is also partly due to the inadequacy of banks to meet the needs of these excluded potential customers and to the high use of informal financial services (Abdelkhalek et al. 2021).

There is also an emerging fintech scene in **Jordan**, with digital payments initiatives, a peer-to-peer lease-to-own lending platform, a micro-lending institution and other innovative financial solution, a fintech regulatory Sandbox, venture capital funds, incubators, and accelerators labs.[25] Again, **Algeria** has been lagging in the development of financial technology initiatives, products, and services.

[25] Fintech News Middle East, "Examining Jordan's Emerging Fintech Scene," 1 May 2019.

E-commerce

The development of e-commerce varies considerably across the Arab region. According to recent survey, the GCC countries and Egypt account for 80 percent of the e-commerce in the region[26] (Mahroum 2021). This is reflected in extremely variable e-commerce penetration rates. The highest rates are 4.2 percent in the UAE, similar to Turkey and Brazil, and 3.8 percent in Saudi Arabia, which together represent 60 percent of the e-commerce market in the region. These numbers are to be compared to rates surpassing 10 percent in China and the most advanced Western markets.

Figure 17 provides a measure of e-commerce, which is the percentage of the population aged 15 years or older who have used the Internet to buy something online in 2017, based a survey by the World Bank.[27] The data clearly show the extensive use by the UAE and to a lesser extent a few other GCC countries, but only limited use by other Arab countries, especially the low-income ones.

GCC countries

The **United Arab Emirates** is clearly a global leader in e-commerce, with half the population in 2017 having used the Internet to make a purchase – comparable to the most advanced countries.

While Saudi citizens are keen to use the Internet, the country lags behind in e-commerce penetration. It is estimated that only 25 percent of adults make online purchases. This may be due to the limited use of credit and debit cards. According to Gomes and Mahroum (2021b), market research data indicates that credit card penetration in **Saudi Arabia** reached 33 percent in 2017, while as of 2018, 57 percent of online shoppers opt for cash on delivery as their preferred payment method. This led the Saudi Arabian Monetary Authority to introduce a contactless payment service in 2017, using near field communications technology in payment cards and mobile devices. The take-up of this climbed sharply as the infrastructure for it has penetrated the country.

Another impediment is the weak proficiency in English as the founding language of the Internet. English dominates 60 percent of all websites compared to just over 1 percent in the Arabic language. In the 2020 English First – English Proficiency Index, Saudi Arabia ranks 97 out of 100 countries, indicating that the vast majority of its Arabic-speaking population are not fluent in English. Another factor in the low rate of online shopping may be the lack of confidence in the low number of secure Internet servers.

The volume of online transactions in Saudi Arabia has steadily risen since 2014, alongside the country's ranking on the UNCTAD B2C E-commerce Index to 49 out of the 152 assessed countries. In 2020 there was significant growth in investment in e-commerce start-ups in Said Arabia, accounting for a fifth of all deals and two thirds of all investment in SMEs. Together with the rollout of 5G networks, this will simplify and facilitate the growth of e-commerce in the country.

There has been also a low level of e-commerce penetration in **Oman**, with only 32 percent of adults making online purchases.[28] As in Saudi Arabia, this slow take-up of e-commerce may be attributed to the same combination of factors, First, there is the low level of credit and debit card penetration among Omani men (37 percent) and women (16 percent), which is a clear impediment to e-commerce. Second, there is the limited proficiency in English as a main factor. Omani Internet users are likely restricted to using the 1 percent of websites that are in Arabic, allowing them far fewer online options for researching goods and services and making purchases. Finally, concerns about privacy and inadequate security of local Internet servers for making online purchases are also issues (Gomes and Mahroum 2021a).

Other Arab countries

The extent of use of e-commerce to buy goods and services is low in Jordan at 7 percent.[29] Jordan has many specific barriers to e-commerce that need to be addressed, though the main factor is the country's low connectivity and weak infrastructure. In addition, debit and credit cards are used by only 2.5 percent of its population and only 42 percent have a bank account to perform online transfers. The country is also not setup for delivering goods purchased online, as most Jordanian's collect their mail from post office boxes, and their postal service is not configured to deliver parcels efficiently. This issue is further hampered by an absence of unique numbered addresses in many towns and rural areas.

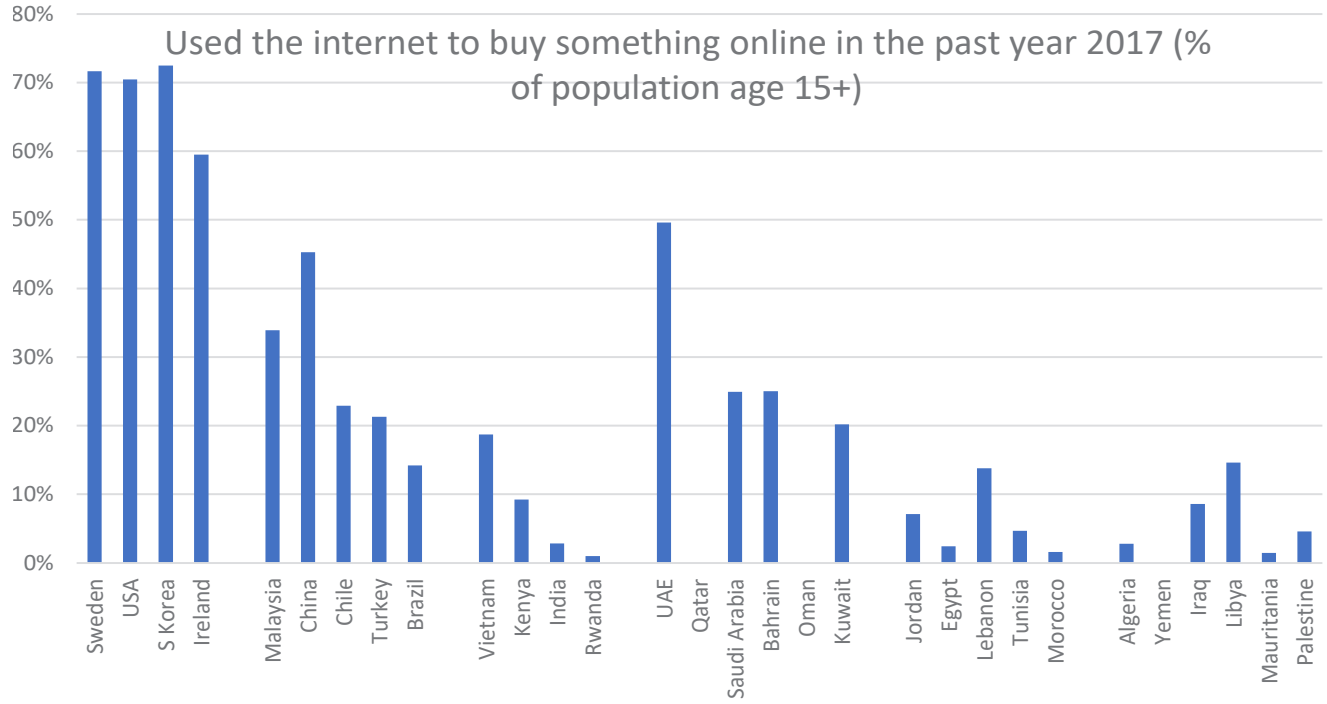
[26] Survey by Bain & Company and Google in 2019: "E-commerce in MENA Opportunity beyond the hype."

[27] World Bank, 2017b, Global Findex database, https://globalfindex.worldbank.org/.

[28] Figure obtained from national sources. See Gomes and Mahroum 2021a.

[29] World Bank (2017b).

Figure 17: Online shopping (% of population age 15+), 2017 (latest available data)



Source: World Bank, 2017b, Global Findex database, https://globalfindex.worldbank.org/.

E-commerce use remains limited, since e-payments and m-payments are not well developed. During the COVID-19, however, there was an important increase in online transactions and the use of e-commerce, with many businesses making efforts to change their business models and sell online. Despite the weak payments system, they have been finding different ways to reach consumers.

In **Tunisia** the use of e-commerce remains limited, with only 6.6 percent of the population making online purchases or bill payments as of January 2020. This is higher than the rate of 5 percent shown in Figure 17, which is for 2017. Use of e-commerce by gender shows that 6.4 percent of Tunisian women and 6.8 percent of Tunisian men make online transactions (Data Reportal 2020). The e-payment problem means that e-commerce is confined to local transactions and most transactions involve cash on delivery, as it allows the user to assess the quality of the goods, since there is no regulation saying that refunds are obligatory for poor quality products. According to a recent study conducted by a local website,[30] 50 percent of e-buyers make their payment only on delivery against 28 percent exclusively online, and 22 percent make their payment either online or on delivery (Ben Youssef 2021).

Many initiatives emerged aiming at encouraging e-commerce by facilitating e-payments. The major telecommunications operators have set up online accounts to enable users to buy data and phone services using domestic bank accounts and prepaid mobile cards. During the COVID-19 pandemic a new mobile payment solution has been launched, which allows Tunisians to create a virtual money wallet on their mobile phones, allowing them to receive money and make digital payments. In addition, mobile payments applications were launched by banks and new financial intermediaries.

Lack of regulations continues to hinder e-commerce in Tunisia. Most e-commerce activities are informal, with firms using social networks instead of regular websites to sell their products and the payments made upon delivery. The regulation of the sector is key to improving trust and controlling fraud.

Lebanon has the most developed e-commerce digital technology in the region, with hundreds of sites that offering online shopping and transactions services, as well as many e-commerce developers. Figure 17 shows a relatively high rate of 14 percent of the population using the Internet to make a purchase in 2017. According to the 2019 UNCTAD B2C E-Commerce Index, Lebanon ranked 68 (out of 152) in the world and ranked 9th in Western Asia. On Internet usage and postal service reliability, Lebanon scores above the world average and above the score for Western Asia. In contrast, surprisingly, Lebanon

[30] MDWEB, https://www.tunisienumerique.com/mdweb-limpact-du-covid-19-sur-le-e-commerce-tunisien-50-des-e-acheteurs-paient-exclusivement-a-livraison/. (http://www.mdweb-int.com/)

lags behind in the percentage of individuals holding financial accounts and in secure Internet servers.

Lebanon stands relatively well positioned to enter a new phase of e-commerce expansion, especially in the light of anecdotal evidence that, with the advent of the COVID-19 crisis, the online shopping market has experienced a significant boom. It is to be noted that this new wave of online shopping services is spearheaded by small and medium businesses, which comprise around 97 percent of all Lebanese enterprises despite the existence of monopolies that can exploit e-commerce to the advantage of large firms, which can dominate the online market environment (Dibeh 2021).

In **Egypt** support for electronic commerce started in the 1990s, but it is only recently that an ICT enabling environment became more conducive to e-commerce growth, with investments in the ICT infrastructure and the actions taken by the Central Bank and the Financial Regulatory Authority to enable electronic payment through different channels. On the other hand, social factors still limit the uptake of electronic commerce, such as consumers' preference to use cash on delivery; preference for face-to-face interaction and bargaining; and lack of trust in online channels. These are also compounded by the level of poverty, illiteracy rate, limited digital capacities, low purchasing power, and infrastructure limitations – especially in rural areas.

The logistics of distribution to ensure faster, efficient, and cheaper delivery also remain a key impediment. Many of the established SMEs in the retailing business have so far chosen not to go online, and cultural factors have led to limited growth with a market largely dominated by a few enterprises with a real and effective online presence.

According to several reports, the annual growth rate of electronic commerce in Egypt has been rising by more than 30 percent since 2019, yet the volume of transactions remains modest compared to the size of the population. Before the pandemic around 8 percent of Internet users shopped online, and Egypt's penetration in terms of e-commerce stood at 2.5 percent of total retail sales. The fastest-growing categories during the period 2017–2020 were electronics, personal care/beauty products, fashion, and groceries. While the shift to e-commerce was on its way before the pandemic, the health and safety issues resulted in a remarkable acceleration of such a trend, pushing many of the retailers to establish online ordering systems – including mobile apps to facilitate orders (Kamel 2021).During 2020, the first year of the pandemic, the volume of electronic commerce reached $3.27 billion (an average of $79 per purchase) – an increase of 63.5 percent compared to 2019, and involving more than 41 million people (many repeat consumers) shopping or conducting transactions. It is also worth noting that there was a growth in the retail sector of 3.8 percent and 3.9 percent in fiscal years 2018–2019 and 2019–2020, respectively. According to a MasterCard study related to the pandemic, 72 percent of the sample consumers surveyed in Egypt indicated that they increased their online shopping volume since the pandemic, 57 percent indicated that they started to bank online, and 54 percent are spending more money on their virtual experience (Kamel 2021).

With increasing Internet and smartphone penetration rates coupled with the improvement and proliferation of online payment systems and the development of better distribution logistics, it is expected that the volume of e-commerce will move to the next level. According to a study conducted by Egypt's Institute of National Planning, e-commerce will grow by at least 50 percent as a result of the pandemic and that some of the online shopping habits will remain even after the pandemic. These developments have encouraged many entrepreneurs to establish start-ups and online mobile applications to cater for the growing market needs. Nevertheless, the growth remains below par when compared to the market size, with the volume of B2B and B2C transactions around 0.57 percent of GDP, primarily because of the inequitable access to credit cards, electronic payment, and financial institution penetration, all of which are hindering e-commerce growth. Therefore, moving forward, the inclusion of a greater share of the population in electronic financial services is becoming invaluable (Kamel 2021).

It is expected that post-pandemic online shopping will parallel and complement the traditional retailing habits, and not replace them. Retail outlets have begun investing in and enhancing their physical spaces with entertainment as well as food and beverage services to provide a better and more enriched in-person experience. Following the trends in 2020 and based on a survey conducted by checkout.com, 47 percent of consumers in Egypt expect to shop online more frequently, with 44 percent expecting to shop online at least once a month and 54 percent indicating that digital payments is their preferred payment method (Kamel 2021).

In **Morocco** e-commerce remains undeveloped and below its potential. Based on the UNCTAD E-commerce Index, Morocco is ranked 81 out of a sample of 151 countries. As of 2017 only 2 percent of the population aged 15 years and more undertook a commercial transaction on the Internet (Figure 17). As for Moroccan companies, a survey undertaken by a national authority (Agence Nationale de le Réglementation des Telecommunication) reveals that they make 8.4 percent of their purchases online, for an

amount not exceeding 4 percent of the total volume of purchases in 95 percent of cases. This is explained by the lack of confidence in legal guarantees and the low use of online payment solutions. Online payment conditions are also a handicap for e-commerce platforms. Payments on delivery and cash payment for purchases on e-commerce sites represent more than 90 percent of payments when excluding government services and tourism services such as hotels, aeroplanes, and car rentals (Abdelkhalek et al. 2021).

The development of e-commerce remains at very low levels in **Algeria**, with the rate of Internet shopping at less than 5 percent. A few digital platforms are currently in place, such as Ouedkniss.com (for classified advertisements), yassir.com (taxi company and food delivery), jumia.dz (one-stop shop equivalent of amazon.com), even though cash is still used for their transactions. Despite the launch of the first e-payment service in 2016, Algeria's e-commerce is yet to take off (Belaid et al. 2021).

4. Social and Economic Impact of Digitalization in Arab Countries

Digitalization has wide-ranging implications for societies, which are political, economic, and social. Digitalization affects quality of life in many ways by making information and services more easily accessible, allowing people to connect and interact easily without constraints, and reducing the costs of transactions. But the impact may also be negative as when privacy is jeopardized, work conditions deteriorate, or human interactions become less personal. Digital technology is also having major implications for the way political and social interactions are conducted.

We focus on the social and economic impact of digitalization and provide a summary of the findings from the eight country case studies that reviewed their experience, using also the results from the thematic papers produced for this project (Yusuf 2021, Hoekman 2021, Mahroum 2021, Allen 2021). Based on these studies, we can conclude that at this stage knowledge about the impact of digitalization on the Arab economies remains very limited, and there has been little research undertaken to assess in any systematic way the repercussions on labor markets, productivity, or inequality and poverty.

To the extent some evidence is available, the impact of digitalization on Arab countries has been until now quite limited. We have not observed any major disruptions that produce a measurable impact on overall economies and societies, including on productivity or employment. Nevertheless, there is specific or detailed evidence demonstrating that digitalization is starting to impact the social and economic outcomes in many Arab countries, mostly the GCC, where it has most progressed, but also in some of the non-oil exporting countries.

Economic impact of digitalization

An initial overview of the economic impact is provided by data from the Network Readiness Index (NRI). NRI provides among its indicators a component about impact of digital transformation along three dimensions: economic, quality of life, and achievement of the SDGs.

The latter two indices on quality of life and SDGs are broad-based indicators, which are not only or directly related to digitalization. Only the index about the impact on the economy is closely related to digitalization, as shown in Figure 18. This "economic impact" component is constructed using the following sub-indices: (i) proportion of medium- and high-tech value added in total value added, (ii) high-tech manufactures exports as a percentage of total manufactures exports, (iii) number of patent applications under the Patent Cooperation Treaty per million population, (iv) labor productivity per employee, and (v) prevalence of the gig economy. Again, these data show strong divergence between GCC as a group and other Arab countries as a group, with the economic impact being much weaker in the latter, as in many emerging, low-income, and lower-middle income countries.

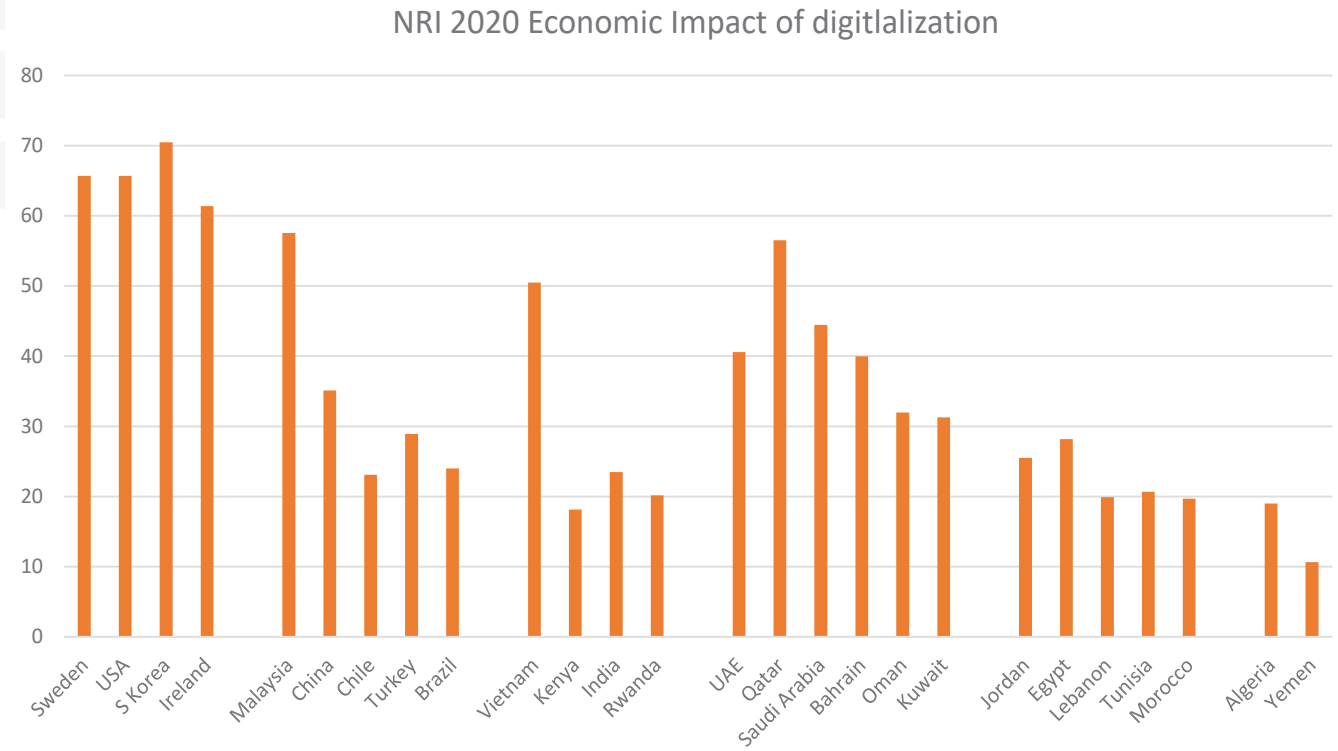
This general finding about the overall economic impact is explored further by focusing on productivity growth, employment in new ICT-enabled activities, diversification and structural transformation, and exports of services.

Productivity growth

The potential for economic gains from digitalization, particularly over the longer term, appears to be large, but the implied major reallocation of economic activity between sectors and countries could be painful and costly during the transition period. Technological changes could also have significant impact on other ongoing global trends, such as income and wealth inequality, globalization, trade and investment supply chains, migration, population aging, and environmental and climate-related challenges.

However, as suggested above, the biggest paradox about the impact of digitalization in advanced countries has been the pervasiveness of adoption of digital technologies over

Figure 18: Economic impact of digitalization, 2020



Source: Dutta and Lanvin (2020).

recent decades, on the one hand, and mostly a slowdown in aggregate labor productivity growth, on the other hand. This has been the case in most advanced countries, particularly the United States, and even some emerging economies.

Digital technologies can lead to efficiency improvements through a variety of channels by lowering transaction costs in market, thus allowing firms to innovate and scale up their operations rapidly Goldfarb and Tucker (2019). Over the past decade, online platforms have indeed become ubiquitous and many of them have expanded globally.

One of the leading explanations of the failure of digital technologies to offset the aggregate productivity slowdown is based on their complementarity with intangible assets that are often difficult and costly to acquire. These include organizational capital and management skills, human capital, ICT-related skills, as well as investment in the data and software ecosystem, and access to communication infrastructure. For instance, a recent OECD study finds that by attempting to close skills gap by half among the top performing countries, the average OECD country could increase the adoption rate of digital technologies by 6–8 percent and raise firm level productivity growth by 3.5 percentage points after three years (Sorbe et al. 2019).

Another major factor explaining this paradox revealed by the most important analyses on the effect of digitalization on productivity in advanced countries is the significance of the highly differentiated impact between firms that are large and technology-leaders and firms that are smaller and technology-laggards. Adoption of digital technologies, especially in digital-intensive sectors, has been more active and deeper in large firms, while it lags in small and medium-sized firms, leading to major divergence in productivity. This divergence in labor productivity growth pulls down aggregate productivity growth (Qurechi 2021).

Erosion of competition, rising market concentration, and greater market power in digital-intensive activities further weigh on productivity growth. Some of the countries that are leaders in the adoption of digital technologies, such as Chile, China, Korea, Malazysia, Sweden, and the United States, have seen declining labor productivity growth. Labor productivity data on Arab countries seem to also follow a declining trend as discussed below.

There are no studies undertaken in the Arab or MENA region to explore such dynamics and impact. Hoekman (2021) argues that Arab countries have been lagging in the adoption of digital technologies in their production, which shows in slower 'servicification'. Between 1990 and 2019 the average share of services in total GDP increased by 7.5 percentage points in Arab countries (from 42 percent to

49.7 percent), compared to 15 percentage points in the middle-income group of countries (from 39.7 percent to 54.7 percent).

It is best to look into the impact of digitalization on total factor productivity growth, which shows improvements in efficiency caused by technological innovation and better organization of production. There is little evidence in the country case studies on the impact on total factor productivity either at the firm level or at the macro-economic level. A simpler alternative is to look at labor productivity growth, which is the result of many factors including digitalization, but going beyond it to include capital accumulation and any other macroeconomic shocks. We use such an indicator to get a very gross assessment about the potential impact of digitalization on labor productivity, shown in Table 3 for the set of countries we have considered. It seems that there is no evident correlation between extent of progress in digitalization and changes in labor productivity growth either between the 1990s and 2000s, or from the 2000s to 2010s (until 2019).

Labor productivity growth has been negative on average over the last 20 years in Saudi Arabia and Oman, with large fluctuations. Over the period 2011–2019 it averaged -4.3 percent per year in Oman and -0.5 percent in Saudi Arabia.[31] **Oman** has lagged in terms of adoption of digital technology by businesses, and its productivity growth is strongly negative. On the other hand, **Saudi Arabia** has been making strong progress in the adoption of digital technology (see above). Could the relatively better performance by Saudi Arabia be imputed to digitalization? It is difficult to say, but this is an interesting hypothesis that should be explored further. In any case, the apparent lack of impact of investments in digitalization and education may be because Saudi Arabia has a very large share of low-skilled and semi-skilled jobs associated with low productivity. These are mostly performed by foreign workers in the construction, retail, and service sectors, rather than industries such as manufacturing, which respond to capital investments in technology and education.

The country case studies for **Jordan** and **Lebanon** provide also limited evidence on the impact of digitalization on productivity growth. Labor productivity growth was also negative on average during 2011–2019 at -4.9 percent per year for Lebanon and -0.8 percent per year for Jordan. Both countries have high rates of adoption of digital technologies compared to other countries in the region. But again, many other factors affected productivity growth in both countries, and it is difficult to detect any measurable impact of digitalization.

The **Tunisia** case country study provides more evidence about the impact of digitalization on productivity growth (Ben Youssef 2021). The overall labor productivity growth remained low in Tunisia at 1.1 percent per year during 2011–2019, which is 50 percent lower than during 2001–2010 (2.2 percent). This collapse in labor productivity growth is caused by many factors, with the political and social turmoil being a major explanation. The most recent and comprehensive study by Dahmani, Mabrouki and Ben Youssef (2021) finds a positive impact of digitalization on total GDP growth, but quite weak.[32] But this effect varies considerably across sectors.

Morocco is one of the few countries that has experienced improved labor productivity growth over the last two decades. Paradoxically, it is a country that has achieved little progress in terms of adoption in digital technologies in production, especially in e-commerce or financial services. It is difficult to see any impact of digitalization on productivity growth.

Egypt also shows significantly positive labor productivity growth over the last three decades, but it is difficult to identify any links with progress in digitalization in the country.

Labor productivity growth has been mostly negative or low in Algeria, except during the last decade, but there is no evidence of any link between digital technology adoption and productivity growth.

Self-employment and the expansion of the new ICT-enabled services (start-ups)

The expansion of business activities to supply services that are made possible by the development of the digital infrastructure is an indicator of progress in digitalization, but it is also a measure of impact as it leads to the creation of new jobs and the production of value-added. Often considered as part of the 'start-ups' activities, they are producers of digital software and the launch of new businesses using digital technology. The authors of country case studies have devoted much attention to this aspect, which illustrates that it is perceived to be the most tangible and visible impact of digitalization on economic activity and on labor markets.

[31] Calculated based on data from World Bank World Development Indicators.

[32] An elasticity of output of 0.04 to 0.056 with respect to an ICT diffusion index.

Table 3: Labour productivity growth (%), 1992–2019

Country	Labour productivity growth (%)		
	1992-2000	2001-2010	2011-2019
Sweden	3.22	1.61	0.75
USA	1.98	1.66	0.8
S Korea	5.1	3.47	1.54
Ireland	3.13	1.97	4.45
Malaysia	3.56	2.01	2.18
China	8.78	9.62	6.98
Chile	4.4	1.45	0.97
Turkey	2.98	2.77	2.67
Brazil	0.4	1.44	-0.15
Vietnam	5.16	4.27	4.97
Kenya	-1.42	1.22	1.53
India	3.68	4.96	5.47
Rwanda	-1.09	5.2	4.12
UAE	-1.42	-8.81	2.66
Qatar		-1.84	-0.57
Saudi Arabia	-1.37	-0.99	-0.91
Bahrain	1.29	-3.25	-0.28
Oman	1.66	-2.82	-4.34
Kuwait		-0.2	-2.67
Jordan	-0.53	2.15	-0.77
Egypt	2.2	1.58	2.78
Lebanon	1.73	2.04	-3.56
Tunisia	2.26	2.24	1.15
Morocco	-0.12	2.53	2.83
Algeria	0.44	-0.91	1.22
Iraq	11.69	0.55	1.65
Libya		1.39	-4.85

Source: Based on data from World Development Indicators, World Bank (last updated 19 March 2021)

Oman has actively promoted SME development and entrepreneurship through support institutions (such as the Agency for Small & Medium Enterprises Development, Riyada, created in 2013) and incentives.

More specifically, government targeted SMEs and entrepreneurship in the ICT sector through incubators that provide business development with advice and training, and that facilitate access to finance to help them to grow. Other public agencies have introduced services to support entrepreneurs, particularly younger Omanis who establish online businesses from home because they lack high levels of operating capital. Funding mechanisms have been put in place to support SMEs and start-ups. The most recently available reports from Riyada for 2018 show that young Omanis are responding to the government's incentives, but that the learning curve is proving steeper than many had first imagined and that the new digital and other SMEs are not yet capable of yielding the youth employment opportunities that the country seeks.

While, the focus of Omani incubators and other SME development programmes on cultivating a culture of entrepreneurship at the ideation or pre-start-up stage reflects the needs of the SME market, research with Omani university students reveals that many perceive that they have a strong enough technical understanding of their subject to develop it into a business and are positive about the possibilities of entrepreneurship, but are reticent about this as a career option, preferring instead the familiar job market. Many young men expressing this sentiment indicated that they needed a reasonably high and secure income in order to get married and start a family. While persons under 30 years led most of the 103,569 SMEs that are registered with Riyada, these were mostly micro SMEs (61.7 percent), with small SMEs accounting for another third of the total. Though medium sized enterprises were few overall (4.7 percent), they created far more employment per business (3.38 jobs per SME) than the more numerous micro and small SMEs (0.36 jobs per SME)[33] Gomes and Mahroum 2021a).

The dynamics has been even stronger in **Saudi Arabia**. Even before the launch of Vision 2030 in 2016, the government established an $8.6 billion *National Science, Technology and Innovation Plan* for infrastructure for a digital economy, and to stimulate growth in private and public/private incubators and accelerators to support the development of technology-based start-ups and SMEs. Then in the context of Vision 20230 it established Monsha'at (General Authority for Small and Medium Enterprises) to develop and coordinate start-up infrastructure such as co-working spaces and hubs and providers of skills training and events to nurture a culture of entrepreneurship. These initiatives provided young entrepreneurs with business networking, coaching and mentoring, business planning and strategy, business management training, networking and relationship management, soft skills training, market research, and fundraising. Other initiatives were launched to attract international venture capital and promising start-ups. Monsha'at allocated $1.33 billion in seed funding to match investments via a newly established Saudi Venture

[33] The number of jobs excludes the owner.

Capital Company group. The vast majority of this has been won to date by digital start-ups for online learning, e-commerce, telecommunications, and AI. Two decades of consistent public investment has been accompanied by growth in a wide variety of private and public/private entities that trade equity in promising start-ups for funds to cover capital costs and operating expenses, as well as growth and expansion. Overall, the Saudi financial ecosystem, including the banking and financial sector, is in a strong position to support the expansion of the digital sector.

Between the launch of Vision 2030 in 2016 and the impact of COVID-19 on the global and local economy, the contribution of SMEs to GDP rose from 20 to 33 percent. However, less than 1 percent of all SMEs (5,625 firms) were registered as developing an ICT-related activity in 2019. This makes clear that there are not enough firms to make a significant impact on the economy in terms of revenue generation or job creation. Among them, e-commerce start-ups have attracted the most investor funding in recent years (22 percent of all deals and 67 percent of all funding in 2020), followed by IT solutions using data analytics (7 percent of all deals and 8 percent of all funding in 2020). Digitalization has also enabled a new 'on-demand' economy that is allowing more Saudis to work as independent contractors. However, two thirds of tech start-ups report that their operations have been significantly impacted by the fall in economic activity and access to capital following the pandemic, with many requiring staff to work remotely on reduced staff hours and pay, together with seeking debt restructuring, and 17 percent suspending their operations altogether (Gomes and Mahroum 2021b).

Jordan has been pursuing an active policy for encouraging entrepreneurship, supporting SMEs and start-ups through the creation of special funds and the establishment of public, private, and public-private-partnership incubators. These are financially supported by funding from government, international aid agencies, and/or the SMEs that benefit from their services. Launched 20 years ago with public funds, Oasis 500 was the region's first start-up incubator. It takes a 10 percent equity stake in promising technology start-ups for a six-day intensive training programme and three months of mentorship for their founders, plus funding. Start-ups that meet subsequent growth targets qualify for another three months of incubation. The Jordanian Government has committed $69 million to the Jordanian Entrepreneurship Fund to provide financial support for 825 innovative projects. The importance of digitalization for SMEs is evident in Ministry of Entrepreneurship and Digital Economy statistics, which show that 42 percent of SMEs are technology-based. Around a tenth of Jordan's working age population are self-employed but without employees of their own. The government is hoping that digitalization will provide a pathway for more unemployed young adults to join them as entrepreneurs in an emerging 'on-demand' economy created by digital platforms that connect persons who need goods and services with sellers (Gomes and Mahroum 2021c).

The main driver for the development of start-ups in Tunisia was the adoption of the Start-up Act by Parliament in October 2018, which triggered a new dynamic in the country. The new regulations deal with issues such as paperless administration, exporting, international money transfers, recruitment of international staff, etc. They cover the whole start-up ecosystem from inspiration and ideation to concept, product development, market entry, and growth. Recent efforts focus on the growth stage, which is crucial to resolving the problem of youth unemployment. Ideation and early-stage start-up have been facilitated by the provision of incubators, fablabs, co-working spaces, etc. Recently, the country started to attract international business angels and already has benefited from several new national business angels. As of January 2021, 401 start-ups have received the start-up label. On average, each labelled start-up employs more than 11 people.[34] One of the most relevant indicators, which highlights the development capacity of start-ups, is the number of jobs created. Indeed, new jobs were created during the first year of the Start-up Act 2019–2020, with an average of three new jobs per start-up. New start-ups are accelerating the emergence of new services and industries (clusters), such as the educ-tech cluster (e-education services), the video gaming cluster, creative industries, 3D modelling, and Artificial Intelligence. The six main sectors of activity targeted by start-ups are: software development and services (Business Software & Services), e-commerce or the creation of marketplaces (Marketplace), education (EdTech), finance (Fintech), cultural and creative industries, and health (Health Tech). These six sectors alone account for 60 percent of the start-up population, and reflect the degree of maturity of these sectors as well as the expectations and concerns of Tunisian business and citizens (Ben Youssef 2021).

Lebanon has also developed a dynamic start-up ecosystem. According to a World Bank (2017a) study, the tech start-up ecosystem in Beirut is past its nascent phase but far from maturity, with a compound annual growth rate of 24 percent. The founders of start-ups were highly skilled, with 90 percent having university degrees and 50 percent having graduate degrees. They typically attended 10 accelerator programmes, three of which were

[34] These start-ups were newly labelled after the Start-Up Act, but many have developed their activities over many years.

international. The presence of accelerators has increased funding to start-ups but has not led to an increase in their quality. The Beirut community network is still sparse with low density and a limited number of clusters, with one main cluster formed by the Central Bank. According to an ESCWA (2019a) survey, companies have been established in various areas of the fourth industrial revolution, from AI to blockchain technology. The results show that Lebanon has a vibrant assembling generators and transformers industry as part of the electrical machinery industry, which constitute 9.7 percent of the manufacturing sector. The ESCWA survey notes that the electronics sector "would be an impactful sector to grow as part of fourth industrial revolution technology development, particularly in robotics, automation and instrumentation" (p.36). However, according to the World Bank (2020a), Lebanon has participated only in the limited manufacturing part of the global value chains (GVCs). The report lists the top 10 technology rising stars in Lebanon, with only one type (spark-ignition engines for aircrafts) in a sector most amenable to GVCs (Dibah 2021).

One main objective in **Egypt's** digital strategy is to build and foster an ecosystem that encourages and promotes research and development in entrepreneurship and innovation to drive growth and to support sustainable development. The Technology Innovation and Entrepreneurship Centre was established in 2010 to support entrepreneurship and innovation in different industries. The Ministry of Communication and Information Technology supports young entrepreneurs, start-ups, and innovative SMEs through training, incubation, financial and in-kind support, and mentorship. According to MAGNiTT, a renowned start-up platform, Egypt's start-up ecosystem is the fastest growing in MENA and recorded the highest number of start-up funding and investment deals in the region during the first quarter of 2020. It achieved 37 percent of the total number of deals, worth $277 million, with 52 percent attracting international investors. Most if not all are ICT-enabled start-ups that contribute to the acceleration of digitalization. Furthermore, in 2019 the start-ups attracted 142 investments amounting to $95 million, up 13 percent from 2018. All this is supported by an increasingly dynamic funding and support ecosystem comprising several stand-alone and university-based accelerators and incubators, venture capitalists, and angel investor network, such as Algebra Ventures, Cairo Angels, American University in Cairo Angels, and many others. In 2019, Egypt led the MENA region in venture capital (VC) transactions, accounting for 25 percent of the total, and ranked second for its share of total VC funding at 14 percent. As part of the multiple financial inclusion efforts, Cairo is now home to many fintech accelerators and has been ranked among the top-10 cities globally for affordable talent. In 2019 the country signed a $200 million agreement with the World Bank to support start-ups and SMEs through better access to credit (Kamel 2021).

However, overall, the impact of tech-enabled start-ups remains modest with respect to creating jobs and reducing youth unemployment, and geographically limited due to their presence in urban locations, and mainly in Cairo. In 2021 there are more than 200,000 professionals employed in the country's business process outsourcing (BPO) industry, making Egypt an attractive outsourcing option. According to one estimate, Egypt has become one of the fastest-growing exporters of BPO services in the world. Before the pandemic hit, its wider ICT industry was projected to generate around $6.9 billion in revenue, including $4.7 billion from BPO, and the workforce was expected to reach 240,000 full-time-equivalent during the fiscal year 2020–2021. Moreover, to promote sustainable and scalable growth of the ICT sector in general, universities, higher education organizations, and vocational training institutions have introduced a portfolio of diverse information technology and computer science curricula to cater to different market needs. Today, roughly 10 percent of Egypt's annual university graduates major in ICT-related specializations (Kamel 2021).

Algeria has a strategic objective to develop a knowledge-based economy. It has recently created a ministerial department dedicated to start-ups, micro-business, and incubators. It has also launched the Algerian Start-up Fund with an initial amount of $20 million as a new financing mechanism based on investment in capital rather than credit (Belaid et al. 2021).

Diversification and structural transformation

Economic diversification has been the major challenge for major oil-exporting countries, whether part of the GCC or not. Most of these countries had limited success in making progress in this area, with the notable exception of the UAE, and to a lesser extent Bahrain. Digital transformation has been considered as an opportunity for these countries to 'leapfrog' in their development process and diversify into new activities that are digital-technology based.

The country studies for **Oman** and **Saudi Arabia** find progress in terms of diversification and greater complexity of production over the recent two decades. This coincided with the push towards digitalization, which must have played a role in the diversification achieved. But there is need for more inquiry to provide robust evidence for this impact.

Oman's economy is not highly diversified, and digitalization is being used to develop tourism and the exports of mined commodities, petrochemical products and fertilizers, steel, and automotive components. However, the impact of digitalization in diversifying the Omani economy and its exports is not currently large enough to significantly change the country's dependence on oil and gas exports. In Saudi Arabia digitalization is contributing to the diversification of the country's exports, but not to an extent that it is reducing its dependence on oil revenues.

For the low-middle income countries that are not major oil-exporters, the challenge of diversification is to move up the value-chain to produce and export high-value-added goods and services. The low take-up of digital technology seems to indicate that these countries have not yet achieved significant gains in terms of achieving their diversification and structural transformation objectives.

For **Jordan** digitalization has been used as a strategy for lowering the cost of production and export and raising the quality and price of exports. For instance, digitalization has allowed tourism-relevant information to be uploaded and curated online where it can be accessed through mobile applications that also process flight, accommodation, and tourism package bookings. Digital advances in sensor development, data management, engineering, and logistics have similarly enhanced the productive efficiency of Jordan's important chemical and textile export industries. On the other hand, the ICT sector exports remain limited to only 2.75 percent of Jordan's direct exports, which is not sufficient to change the country's diversification situation. Even though export data show a decline in volume of ICT exports during the last decade, production data show an increasing contribution to private sector GDP since 2016 (Gomes and Mahroum 2021c).

There is no doubt that digitalization is seen as a vehicle to spur diversification in Egypt, Lebanon, Morocco, and Tunisia, but there is no compelling evidence that this has been taking place in any significant way. In all three countries we notice the development of ICT-enabled services with the expansion of start-ups and digital innovations and a dynamic entrepreneurship scene, but the overall impact on diversification is still quite limited.

In **Algeria** digital transformation and a knowledge-based economy have been hailed as the answer to moving away from oil-dependence, but the country has achieved little in this regard. Digital technologies have had little impact in the production sectors, such as industry, agriculture, or even services, which create new activities and jobs.

Trade and exports of services

Hoekman (2021) attempts to assess the impact of digitalization and 'servicification' of the economy on trade of goods and services in Arab countries.

A first type of impact is directly observable regarding arms-length transactions of services captured through balance of payments data. A proxy of such transactions is 'other commercial services' exports, i.e., exports of services that are non-transport and on-tourism. This includes transactions relates to ICT and digital services. The available data for Arab countries are limited, uncertain, and incomplete, but show a lot of heterogeneity in terms of dynamism and composition. For the five-year period 2014–2019 the most rapid growth of exports of services related to digitalization (ICT and computer services) was by Saudi Arabia at over 20 percent, and in other oil-exporting countries (Bahrain, Kuwait, Libya, Qatar). However, there was negative growth in Egypt, Iraq, Jordan, and Tunisia. That said, more disaggregated data available for Lebanon and Tunisia show significant dynamism in sub-categories of exports of digital services.

The second type of impact is through global value chains. It is expected that digitalization should help reduce costs of cross-border transactions and increase a country's participation in traditional merchandise GVCs. This should be reflected in an expansion of integration in GVCs and an increased share of foreign value added in exports. The available data for Arab countries show that the foreign value-added share in exports remained relatively low and has not increased over the last few decades, unlike what has been achieved by high-growth East Asian countries. It is less than 10 percent in oil-exporting countries; between 10 and 30 percent for non-oil exporting countries; and highest for Lebanon, Jordan, and Tunisia at 25–30 percent. The third type of impact is through participation in new 'digital' GVCs, which supply digital services to users. There is limited data and evidence on the extent of participation by Arab countries.

Social impact, labor markets, inequality, and poverty

We focus in this subsection on the impact of digital transformation on how societies function leading to changes on how labor markets function, and possibly to increased market and political power for the business and corporate sector at the expense of labor (UNDP 2019). We consider three main social dimensions that relate to how digitalization impacts jobs and labor markets, women's access to labor markets, and inequality and poverty.

Jobs and labor markets: Evidence of job creation and destruction

Digitalization, robotics, and Artificial Intelligence are already altering the demand for skills, as an increasing number of tasks and jobs are automated and new jobs are created in new activities with low labor intensity and bias for high-end labor skills. These trends are already causing significant shifts in demand for labor between firms and across sectors in advanced economies and some upper-middle income emerging economies.

New technologies and their rapid advances increasingly require cognitive skills, such as the ability to interpret, analyse, and communicate complex information and solve problems. At the same time, digitalization and automation are reducing demand for basic manual labor skills in manufacturing and some services. Estimates by McKinsey (2017) and the World Bank (2016) indicate that 41–85 percent of employment in emerging economies could be automatable.

In the advanced economies, job losses have hit workers with mid-level skills who tend to perform routine (repetitive) tasks. Shifts in demand for labor skills have led to labor market polarization, with a sharp decline in mid-skill jobs relative to high-skill jobs, which tend to be complementary to new technologies, and to low-skill jobs, which tend to be concentrated in service activities and are too costly or impossible to automate. The trend in developing countries is not yet clear, although there is some evidence that a large number of jobs in middle-income developing countries could be at risk from automation unless workers learn new skills.[35]

Remaining competitive in the face of new technology increasingly seems to require tertiary education, which is still unreachable for a large majority of youth in most developing countries, including middle- and upper-middle income countries. Even advanced economies, such as the United States, are facing serious difficulties keeping their labor force competitive in the face of unrelenting technological changes. The solution may require complementary policies, including innovations in developing "21st century skills,"[36] which would work best in conjunction with the building of strong foundational abilities and the strengthening of social safety nets.
In Arab countries, the ICT sector has expanded rapidly with the adoption of the new technologies in telecoms, now contributing a significant share of employment and GDP in many countries. For instance, in Tunisia the share of the ICT sector in GDP increased from 2 percent in 2002 to 4.3 percent in 2017 (World Bank 2020b). McKinsey (2016) estimates the share of the digital economy in GDP in 2015 at 8 percent in Bahrain and 4–5 percent in Kuwait, Egypt, and Saudi Arabia.

In this subsection we focus more on the impact of the adoption of digital and information technologies by existing other businesses. Various regional studies have provided ex-ante estimations of potential impact of automation on jobs, but this evidence remained at a very general level, rather than actual evidence on the ground (McKinsey Global Institute 2018; AfDB/ADB/EBRD/IDB 2018; ESCWA 2019a; ESCWA 2019b; ESCWA 2019c; AUC/OECD 2021). The McKinsey Global Institute (2018) study is the basic reference. This study provides an overall estimation of potential automation of existing work activities for five GCC countries (Bahrain, Kuwait, Oman, Saudi Arabia, UAE) and Egypt, which ranges from 41 to 48 percent. The total number of jobs at risk from automation is estimated at 20.8 million for the six countries, of which 11.9 million are in Egypt. Of course, the risk of automation varies by type of occupation and sector of activity. The study also notes that the process of actual adoption of automation technologies is characterized by much uncertainty in terms of timing and extent and depends on the countries involved.

In a similar vein, ESCWA (2019a) suggests that on average in Arab countries 8 percent of low-skilled jobs are at high risk of automation, 68 percent of medium-skilled jobs are at medium risk of automation, and 24 percent of high-skilled jobs are at low risk of automation. This translates on average at 45 percent of jobs at risk in countries where estimations are available. Jobs in agriculture and industry are at greatest risk, while those in arts, entertainment, recreation, health care, and education at much lower risk (McKinsey 2018). The highest impact countries are Egypt, Morocco, Qatar, Syria, Tunisia, and Yemen. The lowest impact countries are the other GCC countries: Iraq, Lebanon, and Libya. For Lebanon the impact may be as low as 20 percent, but these figures do not take account of specific activities and skills intensity. For example, in Lebanon the job loss would be heavily skewed towards low-skilled workers, who constitute about 20 percent of the overall labor force and 37 percent in production.

All these numbers remain very tentative and uncertain. For instance, since the Lebanese economy is extremely reliant on the banking industry, which accounts for a large part of the already dominant services sector, this will further magnify the effect of automation because of the wide change that will occur as banks heavily shift towards

[35] According to the McKinsey Global Institute (2017), in China alone more than 100 million workers could need to learn new skills that complement new technologies and switch occupations if automation is introduced at a rapid pace.

[36] World Bank (2018c). Spotlight 5, pp. 164–66.

automation. Job losses of the unskilled are likely to swell the ranks of the employed in the informal sector, which already constitutes 55 percent of workers in Lebanon. However, it should be noted that in the Lebanese context where 95 percent of firms are micro to medium, the effects of automation on employment will be mitigated as small firms are less likely to adopt automation of jobs. Beyond the studies that have tried to estimate ex-ante the risks of job destruction, there has been a recent stream of research that studies the actual impact of automation on jobs and wages. The pioneering work by Autor et al. (2003), Acemoglu and Autor (2011), and Autor and Dorn (2013) on the US labor market and other work using data from European countries has shown that automation has led to job polarization. Three main findings are that: (i) the relative share in employment of routine tasks (cognitive and manual) has declined (because of technology and/or off-shoring); (ii) routine intensive tasks tend to be in the middle-skill jobs category, mainly composed of machine assemblers and operators, and robotization is strongly associated with displacement of these middle-skills jobs; and (iii) this results in a process of polarization and hallowing out of the middle-skills and middle-wage distribution.

The newly emerging work on the developing countries has not uncovered similar evidence. Lewandowski et al. (2019) and Maloney and Molina (2020) find limited or no evidence of polarization. The middle-skills category tends to grow at the same rate or more than other categories, and there is no evidence of impact of robotization on growth of middle-skills jobs (effect is either insignificant or positive). At the same time the task intensity of occupations differs significantly from that observed in advanced countries.

Many reasons have been advanced to explain the differences in findings between advanced and developing countries (Maloney and Molina 2020). Initial conditions in terms of structure of production and employment in developing countries are such as there are few middle-skills (routine) tasks. There is also less potential for automation because of lower absorptive capacity, high investment costs for automation, and more limited capacity for maintenance, which means slower rate of technological adoption. Finally, some developing countries benefit from off-shored jobs, as lower relative wages provide incentive to off-shore jobs from advanced countries instead of increasing automation.

There is very limited empirical research on these issues in the Arab countries. Regional studies that have approached this issue have achieved little progress in understanding the impact of digitalization on job creation and destruction in the region. The realization of the potential for automation depends on the speed of digitalization, which itself depends on the institutions, policies, and incentives prevailing in any country. As discussed above, given the low level of adoption of digital technologies by businesses, the impact of digitalization on job creation and destruction has been muted in Arab countries. For instance, this is evident in the cases of fintech and e-commerce, which are still at a very early stage even in the most advanced GCC countries.

GCC countries are the most advanced in terms of adoption of digital technologies by businesses. There is anecdotal evidence of some destruction of jobs, but the size of impact on the labor market is quite limited. This is particularly the case for Oman. Progress on e-government and online delivery of services to 2.3 million clients is reported to have reduced its frontline working hours in 2019 by 160,000. There is some evidence that in the private sector jobs that are vulnerable to displacement by digitalization have been steadily disappearing. This includes low and semi-skilled or repetitive work performed by plant operators in its manufacturing sector as well as jobs such as travel agents that are less in demand because travellers can now search and book their own flights, tours and accommodation online (Gomes and Mahroum 2021a). For Saudi Arabia the evidence of job losses due to digitalization is limited to chatbots or call centres as examples of how digitalization renders certain types of low-skilled or repetitive workers redundant, in both the private and public sectors (Gomes and Mahroum 2021b).

On the other hand, there is more evidence about job creation in ICT-*intensive*, ICT-*dependent*, and ICT-*enabled* activities in Oman and Saudi Arabia. In Oman, during the 2016–2019 period, while total employment increased by 8 percent, employment in these three categories increased much faster by 27.8 percent (such as software developers and computer engineers), 33.8 percent (such as financial analysts and multimedia specialists), and 27.4 percent (such as pharmacists and auditors). Similarly in Saudi Arabia statistics show that since Vision 2030 was launched, the three categories of work created by digitalization increased significantly: in ICT-*intensive* sectors by 43.7 percent in computer programming and 6.9 percent in the manufacturing of computers, electronics, and optical equipment; in the ICT-*dependent* sectors by 52.7 percent in film and music recording; and in ICT-*enabled* sectors by 50.6 percent in information services and 30.6 percent in delivery logistics (Gomes and Mahroum 2021a, 2021b).

It is noteworthy that this evidence does not provide information about non-ICT related activities such as manufacturing, banking, transportation, trade,

construction, or agriculture. Very little is known about the impact of digital technology adoption in such activities.

The case studies of Arab other than GCC countries provide limited evidence about the effects of digitalization on either job creation or job destruction in existing activities. According to Ben Youssef (2021), in Tunisia there is some evidence of stronger demand for skills and substitution towards more skilled labor. The demand for digital skills has been growing, and digital skills are increasingly becoming core competencies in many professions. On the other hand, Marouani et al. (2020) find a mixed picture: the share of higher-skilled jobs increased from 2000 to 2010, while that of middle-skills declined; however, the reverse happened during the period 2010–2017. And when testing more formally for job polarization, they find no evidence in Tunisia during any of the sub-periods during 2000–2017.

The changes in shares of middle and higher-skilled jobs seems to be driven by a variety of other factors beyond automation, such as the changes in supply of skills, employment in the public sector, the relative growth of sectors such as agriculture, or in self-employment. In fact, there is no evidence of a decline in the share of routine jobs or middle-income jobs for both periods 2000–2010 and 2010–2017. It does not seem that automation of routine jobs has been taking place! In fact, there is evidence of an increase over time of the average routine intensity of occupations in **Tunisia**. It has also been found that there has been a higher rate of increase in wages of low-wage jobs during the period 2000–2010, and a decrease of earnings inequality over the same period. In this, a decrease of the education premium has played a major role. These findings are consistent with those in other developing countries by Lewandowski et al. (2019) and Maloney and Molina (2020).

In **Morocco**, according to the Central Bank the digitalization of the financial sector has led to a 1.5 percent decline in employment since 2004 due to the decline in jobs in the banking sector, such as agents, cashiers, etc. On the other hand, the subcontracting of some activities (cash in transit, security guards) has been generating jobs in other sectors (Abdelkhalek et al. 2021).

The impact of the digital economy on employment in **Egypt** is difficult to assess. The trend of embracing innovative digital platforms is likely to gain momentum, which creates opportunities to increase businesses efficiency as well as provide opportunities for women, young graduates, and people with disabilities. However, research studies have shown that the inability of producers to leverage digital platforms to achieve economic growth (often due to lack of technical education and knowledge) will mitigate any potential positive effects on employment unless there are large and advanced production bases. Therefore, Egypt needs to continue building the universal ICT infrastructure, developing human capital (including digital and ICT-related skills), promoting innovation, strengthening the development of financial inclusion, deregulating the business environment to help minimize the disparities between urban and rural areas that could be further exasperated due to the acceleration of digitalization, and striking a balance between digital access and digital equity (Kamel 2021).

In Jordan the evidence about the impact of digitalization on employment is scarce and ambiguous. Given the low-level of adoption of digital technology in Algeria, there is no evidence of an impact on jobs destruction or creation.

Women in the labor market

There is some evidence that digitalization is improving the prospects for women's access to skilled employment in GCC countries. In Oman nearly three quarters of recent tertiary graduates in ICT subjects are female, and there is near parity in the ICT-intensive jobs category (49.9 percent being held by females). This is a significant outcome given the very low employment rate (23.7 percent) for professionally qualified women aged 25 to 29 years in Oman, as in all Arab countries.

In Saudi Arabia the female labor force participation rate has increased from 17.4 to 31.3 percent since the government called upon women to join the workforce in Vision 2030. The ICT sector has contributed to this outcome, with women joining the sector at a faster rate than men, though in a limited way, with strong access in ICT-intensive jobs in computer programming (49.3 percent increase), and in the manufacturing of computers, electronics, and optical products (10.8 percent increase).

At the same time that women are joining the ICT sector, in Oman they continue to be held back from entrepreneurship and the creation of businesses. Women report that they have much more difficulty accessing capital, business training, and mentors, as local business networks are dominated by men who do not always welcome their participation. However, progress is seen in **Saudi Arabia** following the push for entrepreneurship in digital and other sectors in Vision 2030, combined with the lifting of various restrictions on women by the government. As a percentage of the adult female population, the share of those in business since the strategy was launched has climbed from less than 1 percent to almost 15 percent. For the first time in Saudi Arabia start-ups led by female entrepreneurs outnumber men, despite the fact that

female entrepreneurs continue to encounter difficulties as businesspersons in society.

But digitalization is helping in many ways. For example, when seeking services from government offices that are configured only to serve male clients or that require them to be accompanied by a male guardian, women report that e-government portals are helping them to bypass such obstacles to access and complete various administrative formalities. For Saudi businesswomen whose movements have been curtailed by gender segregation, and who have limited resources, business contacts and potential customers outside their immediate family circles, social media platforms, and Internet forums are providing them with a means of launching a business online, and then helping them grow a brand and customer base and to develop business networks. Female entrepreneurs in the digital sector report that starting a business has been a challenging but emancipating opportunity for professional growth and personal development, which has also led some to develop more egalitarian relationships with males within their families and social circles. But digitalization itself may be used to achieve greater efficiency in cultural practices that maintain inequality. For example, the Saudi Ministry of Interior has developed a digital application (*Absher*) to allow male guardians to use the country's high level of digital connectivity to control the lives of women more efficiently. If, for instance, a woman uses her passport at a restricted location such as a border checkpoint, an instant notification is sent to the smartphone of her registered guardian. The *Absher* homepage states that it is "Gladly serving more than 18 million verified users" (Gomes and Mahroum 2021a, 2021b).

In **Jordan** analysis of ICT workforce data indicates that digitalization is having an important positive impact on women's access to employment. For ICT firms a third of all employees in 2018 were female, which is almost twice the national employment rate (17.7 percent). It should be noted, however, that while digitalization has created employment opportunities for women, it has had no discernible impact on the problem of unequal compensation and work conditions. Interviews with Jordanian women suggest that discrimination in pay incentives and access to external training and promotion is perceived to be as significant an issue as inferior pay. Also in Jordan, female entrepreneurs report that they face exclusion from business networks dominated by males. Their husbands and families also impede their efforts, for example, by forbidding them from travelling unaccompanied for business purposes. As a result, the total early-stage entrepreneurial activity rate for females of 6.8 percent is almost half that of males (11.4 percent), and just over 3 percent of working age women in Jordan are self-employed, compared to 17.3 percent of men (Gomes and Mahroum 2021c).

Lebanon suffers from a massive gender gap in many areas in the economy and society (ranking 145 out of 153 countries), and it has mixed standing at best with respect to various indicators relevant to digital technologies, such as labor market participation, pay parity, ownership, and access to resources. However, education and recent evidence on the participation of women in the existing tech sector shows that the development of the digital sector in Lebanon will help in bridging the gender divide. For instance, according to a study at the Beirut Digital District, which is the premier hub that provides space for approximately 70 tech start-ups and companies with 1,300 employees, the gender ratio is 1.22 in favour of women. However, at the executive level the ratio is 80 percent men to 20 percent women (Dibah 2021).

We have no evidence about the impact of digitalization on the participation of women in the labor market in Algeria, Egypt, Morocco, and Tunisia. There has been no systematic change in the rate of female labor force participation between 2010 and 2019 in the four countries. It has declined in Egypt (from 24.3 percent to 20 percent) and Morocco (from 27.3 percent to 23.4 percent), while it increased somewhat in Algeria (from 15.5 percent to 18.7 percent) and Tunisia (from 26.9 percent to 28.1 percent).[37] It is difficult to link any of these changes to digitalization.

Income inequality and poverty

Little work has been done on the direct impact of digitalization on poverty in either advanced or emerging economies. The existing literature mainly focuses on the positive impact of digitalization (e.g., e-commerce, SME growth, mobile banking, etc.) on job generation and thereby on reducing poverty. It is only indirectly through the impact of digitalization on inequality that we can assess how digitalization may potentially have an adverse impact on poverty, discussed extensively by Yusuf (2021) and Bourguignon (2022). There are two main channels of impact. One of the main effects of digitalization is on inequality in labor incomes between skilled and unskilled workers. Digitalization is expected to cause an increase in productivity and in the demand for skilled labor and a decrease in demand for unskilled labor, resulting in increased inequality of earnings between the two. This results in greater wage differentials between workers according to skill levels. The second channel is through digital technology magnifying the scale and network

[37] The rates are with respect to the working population aged 15–64, using ILO modelled estimates.

economies, leading to more concentration favouring a small number of superstar firms, which can charge higher mark-ups and get a greater capital share of income. In advanced countries globalization, which reallocates employment in low-skilled occupations and tasks these to less-developed countries, leads to added downward pressures on wages for the unskilled,[38] as evidenced by the fact that the average wage growth has not kept up with productivity growth in either manufacturing or services.[39] However, Yusuf (2021) argues that Arab countries have been lagging in the adoption of digital technologies by businesses in the production and distribution of goods and services, and there is no evidence this impact on inequality is emerging. The country case studies in this project provide only anecdotal evidence in this area.

In Jordan the skill and education requirements of professionals employed in the digital sector command, on average, more than twice the salary of retail, service, or lower-skilled occupations. But while digitalization is providing opportunities for the 1.5 percent of Jordanians with tertiary qualifications to earn good wages, this proportion is not large enough to exacerbate wage inequality overall (Gomes and Mahroum 2021c).

According to Dibah (2021), in Lebanon it is expected that automation and digital technologies, by favouring higher skilled workers, will only worsen the current labor distribution of income. On the other hand, Lebanon has a substantial skilled migrant workforce that works in the Gulf Cooperation Council, Europe, and the United States. This skilled labor migration is a major generator of current skill-based inequality between the migrants and all forms of local labor, whether skilled or unskilled. In this respect, the adoption of new technologies in Lebanon will have a mitigating effect on income differentials between local skilled labor and migrant skilled labor as wages of local skilled labor increase with increased demand for skilled labor resulting from growth of high technology sectors. At the same time, the introduction of new technologies will likely lead to an increase in inequality between capital and labor incomes, increasing the share of capital income in Lebanon.

In Tunisia digitalization seems to benefit the most skilled people and is marginalizing the less skilled people, but there is limited empirical evidence. In addition, digitalization is not benefiting unemployed people; and unemployment remains high despite the progress of equipment and use of digital technologies.

5. Bottlenecks and Policy Challenges

All Arab countries included in the case studies have developed very active strategies and elaborate frameworks for digital transformation. As shown in previous sections, Arab countries have invested heavily in the development of digital infrastructure and connectivity. They have succeeded in improving access and in narrowing the digital divides. Arab countries, especially the low and middle-income countries, still need to improve access and connectivity. Like most developing countries, they need to pursue universal access and address gaps in adoption (ITU 2021d). Financing constraints, at the macroeconomic as well as the microeconomic level, and ways of financing digitalization need to be addressed. Nonetheless, at this stage the country studies in the Arab region have revealed that the focus needs to be on many other issues.

The populations of Arab countries are very active users of digital technologies. But Arab countries continue to lag in terms of adoption of digital technologies by firms and to take advantage of the opportunities offered to improve productivity, create better jobs, and diversify their economies. Challenges vary from one country to another and differ overall between GCC and other Arab countries. But we have identified eight major bottlenecks, which are relevant to a significant degree in at least a few countries:

1. Human capital, skills, and labor markets
2. Digital divides differences in access
3. The challenge of e-government
4. Digital technology adoption by businesses and innovation
5. Regional and global regulatory challenges
6. Taxation and regulation of digital transactions
7. Competition and regulations
8. Cybersecurity, privacy, and data protection

Human capital, skills, and labor markets

As with previous studies, all country case studies identified skills and human capital as a major bottleneck to progress on digitalization. For instance, studies about the GCC have consistently called attention to the constraints on digitalization due to inadequate skills and training (McKinsey Global Institute 2018, Strategy& 2017). This

[38] See https://oecdinfo.oecd.org/info.aspx?app=OLIScoteEN&Ref=DSTI/ICCP/IIS(2016)1/FINAL
https://www.imf.org/external/np/g20/pdf/2018/071818a.pdf.

[39] OECD (2018a), chapter 3. As the OECD notes, evidence on the drivers of the decline in the labor share remains limited, but some studies suggest that advances in ICT that lower the cost of investment goods as well as "scale without mass" and "superstar" dynamics unleashed by digitalization and globalization (Autor et al. 2020) played a role. The adoption of technology may also exacerbate regional inequalities. In the United States, for instance, regions most exposed to the adoption of robots saw large negative effects on employment and wages (Acemoglu and Restrepo 2018). For an excellent treatment of this topic and the links between inequality and globalization, see Bourguignon (2015).

has also been raised in other regional studies by ESCWA and the World Bank, and it is highlighted by sectoral studies such as on fintech in the GCC (Mueller and Piwowar 2019), where lack of skills and talent is found to be a major constraint on the development of these activities.

Educational systems in Arab countries have allowed strong advances in literacy and levels of schooling over the last few decades. But Arab countries have not reaped the economic benefits from their investments in education due to the low quality of learning and mismatches between the supply and demand of skills (World Bank 2019c).

Country papers argue that the education systems limit the supply of graduates capable of becoming skilled ICT professionals. Secondary-level students across the Middle East do not acquire the capabilities needed to work in knowledge-based activities or pursue tertiary qualifications in disciplines such as ICT. There have been significant investments in higher education and great gains in the number of graduates at the tertiary level in many countries, especially among women. However, most of the tertiary education graduates are in humanities, religious studies, and philosophy, and the tertiary sector is producing a smaller proportion of graduates with ICT qualifications than countries rapidly advancing in digital transformation. Recent TIMSS (Trends in International Mathematics and Science Study) international assessments of student capability in mathematics and science in 2015 and 2019 show that the performance of Arab states (Bahrain, Egypt, Kuwait, Jordan, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, UAE) remains at the bottom end of its 64-country comparison. Bahrain, the UAE, Qatar, and Oman tend to have the highest scores among Arab countries, but they all remain below the "centrepoint" of all scores. Studies of TIMSS results show that most of the variance in mathematics and science performance across countries is not explained by school factors (which recent reforms have focused on), but rather by parent, cultural, and institutional characteristics. This means that spending more on schools alone will not yield the improvement required. The overall implication is a need to temperate the aspirations for digitalization and for building a knowledge-based economy and to focus on cultural change and reforms of the educational system.

ITU (2021b) provides specific data on the penetration rates of basic, standard, and advanced ICT skills in a few Arab countries (Table 4).

Arab countries vary considerably in the ability of their citizens to possess basic, standard, and advanced ICT skills. On basic and standard skills, we observe the major distinction between the three country groupings. The proportions of the population who possess basic and standard skills in the GCC countries tend to be higher than those of the middle-income countries and are on par with advanced countries, while those of the lower-income

Table 4: Penetration of population with basic, standard, and advanced skills, 2020 or latest available year (%)

Country	Basic Skills/1	Standard Skills/2	Advanced Skills/3
Arab countries			
Algeria	18	12	7
Bahrain	63	48	17
Djibouti	17	13	5
Egypt	55	43	11
Iraq	30	1	5
Kuwait		44	15
Morocco	40	28	10
Oman		37	8
Qatar	47	30	5
Saudi Arabia	61	64	21
Sudan	3	2	2
Tunisia	21	17	16
UAE	79	69	17
West Bank and Gaza	13	6	3
Advanced countries			
Finland	74		9
Germany	65		5
Ireland	58	41	7
Japan		49	4
South Korea	72	51	7
Sweden			11
Switzerland			10
United Kingdom	68		7

Source: ITU database, 2021
1/ Basic skills are defined as copying or moving a file or folder, using copy and paste tools, sending emails and attached files, and transferring files between a computer and other devices.
2/ Standard skills include using basic arithmetic formula in a spreadsheet; connecting and installing new devices; creating electronic presentations; and finding, downloading, and configuring software.
3/ Advanced skills would allow writing computer programmes using specialized programming language.

countries are very low. All countries tend to have a low percentage of the population who possess advanced skills, with the UAE, Bahrain, and Tunisia having the highest numbers (Table 4).

Interestingly, according to ITU data the percentages for many Arab countries are even higher than those of advanced countries. The mismatch is even greater between the skills for existing jobs and those required for the jobs of the future.

Oman and Saudi Arabia suffer from all these same problems, and they have launched initiatives to mitigate the issues. This includes in the case of Saudi Arabia an important Irtiqaa initiative (within Vision 2030) which aims to engage 80 percent of parents in their children's learning by 2020, along with establishing parent-led school boards and discussion forums to engage parents, and raising awareness among teachers and equipping them with effective methods for engaging parents in children's learning. To date no process or outcome data about this initiative has been released, but such a culture change in social norms could require a generation to achieve. One major policy challenge related to human capital and the availability of skills that is specific to the GCC countries is the structure of their labor markets and the intensive use of foreign workers in their economies. These countries have in most cases launched 'nationalization' policies for replacing foreign workers with nationals, which pose major challenges for digitalization (Gomes and Mahroum 2021a, 2021b).

In Oman and Saudi Arabia (as in other GCC countries) several decades of preferential access to well-paid public sector jobs has made the private sector comparably less attractive to skilled nationals. They expect better pay, working conditions, job security, and pension plans akin to what is offered in the public sector, and are more likely to leave the private sector (including from Omani owned firms) for the public sector. Some even prefer to remain unemployed than accept private sector offers that they perceive to be inferior. A key challenge for policy makers is thus to reduce the disparity so that the private sector can compete for skilled nationals (Gomes and Mahroum 2021a, 2021b).

Until recently, it was difficult to attract skilled Saudi nationals to the private sector. The Saudi Ministry of Human Resources and Social Development has set a minimum wage for specialized and technical jobs such as ICT professions, but previous Saudization policies have rendered the private sector so unattractive to tertiary-educated Saudis that firms report difficulty in recruiting them (including to fill Saudization quotas) even at twice the salary of better skilled and more productive foreign workers. At the same time, the government's current Saudization policies are making it difficult for firms to employ skilled foreign personnel to fill the shortage of home-grown talent. If these Saudization-based supply and demand bottlenecks of the flow of skilled Saudi and foreign manpower into the ICT sector are not addressed, the government's hopes for capturing the range of digital dividends enjoyed by the nations ahead of it may be thwarted (Gomes and Mahroum 2021b).

In Jordan the level of digital skills across a youth dominated population is perceived to be high according to the executives from Jordanian firms. However, it is estimated that 48.5 percent of young adults aged 15 to 24 and only 4.8 percent of the total working age population possess basic ICT skills. Jordan has implemented a number of actions, such as the *National Human Resource Development Strategy 2016–2025*, to expand parenting programmes and to mobilize families to support children's learning at home and school, as well as other initiatives to strengthen skills and qualifications in ICT professions (Gomes and Mahroum 2021c).

The weaknesses of the educational system and limited supply of digital skills are also significant in Tunisia. There is growing demand for expertise in fields linked to the technological revolution (digital, automation, science), and digital skills are required in various branches and sectors. While there is oversupply of tertiary educated youth, the supply of ICT-skilled is constrained. The COVID-19 pandemic has accelerated digital transformation and the need for new digital skills, creating more pressure in the labor market for skills. As in other Arab countries, Tunisia should be investing more in upskilling, understanding the added value of those technologies and the large opportunities (economic and social) they can offer. A large part of Tunisian society is lacking the basic e-skills that are necessary for a critical and sure use of digital technologies, as shown in the very low score in Table 4. For example, they are lacking basic skills about privacy and security in the use of digital technologies (Ben Youssef 2021).

The situation may be somewhat different in Lebanon, where the mismatch is mainly a demand-side issue, and where skilled labor produced by the educational system lacks demand for it in the economy. Nevertheless, digitalization requires new skills that need to be constantly updated; and the educational system in Lebanon needs to be reformed to avert the labor mismatch problem from becoming a supply-side one. There is need for an overhaul of the system of education that goes beyond the

production of a specialized minority of digitally-skilled workers towards the engendering of a society-wide digital literacy. What is needed is one that teaches skills that are relevant for the digital age, such as creativity, coding, and communication, all of which are all currently missing in the regimented standardized Lebanese curriculum (Dibah 2021).

The lack of digital skills is considered to be a major constraint to progress in digitalization in Egypt. The government has been investing resources towards upskilling, reskilling, and providing lifelong learning and capacity-building in different ICT specializations as part of the digital skills and job component of Digital Egypt. Additionally, in order to increase the competitiveness of innovative and tech-enabled start-ups, the government launched a series of initiatives, mentorship programmes, boot camps, ideathons, incubations, and acceleration schemes targeting undergraduate and graduate students, entrepreneurs, and professionals. During the fiscal year 2019–2020 some 13,000 learners were trained; and during fiscal year 2020–2021 the plan is to train 115,000 learners, demonstrating the acceleration of the reskilling and upskilling of human capital through multiple private and public sector channels. One of these programmes addresses the creation and empowerment of an innovation culture within SMEs and leverages their capacities to generate and implement innovative ideas. The skills development and job creation components also support the entrepreneurial space by creating tech-hubs across the country. To date, six of Egypt's universities in the governorates of Sohag, South Valley, Qena, Menoufia, Minya, and Mansoura have an on-campus tech-hub, reflecting the important role of universities in promoting entrepreneurship and innovation among youth. Despite these efforts, however, the seamless integration of ICT and digital skills into education and lifelong learning at the level and pace that can help achieve the transformation expected through digitization is yet to be realized (Kamel 2021).

In Algeria there is a need to invest in the skills required to cope with the impact of digitalization on jobs. The scores in Table 4 are exceedingly low for Algeria, and the learning should target transversal skills and competencies that are adapted to digitization (Belaid et al. 2021).

Morocco also suffers from the digital skills imbalance, which constrain digital development. Morocco's labor market has not been able to provide digitally skilled workers, where 70% of ICT recruiters stated that they face difficulties to find digitally experience talent (Digital Talent Review: A Huawei Initiative 2021).

In many Arab countries, specifically in Jordan, Oman, and Saudi Arabi, the low level of proficiency in English has been identified as a major constraint to benefiting from digitalization. English is the common language of international trade and the dominant language of the Internet, being found on 60 percent of all websites, compared to around 1 percent that are presented in Arabic. As a predominantly Arabic speaking country, Oman ranked second to last out of 100 countries on the 2020 English First – English Proficiency Index, and this limits their access to online markets.

The deep penetration of the Internet in Saudi Arabia has enabled access to a wealth of global information and goods and services, but much of it remains unknown among the 73 percent of its Arabic speaking Internet users who do not understand the English language, used on most of the world's websites. As a consequence, digitalization is creating a digital divide that excludes Saudis who lack this proficiency. This is especially acute for older persons, with only 8 percent of Saudis aged 35 to 44 years using the Internet and less than 1 percent of the 5 million Saudis who are even older, having ever been online. This category of the population is missing out on the countless communication, e-commerce, entertainment, and online education opportunities, and are excluded from the country's expanding array of e-government services. The growth of e-commerce creates a tangible advantage for Saudis who are proficient in English. For consumers it means having a wider range and more competitively priced options to choose among. For sellers it means being able to negotiate better deals from a much larger competitive pool of suppliers and making more sales by virtue of access to a much larger customer base.

Jordan also faces a serious problem with respect to language proficiency. Of the 100 countries surveyed on the English Proficiency Index, Jordan is ranked 72 and its people prefer to use sites in Arabic rather than English. Studying ICT at the tertiary level requires proficiency in English because it is the basis of programming languages and computer software. For example, the 10 most popular Youtube.com sites in Jordan are all in English, as are nine of the 10 most followed profiles on the Twitter social media platform. Language thus represents a barrier to the development of e-commerce and the government's goal of developing digital services exports beyond the Middle East.

In Morocco the language barrier is largely behind the limited development of e-commerce. Most of the Moroccan commercial sites present content only in French, while a large proportion of consumers need access to Arabic-language content in order to be able to better choose the

products and services to be purchased and to understand in detail the general terms and conditions of services.

The shortage of online content in Arabic is beginning to spur demand for its creation among developers across the Middle East. Global e-commerce retailers are already starting to use Artificial Intelligence to translate their websites into Arabic for local users. Incentives for producing content appropriate for the Omani and Saudi market are starting to emerge. For example, content sharing websites such as YouTube (the second most popular website in these countries) has introduced a monetization policy that pays users for producing local content, most of which is in Arabic. Some Saudi and Jordanian entrepreneurs in the digital sector are seeing low proficiency in English in the Arabic speaking Middle East as an opportunity to 'Arabize' software and websites developed in other languages. Over time, digitalization in Saudi Arabia and other Arabic-speaking countries may underpin the emergence of a regional Internet culture that is driven by the development of content in their preferred language, and one that more closely reflects the interests and preferences of the citizens of this part of the world.

Oman enterprises are recognizing the opportunity that exists for developing content that serves audiences across the Middle East. For instance, an e-learning organization (Omani Society for Education Technology), which began operations in 2014, focuses on educational technology and content creation in Arabic, delivering this to over 10,000 individual members and educational entities across the Sultanate. In Jordan, Mawdoo3.com, which serves as a Wikipedia-like portal for the Arabic-speaking world, began in 2010 and claims to have 150,000 articles online covering lifestyle, health, education, food, and many other topics, and is reaching over 45 million unique monthly users. Likewise, Jamalon.com is a Jordanian online bookstore that supplies the Arabic-speaking world in the way that Amazon did in its infancy. In Saudi Arabia the Attaa initiative was launched in 2018 to spread digital culture to meet the knowledge needs of Arabic speakers by engaging Arabic-speaking technology specialists to become more active in enriching online digital content in this language.

Digital divides and differences in access

While most Arab countries, especially the GCC and the lower-middle income countries, have to a large extent overcome the digital divides related to access to digital infrastructure, other divides have emerged that constitute major constraints for vulnerable groups. While there may be few issues of access to the Internet in the GCC countries, various problems of access appear to be significant in some of the lower-middle income countries due to the cost of access or the quantity and quality of infrastructure.

In Jordan the high cost of the Internet is a significant barrier. Although growth in fixed and mobile Internet coverage to 88 percent of the country has brought the Internet within reach of most Jordanians, around a third of the population is not using the Internet as the cost of access subscriptions is over four times higher than the international median. This issue threatens to create a cost-driven *digital divide* that excludes, in particular, the 15.7 percent of Jordanians living below the poverty line and most of the 3.1 million displaced refugees on low incomes. As discussed in subsequent sections, telecom providers claim that high taxation and inefficient regulations are the main reason for the high prices and the suboptimal infrastructure spending.

In Tunisia the equipment divide is narrowing due to the rapid evolution of the technology and the sharp fall in the prices of equipment. However, significant differences in Internet access are still evident between the poor and the non-poor as well as between regions. People living in the big cities (Tunis, Sousse, Sfax) have better quality of bandwidth and better 4G coverage than the those in the countryside. Specific public policies are still needed to address social inequalities in access to equipment and infrastructure. There is also a gender gap: as of 2019, 72.5 percent of men have regular access to the Internet compared to 61.1 percent of women.

One important limitation for digital transformation in Egypt to impact economic growth are the digital divides that have been further exposed by the pandemic. The divides are caused by various inequalities within society, including but not limited to access to technology, education, job opportunities, gender, and health care as well as the public service support environment. They can also be found in laws such as the Data Protection Law (Law No. 151 of 2020) that requires from controllers and processors an application fee (a maximum of $1,280) to process personal data. The gaps in reach and quality of digital connectivity and digital literacy are also a determining factor for the country's future development. Digitalization is currently mitigating the pandemic-induced disruptions for only the segment of the population who have adequate access to the digital infrastructure. The digital divide could be narrowed if the proper investment is made to provide universal access to digital infrastructure. However, the divide in Egypt is also caused by the demand-adoption side, i.e., users who can afford buying the broadband service but are not doing so for various reasons, including being digitally illiterate or for the lack of available appropriate content. From a

different societal perspective, the availability of remote learning for some learners but not for others will create a new form of divide, which will impact the future career paths of many. The main cause of this divide is the lack of affordable bandwidth in remote locations. However, a secondary cause is the lack of technology devices to access remote learning. Studies show that the impact of home broadband access on learners' performance with a computer at home could increase school enrolment by 1.4 percent, improve academic performance, and lead to a 6 to 8 percent increase in high school graduates (Kamel 2021).

Digital divides, whether due to language proficiency or access to digital services, are also still significant in Morocco and Algeria, where they remain a major challenge to the adoption of digital technologies and the expansion of the digital economy.

The challenge of e-government

GCC countries have made significant progress in the digitalization of public services. But e-government remains a challenge for lower-middle income countries, as digitalization of public services has played a leading role in the digital transformation of the successful countries and accelerated their digital transformation. Lack of progress on e-government will continue to be a major constraint for progress in digitalization of these countries unless tackled.

This is the case in Egypt, Morocco, and Tunisia where, despite important progress and the establishment of new laws and regulations, neither country has reached a critical level of e-government and e-administration. Digitalization of public administrations is at the core of the three governments' agendas, but the end-to-end approach is lacking and digitalization of services is still partial. Promoting digital transformation in Egypt, Morocco, and Tunisia requires accelerating the transformation of public administration and e-government. The COVID-19 crisis has clearly shown the need for such a change.

The same situation applies in Jordan, and even more in Algeria and Lebanon, where e-government is lagging.

Digital technology adoption by businesses and innovation

A few Arab countries have made strong progress in terms of adoption of digital technologies by businesses (Jordan, Saudi Arabia, UAE), but most are still lagging. According to Yusuf (2021) the gap between Arab countries and the OECD average has widened between 2007–2008 and 2017–2018 in terms of labor market efficiency, business sophistication, and technological readiness and innovation. This may be a clear indication of limited adoption of digital technologies by Arab businesses, possibly because of managerial inertia, shortage of skills, or weak competitive pressures.

Benchmarking Oman's progress in digitalization shows that its firms are not moving very quickly to capitalize on digital innovations. The 2020 *Global Innovation Index* (GII) ranks Oman at 84 among 133 exporting countries, indicating that Omani firms do not exhibit high levels of innovation. Of most concern for policy makers is the fact that Oman's ranking on the GII has slipped 15 places over the last two assessments, indicating that Omani firms are not keeping pace with firms in other countries. The Omani Government has played a strong leadership role in driving digitalization in recent decades. The general population has embraced digital technology and become accustomed to relying on it for comfortable jobs, welfare, and more recently – through public sector innovations in digital infrastructure – e-government and a supportive ecosystem to nurture SME growth. The challenge for policy makers is to get Omani firms and entrepreneurs to accept the challenge of adopting digital technology through industry innovation and leadership (Gomes and Mahroum 2021a).

In Saudi Arabia, Vision 2030 calls for the use of innovative digital technologies such as automation, AI, fintech, and the like to stimulate job creation, productivity, and growth. This is central to the objective economic diversification. But Saudi Arabia's ranking on the Global Innovation Index has declined in recent years to 66 out of 131 nations in 2020. Compared to other countries with similar levels of GDP, it produces much fewer innovation outputs relative to what it invests. Despite its relative progress in adoption of digital technologies by firms, unless it is able to radically reverse this trajectory, it will face major obstacles to achieving its goals for economic diversification through digitalization.
In Egypt digital transformation has the potential to attract foreign direct investment (FDI) that can help leverage the local market through further automation as well as connect to the GVCs, but the limited adoption of digital technologies by businesses spans all sectors of activity, including agriculture, tourism, transportation, health, and education. This is well illustrated by the manufacturing sector, as innovative-based manufacturing remains largely unexplored. Introducing and benefiting from advanced digital production technologies could help improve the quality and offer opportunities to accelerate innovation in manufacturing and increase efficiency of industrial production processes as well as help create new industries. It can lead to the emergence of new job opportunities in more skilled and knowledge-based sectors. However, a prerequisite to adopt these new technologies is the active participation and engagement in GVCs. Today,

Egypt is considered one of the latecomers based on its level of engagement with advanced digital production technologies applied to manufacturing, and is classified more as a user rather than a producer of digital economy (Kamel 2021).

All other Arab countries lag further behind in the adoption of digital technologies by both private and public enterprises. In Algeria, Jordan, Lebanon, Morocco, and Tunisia the typical existing business firms may have a website or use information technology for the management of their standard operations; but few have fully adopted digital technology in a systematic way to run their operations, including their financial transactions, their sales, and purchases.

Regional and global regulatory challenges

Digitalization has enabled the creation of new markets; it also has the potential to increase cross-border transactions, leading to increased competition, economic benefits, and consumer surplus (OECD 2018b). Although many of the economic gains are likely to be captured by private firms and countries that control high-tech industries, significant gains could accrue to developing countries as well. Through cloud computing, for example, even low-income countries can benefit from the sophisticated algorithms and software developed in advanced economies.

Developing countries can enjoy the full benefits of new technologies in an inclusive manner only if competition is fair and takes place in well-functioning markets. However, some key features of the digital sector, such as economies of scale and scope and network effects, can favor the emergence of dominant firms (related to Big Data, platforms, computer algorithms, and machine learning, for example).

OECD research shows that business dynamism has decreased, particularly in ICT manufacturing and services. There is also evidence that mark-ups have been increasing (De Loecker and Eeckhout 2017; OECD 2018a). While higher mark-ups could indicate an abuse of dominant positions, other more benign factors, such as temporary restrictions to competition due to patents or higher-quality products, may also play roles. Some of the recent evidence based on the experience in advanced economies suggests that economies of scale and scope and network effects may be greater challenges for maintaining competition than previously realized. Policy makers therefore need to be careful not to confuse market gains by more competitive companies with abuse of dominant positions by firms with monopolies over certain technology or algorithm. A key issue is whether and how regulations and enforcement tools should be adapted in light of digital transformation. International cooperation will be key to tackling enforcement challenges from cross-border digitalization.

The potential to expand trade in services and participation in Global Value Chains (GVCs) in Arab countries depends to a large extent on the way these countries design their regulatory frameworks to be compatible with those applied by regional and international players. Hoekman (2021) argues that Arab countries are "well positioned" given their level and quality of digital infrastructure and institutions to benefit from the potential for expanding trade and exports that benefit from digitalization. However, there is a major challenge in terms of regulatory regimes, as there is strong heterogeneity in regulatory regimes toward digital transactions at the global level. Such policies towards cross-border flows of data, services, digital products, and providers of services are critical for the growth of trade in both goods and services. They may involve various dimensions, such as storage use and cross-border transfer of data, regulation on the conduct including taxation of transactions, or policies toward inward FDI and related intellectual property rights obligations. While standard trade policies that discriminate between domestic and foreign suppliers is central to the determination of the composition and content of trade, for digital services differences across-countries in regulatory frameworks are as if not more important.

There has been a global trend toward more restrictive policies on data flows across borders, with more screening of foreign direct investment (FDI), more data localization requirements, and more local content policies. There is little knowledge about regulatory regimes in Arab countries. Available information about broad classifications for a large group of countries show that some Arab countries have very restrictive data flow regimes (Tunisia), others have very open data flows regimes (GCC, Egypt, Iraq), and still others have a regime that allows flows conditional on attaining national standards (Morocco).[40]

Arab countries can do much more to use international cooperation as a tool to improve their digital-specific regulatory regimes. A key goal of such initiatives should be to adopt regimes that reflect internationally accepted good regulatory practices and that are accepted as such by major trading partners. This may involve a degree of harmonization through the adoption of international standards or procedures through which regulatory regimes are deemed to be equivalent. Such cooperation

[40] Based on Ferracane and van der Marel (2021).

will reduce the burden and cost for firms of meeting regulatory requirements pertaining to digital trade. This can be achieved through bilateral or multilateral trade agreements, or through issue-specific digital economy agreements as has been happening in East Asia and the Pacific. Arab countries have not been active or engaged in such efforts. This is a major challenge that needs to be addressed and goes beyond the standard trade discussions and agreements. Except for some GCC countries, Arab countries have not engaged in international initiatives to negotiate plurilateral agreements on matters that are highly pertinent to digital trade inside the World Trade Organization (WTO), including efforts to agree to a new agreement on e-commerce. Such cooperation need not take the form of a trade agreement but can involve international cooperation among regulatory agencies and the establishment of equivalence of national regulatory systems to facilitate (permit) cross-border data flows and international movement of services providers.

Taxation and regulation of digital transactions

The country studies of Algeria, Morocco, and Tunisia) do not discuss taxation . Other case studies cite them as a major bottleneck for the adoption of digital technologies and progress in digitalization.

For instance, the business model underpinning the Uber ridesharing platform has been characterized as a 'legal artefact' because the company claims to have no tangible assets or employees supplying transportation services in places where it operates. It argues instead that it connects consumers of taxi type services with local chauffeurs through a digital platform domiciled and administered in another country. This artful positioning allows Uber to exploit international tax treaties to repatriate the fees it charges for administering a consumer – supplier matching service to wherever its virtual operations are domiciled. This arrangement allows it to avoid paying value added tax (VAT) in Saudi Arabia and Oman, where it was scheduled to be introduced in 2021. This form of tax minimization undermines public confidence in the benefits of digitalization, as it introduces unfair competition vis-à-vis local companies. In Saudi Arabia, as revenues from the sale of online goods and services rise, so too does the number of companies seeking to game the VAT system through the cunning exploitation of such legal artefacts.

In Jordan, Oman, and Saudi Arabia, tax regulations were developed to handle value created and stored in tangible form rather than digital form. Given that this value was created off the back of the countries' sizeable public investment in digital infrastructure, their regulations need to be upgraded to avoid losing out on the returns. To prevent profit shifting to low-tax jurisdictions, new regulations are required that allow governments to tax profits based on where customers reside, irrespective of where the company providing digital services is domiciled. In Jordan, the government has established a tax regime for telecom providers that includes a 24 percent income tax, a 1 percent of operating revenues annual licensing fee tax, a 10 percent of operating revenues 'revenue sharing' tax, a 16 percent of invoiced sales value added tax, and a 26 percent of invoiced sales 'special tax' on VAT.

Telecom providers also claim that high taxation has also undermined infrastructure spending. The Jordanian government is aware that its high level of taxation is creating a bottleneck to digitalization by reducing the resources available to expand telecommunications infrastructure and raising the cost of Internet access beyond the means of low-income Jordanians. In 2019, it announced that it would renegotiate its revenue-sharing model with mobile operators to incentivize infrastructure spending. No changes have been forthcoming and the country's worsening fiscal situation in the wake of the pandemic makes changes even more difficult.

In Egypt, the taxation of digital transactions needs to be improved. VAT Law 67 of 2016 enables VAT collection from online platforms. However, Income Tax Law 91 of 2005 does not fully cater to digital realities as it misses opportunities to tax companies not incorporated under Egyptian law or with no headquarters in the country as well as for online advertisements (Kamel 2021).

Taxation has also been a constraint to digitalization in Lebanon, where the telecommunications sector performs poorly in terms in terms of mobile tariffs, international Internet bandwidth, and the number of active mobile broadband subscriptions. The sector's lagging status arises not from the ownership or market structure, but from the fiscal burden on the sector. The sector is considered a source for revenue for the government even when the mobile sector was private (pre-2002). Because the sector is now publicly owned, investment has been constrained by lack of fiscal resources.

Competition and regulations

Regulations for the digital economy seem to be adequate in GCC countries. According to the World Economic Forum's *2019 Global Competitiveness Report*, firms in Omani and Saudi Arabia perceive that good progress is being made by their governments in developing regulations to support digitalization. Of the 141 countries surveyed, Oman ranked 16th and Saudi Arabia ranked

11th for the adaptability of their legal framework to digital business models, they are ranked 10th and 2nd for their governments' responsiveness to change, 17th and 10thfor the burden of complying with regulations, and 25th and 17th for the efficiency of their legal framework in settling disputes. Both countries are signatories to a range of international copyright protection treaties, and have introduced copyright laws and improved the administration and enforcement of these laws. Surveys of local firms by the World Economic Forum for the *2019 Global Competitiveness Report* ranked Oman a comparably high 18 and Saudi Arabia 27 out of 141 countries for this aspect of its regulations.

In Jordan, intellectual property is protected under copyright, trademark, patent, industrial designs, trade secrets, and competition laws – all of which form a comprehensive framework of protections in line with international trends. Jordan is also a signatory to international treaties protecting intellectual property. Based on surveys of local firms by the World Economic Forum, Jordan ranks 35th out of 141 countries for this aspect of its regulations. Nevertheless, inefficient private sector infrastructure spending drives the high cost of mobile Internet in Jordan, as new telecommunications providers must invest in new infrastructure, such as mobile signal towers in areas that are already covered by those owned by other providers. Jordan's regulatory framework does not include obligations for providers to share infrastructure. This problem will be exacerbated with introduction of 5G, which will require many more cell signal locations, causing Jordan to likely fall behind other countries if a coordinated regulatory solution is not found.

Regulations of digital transaction in Egypt are still inadequate. For fintech, the regulatory authority is divided between the Central Bank of Egypt (CBE) and the Financial Regulatory Authority (FRA). The new Central Banking Law lays the foundation upon which it will regulate fintech. The CBE is empowered to exempt compliance with certain regulatory requirements in its regulatory sandbox, an important improvement that can allow more innovation. The CBE's prior approval is required for digital financing providers whose services are associated with electronic payment or electronic collection. The CBE licensing is mandatory for the issuance, trading, and marketing sectors, establishing platforms for the circulation or implementation of activities related to crypto-currency and electronic money. Further regulations are expected regarding the criteria, requirements, and scope of electronic applications that allow access to clients' accounts; electronic provision of services; electronic ratification of banking transactions, payments, and transfer orders; electronic settlement of cheques; issuance and circulation of electronic checks; and the delegation and direct deduction order for electronic copies. It is important to ensure that upcoming fintech regulations encourage, promote, and support innovative technologies that can help enhance financial inclusion and consequently economic development and growth while ensuring that fintech can fend-off the continuous push by traditional banks to prevent them from entering the marketplace given their significant potential role in supporting financial inclusion with implications for individuals, organizations, and society (Kamel 2021).

Except for a draft electronic transactions law pending before the parliament, there is no comprehensive legislation covering the electronic conduct of transactions, and especially the increasingly international aspect of it. Legislation is sporadic and fragmented. In terms of electronic payments, the private sphere is rapidly developing, with regulation by both the CBE and the FRA. The FRA has regulated electronic funding and collection transactions for microfinance associations and companies; enables micro-finance prepaid cards; and authorizes electronic issuance and payment of insurance policies premiums as well as the collection by electronic payment companies of compulsory insurance premiums. Before the issuance of the new Central Banking Law (CBEL), the CBE had issued several regulations on mobile payment services, contactless payments, and technical payment aggregator and payment facilitators. With the CBEL, the foundation has been laid for digital banks (which should operate under the same licensing requirements as traditional banks with the possibility of being exempted from the minimum capital requirement) as well as for Payments Services Operators and Payments Services Providers. These latter two must obtain a CBE license to deliver services in Egypt, regardless of their location, and are under extensive compliance and notification requirements, in addition to having to observe several rules governing banks (Kamel 2021).

Regulations in the areas of consumer protection, electronic signature, and competition are also in need of strengthening. Law 181 of 2018 introduces the concept of remote contracting and provides safeguards for the conclusion of transaction and product liability. However, the law excludes banking, financial, and capital market services; newspaper and periodical subscriptions; and booking transportation and hotels from its scope. Additionally, matters related to financial consumer protection is left to the CBE and the FRA. In data protection, Law 151 of 2020 covers direct electronic marketing by requiring marketing entities to provide data on their identity, address, and clear purpose of the marketing communication; to obtain the data subject's consent; and to allow for the existence of clear opt-out mechanisms to withdraw consent at any time.

The Law also sets timeframes for keeping underlying documentation.

Regarding the use of electronic signatures, Law 15 of 2004 grants them the same evidentiary power as wet ink signatures if they meet the statutory certification requirements. The law is mostly used for government digital platforms, with very little uptake in B2B or B2C transactions due the complex certification requirements. As to competition, the Egyptian Competition Authority lacks essential regulatory tools under Law 3 of 2005, such as directly fining violators or imposing ex-ante merger controls (although an amendment authorizing the latter has been approved in principle by the parliament in February 2021). Additionally, the competition framework is fragmented among competing jurisdictions (Kamel 2021).

Another example relates to the growth in virtual cryptocurrencies, which is creating a new challenge to the countries' ability to capture value generated by digitalization. The Saudi Arabian Monetary Authority and Jordan's Central Bank have banned banks from dealing in cryptocurrencies, but have placed no restrictions on individuals trading them in an unregulated marketplace. This hands-off stance in Jordan, Oman, and Saudi Arabia exposes the public to a heightened risk of fraud and exploitation, potentially allows for money laundering, and closes the door on a growing source of potential tax revenues.

Although this issue of cryptocurrencies has not been raised by country studies for Algeria, Lebanon, Morocco, and Tunisia, regulations to deal with the various aspects of the digital economy are generally deemed inadequate in these countries and require attention from public authorities.

Cybersecurity, privacy, and data protection

Cybersecurity and data protection are global challenges. They are critical for the development of the digital economy at the national level. Enhancing information-sharing and incident reporting frameworks and helping emerging market and developing economies build cybersecurity capacity and data and information sharing capacities are key to ensuring that critical aspects of the financial system are resilient.

As economies become more digitalized, there is a need to ensure that digital technology can be used safely by governments, consumers, and firms. The incident of cyber-attacks and cyber-crimes increased during the COVID-19 crisis. Arab countries need to introduce and/or upgrade their programs, laws, and regulations to ensure cybersecurity and protect critical and private data. A March 2021 report of the UN Open-Ended Working Group, pursuant to General Assembly Resolution 73/27 on developments in the field of information and telecommunications in the context of international security, concluded that harmful ICT incidents are increasing in frequency and sophistication, and warned of the implications of malicious use of ICTs for the maintenance of peace, security, human rights, and subsequently for development.

Oman has no specific privacy or data protection laws. A Cyber Defence Centre has been established to oversee data protection and cybersecurity policy. The Information Technology Authority is working on a comprehensive data protection law to bring Oman in line with international standards. The 2011 Cyber Crime Law makes it illegal to violate the privacy of individuals using technology, but does not impose obligations on those who collect personal data. The 2008 Electronic Transactions Law, which was derived from UN Model Laws relating to e-commerce and electronic signatures, offers limited protections regarding the handling of personal data, but it applies only to electronic transactions and therefore excludes data collected outside the scope of this law., The 2000 Banking Law, 2002 Telecommunications Law, and 2019 Healthcare Law all forbid the sharing of a client's information without r his or her express written consent (Gomes and Mahroum 2021a).

Saudi Arabia recently adopted a new Personal Data Protection Law in September 2021, which will come fully into effect in March 2023. Other relevant laws afford a range of associated protections. Sharia law forbids the disclosure of a person's secrets without his or her consent, except in the public interest. The Anti-Cyber Crime Law makes it illegal to access the bank or credit information of another person, or to access the person's computer to delete, destroy, alter, or redistribute its information. More recently introduced or updated regulatory frameworks, such as the Telecommunications Law, Electronic Transaction Law, and Cloud Computing and Internet of Things forbid digital providers from disclosing information about their customers or permitting their communications to be monitored. These laws forbid the un-authorized accessing of personal information and the storage of data from sector-regulated industries and government agencies outside the country or at non-approved sites. The recently decreed E-Commerce Law of 2019 holds e-commerce retailers responsible for protecting the personal information of customers, including when it is in the hands of a third party through an outsourcing agreement. Service providers must also not retain this data for longer than required to conduct a transaction (Gomes and Mahroum 2021b).

Jordan has no privacy or data protection laws to oblige actors to protect the privacy and data of clients when supplying goods and services, but the country's constitution does include some related protections. For example, Article 7 punishes violations of the private life of individuals; Article 18 renders secret postal and telegraphic correspondence, telephonic, and other communications means except by judicial order. Complainants may invoke these provisions to seek redress if there are violations (Gomes and Mahroum 2021c).

In Tunisia, cyber-crimes remain a problem, despite efforts to ensure safe and secure digital services. Technological developments, network openness, and lack of appropriate data protection are affecting Tunisia's networks. A Shadow Server (2020) report suggests that Tunisia was subjected to the largest number of cyber-attacks in Africa. Tunisia is ranked sixth in Africa for computer viruses with over 20,000 detected by malware analysis in 2020. It is vital that Tunisia invests in improving network security and implementing new strategies to protect citizens and firms from cyber-crime. Doing so would ensure Internet resilience and raise awareness among citizens so that they can understand how to protect themselves from these risks (Ben Youssef 2021).

Morocco has put in place legal mechanisms to create and strengthen the conditions for digital trust, such as the law supplementing the penal code on offences relating to automated data processing systems and the law on the electronic exchange of legal data and on the protection of personal data. Moroccan legislation does not contain a specific law on electronic commerce, which is governed mainly by the Commercial Code and Law 31-08 on consumer protection measures. Other aspects specific to e-commerce are specified in the laws governing Internet promotion, online sales, electronic payment, and delivery (Abdelkhalek et al. 2021).

In Egypt, Law 175 of 2018 on the Combating of Information Technology Crimes (the "Cybercrime Law") protects the conduct of online activities with 23 punishable crimes covering violations against networks and ICT safety; crimes committed by means of ICTs that cover scam and breaching privacy of banking cards, services, and electronic payment methods; invasion of privacy and illegal content; web administrators; and criminal liability of service providers and legal persons. The cybercrime law and its executive regulations establish new obligations, such as requiring service providers to save and store certain data for 180 days, maintain data secrecy, and take several measures to secure it. Additional obligations apply to service providers managing, owning, or operating critical information infrastructure (which covers networks that can impact the state's provision of services or its main facilities or cause significant economic or social losses, and includes financial entities and banks). The law has extra-territorial scope and applies to perpetrators outside Egypt so long as the crime is also punishable in the country in which those crimes were committed. The law has been criticized for having vague and harsh sanctions, with no sufficient coverage for the intricacies of a cyberworld (Kamel 2021).

Another integral piece to build trust in the digital economy is data protection, which was finally enshrined by the long-awaited data protection law issued on July 13. 2020 and came into effect on October 14, 2020. The Data Protection Law leaves several significant issues to the executive regulations, making it premature to assess properly the full extent of the data protection regime in Egypt. Nevertheless, the law laid the foundations of a new regime by establishing the principle of protection of personal digital data (with some exclusions); defining personal and sensitive personal data; establishing new business functions (data controller and processor) and obligations (in relation to processing and controlling data and licensing, etc.); regulating cross-border data transfer; and creating the Personal Data Protection Centre, with an extensive mandate covering both policy and regulation.

A missing piece, however, is data protection under the new Central Banking Law, since personal data in the possession of the CBE and entities falling under its supervision (except money transfer and exchange companies) were excluded from the Data Protection Law's scope. The Central Banking Law lacks sufficient data protection measures; it protects data secrecy in general terms but does not deal with the s intricacies related to how to protect processed data, and it does not establish the functions required to ensure data protection. In addition to not creating a safe environment for data protection, this exclusion creates discrimination in the financial sector at-large, as companies falling under the Financial Regulatory Authority would follow the Data Protection Law provisions and would have to incur the extra obligations and financial burdens under the latter Law; entities falling under CBE have fewer compliance obligations (Kamel 2021).

6. Prospects for Digitalization and Policy Implications for Arab Countries[41]

Prospects for digitalization and development pathways in Arab countries

Digitalization is shaping the world economy in new ways that will determine the pathways that are open to countries for their growth and development. Some observers have argued that digitalization makes the traditional path of development through integration into the global economy unfeasible, because global value chains (GVCs) will be disrupted and low wages become less important than they currently are in achieving a competitive advantage. Rodrik (2018) notes that digital technologies are making integration into GVCs a much less potent instrument for industrial development and employment creation. New technologies are both labour-saving and highly biased toward more skills, which make the potential for substitution between low-skilled labor and other complementary inputs less feasible, making the competitiveness through low-cost labor much less attractive.

Hoekman (2021) argues that this pessimistic view about the impact of new technologies is premised on the misplaced view that it is only manufacturing that generates dynamic productivity spill-overs. In fact, distinguishing between manufacturing and services is less and less meaningful. What is most significant is the movement of resources from less productive to more productive activities and tasks, whether they are classified as services or manufacturing. The trend towards 'servicification' (an increased share of services in the economy) is inevitable for all countries, and there is no presumption that it is associated with declining productivity growth.

The Pathways for Prosperity Commission (2018) adopted a nuanced approach on the potential effects of digital transformation on growth and development in middle-income countries. New technologies may be disruptive, leading to job losses and changes in GVCs, but they also create new opportunities. Developing countries may benefit from such opportunities in more productive agriculture, new GVCs in manufacturing, new global trade in services, and better connections in the domestic economy, including between the formal and informal sectors. New job opportunities will be available, and scope for competitive activities in developing countries will emerge.

Coulibaly and Foda (2020) recognize the shifting dynamics in comparative advantage and the losses in competitiveness by developing countries in traditional low skill–intensive manufacturing. There is a trend toward concentration of manufacturing in technology hubs (in the United States, Europe, and East Asia) that are investing heavily in new technologies, such as robotics and AI. The new technologies are boosting productivity and reducing the low-cost advantages of developing countries, even leading to the reshoring of some activities.

The growth of GVCs has stalled, and the share of manufacturing in value-added and in employment in developing countries is declining. But the new landscape offers new opportunities for developing countries. First, the rising middle class in developing countries creates new opportunities for meeting the demand for a large range of manufacturing products near their consumer markets. Second, there is scope for a large set of industries outside of manufacturing that are growing rapidly and in which developing countries may have a comparative advantage, such as agro-processing, horticulture, tourism, and services based on ICT. Developing countries need to take advantage of old and new opportunities to move into higher-productivity activities and achieve structural transformation.

In the past, one of the major constraints to the growth and development of Arab economies has been the limited integration into the global economy. Arab economies have not succeeded up to now in becoming significant players in the international value chains – i.e., in the global and regional fragmentation of production. Their failure to do so reflects several factors, including high trade and transactions costs, and complex regulations and rent seeking, which have also stifled completion and innovation and inhibited entry by new firms and the scaling up of business activities of successful start-ups.

Is digital transformation going to make it more difficult for Arab countries to achieve structural transformation and

[41] This section draws heavily on Hoekman (2021).

higher rates of economic growth, to reduce poverty, and achieve the SDGs? Could digital transformation provide an opportunity for Arab countries to better integrate into international markets? Or is it likely to worsen their prospects and lead to even less integration into the world economy? These questions are central to the development prospects of Arab countries, and to the type of pathways they may be able to take.

Arab countries could significantly benefit from the shift to a more digital economy if they put in place policies and investments that encourage a deeper and more inclusive digitalization of governments and the private sector in producing and providing their respective goods and services more efficiently and effectively.

A recent study by the World Bank (Cusolito et. al. 2022) on the socioeconomic impacts of digitalization of economies in the Middle East and North Africa region finds that under an illustrative scenario, based on highly optimistic assumptions, the region's average real GDP per capita could rise by more than 40 percent, manufacturing revenues per unit of factors of production could rise by 37 percent, employment in manufacturing could rise by 7 percent, and tourist arrivals could rise by 70 percent, creating many jobs in the hospitality sector.

As a result, long-term unemployment rates could fall to negligible levels, and female labor force participation could double, to more than 40 percent. These very large positive outcomes are based on a set of assumptions that include universal access to affordable Internet, major behavioral changes in the use of digital technologies across the population in the region, favorable business climate, access to finance, supportive regulation and increased competition. One of the main explanations for the very large economic upside to digitalization is that new technologies will significantly reduce informational costs that constrain economic transactions.

Recent studies by de Melo and Solleder (2022) and Atiyas and Dutz (2022), which cover both the MENA and Sub-Saharan Africa regions, also find potentially positive impact from improved digitalization (infrastructure, access, affordability, competition) on productivity and employment through increased participation in Global Value Chains for services trade and easing of the demand-side and supply-side constraints on digitalization, respectively.

However, by taking into account important downside risks related to inequality, affordability, and weak business climate, including limited availability of financing, their results concerning potential gains from digitalization for the two regions, particularly for MENA, appear to be more modest than those reported by Cusolito et. al. (2022). Moreover, both studies point out that in many MENA countries manufacturing has failed to take off. In these countries, the digital transformation, where 'value creation shifts from capital to knowledge', presents an opportunity for structural transformation. And, as argued by Hoekman (2022), successful digitalization would then allow MENA countries to achieve a service-sector led high-productivity growth structural transformation. For MENA, the challenge is improving across-the-board low indicators of competitiveness for their per capita-income level. Indeed, for countries in the MENA region, taking advantage of digitalization will require much improved institutional and regulatory frameworks that support access to and use of digital technologies and market platforms accessible for micro, small, and medium-sized enterprises (MSMEs). In addition, substantial improvements in digital skills by the entire work force will be required to capture a greater share of value-added along the supply chain.

For these reasons, our views, which are based on the eight country studies, as well as the review of global evidence, tend to be closer to those of de Melo and Solleder (2022) and Atiya and Dutz (2022) than those of the World Bank study, which may have underestimated at least some of the demand- side and the supply- side constraints on digitalization, such as adequacy of high quality infrastructure, affordability of access to digital tools and high speed Internet, adequate digital literacy and training, supportive business climate, as well as availability of financing for the needed massive investments in digital infrastructure.[42] Removing such constraints takes time and resources, and the gains while positive and potentially significant, are likely to be more modest and be realized over the longer term.

Digitalization offers opportunities for Arab countries to build on the significant investments they have made in digital infrastructure and tertiary education, resulting in a relatively large digitally savvy cohort of young people across the region. However, realizing each country's potential is highly dependent on supportive policies and cooperation among Arab countries, as well as for major non-Arab markets to permit firms and entrepreneurs to sell and source services and digital products.

The COVID-19 pandemic has shown how important digitalization is. It has also magnified the risks of inequality where polices are inadequate. The dynamic nature of the situation requires proactive policies and substantial investments. Inaction and neglect of the implications

[42] An additional technical issue raised by the World Bank study is the functional form linking adoption rates to GDP, which is assumed to be concave, implying exponential rates of increase of output.

of the digital economy will lead to less diversification of economic activity and reduce resilience to shocks. Dependence on (or specialization in) tourism and transport has proved risky for several Arab countries during the pandemic. A more balanced portfolio of services exports, whether embodied in goods or disembodied, can increase resilience to shocks. During the global financial crisis of 2008–09 services sector (and services trade) as well as the informal sector proved more much more resilient to the massive demand side adverse shock than the goods producing sectors. During the COVID-19 pandemic non-travel and non-transport services proved relatively robust, with e-commerce growing rapidly in many countries.

Prospects for digitalization will vary across countries and may or may not play a critical role in their development outcomes. But across countries, policy makers should be aware of the risks posed by falling behind or by poorly planned progress in digitalization in terms of disruptions to many activities and job losses while also recognizing the benefits.

GCC countries

Having achieved strong progress in use of digital technologies by individuals and for e-government, the GCC countries are likely to achieve even stronger progress in the business sector. Countries in the GCC need to adopt digital technologies for the production and delivery of goods and services that induce higher productivity and better-quality products. The effects on productivity growth, employment, and quality of life are likely to be significant.

The challenge for GCC countries is to create jobs for their nationals that create high value and pay well, so that more of their workforces are attracted to the private sector rather than non-productive rent-seeking government jobs. Digitalization is likely to reduce the demand for unskilled imported labor as well as unskilled government labor for nationals. Digitalization will put pressure on the long-established growth model of rich countries that are well endowed with natural resources – a model based on cheap imported labor for low-skilled production of goods and delivery of services. The prospects of declining oil revenues and the need for economic diversification make the changes that could be brought about particularly compelling.

GCC countries need to create new private sector jobs in digitally driven activities in education and health, tourism, and other activities associated with well-being, using new technologies, such as AI , machine learning, and 3D printing. Imports of low-skilled labor will decline, and higher-skilled labor imports will increase. Even in the delivery of public services, workers will have to be more skilled and productive. The success of this new pathway to diversification and upgrading for the employment of nationals depends critically on reforms that promote the acquisition of education and skills.

Middle-income Arab economies

The central question facing middle-income economies in the region (Algeria, Egypt, Jordan, Morocco, Palestine, Tunisia) is whether global digitalization makes obsolete the traditional development path through integration into GVCs. Many countries, including Egypt, Jordan, Morocco, and Tunisia, have been pursuing this path, building export niches in textiles and clothing and more recently in mechanical and electrical products.

Is there a risk to the existing production infrastructure, which is based on global value chains? The potential for growth in digitally enabled economic activities and expansion in tradable services need not be accompanied by erosion of the successes some Arab countries, such as Tunisia or Morocco, enjoyed in the last few decades in increasing participation in GVCs and growing manufacturing. Although new technologies may change the way products are produced, re-shoring of GVCs by lead firms producing manufactures for the EU market may take place, albeit possibly in a limited way. Arab countries can improve their attractiveness by leveraging the use of digital technologies in order to lower transaction costs, particularly those related to red tape that underpin much of trade costs, a major factor responsible for discouraging GVC related investments in Arab countries.

For middle-income Arab countries to be able to benefit from the opportunities offered by digitalization, their governments take policy action in a range of areas.

Approaches, strategies, and priorities

In countries that have benefited from digital transformation, a major success factor has been the ability and determination to develop strategic and comprehensive approaches to digitalization, as Estonia, France, Hungary, Italy, Japan, Poland, and the United Kingdom did (ESCWA 2018). Such approaches typically start with a broader country vision of development and view digitalization as a coherent set of policies and programs that fits into such a vision. Digitalization is not just about infrastructure or ICT; it includes human capital, skills and training, education, governance of the digital economy, laws and

regulations governing the use and exchange of data, and cybersecurity. Strategic and comprehensive approaches are more effective than piecemeal approaches. Progress has to be achieved on all fronts. The overall governance of the digital economy is crucial for success, as it allows continuous monitoring and evaluation as well as corrections as needed.

The digitalization of public services, followed by digitalization of the business sector, is a perquisite to a successful digitalization strategy. Arab countries have focused on encouraging new businesses in ICT enabled services and start-ups in the digital sector. They have failed to spur the adoption of digital technologies in all areas of economic activities, including education, health, manufacturing, industry, and agriculture (Pathways for Prosperity Commission 2018).Policies supporting the movement of workers from low- to high-productivity jobs, especially in digital-intensive sectors, would help. The wider adoption of teleworking practices could incentivize workers to switch to potentially more productive firms located farther away, or even abroad, if those firms no longer require continuous physical presence or frequent commuting.

A surge in digital adoption could be especially beneficial to small and medium-size enterprises (SMEs). Online platforms offer simple pathways to digitalization while providing services (e.g., outsourcing of data storage, advanced low-cost logistics and payment services, tailored advertising, better communications between buyers and suppliers, and dispute resolutions) that can be especially beneficial to micro enterprises and SMEs (OECD 2021b). Preliminary evidence suggests that the productivity benefits from digital platform diffusion are larger for SMEs, suggesting that platforms can reduce productivity gaps between SMEs and larger and more productive firms that are already at an advanced stage of digitalization (Costa et al. forthcoming).

Surveys of SMEs in eight advanced and emerging market economies indicate that some 70 percent were accelerating their digitalization efforts because of COVID-19 (CISCO 2020). A much larger survey of SMEs in advanced economies finds that adoption of digital technologies has been much more modest at small firms than at large ones (OECD 2021b). Firms of all sizes recognized the importance of digital technologies for sustaining and expanding their business activities. But, smaller firms were constrained by the cost of purchasing digital technologies and their lack of relevant digital skills. The main issue facing the larger firms was integrating the digital technologies that they invested in into their processes effectively.

Harnessing the potential of digitalization for development

Seven policy areas are critical for harnessing the potential of digitalization. The first four issues are particularly important in Arab countries:

1. Education and training programs need to be revamped to meet the requirements of the digital age and to encourage the acquisition of skills that complement the new technologies by both young and older workers, with an emphasis on women and disadvantaged groups.
2. Trust and confidence in digital technologies need to be strengthened by improving cybersecurity. Data need to be protected from abuse and unethical use. Rules and regulations should be adopted and enforced to build trust and allow the digital economy to develop.
3. The investment climate needs to be improved:
    - Taxation needs to be adjusted so that it does not penalize or create unfair advantages for certain operators.
    - Procedures for creating and expanding businesses need to be simplified, with a focus on facilitating the use of digital services and technologies.
    - Access to finance by businesses need to increase.
    - The business environment needs to be made more competitive, in order to allow innovation to prosper and avoid market concentration and dominance.
4. International-level engagement is needed to address the cross-border dimensions of digitalization and competitiveness. Arab countries need to be more active in participating in international efforts to identify and adopt good regulatory practices and facilitate digital trade and e-commerce through cooperation with trading partners. They need to engage in international efforts to define rules and procedures that enable firms and consumers to engage in digital transactions across borders, both within and outside the World Trade Organization.
5. Greater investment is needed in digital infrastructure to make it more affordable for all segments of the population, in order to narrow digital divides. These efforts should go hand in hand with efforts to address digital divides caused by skills deficiency rather than access and affordability.
6. More support is needed to (i) spur the adoption of digital technology, including by easing access to intangibles, especially for small and low-productivity firms, and (ii) eliminate skill shortages, which would boost aggregate growth while reducing the wide dispersion across firms and workers in productivity

and wage levels. Support for patent systems and research and development is needed to spur innovation and technological advances, the benefits of which should be broadly shared.

7. Social protection systems need to be aligned with the changing economy, the nature of work that could result from digitalization of the economy, and widening skill gaps.

Participating in the global trade of digitally driven services requires that norms and regulations are consistent and do not impose excessive costs and burdens on firms. A supportive domestic regulatory framework, including a competition policy that disciplines the scope for anti-competitive practices by digital platforms is not sufficient (see Hoekman 2021). Such a framework must also meet international good practice standards. For trading partners regulatory regimes must allow firms to operate in their markets and be permitted to access and use data created in their jurisdictions. These developments call for international cooperation, and the conclusion of agreements on standards and norms for mutual recognition of equivalence of regulatory regimes. Such standards can build on (expand) existing trade agreements but can also be pursued through digital-specific initiatives.

Most Arab countries that are part of the EU Neighbourhood Policy are not vigorously negotiating a digital economy-centric agenda with the EU. They have even shown reluctance to engage on these matters. The same applies to efforts to extend the Pan-Arab Free Trade Area Agreement to encompass services, which have shown limited ambition.

An alternative for Arab countries is to pursue domain-specific bilateral or plurilateral arrangements. But few governments appear to be participating in such initiatives. Most are not engaged in efforts by the WTO to agree on what constitutes good practice in the areas of e-commerce, services regulation, investment facilitation, or measures that allow microenterprises and SMEs to exploit trade opportunities. The ongoing efforts by groups of WTO members offer an alternative to expanding the coverage of bilateral and regional trade agreements with specific trade partners, a track that to date many Arab countries have opposed. Continuing to neglect – or actively oppose – international cooperation and agreements on matters digital can only reduce the prospects for the region benefiting from the inevitable digital transformation of the economy.

Managing the risks of increased inequality[43]

Digitization has been penetrating into the Arab economies over the last decade. However, the speed of this penetration has been slow As digitalization spreads the risks for greater income and wealth inequalities could increase through at least three channels.

First, access to and use of information and communication infrastructure is becoming increasingly uneven. To address this issue, policy interventions such as fiscal and financial incentives are needed in order to de-risk private investment in underserved areas, or direct public investment where private investment is not commercially viable. Governments may also leverage their public procurement strategies to ensure an adequate supply of digital infrastructure. Ensuring competition in telecommunication markets would broaden access to communication networks and accelerate the pace of digital transformation in an inclusive manner.

Second, productivity growth is likely to grow as a result of greater use of digital technologies by sectors and firms with greater access to (and investments in) digital infrastructure widening of income gaps across sectors and across firms in the same sector. In many advanced economies differences in average wages across firms explain about half of overall wage inequality, with the remaining half explained by the wage differences among workers in the same firms. Closing digital gaps by supporting technology adoption, easing access to intangibles (especially for small and low-productivity firms), and eliminating digital skill shortages can help boost aggregate growth while reducing the dispersion across sectors, firms and individuals of productivity and wages.

Third, the differential effects of digitalization on wages and employment in labor markets may increase inequality. It is the loss of such semi-skilled jobs, mostly by less educated middle-aged men, that at least partly accounts for widening inequality in labor income in Europe and North America. As technological change continues on its current trajectory, which is labor displacing and biased toward high skills, workers with high school education or less, who are mostly in low-wage occupations, will be the first to feel the full brunt of the changes. When this happens, digital technologies will have advanced to a point where it will be possible to automate well beyond routine and repetitive activities. Even jobs that require higher cognitive and non-

[43] This section draws heavily on Yusuf (2021).

cognitive functions are likely to be automated. Only jobs requiring creativity, dexterity, social skills, empathy, and decision-making capacity are likely to remain, as will some low-skilled manual jobs, such as garbage collection and mail delivery that machines will not be equipped to perform as cheaply.

In response to these risks, the standard recommendation for all countries, advanced and developing, is to invest heavily in deepening skills through greater emphasis on STEM skills and the soft skills that AI-enabled computers will struggle to master. As it is impossible to predict the jobs of the future, governments are being urged to increase spending on education that builds foundational skills, training that equips people with marketable capabilities, lifelong education that brings workers up to speed as the job market evolves, and to strengthen social safety nets. By enlarging the pool of human capital; narrowing health, education, and gender inequalities; and enhancing capabilities more broadly, countries could in principle achieve not only more equal opportunity for their labor force but also an increase in the pace of productivity growth and a higher readiness for change, which in turn would help reduce income inequality in a digitizing world.

In advanced economies the typical policy prescriptions are for more years of schooling, an increase in tertiary education, subsidies and incentives for vocational training, and calls to promote lifelong learning. But education as currently conducted does not appear to lead to improved productivity, or an enhancement of the flow of innovation that drives growth. Its failure to do so is apparent from the recent track record of Arab countries and some high-income, industrialized ones as well. Hausmann (2015) has observed that between 1960 and 2010 the average years of schooling for the global workforce increased by a factor of 3, from 2.8 to 8.3 years. In 1960 countries with 8.3 years of schooling were 5.5 times richer than ones with 2.8 years of schooling. By 2010 countries that had increased their average level of schooling from 2.8 to 8.3 years were only 1.67 times richer, with much of the increased prosperity being due to technological advances during the intervening years. The quality of education needs to be improved for people currently in school and for the generations to come. Recent research suggests that of greater importance than the outlay on education and class size is the quality, motivation, and remuneration of teachers. Persuading some of the most talented graduates to become teachers, as Nordic and East Asian countries have done, will be key. But the payoff from improvement in education quality will be far in the future. Over the coming 20 years Arab countries would need to enhance the productivity of people already in the workforce who are directly affected by digital and other disruptive technologies, and who risk being displaced and becoming a part of the structurally unemployed.

Arab countries were already facing a daunting challenge before their economies were hit hard by the COVID-19 pandemic. Now they must try even harder. They need to diversify their economies and engage in activities with good growth and employment prospects. This shift involves harnessing digital technologies. Some will be new activities requiring a yet unknown set of labor skills. Industrial diversification has proven to be as difficult for virtually all the Arab economies as has upgrading their workforces.

Economic growth rates and productivity are likely to suffer, which may lead to increased inequality of labor income. And very likely, incomes will become more unequal. Atkinson (2015), Acemoglu (2002, 2019); Rodrik (2020); and others have suggested that governments need to take a more active role in directing technological change in or oder to enhance the employability of workers. However, Arab countries are mostly users of technology and not the ones that can influence its course.[44]

If transformation of the workforce and active labor market policies that improve access to labor market information fail to produce results, structural unemployment could become entrenched, with more people engaged in informal activities. In this scenario, income inequality would rise with the fortunate 10 or perhaps just 1 percent pulling further away from the rest, assuming that the elites can control the rest.

The opportunities presented by globalization may be ebbing as globalization appears to have peaked and there is a risk that trade protectionism will rise. Under these circumstances, the apparent relative stability of the labor income distribution in Arab countries is likely to be imperilled, with the bottom 90 percent losing out. This grim but likely outcome has already begun to attract a great deal of attention in advanced economies, which are also confronting the burden posed by aging populations. While education and training receive the most emphasis, countries are also banking on another wave of technological

[44] See Yusuf (2021).

change that could benefit all income groups. However, for advanced economies as well as Arab countries, a strengthening of the social safety net is emerging as a high priority policy area to face increasing volatility and uncertainties.

Digital technology might enable countries to enhance productivity and reduce labor income inequality, but there is a high likelihood that Arab countries will be faced with a widening gap between the number of available jobs (including in the public sector) and the number workers seeking employment. To avert a sustained rise in unemployment and poverty, countries may have to consider introducing some form of income guarantee. If a universal basic income scheme, versions of which have been widely discussed (and tested on a pilot basis), proves too costly from a budgetary point of view, a more targeted scheme may prove to be more appropriate.[45]

7. Knowledge Gaps and Future Research

One of the key findings of the UNDP–ERF project is that knowledge in Arab countries about both the beneficial and down-side impacts of digitalization on economic and social outcomes is very limited. The first priority area where large research gaps exist is about understanding the microeconomics of digital technologies adoption. There is a need to understand at the firm and household levels how digital technologies are adopted, the extent about their adoption by existing business activities, and how this affects productivity, jobs, and incomes.

Research should be undertaken at the firm level to identify the determinants of adoption of new technologies by existing firms and how it affects productivity, wages, and incomes. The hypothesis of divergence between leading and lagging firms in the adoption of digital technologies should be tested in Arab countries. Evidence on the impact of digital technologies on growth, demand for skills, wages, and distribution of income is almost non-existent and very little research has been done on how the large gender gap (in digital access, use, and skills) could be narrowed.

Research could also be undertaken at the sectoral level, to understand the extent to which digital technologies are changing the allocation of resources between old and new activities. The process of the destruction and creation of jobs needs to be assessed and explained. The contribution of digitalization to diversification and structural transformation in Arab countries remains a major concern and needs to be documented and assessed. The second priority area is about the impact of digitalization at the macroeconomic level. Many research questions raised by this report need to be addressed:

1. What is the impact of digitalization on aggregate productivity growth (labor productivity and total factor productivity)?
2. How is digitalization affecting labor market dynamics, including the role of skills and labor matching?
3. What are the likely implications of digitalization on competition and market structures in Arab countries?
4. What is the impact on the trade and exports of goods and services, and how is digitalization affecting competitiveness and the prospects of participation in GVCs?
5. What is the impact of digitalization on inequality and poverty in Arab countries?
6. What is the impact of digitalization on the participation of women in the labor market?
7. What role does the lack of language proficiency play in sustaining digital divides?

As the answers to these questions will depend on the policy ecosystems that accompany digitalization, empirical trials and simulations are necessary to design coherent policies that accompany a more inclusive digital transformation than experienced to date.

[45] For an assessment see Francese and Prady (2018).

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