Chapter 6

Digital transformation for youth employment and Agenda 2063 in North Africa

Unemployment and the precariousness of youth employment remain major concerns in North Africa. The digital transformation presents several opportunities but also generates new risks for economies, requiring the implementation of adequate policies. Despite high mobile phone penetration, significant Internet service coverage and progress in e-commerce, the region still needs to build infrastructure, develop human capital, promote innovation and deregulate the digital environment if it is to exploit its full potential. The chapter starts with an overview of the labour market and digital development in North Africa. The following section highlights the risks and opportunities related to the digital transformation to support youth employment and fulfill the ambitions of the Agenda 2063. The last section proposes public policies to support and accelerate the digital transformation.

IN BRIEF

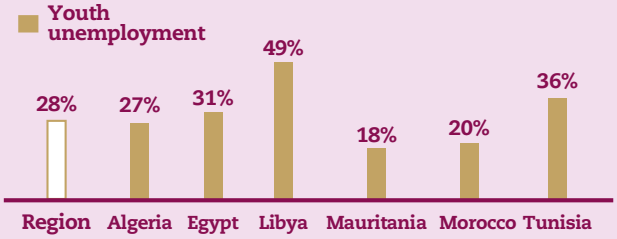
Employment is a major challenge in North Africa, with unemployment and rising inequality producing political instability in the region. Between 2010 and 2018, the average unemployment rate was 12.1%, with higher rates in Libya (19%) and Tunisia (15.8%) than in Morocco (9.2%). Youth unemployment, which has reached almost 50% in Libya, continues to be difficult to control, particularly among graduates. The digital transformation therefore presents many opportunities, given that the region is outperforming the rest of the continent in terms of digital development with 67% mobile phone access and 48.3% Internet access. The latter figure conceals a strong disparity between urban (53.9%) and rural (35.7%) areas. The mobile ecosystem directly employs 390 000 people in the Middle East and North Africa (MENA) region, more than half of whom work in distribution and retail, and indirectly creates another 650 000 jobs. To fully realise its digital potential, North Africa still needs to build infrastructure, develop the necessary human capital, deregulate the digital environment and strengthen its capacity to innovate.

The region could target three main policy areas to accelerate the digital transformation and create jobs: (i) strengthening digital finance (Fintech) development, (ii) developing digital skills, and (iii) supporting entrepreneurship and innovation. This will involve, in particular, loosening regulatory constraints, reducing the infrastructure gap with advanced countries, modernising education and training systems, supporting public-private partnerships (PPPs), promoting incentives and improving governance in the region.

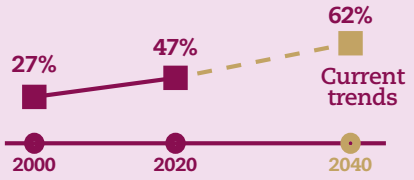
North Africa

Youth employment

A critical situation in some countries of the region



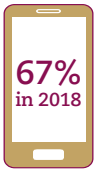
Almost 50% of the population aged 15-29 **have an upper secondary education** (the highest in Africa)



Communications infrastructure

North Africa is the **best-connected region on the continent**

Mobile phone penetration rate



4G coverage **83%** in 2020

Public policies must remove the obstacles to **infrastructure access**

% of the population with Internet access, 2018

Digital economy

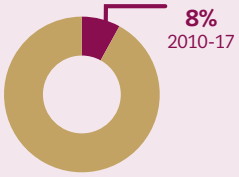
Limited access to finance hinders the development of dynamic start-ups

No. of start-ups that raised over USD 100 000 (2011-20)

Despite steady growth, **e-commerce** is still a minor part of exports

E-commerce annual growth rate

E-commerce as % of exports



What's next for policy makers?

- Improve the **regulatory environment** to accelerate Fintech development
- Encourage **public-private partnerships** to support innovative entrepreneurship and develop digital skills
- Facilitate the development of **data management infrastructure**

North Africa regional profile

Table 6.1. **Selected indicators on digital transformation in North Africa**

			North Africa (5 years ago)	North Africa (latest year)	Source	Latest year
Digital sector	Communications infrastructure	Percentage of the population with a cell phone	29.9	67.1	ITU	2018
		Percentage of the population with 4G coverage	35.0	83.4	GSMA	2020
		International Internet bandwidth per Internet user (kilobits/second)	12 535.3	37 764.0	ITU	2018
	Telecommunication sector	Total capital expenditure (as a percentage of total revenue)	19.7	19.3	GSMA	2018-20
		Earnings before interest, taxes, depreciation and amortisation (as a percentage of total revenue)	42.6	41.1	GSMA	2018-20
		Total employed headcount within the telecom companies (head account full-time equivalent).	103 731	125 764	GSMA	2016-17
Digital economy	Start-up development	Number of active start-ups that raised at least USD 100 000	30	116	Crunchbase	2011-20
	Digital services	E-Commerce sales (in USD million)	1 812.6	1 944.5	UNCTAD	2014-18
		Export of professional and IT services delivered electronically (in USD million)	7 061.6	7 222.0	UNCTAD	2014-18
Digitalised economy	Internet use among people	Percentage of the population that uses mobile phones regularly	85.2	81.7	Gallup	2018
		Percentage of women with Internet access	36.2	41.9	Gallup	2018
		Percentage of the poorest 40% with Internet access	33.1	32.6	Gallup	2018
		Percentage of rural inhabitants with Internet access	29.0	35.7	Gallup	2018
	Digital-enabled businesses	Percentage of firms having their own website	10.1	57.0	World Bank	2018*
		Percentage of firms using e-mail to interact with clients/suppliers	38.8	82.2	World Bank	2018*
		Percentage of goods vulnerable to automation that are exported to OECD countries	n.a.	23.0	World Bank	2020
	Access to finance	Percentage of the population with a mobile money account	3.0	14.0	Demirgüç-Kunt et al.	2017

Note: * Data for 2018 or the latest available. Chapter 1 provides the definitions of a digital and a digitalised economy. n.a. – not available, ITU – Information Technology Union, GSMA – Global system for Mobile communication Association, UNCTAD – United Nations Conference on Trade and Development.
Sources: Authors' calculations based on data from Crunchbase (2020a), *Crunchbase Pro* (database); Demirgüç-Kunt et al. (2018), *The Global Findex Database 2017* (database); Gallup (2019), *Gallup World Poll* (database accessed on 1 February 2020); GSMA (2020), *GSMA Intelligence* (dataset); ITU (2019), *World Telecommunication/ICT Indicators Database* (database); UNCTAD (2020a), *UNCTADSTAT* (database); World Bank (2020a), *World Bank Enterprise Surveys* (database); World Bank (2020b), *World Development Report 2020*.

Unemployment and the precariousness of youth employment remain major concerns in North Africa

Employment is a major concern, given that unemployment and rising inequality have proven to be sources of political instability since 2011. Faced with imbalances in the labour market, both the African Union's Agenda 2063 and the United Nations' Sustainable Development Goals (SDGs) have placed employment at the heart of their strategic objectives. Between 2010 and 2018, the average unemployment rate in the subregion was 12.1% (Table 6.2), with higher rates in Libya (19%) and Tunisia (15.8%) than in Morocco (9.2%). Persistent unemployment is exacerbated by a low labour force participation rate (around 43.9%), characterised by a wide gender gap: 66.3% for men, compared with only 17.3% for women (ILO, 2019).

Table 6.2. **Employment situation in North Africa, 2010-18**

	Unemployment rate		In-work poverty rate	
	15+ years	15-24 years	15+ years	15-24 years
Algeria	10.7	27	0.11	0.12
Egypt	12.1	30.8	0.66	0.97
Libya	19	48.7	0.17	0.15
Mauritania	10.1	18.2	3.99	5.71
Morocco	9.2	19.5	0.80	0.95
Tunisia	15.8	35.8	0.15	0.16
North Africa (average)	12.1	27.8	0.98	1.35

Source: Authors' compilation based on ILO (2019), *ILOSTAT* (database), https://ilostat.ilo.org.

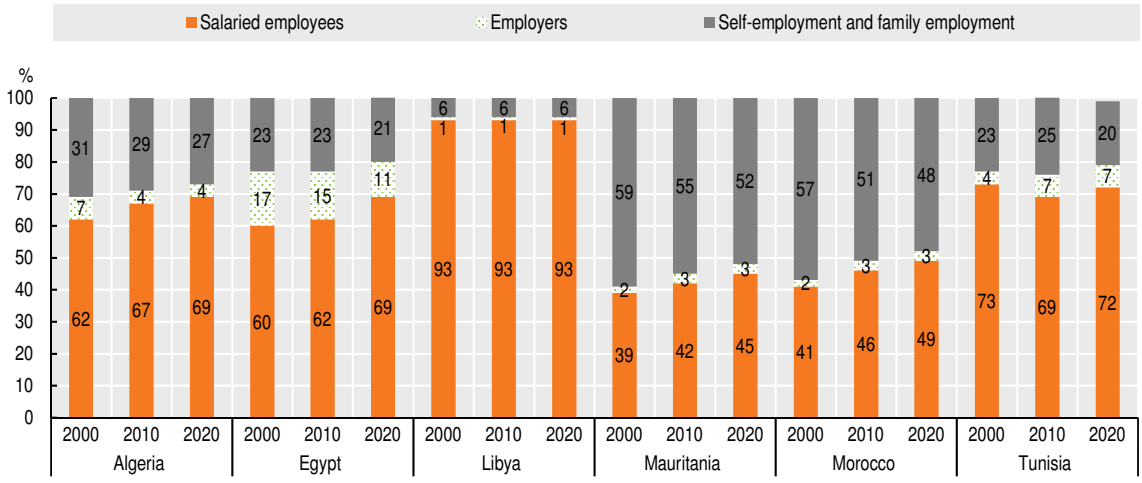
Beyond the thorny issue of general employment, youth unemployment remains a persistent challenge that North African countries struggle to manage given their large pool of young graduates. The youth unemployment rate is more than double the overall unemployment rate in most countries, and remains critical in Tunisia (35.8%) and Libya (48.7%). This is partly due to the mismatch between training profiles and labour market requirements, as well as the weak development of innovative start-ups capable of supplying stable employment opportunities. Those countries with high youth unemployment were the most affected by the political instability associated with the Arab Spring. Tackling the lack of access to employment, particularly among young people, is therefore crucial for political stability.

Moreover, the labour market is still beset by a substantial informal sector, accounting for between 30% and 70% of economic activity (ILO, 2015), which puts workers in a precarious position. The rate of informality contrasts with the low proportion of workers living below the poverty line (USD 1.90 per day), which is relatively low in North African countries. However, about one in 100 workers is poor in North Africa and there are disparities between countries in the region, a sign of ongoing social fragility. Beyond the urgent need to provide work for a large number of job seekers, it is therefore necessary to create decent jobs to improve the living conditions of the population and reduce growing inequalities.

The precariousness of employment in North Africa is linked to the fragility of the main employment sectors. Between 2010 and 2018, services contributed 47.7% of total employment, compared with 27.1% in the industrial sector and 22.8% in the agricultural sector. Industry, which is most likely to create stable, quality jobs, employs just a quarter of the labour force. Priority labour policies in the subregion should to some extent focus on this sector, which, beyond the quality of the jobs it provides, accelerates the productive transformation by enabling countries to occupy a higher position in global value chains.

The employment situation in North Africa is also a symptom of its focus on employed workers. Between 2000 and 2020, dependent employment has dominated, accounting for 62.1% of all employment, compared with 29.3% for self-employment and 8.6% for entrepreneurs, who are themselves employers (Figure 6.1). One explanation for this lies in the structure of the North African economy, characterised by the strong presence of extractive industries (Libya and Algeria) and tourism (Morocco, Tunisia and Egypt). Hence the need for significant private investment in the digital sector and innovative start-ups, to take advantage of the subregion's pool of skilled labour.

Figure 6.1. **Employment profile of North Africa, 2000-20**



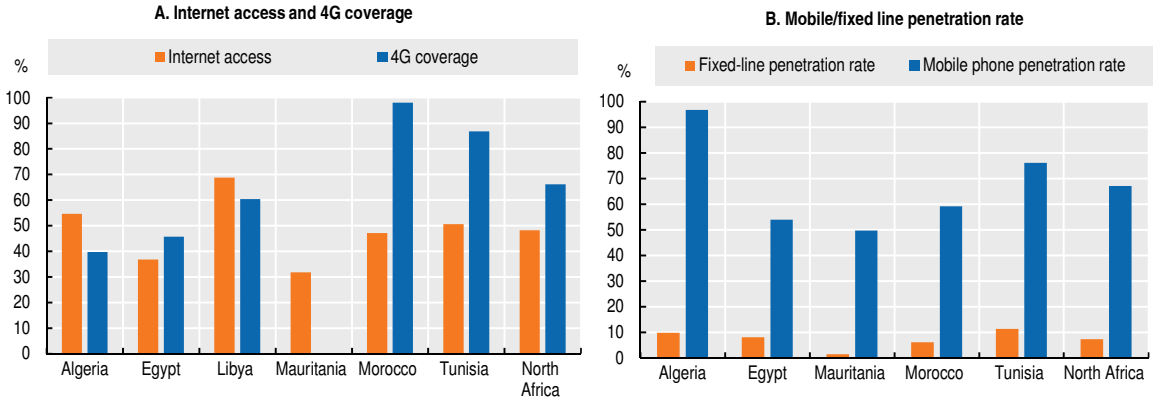
Source: Authors' calculations based on ILO (2019), *ILOSTAT* (database), https://ilostat.ilo.org.
StatLink https://doi.org/10.1787/888934203947

North Africa has a considerable lead in terms of digital development

The digital sector not only provides a pool of jobs for skilled young people, its positive externalities also influence many other sectors, where they improve productivity, contributing indirectly to job creation. If digitalisation is to serve as a lever for job creation through its various applications, communications infrastructure will be indispensable.

With an average mobile phone penetration rate of 67.1% and 4G coverage of 66.1% in 2018, North Africa is the best-connected region on the continent. Despite this lead and the continued growth in the number of mobile network subscribers, the region still has a way to go in terms of digitalisation. Overall, two-thirds (67.1%) of the population had access to a mobile network in 2018, while a similar proportion, 66.1%, were covered by 4G (Figure 6.2), giving an Internet access rate of 48.2%. Moreover, mobile phones have replaced fixed lines (less than 10% penetration in all countries except Tunisia).

Figure 6.2. **Access to digitalisation in North Africa (percentage of population, 2018)**

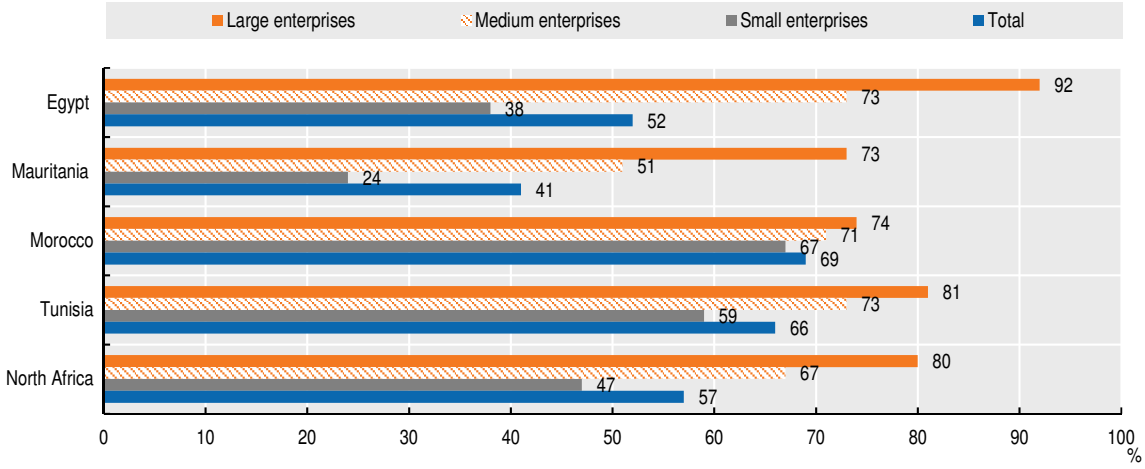


Source: Authors' calculations based on International ITU (2019), *World Telecommunication/ICT Indicators Database*, www.itu.int; GSMA (2020), *GSMA Intelligence* www.gsmaintelligence.com/; Gallup (2019), *Gallup World Poll* (database www.gallup.com/analytics/213617/gallup-analytics.aspx.

StatLink https://doi.org/10.1787/888934203966

Despite this encouraging overall dynamic, disparities in digitalisation can be observed between certain indicators and countries. Mauritania and Egypt have lower levels of digitalisation than other countries. The telephone penetration rate is higher in Algeria and Tunisia, while 4G coverage is better in Morocco and Tunisia, which are service economies. Finally, Internet coverage appears to be better in Libya and Algeria. The digital potential of North Africa has made it possible to improve business communication through websites (Figure 6.3) and to develop e-commerce platforms.

Figure 6.3. **Proportion of businesses with a website in North Africa**



Note: The data shown on the graph refer to different years due to availability: Egypt (2016), Morocco (2013), Mauritania (2014) and Tunisia (2013).

Source: Authors' calculations based on World Bank (2020a), *World Bank Enterprise Survey*, www.enterprisesurveys.org/en/survey-datasets.

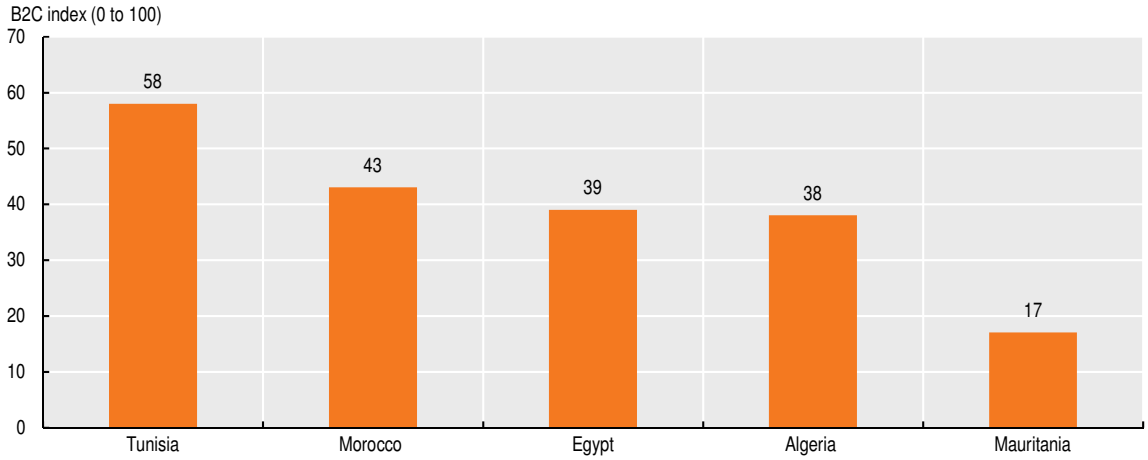
StatLink https://doi.org/10.1787/888934203985

In North Africa, with Morocco and Tunisia taking the lead, 57% of companies have a website, offering significant potential in terms of marketing and customer base. This rate is 47% for small businesses, 67% for medium-sized businesses and 80% for large firms. While a large majority of North African businesses have a website, these websites do need to be updated to make them an effective tool. In contrast to other countries, more

than half of small businesses in Morocco and Tunisia have a website, demonstrating a strong digitalisation trend.

Morocco and Tunisia's lead in terms of the use of digital tools for economic purposes is confirmed by the B2C E-commerce Index (Figure 6.4), given that both scored over 40 in 2019. To get the most out of e-commerce, electronic payment tools and efficient goods transport systems are a necessity. The inadequacy of these channels, which are vital to e-commerce, may explain the low B2C Index scores in North Africa, despite its good Internet coverage and high mobile phone penetration. Consequently, to enhance e-commerce and promote job creation, banks will have to provide electronic payment methods. Additional investment in transport infrastructure is also needed to facilitate the delivery of parcels from sellers to buyers.

Figure 6.4. **Business-to-Consumer (B2C) Index, 2019**



Notes: The B2C Index is based on four indicators strongly linked to online shopping: (i) account ownership at a financial institution or with a mobile-money-service provider (percentage of the population aged 15+); (ii) Individuals using the Internet (percentage of the population); (iii) Postal Reliability Index; and (iv) secure Internet servers (per 1 million people).

Source: Authors' calculations based on UNCTAD (2020b), "UNCTAD B2C E-commerce Index 2019", *UNCTAD Technical Notes on ICT for Development No. 14*, https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d14_en.pdf.

StatLink https://doi.org/10.1787/888934204004

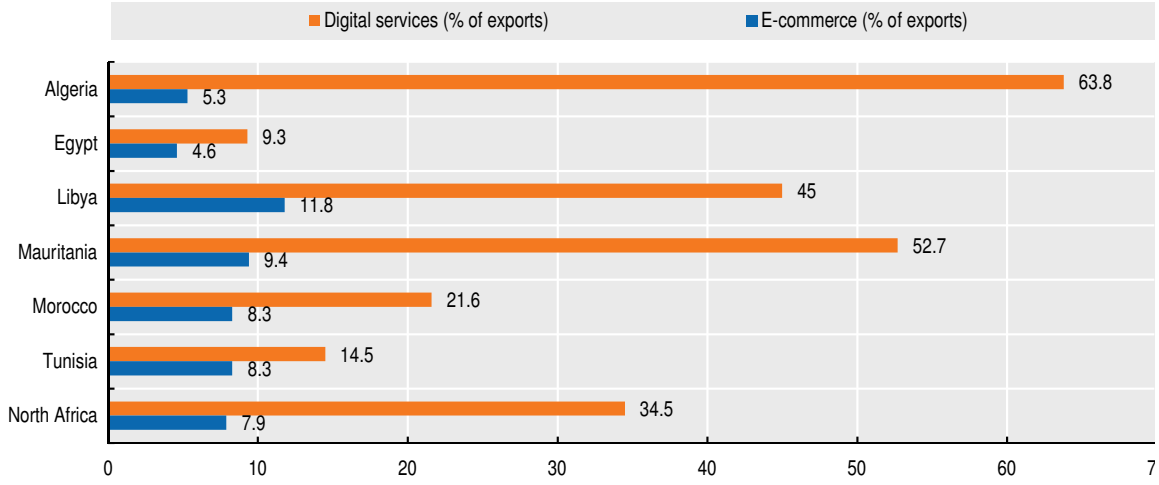
Well-developed fintech, along with broadband connections and modern and responsive payment systems, is enabling the development of a new economy that fosters the revival and creation of quality jobs for the benefit of young people in North Africa. The development of digital financial services can be a vehicle for economic, social and cultural transformation. These services are conducive to financial inclusion as they provide households and small and medium-sized enterprises (SMEs) with tailored financing and insurance solutions. They cut down on administrative processes and business costs, and generate new opportunities for the recovery of the economy as a whole.

Digitalisation has fostered the development of e-commerce in North Africa, which has evolved rapidly, experiencing an annual growth rate of 6.2% over the 2005-17 period. This growth has been made possible by technological resources (smartphones, mobile and Internet access, 4G) and human capital, bolstered by a large number of young graduates. However, the contribution of e-commerce to exports remains low, at around 8% between 2010 and 2017, with different trends seen in different countries (Figure 6.5).

Services that can be delivered via the ICT network alone are emerging, such as customer support in various sectors (after-sales services, insurance and banking), and present opportunities for job creation. Indeed, in response to high labour costs in

developed countries and the boom in ICT in many developing countries, a number of companies have offshored their call centres. Paradoxically, the contribution of digital services to exports is relatively higher in countries with low digital coverage (Algeria and Mauritania), due to their limited export potential (Figure 6.5). However, the turnover generated by digital services has experienced a downward trend in recent years due to the Arab Spring, which led to the relocation of many companies offering this type of service.

Figure 6.5. **E-commerce and digital services (average for 2010-17)**



Source: Authors' calculations based on UNCTAD (2020a), *UNCTADSTAT*, (database), https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=158359.

StatLink https://doi.org/10.1787/888934204023

The low level of e-commerce and digital services, coupled with the lack of active start-ups, indicates that North Africa is not yet in a position to really capitalise on digitalisation to boost employment. Indeed, the region continues to be characterised by weak start-up development, unevenly distributed within and between countries, according to *Crunchbase* (2020b): in Egypt only 92 start-ups have been able to raise more than USD 100 000 between 2011 and 2020; for Algeria, Morocco, and Tunisia, it was respectively 3, 13, and 13. Moreover, the impact of start-ups on jobs remains geographically limited due to their location in urban centres. This concentration of start-ups, coupled with geographical inequalities in Internet access, underscores the need to not only improve the institutional framework underpinning their development, but also ensure their spread to other cities.

Egypt, Morocco and to a lesser extent Tunisia are the three North African countries with the most fintech start-ups[1], due to a conducive ecosystem characterised by strong government support, good private sector involvement and satisfactory levels of education. Conversely, barriers often noted as affecting the region's countries include a lack of confidence, resistance to change, overly rigid or outdated regulations (e.g. in relation to crowdfunding, blockchain), digital security and reliability issues, and market fragmentation (Wamda Research Lab, 2017).

The low digital dividend in North Africa can also be linked to the quality of education, the lack of technological skills and the mismatch between labour market needs and training curricula. North African countries ranked low on the Enabling Digitalization Index[2] in 2018 (Euler Hermes, 2019), with Morocco in 77th position, ahead of Egypt (80th), Tunisia (84th), Algeria (92nd) and Mauritania (114th). In the MENA region, only 56% of employers believed their company had sufficient skilled employees to achieve their

goals, while 55% believe there is a gap between the skills they are looking for and those of job-seekers (YouGov, 2016). This skills gap is even more pervasive when it comes to basic digital literacy due to the training profiles available. Indeed, as suggested by Youth Employment in the Mediterranean (YEM, 2020), the proportion of higher education students enrolled in engineering, manufacturing and construction programmes remains low overall (Table 6.3): only 20.7% of men and 10.2% of women are enrolled on science programmes. Training courses must therefore be realigned with the requirements of the labour market if countries are to reap the rewards of digitalisation.

Table 6.3. **Percentage of students enrolled in engineering, manufacturing and construction programs in 2018**

	Algeria	Morocco	Tunisia	North Africa
Percentage of women	13.9	3.3	13.3	10.2
Percentage of men	26.5	4.2	31.5	20.7

Source: Youth Employment in the Mediterranean database (YEM, 2020), https://unevoc.unesco.org/yem/DatasetsYEMFR.

The digital transformation presents many opportunities for youth employment but requires the implementation of adequate policies

While digital technology is a boon for North African countries, it may also bring to the fore new risks for economies, notably in terms of digital security. By stimulating economic growth, it nevertheless seems that digitalisation will help to resolve issues around employment, especially for young people.

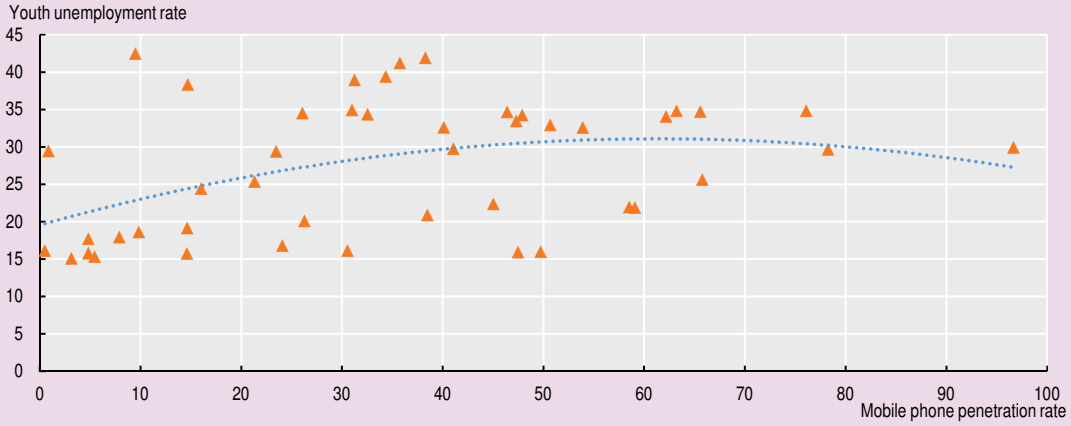
E-commerce (buying and selling on line) is undoubtedly the top economic opportunity linked to digitalisation. The world's biggest brands now showcase their products on line and large commercial groups like Facebook and Amazon have seen their turnover increase rapidly thanks to digitalisation. Digitalisation can enable start-ups to communicate easily with a large customer base and achieve economies of scale given that they operate in the electronic realm. For example, platforms such as Avito, Jumia, Vongo, Affariyet, Bazar and Mytek have established themselves in North Africa by capturing a large share of the attention of online consumers, 70% of whom are aged between 18 and 34. On average, 250 000 people spend 16 minutes and 26 seconds each day on Avito (Herpin, 2020). The development of e-commerce has been boosted by the widespread use of mobile phones. In 2017, mobile commerce or m-commerce will account for a quarter of the turnover generated by online merchants.

In the health sector, the use of digitalisation to produce health maps, hold remote consultations and set up health platforms represents a real step forward. Digitalisation is widely used in medical settings to reduce errors in patient follow-up. It has also fostered the growth of telehealth, which has broadened access to health care. In 2016, the World Health Organization (WHO) and the ITU launched a national programme in Egypt called "mDiabetes" which harnessed mobile technology for the benefit of diabetic patients. Similarly, Ain Shams University's virtual hospital provides institutional telemedicine services through a "Treat and Teach" initiative, serving Egypt, Arab countries and the African continent. The Moroccan Telemedicine Society (SMT) launched the pilot phase of its telemedicine project in 2018, at the health centres in Anfgou and Imilchil (North Africa Health, 2020). Many digital health start-ups have emerged in North Africa, through platforms that allow patients to easily find and book an appointment with a doctor available nearby: D-Kimia, Smart Medical Services and Shezlong in Egypt, SihhaTech in Algeria and Daba Doc based in Morocco and now available in five countries including Algeria, Tunisia, Nigeria and South Africa.

Digitalisation can have several applications (education, finance, agriculture, etc.) and improve the effectiveness of public action. ICT can facilitate the dissemination of teaching materials, and facilitate student evaluation and the administration of grades. Virtual libraries and online access to a range of scientific publications also present valuable opportunities. The continuity of education provided by various platforms (Zoom, Microsoft Teams, Meet, etc.) during the COVID-19 health crisis is a good illustration of how ICT can be used in education. These opportunities extend to the agricultural sector, where ICT can provide farmers with information on weather and crop conditions as well as pesticide monitoring tools, improving their profitability. Public authorities also use digital channels (SMS, WhatsApp, etc.) to disseminate awareness messages and facilitate administrative procedures for businesses (business start-up, tax returns, tax payments, etc.) and households (identity cards, passports, criminal records, etc.). E-government or e-administration remains a valuable opportunity that can be harnessed to achieve greater efficiency in public administration and improve governance. Public policies promoting digital innovation in a range of areas can accelerate the digital transformation and, at the same time, improve youth employment in North Africa.

Box 6.1. **Digitalisation and unemployment in North Africa**

Figure 6.6. **Unemployment rate and mobile phone penetration rate**



Source: Authors' calculations based on World Bank (2020c), *World Development Indicators* (database), https://databank.worldbank.org/source/world-development-indicators

StatLink https://doi.org/10.1787/888934204042

The inverted U-shaped curve suggests that the relationship between employment and digitalisation can be both negative (skill-biased technological change effect) and positive (leapfrog effect). The negative effect of digitalisation can be explained by deskilling and the difficulty of adapting certain job profiles. Conversely, young graduates with a better command of digital tools have a better chance of finding work, given the strong growth of the use of ICT in production processes. However, the positive or negative effects of digitalisation on employment should be put into perspective given the significant size of the informal sector. All else being equal, the skill-biased technological change effect can be observed in Egypt and Tunisia, in view of the persistent unemployment, despite the advanced level of digitalisation in these two countries. Conversely, Morocco has a lower unemployment rate, along with positive digitalisation indicators, providing a good example of leapfrogging.

In MENA countries, the mobile ecosystem contributed 4.5% of gross domestic product (GDP) and 2.9% of productivity in 2018. The mobile ecosystem directly employs 390 000 people in the MENA region, more than half of whom work in distribution and retail, and indirectly creates another 650 000 jobs in other sectors of the economy (GSMA, 2019).

Source: Authors' compilation based on a literature review.

Despite the countless advantages of digitalisation for the region's economies, it does carry some risk given the changes involved.

- The use of digital tools for professional purposes (website, e-mail, etc.) requires a level of competence that many professionals across different sectors do not have, particularly within SMEs. Without ICT training or retraining, companies that fail to integrate digitalisation into their management processes could disappear, at the risk of exacerbating employment problems for a workforce unable to adapt to the needs of the market.
- The pace of automation is also much faster in the production of electrical machineries, automobiles and aircraft components, which constitute a large share of exports for several North African countries such as Morocco and Tunisia. In total, 23% of goods export to the OECD from North Africa is prone to robotisation, much higher than from Africa (14.1%), developing Asia (18.9%) and LAC (19.0%).
- Another constraint linked to digitalisation is the risk of company records being hacked, resulting in the dissemination of sensitive data or other digital security incidents that can lead to heavy losses for companies. Digital tools can also be used to rapidly disseminate false information, particularly by terrorist groups, who, in an effort to generate fear, claim responsibility for attacks or demand ransoms for hostages. Faced with these risks, as digitalisation develops, it must also be made secure to limit the adverse effects of digital security threats.

Public policies to support and accelerate the digital transformation for job creation in North Africa

Despite its high digital potential compared with the continent's other regions, North Africa is not yet benefiting from the dividends of digitalisation (improved productive efficiency and effectiveness, better quality of life, accelerated learning for young people, increased government transparency, etc.). This weakness is linked to low participation in the labour market, especially of young people and women. Public policies are therefore required to improve the digital accessibility of the labour market to potential participants. The region's countries must take steps to enhance the potential of the current technological transformation and the development of the digital economy. To this end, governments should support the development of fintech, improve the linkages between education systems and the new needs of the labour market, and develop entrepreneurship and innovation in the digital economy.

Fintech: A vector for digital transformation in North Africa

Resistance to change is a major barrier for digital transformation in North Africa generally, and for the development of fintech in particular. Access to digital methods of financing investment in this region is mainly influenced by the legal framework, regulations, and the lack of infrastructure and trust in digital tools. North African legal systems are based on civil law, which prohibits anything not laid down in law. This ultimately leads to a regulatory gap. For example, non-banking entities are not permitted to offer alternative banking services as this is not explicitly provided for by law. This means that legal certainty and clarity are essential for fintech development (Lukonga, 2018). In the same vein, banking regulations in these countries have favoured those in dominant positions, i.e. large banking groups such as Attijariwafa Bank or Commercial International Bank (CIB). This has discouraged innovation and creativity in the area of payments relative to other regions in Africa (see the chapter on East Africa). The infrastructure gap is also a serious barrier to the development of digital financial services.

Finally, security concerns and fears about data breaches and/or the proliferation of fraud have dampened the demand for digital financial services in the region.

Loosening regulatory constraints

Setting out a strategic roadmap including far-reaching banking and financial reforms, with bold goals for Internet access, data transmission, electronic payments, and more (Table 6.4), bringing the various stakeholders on board, is essential if North Africa is to adapt to technological disruption. Such an approach must start with greater openness, promoting competition and encouraging the development of tailored technological solutions. It must also mobilise all stakeholders around a common goal and help young people find decent work in the digital age. Morocco's central bank, Bank Al-Maghrib, for example, passed Act 103-12 allowing non-banking entities to provide electronic payment solutions and giving actors in the marketplace the freedom to position their e-wallets and adapt their offerings (PwC and Casablanca Finance City, 2020).

Table 6.4. **National strategic objectives for the digital sector in North Africa**

	Accessibility	E-commerce
Algeria	• Strengthen, develop and diversify digital technologies used to access and secure high-speed and ultrafast broadband infrastructure. • Roll out fibre optics nationwide.	• Implement an e-commerce statistical information system.
Egypt	• Achieve Internet coverage of 90% of the population, 40% with a very high-speed Internet connection in 2021.	• Double the number of companies using e-commerce by the end of 2020.
Morocco	• Reduce the digital access gap by 50% by the end of 2020.	• Make Morocco a regional digital hub by strengthening digital exports, reducing the digital gap and transforming the most important sectors of the national economy.
Mauritania	• 25% of households have access to the Internet (thanks to the expansion of 4G) in 2023. • 80% of the population has access to the Internet (thanks to the expansion of network coverage).	• Expand access for all citizens by stimulating private investment in broadband Internet.
Tunisia	• Three in five families connected to broadband and 50% mobile broadband penetration by 2021.	• Establish a digital culture through the digitalisation of content. • Improve the competitiveness of businesses, across all sectors, through investment in ICT and their positioning in the digital economy.

Source: Authors' compilation.

In North Africa, the cautious approach, which reflects the desire to limit risk and slows down innovation, must give way to a risk-tolerant strategy. As such, governments should relax the rules around enabling infrastructure, such as open application programming interfaces (APIs), the cloud and data sharing, to encourage the emergence of fintech firms and promote investment in this area. In the same vein, deregulating telecommunications and finance could encourage the emergence of non-banking operators offering solutions adapted to SMEs and support the development of digital solutions (see chapter on East Africa). This deregulation needs to be carefully assessed, considering its potential impact on the health and stability of the financial system. Governments could also encourage partnerships between public banks and fintech firms to improve their penetration and enhance consumers' access to digital financial services. They should allow ICT companies (especially SMEs) to offer their connectivity services using their own infrastructure rather than being dependent on incumbent operators. Moreover, the region's competition authorities must ensure that the obstacles faced by new entrants are not compounded by incumbent operators enacting illicit strategies (exclusive distribution, loyalty discounts, etc.). This will ultimately facilitate innovation and the acquisition of market share by SMEs.

The regulatory authorities in these countries must gradually shift from a regulatory approach to an experimental approach. These authorities are often seen as conservative and they lack capacity, which contributes to their risk aversion and lack of awareness of the opportunities offered by disruptive technologies (Lukonga, 2018). It is for this reason that governments in North Africa should build capacity within the public and regulatory bodies responsible for the digital sector. An experimental approach that gradually clears the regulatory bottleneck is required. The Central Bank of Tunisia, for example, has just launched a regulatory sandbox, which allows fintech firms to test their innovative solutions on a small scale with volunteer customers (Box 6.2). A *sandbox* was also established in June 2019 by the Central Bank of Egypt to monitor the regulatory dynamics of fintech firms, ensure financial inclusion, improve SME access to banking and financial services, and support the transition to a digital economy that promotes de-cashing (AFI, 2018).

Box 6.2. **The regulatory sandbox: A tool for fintech experimentation in Tunisia**

Launched in 2020 by the Central Bank of Tunisia, the regulatory sandbox is a space for would-be entrants (especially young entrepreneurs) to develop their financial products and/or services. It enables the authorities to both better understand the fintech ecosystem and adapt the regulatory framework.

Within the sandbox, financial products and services based on new technologies (or new permutations of existing technologies) can be tested without having to comply with the various regulatory requirements. At the end of the testing period, all those who meet the regulatory authorities' testing criteria can apply for the relevant authorisation or approval. The testing period lasts nine months from the date of admission to the sandbox and can be extended by three months on request.

This mechanism enables fintech operators to understand and comply with the regulatory requirements in force so they can advertise services adapted to the market. It also enables the Central Bank of Tunisia to understand the complexity of technological innovations with a view to adjusting regulatory provisions and supervisory and monitoring processes if necessary.

Source: Authors' compilation based on a literature review.

For countries without adequate regulation, a monitoring and supervisory framework governing fintech services and providers will be important. The region's central banks will therefore have to create stronger co-ordination units, get buy-in from the multiple departments affected by fintech developments and involve the relevant public authorities closely in licensing and oversight of these entities (World Bank, 2018). Establishing co-ordination mechanisms enables regulators to pool their efforts with a view to identifying and resolving any regulatory inconsistencies and gaps that arise. Introducing reporting requirements for licensed entities also enables supervisory bodies to monitor changes in fintech market structures and, consequently, to identify risks and provide timely policy responses.

Furthermore, only market confidence in the integrity and security of digital finance can safeguard the development of fintech. In this context, governments need to invest in strong mechanisms to protect consumers and provide remedies in the event of unfair practices by service providers. They must likewise implement a legal and regulatory framework for data protection and privacy, as well as digital security standards and governance requirements. Finally, they must introduce appropriate standards and/or legislation

to support the certification of IT security and risk management within IT networks. The supervision and monitoring of providers should also cover their readiness to address digital security risks as well as banks' inappropriate risk management practices *vis-à-vis* third parties, and prohibit the concentration of risk among the same providers. Moreover, collaborative arrangements between financial regulators and other non-traditional regulatory bodies should be strengthened (Lukonga, 2018).

Reducing the infrastructure gap

The spread of digital technology should be an opportunity to develop payment infrastructure in North Africa. As such, the region's governments must first address the current underinvestment in communications infrastructure by strengthening fibre optic networks and promoting the use of 4G and 5G technologies. Efforts should also focus on developing and upgrading payment infrastructure and opening up the market to financial service providers. Governments are invited to facilitate the integration of financial service providers into their national settlement infrastructure, whether payment systems or clearing houses.

The development of fintech firms in North Africa must go hand in hand with policies to develop communications infrastructure and connectivity. Governments should support private investment seeking to improve broadband accessibility and connectivity, accelerate the installation of fibre optic networks, increase the number of Internet exchange points[3] and promote the interoperability of virtual platforms. On this last point, interoperability between banks and payment institutions in Morocco was initiated in 2018. The aim is to enhance the potential profitability of the various entities by making it easier to access a vast and still underexploited market segment and providing services tailored to microenterprises.

Many North African countries are in a position to transform into connectivity hubs if they can harness their potential. These countries can capitalise on their terrestrial networks to complement submarine connectivity in the Mediterranean. Egypt, Morocco and Algeria could therefore further develop their position as connectivity hubs. Algeria, for example, has an impressive 75 000 kilometres of fibre optic cable. If it were to connect this infrastructure to sub-Saharan Africa and the cables in the Mediterranean Sea, the country could change the geography of the global Internet infrastructure (World Bank, 2018). In this context, broadband markets must be made less concentrated and more competitive, by promoting the entry of private actors, primarily the relevant national IT companies. Similarly, pilot projects for fast 5G wireless networks in the region's major cities are proving fruitful, attracting industrial groups and boosting the employment of qualified young people. Finally, specific financing facilities, including the proactive use of public subsidies, can facilitate access to networks and support young tech-savvy entrepreneurs.

Public interventions must also work to resolve existing infrastructure bottlenecks, especially in rural areas, to help the less privileged social strata benefit from the development of fintech. According to data from the Gallup World Poll, only 35.7% of the population in rural areas has access to the Internet, compared with 53.9% in urban areas in North Africa. In this context, governments can support private innovation in these areas, such as the development of satellite networks that increase Internet coverage and boost the communication capabilities of rural communities. Similarly, incentive policies that promote collaboration between different operators in the local market can stimulate investment in remote areas. Finally, a reliable electricity supply in these areas would avoid any disruption to the provision of digital financial services to rural populations (European Bank for Reconstruction and Development, European Investment Bank and World Bank, 2016).

Fostering closer ties between potential digital finance operators

In North Africa, public policies must support ICT investment efforts through "accelerator" mechanisms that provide start-up development programmes, as well as incentives for importers and/or producers of high-tech equipment. Governments in the region must therefore revise their legislation to make it easier for start-ups to work with accelerator financial partners and benefit from their expertise. Moreover, a policy to target subsidies towards investment in communications infrastructure and reduce tariffs on high-tech imports is also needed to cut costs and stimulate demand. Tunisia, for example, passed a law on start-ups in 2018 (the Start-up Act), making it easier for young entrepreneurs to raise funds, the government to award grants and tax benefits, and project owners to take time off work and get help filing international patents.

The public sector should partner with the private sector to bolster potential demand for fintech firms. This will unblock initiatives, stimulate supply and boost youth employment. As such, public policies will have to provide for public and/or sectoral financing facilities to enable consumers (especially those with reduced purchasing power) to procure the equipment required to make electronic payments (smartphones, computers, telephone chips, etc.). Governments must therefore implement incentive mechanisms to encourage young people to use digital platforms, whether for financing (on the entrepreneur side) or to pay for services (on the consumer side). Morocco, for example, is one of the first countries on the continent to make a major effort to pass a law that facilitates participatory financing or crowdfunding. In Tunisia too, a bill on crowdfunding was passed in July 2020 in the wake of the Start-up Act. Moreover, the Central Bank of Egypt has made it compulsory for government bodies to use electronic payment methods for sums above EGP 20 000 (Egyptian pounds), benefiting service providers (AFI, 2018a).

Finally, governments should recognise the importance of partnerships between microfinance institutions and mobile phone operators on the one hand, and, most significantly, between these financial institutions and digital financial service providers on the other. The first type of partnership promotes digital savings and credit services, mobile interoperability with e-wallets, etc. The second type of partnership facilitates credit scoring solutions and the use of blockchain technologies (AFI, 2018b). Above all, regulatory authorities must understand the importance of these partnerships and how the financial sector is changing in general. They must also optimise potential synergies between digital finance and microfinance, which will benefit both fintech (convenience, effectiveness, etc.) and microfinance institutions (operational efficiency, client diversification, etc.). This can be facilitated by clarifying (or abolishing) rules around outsourcing and by introducing a requirement to share credit information.

Skills development: A guarantor of the digital transformation in North Africa

The technological disruption caused by the digital revolution is reshaping the world of work and changing the nature of demand, and skills must adapt to this change. In this context, North African governments have a central role to play in laying the foundations for the inclusive and equitable development of digital skills, enabling them to adapt to the various changes in the labour market. In particular, this means modernising education systems and improving technical and vocational training. As such, the region's governments must attach particular importance to lifelong learning and reskilling the workforce, to create conditions conducive to the sustainable supply of digital skills. Finally, they should implement public policies to support and, where necessary, co-ordinate partnerships with the private sector, and to monitor and evaluate the various digital literacy programmes.

Modernising the education system and improving technical and vocational training

Education policies in North Africa must be proactive, innovative and based on a participatory approach. Technology is changing the way young people prepare to enter the labour market. It influences not only the ends of education, but also the means (IBRD, 2019). Learning must therefore be based on experiential education that develops children's communication, teamwork, resilience, self-confidence, negotiation and expression skills at an early stage. This approach to learning must engage both teachers and parents. Likewise, the region's governments must integrate the use of ICT into teaching methods, equip school children with digital educational tools and develop digital educational platforms. The free online educational platform Nafham, available in Algeria and Egypt, is one example. It publishes original content, based on curricula from several countries in the region, and has made use of crowdsourcing to enable lessons to be downloaded. Furthermore, supporting specialised educational start-ups has shown to help disseminate digital educational content. In Egypt, for example, the start-up Tutorama connects students and their parents to tutors. This platform provides a form of personalised teaching, giving young people more space to understand and assimilate textbook teaching.

New digital technologies present an opportunity to innovate and modernise the education system in North Africa. The digital revolution requires an awareness of the new skills needed to make a smooth transition into the labour market. As such, education programmes should adapt to the new reality by incorporating soft skills, in particular cognitive skills, socio-behavioural skills and critical thinking. For example, Moroccan legislation sets out the skills that students should acquire at school: mastery of languages, social skills, an understanding of civic affairs and early preparation of students for their future careers (IBRD, 2019). New e-learning and practical self-study tools must also be adopted and digital culture courses developed. The Egyptian Knowledge Bank (EKB), a digital learning platform launched in 2016, has provided access to resources and educational tools for teachers, researchers, students and the general public. The objective is not only to advance scientific research and promote new teaching methods for teachers, but also to provide new educational resources for students.

Governments must bridge the technological skills gap by ensuring that technology complements the labour component. The evolving world of technology should push governments not only to embrace the idea of reforming the education and training system, but also to set out a programme for learning and adapting to change. The skills-based approach adopted in Morocco and its replication in the digital and technology field is proving useful to the region. The aim is to transform qualifications so they provide knowledge and skills applicable to the digital sector. Morocco's comprehensive reform of the training system was based on a participatory approach through which different stakeholders (state, regions, employers, trade unions, sectors and businesses) have engaged in both steering and implementing the vocational training system. Professional associations are then involved in identifying the training needs of companies and managing the training system, in collaboration with the Office for Vocational Training and Labour Promotion (Maurin and Melonio, 2011).

The need for technologically literate workers should prompt authorities to rethink the tertiary education programmes provided. This would mean placing particular emphasis on Science, Technology, Engineering and Mathematics (STEM) rather than social studies, which have long been prioritised by public sector employers (World Bank, 2018). The aim would be to permeate educational courses with ICT-related disciplines (data analysis, financial engineering, computer sciences, coding, software development, etc.) and to encourage greater openness to innovation and risk-taking to enhance creativity among

young people and create a technological ecosystem in which they can turn ideas into projects (AUC/OECD, 2019).

Beyond STEM, education programmes in North Africa need to strengthen business skills, entrepreneurial spirit and cognitive and non-cognitive skills (social and emotional skills such as curiosity, self-control, etc.). All this will facilitate the creation (and the uptake) of digital technologies, limit technological dependence on countries in the global North and create conditions conducive to young people's integration into the labour market (AfDB, 2019).

Public authorities should also pay particular attention to technical and vocational training through the establishment of rich and adapted programmes. The ultimate aim of these programmes must be to improve the skills of young people who want to take advantage of the opportunities offered by Industry 4.0 in general, and the digital sector in particular. This means integrating basic educational and general vocational skills into training courses, with the aim of increasing the versatility of young people in certain sectors (AfDB, 2019). There is also a need to develop training programmes for trainers and to equip them with teaching materials and educational software. The Centre for the Development of Vocational Skills (CDCP) in Tunisia, for example, provides certified training for trainers, accredited by the American Institute of Professional Studies (AIPS). This centre seeks to integrate the rapid evolution of learning styles in the wake of the technological revolution and to rethink the patterns of knowledge transmission, while incorporating new visual formats.

Educational strategies in North Africa must guarantee the development of a culture of lifelong learning to prepare for the digital transformation and adapt to the demands of the digital economy. These strategies should be based on the need to acquire a certain number of basic skills to be able to continue on the education and/or training pathway. Moreover, the requirements in terms of technical and professional competence should be made more demanding to ensure the development of the necessary skills. At each stage, the use of ICT should be expanded to ensure the lesson content is disseminated on a large scale. In parallel, governments should support the development of an educational software industry, which is lacking in the majority of North African countries (World Bank, 2013).

Fostering PPPs for digital skills development

Human capital development policies seeking to upskill and/or promote the re-qualification of certain cohorts in the labour market (reskilling) are necessary to weather the upheavals expected in the North African labour market. Public policies must help to reduce the gap between future labour market needs and the qualifications of tomorrow. As such, governments should support private sector efforts to meet the expected high demand for professionals able to combine their traditional expertise with digital and STEM skills, as well as for experts able to facilitate seamless interaction between human and machine (digital mechanical engineers, business operations data analysts, user interface specialists, etc.). More specifically, this will involve financing programmes/contracts for companies that want to recruit the above-mentioned profiles, set up online collaboration platforms or offer technical training for their executives. Furthermore, it will be necessary to support companies that want to train young people in the digital domain, following the example of Germany, which has a dual vocational and educational training system. Such policies generate new employment opportunities for young people, increase the skills and productivity of workers and offer new and more flexible ways into work for job seekers (World Economic Forum, 2017).

Public policies need to address women's technological skills to harness a yet untapped pool of human capital in North Africa. To improve the female participation rate, gender-based discrimination must be tackled through partnerships between public institutions and private operators facilitating women's access to technology. Implementing a regulatory framework that prohibits unequal pay for men and women and promotes the mobility and security of working women would also help. Finally, countries in the region can deploy collaborative mechanisms to promote flexible working arrangements by removing restrictive laws, improving women's access to credit and promoting more gender-balanced workplaces (World Bank, 2018).

Involving the private sector in defining curricula in North Africa could facilitate the transition from school to work. Such a collaboration could strengthen the capabilities of the public education sector and the alignment between each country's skills development agenda and future labour market needs. Engaging the private sector in the co-creation of vocational training courses would therefore be a relevant endeavour. In Morocco, under a partnership with the National Agency for the Promotion of Employment and Skills (ANAPEC), the Federation of Information Technology, Telecommunications and Offshoring (APEBI) is seeking to boost employability in the IT sector through the co-creation of training courses and vocational qualification certificates. The CQP certification programme (a professional qualification certificate for new technology developers) is a perfect illustration of this.

Partnerships can be expanded to include national and international non-governmental organisations (NGOs) to facilitate the development of entrepreneurial ICT and digital skills. Partnerships of this kind facilitate the development of programmes to encourage ICT-related entrepreneurial skills and ensure a minimum level of digital literacy. An interesting example is the Digital Livelihoods: Youth and the Future of Work at Scale project, a partnership between the Canadian government, the Digital Opportunity Trust and a number of African countries (including Morocco). This programme works to equip young people with the skills and education they need to use ICT to create new businesses, find jobs and access financial products and services (UNESCO, 2017). North African governments should ensure they are in a position to evaluate the different programmes established with partners, so that they can identify and strengthen those that are working well, clarify best practices and inform public policies. By enhancing co-ordination between the government agencies and intersectoral bodies involved in digital training programmes, it will be possible to ensure these evaluations are both rigorous and objective. Research and data-sharing efforts are also needed to facilitate regional and global analyses.

In North Africa, adopting a decentralised approach could help strengthen the links between training courses on the one hand and the skills needs of local businesses on the other. Stakeholders with the capacity to identify the skills required in the different regions must collaborate so the specificities of each region can be taken into account, alongside a shared national vision for the digital sector. Meeting the needs of local businesses to boost graduate employment and creating training courses adapted to the specificities of each region have proven fruitful. In particular, the supply of higher education courses is especially rich and diverse in regions where public and private institutions compete to offer the most cutting-edge and innovative courses. Good examples of this are the Cities of Professions and Skills in Morocco. These are regional multisectoral and multifunctional facilities offering new training courses and modern programmes that meet the expectations of sectoral and regional ecosystems. A selection of pilot regions have been designated to host the first Cities, including Souss-Massa, where high-level training will be provided, including on digital subjects.

Entrepreneurship and innovation in the digital economy: Two pillars for digital transformation and job creation in North Africa

Beyond their direct involvement in creating jobs for young people, governments should cultivate an enabling environment for entrepreneurship and innovation. Improved governance can also accelerate the digital transformation and improve employability in the region.

Creating an entrepreneurial environment conducive to digital transformation

To succeed in their digital transformation, North African countries must support the development of a new economy that encourages entrepreneurship, generates more opportunities for young people and builds public sector capacity to support SMEs. Incentives and entrepreneurial skills development, supported by digital hubs and tailored education programmes, are in place (Table 6.5). Flat6Labs is a good example of an entrepreneurship accelerator programme. It provides a range of preparatory workshops that aim to help young entrepreneurs secure financing for their start-ups. It offers various investment tickets and welcomes start-ups focused on innovation and the knowledge economy in a number of sectors, including education, energy, transport, fintech, green tech, ICT, electronics and industrial solutions. Such a programme is made possible by the presence of an educated, connected and tech-savvy population, as well as public authorities' willingness to cultivate an entrepreneurial ecosystem, which is already growing. Similarly, the development of such an ecosystem can only be achieved by tapping into appropriate funding sources, from both national and international investors. In Egypt, for example, the growth of start-ups has prompted national venture capital firms and angel investors to seize the opportunity and increase their funding. Algebra Ventures is a classic example. Since it was founded in 2016, significant financing has been granted to around 15 companies specialising in a range of sectors. Beyond local financing, international investors such as DiGAME, EndureCap, BECO Capital and Silicon Badia have provided additional financing and expertise to enable local companies to grow.

Table 6.5. **Examples of start-up incubators in North Africa**

Name	Date created	Country	Notable features
Flat6Labs Cairo	2011	Egypt	Provides start-up financing (up to EGP 250 000) and follow-on financing (up to EGP 1 million) to selected start-ups, strategic mentoring, premises and entrepreneurship training and workshops, in return for the transfer of 10% of the company's shares to the hub, which has mentored more than 70 start-ups and over 140 companies in the MENA region.
WikiStart Up	2011	Tunisia	The first private incubator in Tunisia, it encourages the creation of start-ups by providing an innovation-oriented ecosystem and facilitating access to expertise, business development tools, financing and an international professional network enabling rapid growth.
New Work Lab	2012	Morocco	Develops support programs to accelerate the creation of businesses and jobs, strengthening the skills and leadership of young Moroccans. In 2020, it worked with more than 300 entrepreneurs.
Hadina Rimtic	2014	Mauritania	The country's first ICT incubator. In 2017, the Entrepreneurship Marathon was launched in partnership with the World Bank and the Mauritanian Ministry of the Economy to support new start-ups and raise awareness among more than 2 800 young people about the opportunities offered by entrepreneurship.
Tatweer Entrepreneurship Campus (TEC)	2017	Libya	Promotes an entrepreneurial ecosystem in Libya through various programmes, including business incubators, co-working spaces and training programmes on technology, business administration and financial management. Over the 2017–20 period, the programme has supported more than 75 entrepreneurs, creating more than 1 000 value-added jobs.

Source: Authors' compilation.

A supportive entrepreneurial ecosystem in North Africa is only possible if policymakers focus on the factors that enable multidimensional digital platforms to develop and on creating a level playing field. This means ensuring the availability of cloud-based services, geolocation, security, etc., which enable the development of multidimensional digital platforms. The regional expansion of Uber, for example, (already present in Egypt and Morocco) could prove interesting in this context. Governments must also amend regulations to facilitate young entrepreneurs' entry into the market through these platforms, particularly those linking job offers with job seekers, offering tailored training and hosting start-up incubators, along the lines of the Upwork platform. In particular, in energy-based economies, the development of digital platforms for factory automation or redesigning cloud-based energy platforms can encourage the emergence of an ecosystem of private providers.

Governments should pay particular attention to data and consider data as "national assets" if they want to achieve their goal of digital transformation. Public policy must focus on management (collection, access, security, etc.) and governance (ownership, financing, storage, etc.) of these assets. Likewise, governments in the region should facilitate the development of physical infrastructure to manage data from non-traditional sources, which the existing communications infrastructure does not have the capacity to accommodate (e.g. Internet of Things). Setting up data centres designed to host servers and computer storage systems would promote the development of a national digital ecosystem. This would facilitate access to ICT and reduce the cost of experimenting with new technology for young entrepreneurs facing financial constraints. It would also help to adapt technology use to the business cycle (OECD, 2019). Egypt has the region's highest number of data centres[4] and the government, through partnerships with incumbent operators based in the country, is promoting the installation of these centres so that it can harness smart technologies to provide various services (related, in particular, to the Internet of Things, cloud computing and artificial intelligence platforms).

Fostering innovation, creating jobs for young people

Governments in North Africa should help entrepreneurs acquire new technologies that enable them to design new business models and long-term development solutions. Public policies to support the development of local content for SMEs can help them innovate through the production of software and manage their resources, access information and reduce costs more effectively. They can also help reduce time-to-market and improve market positioning (UNCTAD, 2019). In this context, ensuring legal and policy clarity for local content developers, hosting providers, content delivery networks and other relevant stakeholders is essential (African Union (AU), 2019). In the same vein, laws protecting intellectual property can strengthen young entrepreneurs' motivation to innovate in North Africa. This would involve implementing policies to protect trademarks and related rights as well as measures to facilitate the filing of patents. In particular, the introduction of franchise rights, database rights, licences for the use of the products of research and development and copyright in software are likely to encourage innovation and create jobs.

Policies promoting triangular collaboration between governments, universities and the private sector are facilitating the establishment of technology hubs and incubation centres in North Africa. This collaboration is creating an environment conducive to the cross-pollination of ideas and the co-creation of projects, fostering innovation in the region (Table 6.6). These hubs and centres often provide additional logistical support and technical assistance to young entrepreneurs. In recent years, Egypt has become home to several leading incubators (EBNI, 1864 Accelerator and EdVentures), whose ultimate objective is to support a range of technology start-ups. It is also home to one of the first

technology parks among African adopters, having launched Smart Village Cairo in 2001, with the government more recently investing in the new Maadi Technology Park in 2017 (Oxford Business Group (OBG), 2019).

Table 6.6. **Examples of technology parks in North Africa**

Name	Location	Funding model
Maadi Technology Park	Egypt	PPP, investment area specialising in ICT with the aim of creating 40 000 direct and 100 000 indirect job opportunities.
Technopark	Morocco (Casablanca, Rabat, Tangier and Agadir)	This PPP hosts 280 Moroccan start-ups and SMEs, nearly 2 000 employees with an average age of less than 30 and more than 10% of the national ICT turnover (excluding telecoms), attracting more than 60 new start-ups each year.
Smart Tunisian Technopark Elgazala	Tunisia	Bringing together private companies, public bodies and universities to create synergy and cross-fertilisation between these stakeholders. More than 250 companies including ten subsidiaries of major global groups (Microsoft, STMicroelectronics, Ericsson, Alcatel-Lucent, etc.) as well as Tunisian success stories (Telnet, Omniacom, Picosoft, Cynapsys, EBSYS, etc.) are housed in the different areas of this site.

Source: Authors' compilation.

The growth and expansion of these technology parks can be achieved through "clustering" policies that support the digital economy and advance the region's digital transformation. Policies to attract firms operating in the digital sector, and more broadly in ICT, are enabling the region's countries to benefit from technology transfers and increase local capacity for innovation. Moreover, policies to attract highly qualified foreign skills and, above all, expatriates working at universities, laboratories and technology giants (Google, Apple, Facebook, Amazon and Microsoft in particular) are required. Morocco, for example, was able to launch, through PPPs, the Maroc Numeric Cluster (MNC), to strengthen the ICT ecosystem and make the digital sector a vehicle for economic and social development (Box 6.3).

Box 6.3. **Maroc Numeric Cluster: the digital sector in service of the economy**

This mixed public-private body, launched in November 2010, brings together several of Morocco's ICT stakeholders. An initiative of the Ministry of Industry, Trade, Investment and the Digital Economy, it aims to promote the digital economy in Morocco. MNC is a partner of two "competitiveness clusters" (Systematic Paris Région and Images & Réseaux in Brittany) as well as the local productive system cluster 16000 Images de Poitiers. The main aims of this cluster are to develop and support innovative and collaborative projects, mobilise skills in the ICT sector, bring together universities and companies and officially endorse projects and training (Mediterranean World Economic Foresight Institute (IPEMED, 2014).

MNC works on projects in a wide variety of areas: mobility, multichannel, digital enterprise, the cloud and security, big data, the Internet of Things, smart cities, multimedia and smart education. Through these projects, it has opened up a number of opportunities for Moroccan start-ups and companies to develop new value-added services for citizens, cities and businesses.

Source: Authors' compilation based on a literature review.

Governments in North Africa can act as facilitators by providing support mechanisms for young innovators. This can be done by offering local solutions as well as by providing greater support for innovation within companies. Such support can be provided through new financing and technological knowledge transfer mechanisms. In Egypt, for example, the government set up a programme in 2004 to finance start-ups through the Technology

Innovation and Entrepreneurship Centre (TIEC), one of the first initiatives of its kind in the region. In late 2017, the Ministry of Investment and International Cooperation launched a start-up incubation project called *Fekretak Sherketak* ("Your Idea, Your Project") that helped found 42 local start-ups with amounts ranging from USD 5 000 to USD 30 000 each (OBG, 2019). Along similar lines, given the dominance of SMEs in the economic fabric of North Africa, the region's governments must redouble their efforts to facilitate market access for this group. Public administrations can therefore support these entities' innovative projects through public procurement, following the model of the Small Business Act. They can also create national digital procurement platforms to help these companies manage their purchases and thereby reduce their costs.

Accelerating the digital transformation through better governance

North African countries will only be able to sustain an entrepreneurial ecosystem and safeguard an innovative environment if they are disciplined in their governance. The inefficiency of public services and the low level of trust in public authorities resulting from a lack of transparency can be addressed through the development of a digital administration. Such an administration would certainly increase the responsiveness, effectiveness and transparency of administrative services and help to create a climate of confidence and innovation for businesses. The adoption of *open data* and *open government* in North Africa is now proving to be indispensable. Morocco has already demonstrated its utility, having launched a national portal in May 2011, as part of wide-ranging reforms. Similarly, Tunisia has had its regulatory framework in place since 2011, following the adoption of a law granting access to administrative documents, and has launched a national data portal. This portal provides access to data on a wide variety of topics and is complemented by open data portals linked to various government departments (OECD, 2017).

Public policies to combat corruption using digital tools are also needed in North Africa. The digitalisation of the administration and the development of digital public services reduce the number of points of contact and therefore the risk of corruption, discrimination and informal payments. Offering paperless electronic solutions, such as digital public procurement applications, improves governance, curbs corruption and builds trust. Indeed, electronic public procurement facilitates interactions and the exchange of information between the administration and economic operators. In Tunisia, the Tunisia Online E-procurement System (TUNEPS), an online public procurement platform, aims to make public procurement more efficient and transparent, with the corollary of better public finance management. For SMEs, the digitalisation of public procurement processes promotes competition and increases transparency. It enables them to overcome limited technical and financial capacity, save on costs and avoid the risk associated with corruption. Morocco and Tunisia, for example, have recognised the significant role played by SMEs and have reserved 20% of the estimated annual value of public procurement for them (OECD, 2016).

Notes

1. For more detail, see Economic Commission for Africa (UNECA, 2018).
2. The Enabling Digitalization Index is based on five criteria: regulation and business environment, education and research facilities, connectivity, logistics infrastructure and market size.
3. The advantage of this type of infrastructure is that it smooths the flow and increases the speed of Internet traffic, and enables 5G connectivity and the Internet of Things.
4. Egypt has 12 data centres, whereas Morocco has five, Tunisia two and Algeria only one. For more detail, see Internet Society (2020).

References

AFI (2018a), *Financial Inclusion Through Digital Financial Services and Fintech: The Case of Egypt*, Alliance for Financial Inclusion, Cairo, www.afi-global.org/sites/default/files/publications/2018-08/AFI_Egypt_Report_AW_digital.pdf.

AFI (2018b), *Digital Transformation of Microfinance and Digitization of Microfinance Services to Deepen Financial Inclusion in Africa*, Alliance for Financial Inclusion, Cairo, www.afi-global.org/sites/default/files/publications/2018-08/AFI_AfPI_Special%20Report_AW_digital.pdf.

AU (2020), *The Draft Digital Transformation Strategy for Africa (2020-30)*, African Union, Addis Ababa, https://au.int/sites/default/files/newsevents/workingdocuments/37470-wd-annex_2_draft_digital_transformation_strategy_for_africa.pdf.

Herpin T. (2020), *7 choses à savoir avant une implantation au Maghreb*, E-Commerce Nation, www.ecommerce-nation.fr/7-choses-implantation-maghreb/.

AUC/OECD (2019), *Africa's Development Dynamics 2019: Achieving Productive Transformation*, African Union Commission, Addis Ababa and OECD Publishing, Paris, https://doi.org/10.1787/c1cd7de0-en.

BAfD (2019), "Creating Decent Jobs: Strategies, Policies and Instruments", *Policy Research Document 2*, African Development Bank, Abidjan, https://am.afdb.org/2019/sites/default/files/AfDB18-16_Jobs_English.pdf.

Crunchbase (2020a), *Crunchbase Pro* (database), www.crunchbase.com (accessed 28 June 2020).

Crunchbase (2020b), *Startups Founded in 2020*, www.crunchbase.com/hub/startups-founded-in-2020#section-overview.

Demirgüç-Kunt, A., D. Klapper, D. Singer, S. Ansar and J. Hess (2018), *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*, World Bank, Washington, DC, microdata.worldbank.org/index.php/catalog/global-findex (accessed 1 February 2020).

EBRD, EIB and World Bank (2016), *What's Holding Back the Private Sector in MENA. Lessons from the Enterprise Survey*, European Bank for Reconstruction and Development, European Investment Bank and World Bank, Washington, DC, www.eib.org/attachments/efs/econ_mena_enterprise_survey_en.pdf.

Gallup (2019), *Gallup World Poll* (database), Washington, DC, www.gallup.com/analytics/213617/gallup-analytics.aspx.

GSMA (2020), *GSMA Intelligence* (database), Global System for Mobile Communications Association, London www.gsmaintelligence.com/.

GSMA (2019), *The Mobile Money Regulatory Index*, February 2019, London, www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/03/The-Mobile-Money-Regulatory-Index-1.pdf.

IBRD (2019), *Expectations and Aspirations: A New Framework for Education in the Middle East and North Africa*, International Bank for Reconstruction and Development, World Bank group, Washington, DC, http://documents.worldbank.org/curated/en/527931542039352771/pdf/Overview.pdf.

ICANN (2017), *Accelerating the Digital Economy in the Middle East, North Africa and Turkey*, Internet Corporation for Assigned Names and Numbers, Los Angeles, California, www.icann.org/en/system/files/files/accelerating-digital-economy-report-09oct17-en.pdf.

ILO (2019), *ILOSTAT* (database), International Labour Organization, Geneva, https://ilostat.ilo.org/data/.

ILO (2015), *Ways Out of Informality: How a New ILO Standard Tackles the Informal Economy Trap*, International Labour Organization, Geneva, www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_377771/lang--en/index.htm.

Internet Society (2020), *Middle East and North Africa Internet Infrastructure*, Reston, Virginia, www.Internetsociety.org/wp-content/uploads/2020/04/Middle_EastNorth_Africa_Internet_Infrastructure_2020-EN.pdf.

IPEMED (2014), "Clusters au Maghreb : vers un modèle de cluster Maghrébin spécifique", *Etudes & Analyses,* Institut de prospective économique du monde méditerranéen, Paris, www.ipemed.coop/adminIpemed/media/fich_article/1411461804_IPEMED%20-%20Clusters%20au%20Maghreb.pdf.

ITU (2019), *World Telecommunication/ICT Indicators* (database), International Telecommunication Union, Geneva, www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Lukonga, I. (2018), "Fintech, Inclusive Growth and Cyber Risks: A Focus on the MENAP and CCA", *IMF Working Paper* (WP/18/201) 11 September, Washington, DC, www.mfw4a.org/sites/default/files/resources/fintech_inclusive_growth_and_cyber_risks_a_focus_on_the_menap_and_cca_regions.pdf.

Maurin, J.C. and T. Melonio (2011), "Formation et emploi au Maroc : État des lieux et recommandations", *Document de travail n°116*, Agence française de développement (AFD), Paris, http://adapt.it/adapt-indice-a-z/wp-content/uploads/2015/01/afd_formation_emploi_maroc_2011_116.pdf.

North Africa Health (2020), *Digital Healthcare in North Africa*, Cairo, www.northafricahealthexpo.com/content/dam/Informa/northafricahealthexpo/english/downloads/NAH-IndustryReport_1_ENG.pdf.

OBG (2019), "Egypt 2019", *The Report*, Oxford Business Group, London, https://oxfordbusinessgroup.com/egypt-2019.

OECD (2019), *Measuring the Digital Transformation: A Roadmap for the Future*, OECD Publishing, Paris, https://doi.org/10.1787/9789264311992-en.

OECD (2017), *Benchmarking Digital Government Strategies in MENA Countries*, OECD Digital Government Studies, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264268012-en.

OECD (2016), *Stocktaking Report on MENA Public Procurement Systems, MENA-OECD Network on Public Procurement*, Organisation for Economic Co-operation and Development, Paris, www.oecd.org/governance/ethics/Stocktaking_MENA_Public_Procurement_Systems.pdf.

PwC and Casablanca Finance City (2020), "Digitalizing Africa: The Rise of Fintech Companies", *CFC Africa Insights*, PricewaterhouseCoopers, London, Casablanca Finance City Authority, Casablanca, https://images.content.pwc.com/Web/PwCGlobal/%7B53274c70-ea92-4c8d-93dd-bf6cbb06c9a3%7D_fr-maroc-etude-pwc-fintechs-en-afrique.pdf.

UNCTAD (2020a), *UNCTADSTAT* (database), Geneva, https://unctad.org/en/Pages/statistics.aspx.

UNCTAD (2020b), "UNCTAD B2C E-commerce Index 2019", *UNCTAD Technical Notes on ICT for Development No. 14*, Geneva.

UNCTAD (2019), *Digital Economy Report. Value Creation and Capture: Implications for Developing Countries*, United Nations Conference on Trade and Development, Geneva, https://unctad.org/en/PublicationsLibrary/der2019_en.pdf.

UNECA (2018), "Promoting Financial Technology Startups in Africa", *ECA Policy Brief 18/001*, United Nations Economic Commission for Africa, Addis Ababa, www.uneca.org/sites/default/files/PublicationFiles/eca_policy_brief_promoting_fintech_start-ups_rev1.pdf.

UNESCO (2017), *Working Group on Education: Digital Skills for Life and Work*, Broadband Commission for Sustainable Development, September 2017, United Nations Educational, Scientific and Cultural Organisation, Paris, https://broadbandcommission.org/Documents/publications/WG-Education-Report2017.pdf.

Wamda Research Lab (2017), "Fintech in MENA: Unbundling the Financial Services Industry", *State of Fintech Report*, Dubai, United Arab Emirates, http://backend.wamda.com/api/v1/downloads/publications/fintech-mena-unbundling-financial-services-industry.

WEF (2017), *The Future of Jobs and Skills in the Middle East and North Africa: Preparing the Region for the Fourth Industrial Revolution*, Executive Briefing, May 2017, World Economic Forum, Cologny, www3.weforum.org/docs/WEF_EGW_FOJ_MENA.pdf.

World Bank (2020a), *Enterprise Surveys* (database), Washington, DC, www.enterprisesurveys.org/en/survey-datasets.

World Bank (2020b), *World development report 2020: Trading for Development in the Age of Global Value Chains*, Washington DC., www.worldbank.org/en/publication/wdr2020.

World Bank (2020c), *World Development Indicators* (database), Washington, DC, https://databank.worldbank.org/source/world-development-indicators.

World Bank (2018), *A New Economy for the Middle East and North Africa*, Washington, DC.

World Bank (2013), "Knowledge Economies in the Middle East and North Africa: Toward New Development Strategies", *WBI Learning Resources Series*, Washington, DC, http://documents.worldbank.org/curated/en/906731468762559496/pdf/280380PAPER0Knowledge0Economies0MNA.pdf.

YEM (2020), *Database*, Youth Employment in the Mediterranean, UNESCO, Paris, https://unevoc.unesco.org/yem/DatasetsYEM.

YouGov (2016), *The Skills Gap in the Middle East and North Africa, A Real Problem or a Mere Trifle?*, London, https://d25d2506sfb94s.cloudfront.net/r/17/The%20Skills%20Gap%20in%20MENA%20WhitePaper%202016.pdf.