The Economist INTELLIGENCE UNIT

From Crisis to Opportunity

Strengthening MENA's digital ecosystem in the wake of the COVID-19 pandemic

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FOREWORD

From Crisis to Opportunity: Strengthening MENA's digital ecosystem in the wake of the COVID-19 pandemic is an Economist Intelligence Unit (EIU) report that has been commissioned by Google. The findings are based on an extensive literature review of more than 100 studies, an internal expert panel and an interview programme conducted by the EIU between July and August 2020. A number of findings were updated in January 2021. In total, more than 10 representatives from government entities, the private sector and academia were interviewed.

The EIU bears sole responsibility for the content of this report. The findings and views expressed do not necessarily reflect the views of the commissioner. The report was produced by a team of researchers, writers, editors, and graphic designers, including:

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EXECUTIVE SUMMARY

COVID-19 has taken more than two million lives[1] and wreaked havoc on even the strongest economies. The pandemic has forced changes to virtually every aspect of economic and non-economic life, from the critical to the mundane. Overburdened healthcare systems around the world have scrambled to build makeshift field hospitals to treat patients, whilst schools have struggled to provide online instruction and in-person business exchanges have all but ground to a halt.[2]

Policymakers around the world have implemented various measures to tackle the spread of the virus, including lockdowns and social distancing. However, these measures have forced business closures and travel restrictions, exacerbating the economic consequences of the crisis. In the Middle East and North Africa (MENA) region, COVID-19 has led to a severe contraction in GDP growth, putting at risk the region's economic growth strategies. For oil-exporting MENA countries, the global fall in demand has resulted in a slump in oil prices, driving an increase in job losses. Widespread travel restrictions have also resulted in the loss of significant tourism revenue; a particular concern for MENA countries, such as Egypt and the United Arab Emirates, where it contributes up to 20% of GDP. [3] Across the region, the current health and economic crisis has amplified long-standing structural challenges, including high youth unemployment, limited economic diversification, low business productivity, overburdened public sectors, and uncompetitive business environments.[4]

In response to the socio-economic fallout of COVID-19, some governments in the MENA region have leveraged technology to ensure that critical social services remain available, and that businesses are able to operate despite increasing uncertainty. The countries of the Gulf Cooperation Council (GCC), for instance, have deployed advanced technology to launch telehealth services, offer digitised government services and transition school lessons online.[5] In North Africa, governments have expanded e-learning services to ensure that students continue to access education. However, not all MENA countries were technologically equipped to handle the crisis.[6] Across the region, even in the richer GCC countries, a number of factors still hold countries back from their full digital potential. These factors include persistent technology skills gaps, complex regulatory requirements, lack of access to digital systems, digital divides across age and gender, and weak data flow, classification and protection frameworks.[7]

The pandemic presents a window of opportunity for MENA governments to reassess their digital readiness and drive changes that will better equip them to create economic and social opportunities, mitigate risks, and minimise socio-economic disruptions during future crises.

This report examines how technological tools have been successfully applied in MENA during the pandemic, as well as key obstacles to future technological adoption in the region. It assesses

areas where new or revised policies based on international best practices could catalyse the MENA region's use of advanced technologies to bolster economic resilience.

The study finds that MENA countries can speed up their economic recovery and better prepare for future shocks by building the digital infrastructure, data security regulation and human capital development frameworks that will enable the greater integration of advanced technologies throughout their economies. These three frameworks account for the physical systems (such as telecommunications infrastructure), policy environment (particularly cloud, data flow and privacy laws), and educational strategies that can equip MENA's future workforce with the necessary digital skills. Together, progress in these areas will build MENA's technology ecosystem capacity to support the region's long-term economic resilience.

In particular, an analysis of MENA's current technology ecosystem highlights the need for concerted policy changes, including:

1. Unfettered, equitable access to high-speed internet, which is the basic building block of preparedness, enabling remote learning, e-commerce, business continuity and more sophisticated and safer healthcare services;

2. The adoption of critical life-saving technologies, such as contact tracing applications and electronic medical records. These require a robust set of data security, transfer and privacy laws and regulations, which must be enforceable, credible and trusted by the public to be in its best interest;

3. The elevation of educational standards to ensure that MENA's current and future workforce is adequately equipped with the hard and soft skills that will enable them to participate in a high-tech economy;

4. The promotion of private participation, regional startups and digital entrepreneurs through the simplification of business licensing procedures, and;

5. Accessible and interoperable legal systems, designed through a participatory process, with key elements consistent across the region, that protect user data as the region increasingly iterates new uses for Artificial Intelligence (AI), cloud computing and advanced data analytics.

Although countries in the MENA region fall on a wide spectrum of technological readiness, a commitment to inclusive and strong economic growth requires that each country prioritises these objectives in its national growth and economic recovery agenda. Many MENA leaders have already started implementing policy initiatives to build their technology ecosystem, and they must now continue to champion these advances in resilience to help safeguard the vast interconnected global population.

INTRODUCTION

The COVID-19 pandemic has forced changes to nearly every aspect of public life. By the time the World Health Organisation (WHO) declared COVID-19 a public health emergency of international concern on 11 March 2020, many countries around the world had enforced lockdowns and social distancing measures. These measures have restricted business operations, reduced international travel, limited global trade, and strained social service delivery systems.

A country's capacity to adapt in the face of these unexpected changes is an indication of its resilience. Crisis management that incorporates advanced technology ecosystems has proven to be critical to building economic resilience and mitigating the impact of COVID-19. For example, South Korea was able to use existing technologies to aggressively trace the contacts of known infected individuals and was one of the countries with the most successful containment results, with 27 deaths per one million residents.[8] Compared with an estimated average real GDP contraction rate of 5.3% for the 37 OECD member countries in 2020, South Korea's real GDP contraction is estimated to be only 1.1%.[9] The EIU also expects South Korea to be the first OECD country to see its economy recover to pre-pandemic levels, with estimated 3% growth in 2021.[10]

In the MENA region, the EIU estimates that GDP contracted by 5.9% in 2020, as a result of COVID-19's effects on the region's economies.[11] Disparities in the development of technology ecosystems in the region, particularly between GCC countries and those in North Africa and the Levant, leave some MENA countries much less able to fully leverage new technologies to support economic recovery and resilience.

This report will examine how MENA countries have managed the challenges posed by the COVID-19 pandemic with the help of technology. It highlights how the pandemic has led to accelerated technology adoption by individuals, businesses and governments in the region in an effort to mitigate against COVID-19'simpact and prevent future disruptions. The report also identifies existing challenges to widespread technology adoption in the region and highlights opportunities for developing an advanced technology ecosystem that could help countries build long-term economic resilience.

SECTION I of this report reviews how the COVID-19 pandemic has affected countries in the MENA region. **SECTION II** assesses how countries in MENA have employed technology to respond to the socio-economic consequences of the pandemic in five sectors - healthcare, education, retail, tourism and government services. **SECTION III** examines the major gaps in MENA's technology ecosystem that have limited the region's ability to harness the full potential for technology to support economic recovery and growth. The section also looks at the key opportunities and international best practices for addressing challenges in MENA's technology ecosystem. Recommended policy changes and their likely impacts and timeframes are further detailed in a Policy Playbook that accompanies this report. The report concludes by reviewing the importance of a strong technology ecosystem for MENA's long-term growth and productivity and highlights key areas for further exploration.

Ultimately, this report aims to guide MENA policy makers and private sector stakeholders in designing data-driven and forward-looking solutions that will help develop the region's technology ecosystems and address socio-economic challenges.

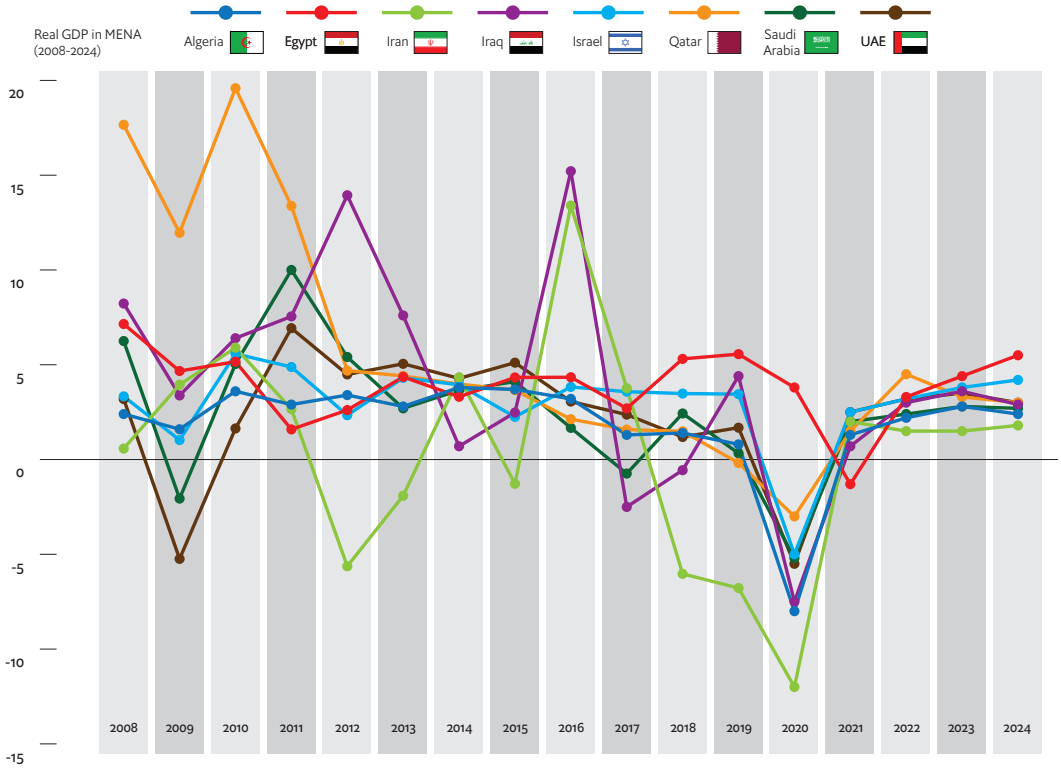
SECTION I: THE IMPACT OF COVID-19 IN THE MENA REGION

COVID-19 has had a greater impact on the global economy than any pandemic before it because of the scale and speed at which it has spread. In the MENA region, the pandemic has increased the strain on healthcare and education systems, adversely impacted key economic sectors, such as tourism and retail, and reduced fiscal stability, particularly in oil-exporting nations.

Unlike past pandemics such as SARS, H1N1, Ebola, and the Zika virus, which had relatively localised socio-economic effects, COVID-19 has had a more global impact. The loss in GDP from SARS, for instance, was largely concentrated in East Asian economies and estimated to be US$54 billion.[12] Likewise, during the Ebola outbreak in 2014, West Africa sustained a GDP loss of more than US$53 billion, while the rest of the world's economies remained largely unaffected.[13] In the case of COVID-19, however, the EIU estimates that the pandemic caused global GDP to contract by 4.3% in 2020, which amounts to a total GDP loss of roughly US$4.4 trillion in 2020.[14] In 2021, the EIU estimates that the world economy will recover gradually at a rate of 4.5% due to the pandemic's effects.[15]

In the MENA region, the economic impact of COVID-19 has been particularly dire, with the EIU estimating a regional GDP contraction of 5.9%, which amounts to a loss of US$288 billion.[16] GDP losses include an estimated 45% decrease in FDI inflows into the region in 2020, a decline of US$17.8 billion compared with 2019.[17] MENA's drop in GDP risks pushing an additional 8.3 million people into poverty amid deepening food insecurity crises,[18,19] and high unemployment.[20] In 2021, the EIU estimates that economic recovery will be subdued, with regional GDP expected to grow at 2.2%.[21] This is because global hydrocarbons output and prices are expected to recover only partially and the revival of tourist activity is expected to be slow, remaining below pre-pandemic levels. GCC countries are rolling out vaccinations and have the capacity to vaccinate most of their populations within the year. However, COVID-19 cases remain high in countries like the UAE that have opened their borders to tourists,[22] despite the country leading the world in terms of vaccinations administered per capita (second only to Israel).[23] This suggests that reopening will have to be gradual and careful, indicating a longer and more tentative road to recovery.

COVID-19's economic impact on the MENA region



Source: EIU analysis.

At sector level, the COVID-19 pandemic has affected countries in the MENA region in five major ways:

1. HEALTHCARE: Increased strain on already weak and overcrowded healthcare systems due to high rates of COVID-19 infection.

2. EDUCATION: Reduced access to education for almost 100 million children aged 5-17 as well as many tertiary-level students, thus threatening the region's human capital development plans.

3. TOURISM: Decreased global travel and demand for tourism, a sector that generates close to 20% of GDP in many MENA countries.

4. RETAIL: Weakened consumer spending due to job losses and reduced consumer confidence placing pressure on retail activity.

5. GOVERNMENT: Increased fiscal pressure due to lower private consumption and business activity as well as lower oil receipts in oil-exporting countries due to reduced global demand.

COVID-19's impact on livelihoods in MENA

Sources: UN Economic Commission for West Asia; Middle East Economy Watch, PwC 2020; EIU analysis.

In the **healthcare sector**, the pandemic has revealed cracks in MENA's medical systems, particularly in low-income and conflict-affected countries. In the region, nearly 5 million people have contracted COVID-19[24], representing 5% of all global cases.[25] While countries like Saudi Arabia, Iraq, Morocco and the UAE have seen 1-2% of their populations infected, smaller states like Qatar and Bahrain have seen infection rates of 5% and 7% respectively.[26,27] Despite the variation in infection rates, in many MENA countries, weak and overcrowded healthcare systems are finding it hard to cope with COVID-19 patients and typical healthcare emergencies. In fragile states, such as Yemen, Syria, Libya, Iraq and the Palestinian Territories, healthcare systems are grappling with a lack of hospital beds and testing capacity. In Yemen, only 51% of the country's health centres remain functional and there are very few testing sites for COVID-19.[28] Syrian hospitals are similarly overburdened due to lost capacity over the years and can only conduct 500 tests a day.[29] Even in richer GCC states, healthcare systems have had to put workarounds in place to cope with the virus. In Dubai, for instance, the health authority instructed hospitals to postpone all elective and non-urgent surgeries in March 2020, to accommodate a potential surge in patients due to COVID-19.[30]

In the **education sector**, full or partial closures during the early days of the pandemic risked derailing the region's human capital development plans. The quality of education in many parts of MENA was already weak before the COVID-19 pandemic. The World Bank's Human Capital Index finds that "a child born today in MENA will be only 57% as productive when she grows up as she would be if she benefitted from complete education and full health."[31] This is largely due to relatively low education rates in many MENA countries, as well as the poor quality of education. The COVID-19 pandemic risks exacerbating these education challenges. According to the World Bank, COVID-19 school closures might increase the learning deprivation gap by approximately 2.5 percentage points in the region. As students in the region return to their respective places of learning, it will be important for governments to identify how policy options deployed during the crisis, such as remote learning solutions, can contribute to building an educational system that is more resilient to crisis, flexible in identifying and responding to each individual student's learning needs, and proactive in protecting the most vulnerable.[32]

In the **tourism sector**, strict lockdowns and social distancing measures in MENA nearly

ground economic activity to a halt in 2020. Prior to the pandemic, tourism accounted for 5.3% of GDP growth and 6.7 million jobs across the MENA region. According to the World Travel & Tourism Council (WTTC), as of November 2020, 4.2 million jobs were lost or affected in the region because of the disruption to tourist activity. The tourism sector alone is responsible for a US$154 billion loss in GDP in MENA.[33] In the first 10 months of 2020, international tourist arrivals fell by 73% compared to the previous year.[34] The tourism sector in MENA is expected to begin to recover in 2021 with the removal of travel restrictions. However, a UNWTO survey of experts shows that 83% of them expect tourism in the region to rebound only in the third and fourth quarters of the year.[35] Surveyed experts do not anticipate a return to pre-pandemic 2019 levels in MENA before 2022, with a third expecting that this will only happen in 2024 or later.[36]

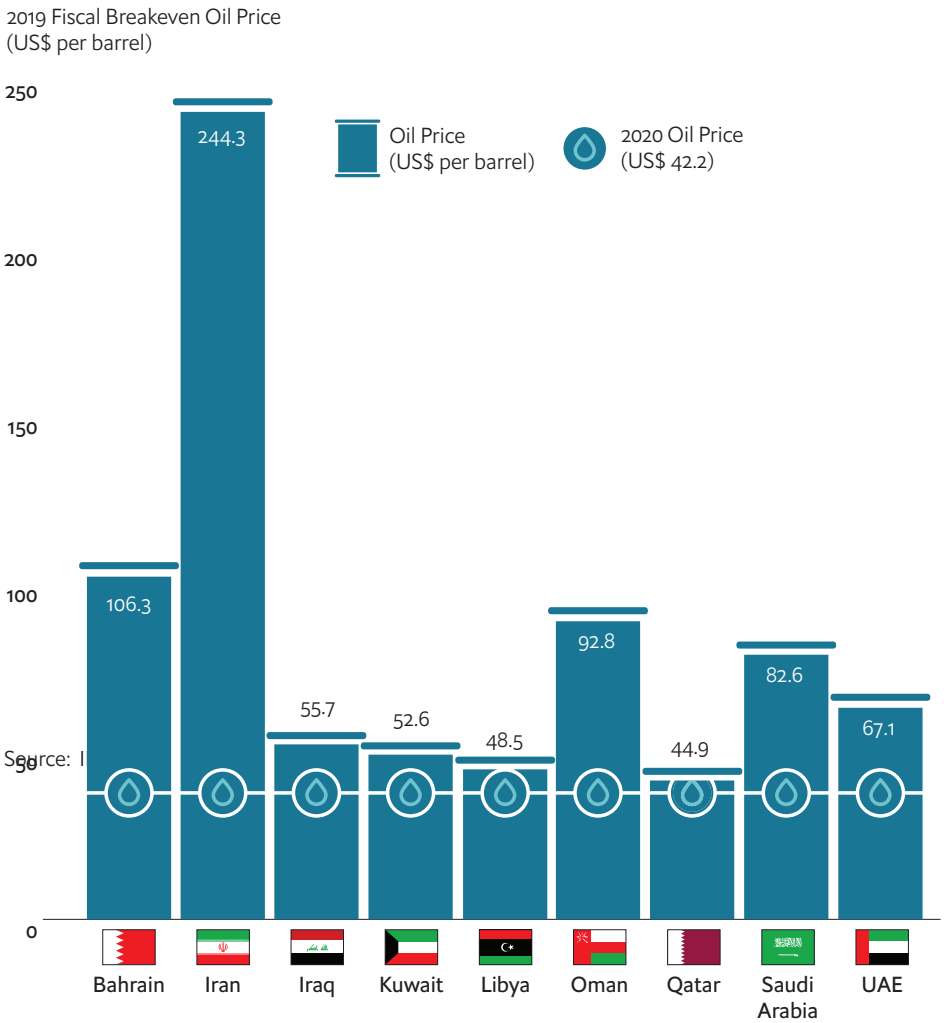
The decline in tourism activity is expected to have a significant impact on Egypt, Jordan, Lebanon, Morocco, Tunisia and the UAE, where tourism contributes between 10-20% of total GDP. In Egypt, for example, the loss of expenditure from international tourists is estimated to represent two thirds of the total loss in GDP caused by the pandemic.[37] In the GCC, where international visitor spend contributes US$90.4 billion to the economy, international tourist arrivals fell by between 65-80% in 2020, with Bahrain (78%) and Saudi Arabia (74%) the worst hit.[38,39] Up to September 2020, Morocco's tourism sector had suffered losses of US$2 billion due to the COVID-19 crisis. In addition, up to 400,000 tourism-related jobs in the GCC region were affected, compounding an already serious unemployment crisis.[41]

In the **retail sector**, a fall in domestic demand due to economic uncertainty and job insecurity has meant that consumers remain cautious about spending. According to PwC's CFO Pulse Survey conducted in May 2020, 40% of firms in MENA are expected to experience at least a 25% dip in profits and plan to cut staff.[42] Household expenditure on leisure and education in the MENA region declined by US$3.5 billion in 2020.[43] Non-food retail sales are estimated to have fallen by US$7.6 billion in 2020 from US$235 billion in 2019.[44] In 2021, retail sales are expected to grow at a modest 2.7%, slower than the 2019 pre-pandemic growth rate (5.1%).[45]

Finally, for **governments** in the MENA region, low economic activity coupled with external price shocks have increased fiscal pressures on a number of economies. In oil-importing countries like Morocco, Lebanon and Egypt, the sharp decline in non-oil activity, like tourism, and low levels of global trade, has limited government revenue. However, some of this pressure has been alleviated by lower oil import bills.[46] In oil-exporting countries, such as Saudi Arabia and the UAE, where oil forms an important component of government revenue, low levels of economic activity due to COVID-19 have reduced global demand for oil thus reducing government oil receipts (see Exhibit below).[47] The International Monetary Fund (IMF) estimates a 7.7% contraction in oil GDP in the region, destructive for oil exporting economies.[48] Moreover, while governments have had to contend with lower revenue prospects, they have also had to provide significant levels of economic support to key sectors. Saudi Arabia, for instance, has committed US$48 billion in economic stimulus to help its economy manage the effects of COVID-19. Similarly, in July 2020, Morocco announced a US$12.9 billion package to stimulate its economy and

Tunisia announced a US$864 million stimulus package to help manage the effects of the crisis in March 2020.[49] In 2021 the region's wealthier economies, particularly in the GCC, will be able to continue to provide fiscal stimulus to support the economic recovery. Dubai started the year by announcing a stimulus package worth AED315 million on 6th January, its fifth since the pandemic began.[50]

Breakeven oil prices and the decline in the oil prices in 2020



Source: I

Though many countries in MENA have introduced economic stimulus packages to minimise the effects of COVID-19, these countries have also leveraged technology to mitigate the crisis. For instance, with teams working remotely, businesses in MENA have sustained day-to-day operations by collaborating online using video conferencing. The next section explores how businesses and governments in the MENA region have used technology across the five sectors discussed above to adapt to the changes brought about by the COVID-19 pandemic.

SECTION II: EMPLOYING TECHNOLOGY TO MINIMIZE COVID-RELATED DISRUPTIONS AND BUILD RESILIENCE IN KEY SECTORS IN MENA

In response to the negative socio-economic impact of the COVID-19 pandemic, countries in the MENA region have sought to stimulate growth and provide essential social services by using technology to minimise disruptions in five key sectors: healthcare, education, retail, tourism, and government services. Across these sectors, actors in MENA have leveraged technology to: (1) scale up the use of existing digital apps and platforms in areas where there was previously minimal use, for example, expanding e-learning delivery during COVID-19 lockdowns; (2) provide new digital solutions in areas where alternative technologies proved inadequate, for example, setting up infrastructure to facilitate wholly touchless travel, and (3) introduce digital tools in areas where they were not previously employed, for example, deploying digital contact tracing and diagnosis applications for COVID-19 prevention.

Technology has played a vital role in many countries' response to COVID-19, both in terms of employing digital tools to fight the virus itself and in using technology platforms to cushion the impact on society as the pandemic persists. This section focuses on how countries in MENA have used technology to improve resilience in five key sectors i.e. healthcare, education, retail, tourism and government services. These sectors are particularly important for the region given their contribution to national GDP (tourism and retail), their role in employing nationals (government services) and their importance to the socio-economic wellbeing of citizens and residents (health and education). Accordingly, building resilience in these five sectors, including through the use of technology, will be vital for the region's economic recovery.

Technology as a tool to build resilience: MENA deployed technology across key sectors to minimize COVID-19 related interruptions

Healthcare	Hospitals and clinics have scaled up **telemedicine**, using it with **AI tools** to enable contactless COVID-19 diagnosis	Governments are using **app-based platforms for contact tracing** to control community transmission Some hospitals and healthcare facilities are using **robots for sanitisation**
Education	Governments deployed existing or new **online learning platforms** to ensure continued schooling	Governments provided **online repositories of learning content** and **educational resources** for teachers and students
Retail	**Shift to online shopping**, as brick and mortar stores in the region have started developing/ bolstering their online presence	Use of **robotics for contactless delivery**
Tourism	Tourism and travel industry is innovating to resume travel with minimal contact and risk of transmission by installing, for example, **self-cleaning escalator handrails**, **touchless elevator buttons** and **contactless passenger screening**	**Virtual reality experiences** from popular tourist destinations have been made available to substitute physical tourism
Government Services	Governments launched comprehensive platforms and used their existing platforms to **enable citizens' access to a wide range of government services**	Governments have set up **online information and support platforms** to **provide vital business information**

Source: EIU analysis.

Healthcare

In the early weeks of the COVID-19 pandemic, it became clear that healthcare systems, even in some of the most advanced economies in the world, were ill-prepared for the shock of a highly communicable virus.[52] An OECD report notes that GCC countries were more efficient than other countries in the MENA region in controlling the spread of the virus. Despite varying levels of healthcare system preparedness across MENA, the region's early response to COVID-19 involved strict containment measures, which proved effective in limiting the spread of the virus in the region, according to the OECD report. Quarantine rules were enforced by incorporating severe penalties for non-compliance, ranging from heavy fines to prison sentences, in countries such as Jordan, Saudi Arabia and the UAE, which helped in controlling the spread of the virus.[53]

GCC countries were more prepared to manage the COVID-19 virus, due to previous

investments in healthcare infrastructure and technologies, which, along with efforts to increase medical staff, significantly improved the quality of healthcare services in the region. In an assessment of COVID-19 preparedness published by the WHO in March 2020, where countries were ranked on a scale of 1 to 5 (with 1 meaning no capacity to respond and 5 meaning sustainable capacity), all GCC countries, except Qatar, scored either 4 or 5.[54] Technology played a key role in these efforts.

Contactless diagnosis using telemedicine and AI tools: Due to the high communicability of the COVID-19 virus, many hospitals and clinics in the MENA region scaled up their telemedicine services. Through virtual "visits", a medical practitioner could assess a patient for symptoms of COVID-19 and determine the need for further testing and treatment. Such services also served to reduce crowding at healthcare facilities, thus lowering the risk of patient exposure to people infected with the virus.

In April, Dubai-based private healthcare entities, Aster DM Healthcare and HealthHub by Al-Futtaim, introduced their own video-conference-style consultations . Both services, currently free, are open to patients who require non-emergency care.[55] In Dhahran, Saudi Arabia, Johns Hopkins Aramco Healthcare, launched primary care and mental health video sessions through their platform MyChart Video Visit. The platform offers patients an option to conduct virtual, face-to-face interactions with a primary care physician from the comfort of their homes.[56]

In addition to online consultations with medical professionals, a number of healthcare providers in MENA have introduced online chatbots, which individuals can use to share symptoms and assess the likelihood of their having contracted the COVID-19 virus. One example of this is the UAE government's Virtual Doctor chatbot service. [57] The chatbot asks people questions relating to their travel history, the possibility of having come in contact with someone who has travelled and is sick or with someone known to have COVID-19. It also asks if the person is suffering from specific symptoms. Depending on the person's answers, the chatbot will deduce if the person is at risk and connect him/her to a doctor through the same service. To scale up telemedicine, the UAE has begun working with its national telecom provider Du to establish MENA's first virtual hospital, which will include a telemedicine app and smart monitors that will enable patients to receive remote care.[58]

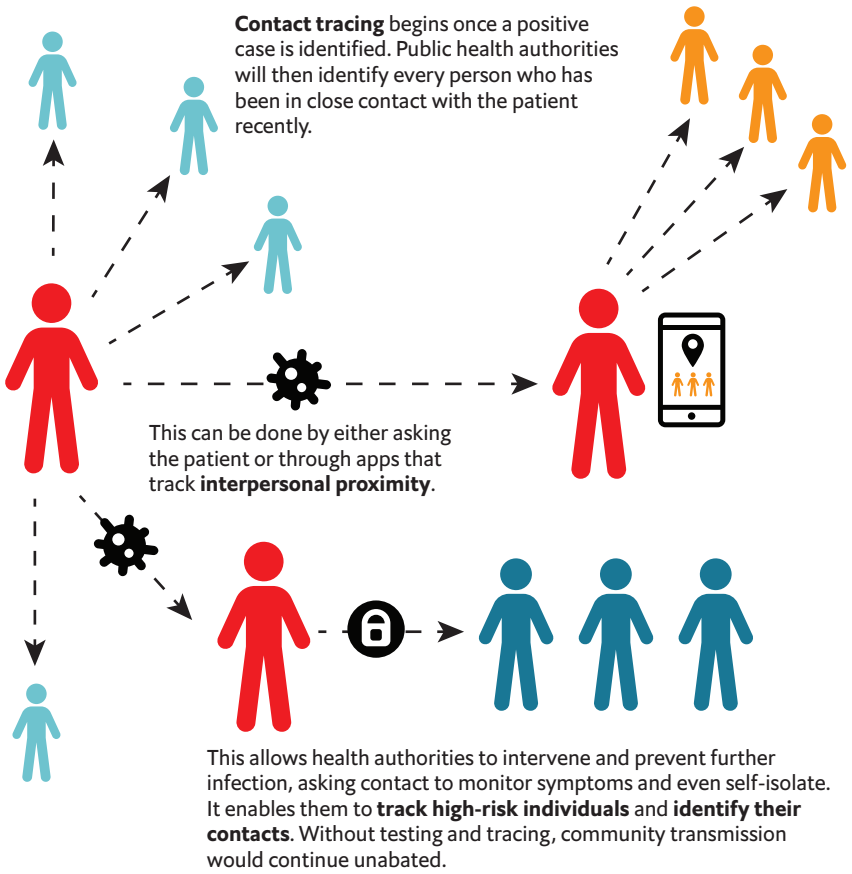
Increasingly, companies and governments in MENA have been deploying AI tools to improve diagnosis and help mitigate the spread of COVID-19. Countries like the UAE, Saudi Arabia and Egypt have begun to adopt big data and AI in healthcare, where they are expected to play a major role, not just in diagnostics but also supply management.[59] For example, Nabta Health, an emerging Emirati healthcare company, is using AI to provide COVID-19 risk assessments, identify symptoms and diagnose underlying health conditions.[60,61] These advanced technologies have already played a role in distributing the UAE's health supplies during the pandemic. An example in this case is the use of a self-driving vehicle, which uses AI to distribute personal protective equipment, including masks, gloves and sanitiser among residents.[62]

Contact tracing using app-based platforms: Contact tracing is the process of identifying all the people in an infected person's network who may need to be tested or quarantined in order

to contain the virus and reduce community transmission (see Exhibit 4). To perform contact tracing, a number of countries in the MENA region have developed new technology platforms to help them track and prevent the spread of the virus. Saudi Arabia, for instance, has introduced a social distancing app, called Tabaud, which notifies people if they came in contact with an individual infected with COVID-19.[63] The government of Morocco has launched its own contact-tracing app, Wiqaytna, developed by the Ministry of Interior. The app uses bluetooth technology and notifies users if they come into prolonged contact with an individual who has tested positive for COVID-19.[64] The government of Qatar has also rolled out a contact-tracing app, called EHTERAZ. Developed by the Ministry of Interior, its use is compulsory for all citizens leaving their homes. The app uses GPS and Bluetooth technology to track COVID-19 cases.[65]

Use of robotics for sanitisation: Robots are being used by a number of countries in the region. For example, The Dubai Health Authority (DHA) has introduced eight "smart" robots to sterilise its government-run hospitals and clinics. These robots, created by Danish company UVD Robots, are able to complete the exhaustive sterilisation of a room in 10-15 minutes, making the process of infection prevention and control highly efficient.[66]

How contact tracing helps stop community transmission of COVID-19



Source: EIU analysis.

Telemedicine requires people to have high-speed internet connections. Currently, internet penetration in MENA averages 63%, ranging from 80% in some GCC countries and Lebanon, to less than 50% in parts of North Africa and Iraq, with high rates of access concentrated in urban areas.[67] To scale real-time sharing of health data, 4G, and eventually 5G, services will need to be more widely available in MENA countries. For contact tracing, a large percentage of the population must also have smartphones. MENA is a mature market in this respect, with smartphones comprising 62% of all mobile subscriptions.[68] In the GCC, penetration is 79%, with North Africa at 54% and the rest of the Middle East ranging between 45% and 61%.[69] Both telemedicine and contact tracing raise concerns over personal and data privacy, as these systems collect personal information and a number of these apps don't include privacy-preserving mechanisms, like anonymising data or reporting the data in an aggregated format.[70]

Education

According to UNICEF, 110 million school-aged children in the MENA region stayed at home because of school closures.[71] To limit further disruptions to student learning, governments and academic institutions in MENA have expanded the number of online educational applications, platforms and repositories available to help parents, teachers and school administrators continue to educate students.

"Due to the lockdown, we had to stop schools in the middle of the second semester. Within four days, we succeeded in populating a new platform called study.ekb.eg where students could access all the resources free of charge"

Ahmed Daher, Deputy Minister for Education.

The use of online learning tools during the pandemic builds on previous government investment in digital education. Governments in the region were supporting investments in e-learning before the start of the pandemic.[72] For example, investment raised by education technology startups in MENA grew from just US$2 million in 2017 to more than US$23 million in 2020.[73] Before the lockdown, only 30% of higher education students took online courses in the region. During the pandemic, this shot up to 100% of university students. The UAE Ministry of Education is expected to expand its investment in e-learning initiatives by 60% to a value of US$7.1 billion in 2023. As part of its Vision 2030, Egypt's Ministry of Education connected 2,530 secondary schools to fibre-optic internet in 2018, with wireless access points in every classroom, and distributed 700,000 tablets among Grade 10 students to help them access digital resources.[74,75] The pandemic has renewed MENA governments' commitment to online education delivery.

Online learning platforms: Governments across the MENA region have responded to the pandemic by upgrading existing e-learning platforms or setting up new ones. The UAE, for instance, put its new online learning system "In This Together Dubai" into action in the first weeks of the crisis.[76] Their Ministry of Education also launched the Alef platform, which specialises in providing lessons in mathematics, the Matvak platform, aimed at providing early childhood education, and the Nahla and Nahil platforms, which specialise in raising Arabic reading skills. These platforms will be available to all students in both the government and private education systems. The UAE's Ministry of Education has decided to complete the 2019/2020 academic school year online, through its e-learning platforms.[77]

Egypt continued the school year through a multitude of national online platforms adopted or launched by the Ministry of Education. According to Ahmed Daher, Deputy Minister for Education, "Due to the lockdown, we had

to stop schools in the middle of the second semester. Within four days, we succeeded in populating a new platform called study.ekb.eg where students could access all the resources free of charge". The platform was the new site of the Egyptian Knowledge Bank, first launched in 2016, one of the largest online knowledge hubs. It gives students, researchers and the public access to "aggregated and curated content in different sciences and humanities from 30 major publishers all over the world". It is tailored to provide learning objects and digital material for the curriculum, providing content by grade level (kindergarten through secondary) and subject.[78] "In another 10 days, we introduced a social learning platform called Edmodo", explained the Deputy Minister. The edtech platform was selected to deliver remote instruction to the K-12 student body. Illustrating how public-private collaboration can generate solutions, the Deputy Minister further explained, "We engineered the business implementation for this use-case for Edmodo, and we tailored it for the Egyptian education engine". "We registered 18 million student accounts and have 11 million students actively using the platform".[79] In Saudi Arabia, the government has launched a new national online platform targeting 6 million K-12 students in public schools. Bahrain restructured its EduNet portal and Jordan introduced an entirely new platform, Darsak ("your course"), to deliver courses online. Qatar announced the activation of an online platform using video lessons to provide early childhood education (up to third grade). In Morocco, the National Documentation Centre launched a platform, "ABHATOO", to provide educational content by subject area, addressing different grade levels in accordance with the national curricula.[80]

Online repositories of learning content: A number of governments in MENA have also launched online knowledge repositories. The UAE Ministry of Education has launched an online library that allows teachers and students to view and interact with the learning curriculum electronically and to download electronic copies of books.[81]

Despite the noticeable expansion of online learning platforms in MENA to ensure education continuity during the COVID-19 pandemic, the unplanned and rapid shift to e-learning has revealed glaring gaps in the region's education system preparedness. Students who are unable to afford high-speed internet connections or the devices necessary to participate in online classes have been excluded from e-learning activities.[82] Countries such as Lebanon and Egypt have sought to address this issue by providing students with free access to online platforms, free internet bundles to compensate for increased internet usage, and SIM cards at no cost. [83] As at June 2020, 13.5 million students and 1.3 million teachers across Egypt had registered on the Ministry of Education's platform.[84] The government is providing servers, screens and tablets to 25,000 public schools.[85] An agreement with cellular providers has allowed the government to provide free access to its Knowledge Bank educational resource through a form of zero-rating, whereby activities on the site require zero data.[86] The online system has also placed immense pressure on working parents, who have had to balance guiding their children on new platforms alongside work commitments.[87]

MENA governments and universities that were previously reluctant to formally recognise

online education are now setting up online courses. While online education can't replace classroom learning, the accelerated use of blended learning methods (which combine the advantages of in-person learning with online technology tools), can help close literacy, digital and learning gaps. As the pandemic eases and countries in MENA begin to see students return to the classroom, they can ensure long-term resilience in education by developing a holistic learning ecosystem that integrates classroom learning with remote learning solutions.[88] Egypt reopened schools in October by adopting a blended learning approach, where students were divided into two groups and asked to come to class every alternate day. This reduced numbers so there were only an average of 15 students in a classroom, allowing them to practice social distancing measures. According to Ahmed Daher, Deputy Minister of Education, "Students are expected to attend class at home, and teaching continues from there in the classroom: the teacher does not revise the material again". This new level of trust and reliance on learning at home may be the lasting impact of the pandemic, even when all students return to the classroom.

Case Study 1

How Saudi Arabia's proactive ICT policies enabled rapid e-learning adoption

Saudi Arabia's successful response to the educational challenges brought about by COVID-19 was largely due to existing efforts towards widespread adoption of e-learning. Proactive ICT policies and the 2019-2023 ICT strategy had emphasised e-learning and facilitated its growing adoption.[89]

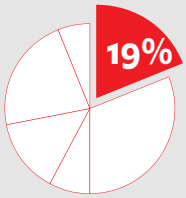
Impact of the pandemic

When the pandemic hit, Saudi Arabia's schools were among the earliest to close, shutting on March 8th. The majority of schools and universities developed e-learning programmes so that students could continue their education online.

Innovative response

Saudi Arabia launched a comprehensive online educational system in March, with 20 TV channels, a YouTube channel and an iEN National Educational Portal.[90] The use of television was to ensure that students who didn't have sufficient digital access or skills were not excluded. The government had insight into this challenge from its efforts nearly a decade ago to promote virtual education, where nearly 50% of students and teachers were dissatisfied, and computer literacy was a key concern.[91] The country was better prepared due to this experience, and many of the kingdom's leading universities[92] had the necessary infrastructure and training to roll out e-learning for all students.[93] The Ministry of Higher Education had been advocating for the adoption of communication technologies at all levels of education for years, in response to growing demand for education. To increase the quality of these virtual classrooms and ensure students stay connected, the Saudi Research and Innovation Network (Maeen) partnered with the Integrated Telecom Company to "increase the data quota between some of the Kingdom's universities and King Abdulaziz City for Science and Technology free of charge".[94]

Future strategy



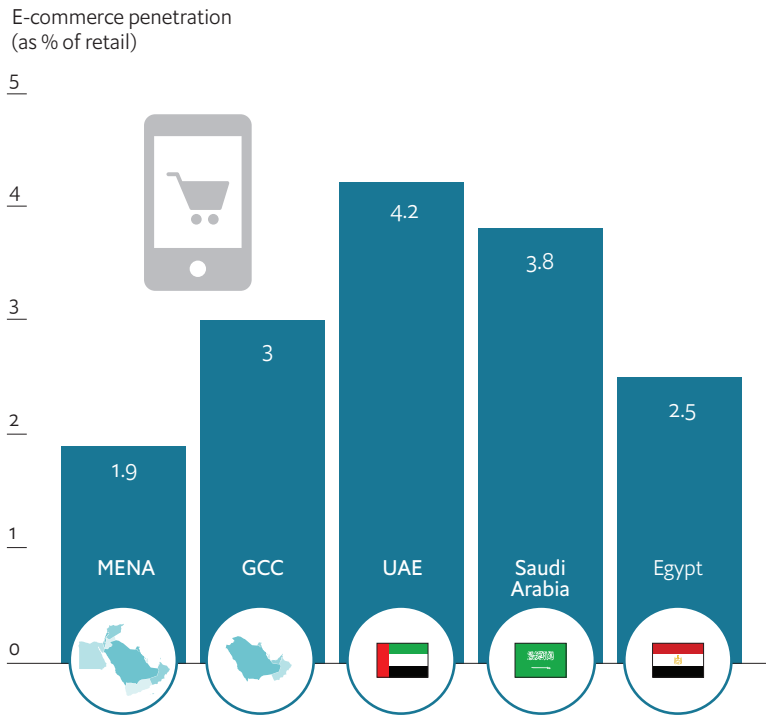
The Kingdom has already allocated nearly 19% of its 2020 federal budget to education, building the required infrastructure necessary to increase resilience. Saudi Arabia's ICT Strategy 2019-2023 placed considerable focus on e-learning, highlighting the Kingdom's plan to further develop its digital ecosystem and attract Ed-tech start-ups.

Retail

Movement restrictions due to COVID-19 forced consumers to switch to online retail channels. Retailers in the MENA region had to quickly establish or expand their online presence by developing websites and mobile applications to stay connected to consumers.

Within the MENA region, countries such as the UAE and Saudi Arabia were ripe for rapid e-commerce expansion (see Exhibit below). GCC countries and Egypt, account for 80% of the e-commerce market in the MENA region, and have been growing at a rate of 30% annually since 2014, twice the rate of the rest of the region. The UAE has developed several strategic projects with an eye to bolstering e-commerce in the region. For instance, the 2.1-million square foot Dubai CommerCity is the first free zone dedicated to e-commerce in the region. Its goal is to create an environment that encourages innovation and attracts foreign investment in e-commerce.[96]

UAE leads the way in e-commerce penetration in MENA



Source: Bain and Company, 2017; EIU analysis.

Shift to online shopping: During the pandemic, the shift to e-commerce in the region has been exponential.[97] This is illustrated by PwC's Global Consumer Insights Survey, which found that 51% of consumers in MENA were buying groceries "mainly" or "exclusively" online/ by phone and that 92% are likely to continue shopping online.[98] To meet this demand, brick and mortar stores in the region have developed or bolstered their online presence. Majid Al-Futtaim Retail, the leading shopping mall, communities, retail and leisure pioneer across the Middle East, accelerated the launch of its online marketplace platform and expanded its last-mile delivery capacity with new transport partnerships to meet increased online orders in UAE.[99] According to Hans Weiss, the CEO of Majid Al-Futtaim Retail, the online platform had "witnessed 400% growth in the number of orders placed (in the retail sector) and 300% growth in online sales between March-May 2020 versus the same period in 2019."[100] Another example of this move to e-commerce by brick and mortar stores is Emaar Malls in the UAE, which partnered with Noon, a Dubai- and Riyadh-based e-commerce company, to open The Dubai Mall virtual store. To keep up with demand for online-shopping, a number of e-commerce stores expanded their offerings during the pandemic. Dubai-headquartered Talabat launched a 30-minute door-step grocery delivery service "Talabat Mart" in some of its markets, including Kuwait and the UAE[101], and is expanding the same to Egypt by the end of this year. Food delivery platforms like Deliveroo, Otlob in Egypt and Careem NOW in Saudi Arabia are offering groceries on their platforms alongside the option to order meals online from restaurants.[102]

Contactless-delivery: The region is also exploring the use of robotics for contactless delivery. Carrefour, a hypermarket chain that operates in 38 countries across the Middle East, Africa and Asia, is set to use robots to pack online grocery orders in Saudi Arabia and the UAE. Carrefour's customers will be able to place orders via its online platform and Takeoff's (a US-based technology company) automated technology, will ensure that robots within the Micro-Fulfilment Centres (MFCs) fulfil the order in less than 5 minutes for pick-up or delivery.[103] The MFCs will process Carrefour's online orders to replace the manual picking method currently used. Dubai has also seen the opening of a cafe run by Robots. Robo cafe, located in Dubai's festival city mall, runs with zero human intervention and uses robots to take orders, prepare and deliver food orders.[104]

Pandemic-related restrictions and concerns about safety have helped grow e-commerce in new markets, however, building on this growth requires leaders in the region to facilitate brick and mortar retailers' expansion online first by strengthening electronic transactions systems, the keystone of e-commerce.[105] Countries like Saudi Arabia and Egypt have made some progress by setting up regulatory frameworks to enable electronic payments[106], but in many MENA countries, few policies or programmes exist to support electronic transactions and e-commerce expansion. The transition to e-commerce has been especially difficult for small businesses – 67% of small and medium enterprises in the GCC region do not have e-commerce platforms, according to a survey by logistics firm UPS.[107] Lack of awareness, high tariffs and complex regulatory regimes make it difficult for startups to get established, and existing small businesses to compete with multinational e-commerce operators.

Case Study 2

A developed fintech market enabling e-commerce in Bahrain

Bahrain's developed fintech market has acted as a key enabler in facilitating the expansion of e-commerce. Fintech solutions, such as digital wallets and payment gateways, are a key part of the ecommerce infrastructure, providing a digital alternative for making essential purchases when in-store shopping was restricted during the pandemic.

Context and pandemic preparedness

Bahrain is home to the oldest financial centre in the Gulf, and has been working to develop financial technology for years. In 2014, two licenses were introduced that allowed entry of non-banking companies into banking services. In 2017, the Central Bank of Bahrain announced new regulations to create a regulatory sandbox that would allow fintech firms to experiment with banking ideas and solutions. The Bahrain Economic Development Board entered a partnership with Singapore Fintech Consortium and Dubai-based Trucial Investment Partners to develop the ecosystem and regulatory framework for the Kingdom.[108]

Pandemic response

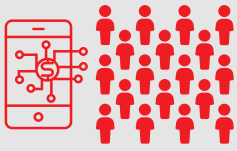
The Kingdom strived to emphasise fintech as the new norm once the COVID-19 pandemic hit, introducing policies such as reducing the minimum value needed to make a transaction on BenefitPay, the Kingdom's national smartphone payments app. As a result of these policies, BenefitPay saw usage surge by over 1000%, with more than 28% of the Bahraini population registered on the app.[109] The national electronic wallet reported a 1257% increase in the number of remittances sent through its Fawri+ service in March alone, amounting to almost US$275 million.[110] The Ministry of Industry, Commerce and Tourism also launched a 'virtual mall' in April. The digital platform, with payment gateways to facilitate online purchases, was launched with more than 24 shopping categories for consumers, including baby needs, electronics, homewares, fashion, and books and stationery, and over 100 retailers registered in the mall.[111]

BenefitPay, Bahrain's national smartphone payment app saw:

- Usage increase by 1000%
- 28% of the Bahraini population registered on the app
- Remittances sent increase by 1257% in March 2020 alone
- Remittances total of US$275 million[3]

Future implications

Across the region, there is immense potential for further development of fintech. Rapid growth of mobile phone penetration is creating a market for mobile payment solutions and other fintech products. However, the pandemic has also shown that fintech is an ecosystem enabler that can unlock further technological adoption and development in e-commerce.



Tourism

Tourism is a major economic sector in many MENA countries and has become a strategic component of the diversification plans of oil-rich economies in the region. With health and safety remaining a top concern for many travellers, the tourism industry in MENA has had to introduce innovations to manage tourist travel, not only to minimise current risks, but also to prepare for post-COVID-19 travel. This process of adjustment and adaptation has required the deployment of an array of technologies to prevent transmission of the COVID-19 virus on mass transit systems and to ensure that national travel protocols meet new international and country-specific requirements.

Touchless travel: Touchless data-entry such as gesture control and touchless document scanning are being tested at airports across the region. Abu Dhabi International Airport stands out in the region for installing self-cleaning escalator handrails, replacing elevator buttons with touchless alternatives and screening passengers upon arrival using contactless technology. The technology, designed by Australian technology firm Elenium Automation, helps identify passengers with medical conditions, potentially even those with early stages of COVID-19 by monitoring the temperature, heart rate and respiratory rate of any person using an airport touchpoint.[112] Hamad International Airport in Doha has also been digitally transformed. The airport has introduced fully autonomous sanitisation robots, ultraviolet disinfection tunnels to disinfect passenger luggage, as well as baggage trolleys and tubs. Furthermore, Doha airport provides thermal screening cameras to measure passengers for fever and smart screening helmets for staff, which use AI to provide accurate contactless temperature measurement. The airport is also using an AI-powered face mask detection system, which can automatically detect if someone is not wearing a mask within the airport.[113]

Airlines in the region are also using technology driven interventions to ensure passenger safety. As the UAE's Etihad airlines resumed flights to 58 destinations in July 2020, the airline introduced a COVID-19 risk-assessment tool powered by AI that was developed in partnership with Medius AI, an Austrian health-technology company. The 22-question assessment reportedly estimates the probability that a passenger may have contracted COVID-19, thus encouraging the passenger to make informed decisions about whether or not to travel.[114]

Virtual travel: Virtual reality (VR) technology has been used by airlines and tourism boards for many years to market travel destinations to customers. Now, VR is being used to make arts, culture and new destinations more accessible to people who aren't able to experience these due to movement restrictions. These tools are expected to complement real time travel experience once travel restrictions are lifted. For example, a popular online platform for arts and culture offers Artificial Reality (AR) and VR views from popular tourist destinations in UAE. It allows users to access content from more than 2000 leading museums and archives around the world at just a click of a button.[115] Jordan is using the same platform to showcase a virtual photography tour of Petra. The free-to-use platform allows people to have immersive experiences through high-resolution images, videos and virtual reality, and to explore artwork and cultural artefacts from top cultural

organisations around the world. The Ramzi and Saeda Dalloul Art Foundation, Beirut, has launched a collection of more than 3000 works from the Arab world on its website. It also plans to add a "virtual walk through" feature using VR in due course. Alserkal Art Week, at the Alserkal Avenue art and design complex in Dubai, UAE, a contemporary art centre with some of the region's best-known dealers and galleries, was supposed to run from 23-28 March this year. Instead, the event was launched online with 360 degree views of more than 15 galleries and 80 artists' work in a responsive VR system, designed by 3D data platform company, Matterport.[116]

The digital technologies embraced by the region to facilitate contactless travel as a complement to real travel experience have set standards for the future of travel and will put the sector on a path to economic resilience, at least in the foreseeable future.

Government services

Over the past decade, governments in the region have made a concerted effort to systematically set up digital platforms for government transactions with the public and to digitalise their internal operations. According to an OECD report, "Countries like Egypt, Morocco and Jordan use e-governance services largely in the context of improved administration, while countries like Bahrain and Dubai apply e-government technology to expand services to citizens and foster inward investment and growth".[117] The report suggests that Egypt, Jordan, Lebanon, Morocco, Tunisia and the UAE have all recognised the importance of digital technologies for public sector modernisation. These countries have developed digital government strategies that include the establishment of open data portals and the revision of legal and regulatory frameworks to ensure citizens' right to information as well as to increase the public sector's transparency and accountability.

The COVID-19 pandemic highlighted the importance of these government digitalisation efforts in MENA. According to HE Abdulaziz Alrasheed, Assistant Minister of International Financial Affairs & Macro Fiscal Policies at the Saudi Ministry of Finance, "the pandemic made governments more confident about shifting operations online".[118] In the region, the pandemic has not only increased demand for the digitalisation of existing government services, such as e-tax filing and online issue of business licenses, but also for new e-government services, such as social security payments, communication and information dissemination on COVID-19. In order to safeguard the integrity of e-government transactions, countries in MENA have also adopted existing technologies in new ways to streamline and digitise their processes. An example of this is KSA's Yesser e-Government programme which was used during the pandemic to deliver safe, reliable and user-centric services while enabling flexibility in sharing data across the government ecosystem.[119] As part of this reform, a number of MENA governments have deployed automated online service requests to facilitate remote responses during the pandemic.

"The pandemic made governments more confident about shifting operations online"

HE Abdulaziz Alrasheed, Assistant Minister of International Financial Affairs & Macro Fiscal Policies at the Saudi Ministry of Finance.

Online Social Services: During the early months of the pandemic, several MENA countries launched comprehensive platforms and used their existing platforms to enable citizens' access to a wide range of government services. These services included delivery of ID cards, issuing of passports and handling

of citizens' records. For instance, Dubai introduced a Paperless Strategy that created 300,000 digital national identities for users, allowing them to access 5000 government and private sector services nationwide. Saudi Arabia's Yesser e-government programme allowed for business continuity with minimal interruptions. Yesser helped in activating remote working for government agencies, and launched a guide for teleworking, benefiting 94% of government agencies in the Kingdom.[120] The Saudi government's interoperable service platforms, Mawid and Absher, have ensured that citizens maintained access to critical services.[121] Mawid allows citizens to seek COVID-19 related consultation services, based on their travel history and symptoms, while Absher e-services gateway enables citizens and residents to perform a variety of government transactions and services, such as issuing and renewing passports, and residency IDs.[122]

Business information platforms: In addition to expanding public access to social services, a number of governments in MENA have set-up online information and support platforms to provide vital business information during the pandemic. The Investment Development Agency of Lebanon (IDAL), for instance, has made available an online legal and tax advisor service, free of charge, to support all companies with COVID-19-related health, financial and fiscal measures. In Saudi Arabia, the Ministry of Investment formed a taskforce, called MISA COVID-19 Response Centre, to answer to company inquiries 24/7 and solve issues to allow businesses to continue operating. Abu Dhabi's Department of Economic Development placed all regulatory services, such as business registration, licensing and permitting, online for 24/7 access.[123]

The crisis has presented MENA governments with an opportunity to further deploy digital technologies, digitise and automate processes to facilitate quick decision making. In the long run, e-governance measures will enable households and businesses to quickly access critical government services, thus improving the ease of doing business in the region post-pandemic.

Case Study 3

How Morocco's government responded effectively to the pandemic

The government of Morocco moved quickly and effectively to contain the spread of COVID-19, and mitigate its adverse impact. Barbara Ubaldi, Head of Digital Government at the OECD explains that when the pandemic struck, Morocco was ready and able to use technology to ensure access to information (especially critical information about COVID-19, including symptoms, recommended precautions, etc) and keep the public sector operational. OECD MENA Policy Advisor Arthur Pataud, while reviewing government responses in MENA, suggests that the Moroccan government website for informal workers was one of the most interesting innovations in the region.

Context and pandemic impact

With a stretched public healthcare system, there was a lot of concern around the possibility of a COVID-19 outbreak in the country.[124] Far more advanced public healthcare apparatuses had been overwhelmed by the disease and Morocco already had a shortage of doctors and medical staff. [125] Morocco's role as a trading hub and its proximity to Europe proved to be deadly as it quickly became the third most affected African country.

Government's response

The Moroccan government quickly sprang into action to contain the spread, declaring a state of emergency and a strict one-month curfew in late March 2020. To manage the lockdown and contain the crisis, the government implemented the following measures:

With over **2.4 million Moroccans** working in the informal sector deprived of their livelihood, the government set up **a digital platform** allowing anyone without a social security number to register for support. It supported over 4 million households.[126]

Mobile cash transfers were also made to more than **2.3 million households** affiliated to the Medical Assistance Scheme, 38% of which were in non-urban areas.

The government also deployed **mobile applications for information dissemination**. The Ministry of Health launched an app for health professionals to ensure faster and improved communication and exchange between medical experts.[128]

The government launched **a digital communication plan** along with weekly updates from the Prime Minister on TV, to raise awareness about COVID-19 and strengthen public support for the lockdown.[127] The success of these efforts was attributed to Morocco's push to ensure national mobile network coverage.

Moroccan researchers also developed an intelligent face mask that can detect COVID-19, supplemented by Trackorona, an application that enables the prediction and diagnosis of COVID-19. The mask can detect COVID-19 symptoms and transmits health data to health authorities via smartphones and Bluetooth.[129]

Legacy and implications

The successful response has enhanced trust in the Moroccan government, particularly because of an unprecedented level of communication with citizens: which may have introduced a level of transparency that citizens will continue to expect. The pandemic experience demonstrated the need to increase public health expenditure. Provision of social support to the poor during the pandemic has shown that the government is willing to spend on the welfare of vulnerable citizens, and this may create expectations of social security provision. The government's portal for informal workers has exposed just how many of them there are, and experts say the authorities are considering integrating them into the formal sector, potentially during the recovery phase.

SECTION III: GAPS AND OPPORTUNITIES FOR ENHANCING THE TECHNOLOGY ECOSYSTEM IN MENA

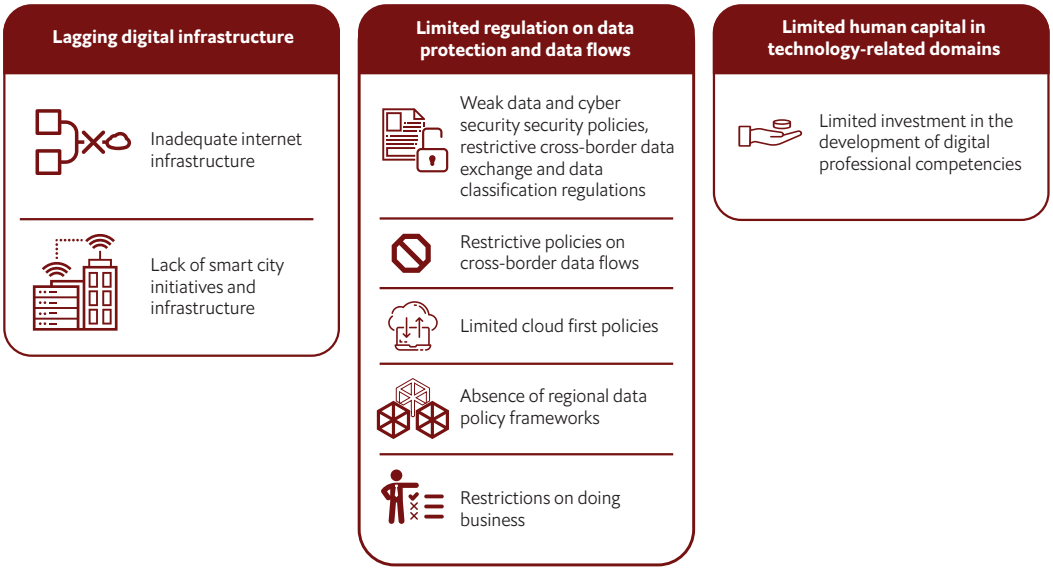
To maximise the use of technology for economic recovery and long-term growth, the MENA region needs to address three structural challenges to the growth of its technology ecosystem: lagging digital infrastructure, weak data security regulations, restrictions on cross-border data transfer, limited focus on promoting cloud adoption, and limited human capital in technology-related fields. To address these challenges, regional governments need to facilitate private sector participation in the telecommunications sector, introduce comprehensive cybersecurity regulation, data protection laws and public sensitisation programmes, and invest in both upskilling the workforce and enhancing technology-related research and development. Importantly, MENA governments will need to invest in boosting public trust in digital infrastructure and policies, attracting funding for the most innovative organisations, boosting regional cooperation, building digital economy statistics to guide policy, and ensuring the transparency and interoperability of technology systems across sectors.

As the discussion in the previous section highlights, countries in MENA have made important strides towards using enhanced digitalisation to stimulate growth and build resilience in the face of COVID-19-related disruptions. While governments in the GCC have taken the lead in the use of advanced technology to provide critical services, some countries in North Africa have also employed technology to protect vital economic sectors. However, important gaps remain in MENA's ability to maximise the use of technology for economic recovery and growth. This section examines these gaps and explores opportunities for addressing them.

Gaps in MENA's technology ecosystem

In order to advance on the path of post-COVID-19 economic recovery and resilience, the region needs to address a number of challenges within its technology ecosystem.

Key gaps: What's stopping MENA from taking full advantage of the opportunities that technology can offer



Source: EIU analysis.

1. Lagging digital infrastructure

Part of the reason COVID-19 was able to disrupt the operations of many businesses in the MENA region stems from the lack of up-to-date digital infrastructure. Entrepreneurs and the business community continue to see digital infrastructure deficits as a "serious problem" in doing business in the region.[130] Improving digital infrastructure, by enhancing internet networks and building smart city infrastructure, needs to be at the heart of government efforts to boost the technology ecosystem in the region.

1.1. Inadequate internet infrastructure

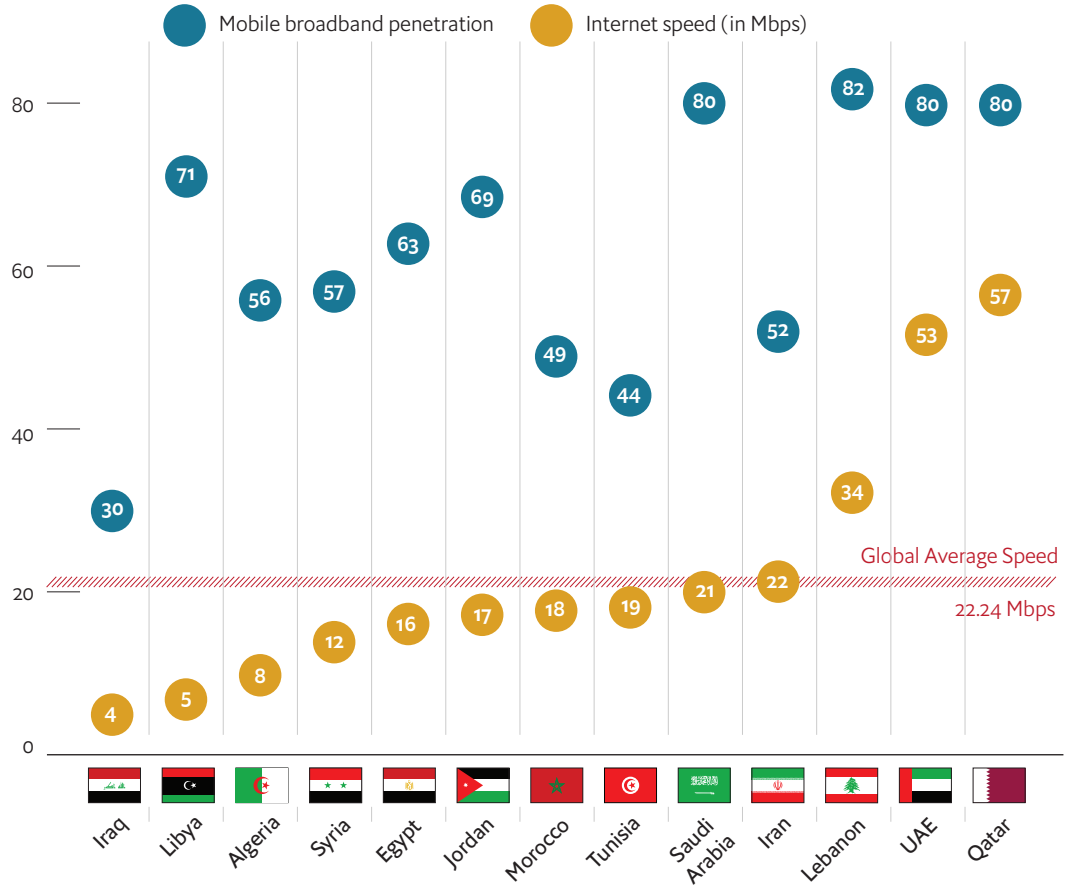
Internet infrastructure is considered a critical input to the broader objective of nation building and the transition to a knowledge-based economy.[131] Although GCC countries have made considerable advances in online services, they still lag behind other developed economies on the Information and Communications Technology (ICT) Index[132], with Bahrain (ranked 31), Qatar (ranked 39) and the UAE (ranked 40) the only MENA countries in the top 40. Other countries from the region, like Lebanon (ranked 64) and Jordan (ranked 70) ranked much lower in the index.[133]

MENA nations' broadband subscriptions, a good test of how well a population can avail

itself of the latest advances in technology, are some of the lowest in the world, with fewer than 10 broadband subscriptions per 100 inhabitants.[134] Meanwhile mobile phone subscriptions are some of the highest in the world[135, 136] despite the fact that over 9% of MENA's population (which equates to 60 million people) is still not covered by a mobile broadband network. By contrast, only 1% of those in North America and 3% in Europe and Central Asia are not covered.[137]

Broadband speed is also lagging. With the exception of Lebanon, the UAE and Qatar, available mobile broadband speed is generally slower in the region than global averages, which reach 22 Mbps (see Exhibit below).[138] This is likely due, in part, to the insufficient number of internet exchange points (IXPs) in the region, which are critical for internet speed. A shortage of IXPs makes it more difficult for the MENA region to support the demands of 5G and the growing number of IoT devices needed to develop smart infrastructure.[139] The MENA region has 12 IXPs spread across nine countries, with six of these in the GCC.[140] This is significantly lower than both developed regions such as Europe,

Internet penetration and speed in MENA



Source: World Bank 2018, Global Speedtest Index.

"Education through technology can be 'gamified' to sustain learning for a longer period of time and improve student motivation, eagerness to learn and competitiveness. This is particularly important in COVID-19 times."

Dr. Mohamed Watfa, founder of the International School of Innovations, Lebanon.

which boasts 171 IXPs, and developing regions such as Asia-Pacific, which has 33 IXPs.which boasts 171 IXPs, and developing regions such as Asia-Pacific, which has 33 IXPs.[141]

Affordability of broadband services is another key issue. GCC countries have some of the most expensive broadband packages in the world.[142] Expanding fibre-optic/submarine cable infrastructure projects will help in meeting the increasing demand of internet in a cost-effective way, but limited competition and lack of private participation is limiting its expansion.[143] Services like Voice over Internet Protocol (VoIP), which enable businesses and individuals to place calls via an internet connection, making them an affordable communication tool, are blocked in a number of countries in MENA due to security concerns.

Addressing digital infrastructure gaps and universal access to the internet is important from the perspective of developing resilient economic sectors in MENA. In healthcare, for instance, a data network with low latency and high bandwidth will enable hospitals to leverage technological solutions, like automated medication delivery, which can slow the spread of a virus, or advanced medical imaging for general health scans. Countries like China used their 5G network to implement cloud video services for hospital isolation wards, enabling quicker collection and transmission of patient information in the isolated area.[144] In the government services sector, countries that had already invested in developing and sustaining internet connectivity have fared much better with respect to delivering essential e-government services during the current pandemic. For example, Argentina had increased broadband connectivity by 500% in the past five years, ensuring that 90% of its population had access to the internet in their homes. On day one of the pandemic, Argentinians already had access to a platform with nearly 2000 government services, and its social protection agency was easily able to provide emergency income to 8 million workers in the informal sector.[145] In the education sector, affordable internet access will enable integration of blended learning in education systems in a post-COVID world. EdTech solutions have proliferated during COVID-19 and will eventually contribute to a more cohesive education ecosystem, with the integration of in-person classes. According to Dr. Mohamed Watfa, founder of the International School of Innovations, Lebanon, "education through technology can be 'gamified' to sustain learning for a longer period of time and improve student motivation, eagerness to learn and competitiveness. This is particularly important in COVID-19 times."[146]

Higher speed, affordable and more comprehensive internet access is a tide that will raise many boats, helping e-commerce markets to grow and blended learning to flourish.[147] According to Arthur Pataud, MENA policy analyst, OECD, "policy taboos in the region are directly affecting new technology and digitalisation efforts". For MENA policymakers, addressing the gap in internet access through public and private investments will spur economic growth and build the foundation for the technological advances that will bring a greater level of economic and health security resilience to the region.

1.2. Lack of smart city initiatives and infrastructure

Another factor that contributes to the region's lagging digital infrastructure is the absence of smart infrastructure. Contrary to traditional infrastructure, smart city infrastructure uses new technologies, such as IoT, to produce more affordable, efficient and responsive solutions to urban challenges.[148,149] Smart waste management systems, for instance, which use sensors to detect when waste should be emptied, are used in South Korea to reduce collection costs and eliminate waste overflow.[150,151] In the case of COVID-19, aside from the many economic benefits that it brings, including cost savings from automating city resources[152], smart infrastructure, such as smart thermal cameras installed in shopping centres to detect whether people have high temperatures before entering the building, can also help to ensure that cities are better prepared to manage pandemics.[153]

With the exception of the UAE, Saudi Arabia and Israel, each of which has dedicated resources towards smart city spending and policy design, the majority of countries in the region have not invested in building smart infrastructure. According to the 2020 Smart Cities Index[154], which ranks 109 cities around the world for the technological provisions of their cities[155], only two cities in the region, Abu Dhabi (42nd) and Dubai (43rd), are ranked in the top 50.[156] Meanwhile, Western Europe is home to nearly half the cities in the top 50. Similarly, according a report by KPMG[157], although the smart cities market in the region is predicted to double from a modest US$1.3 billion in 2018 to US$2.7 billion by 2022, spending still falls behind global averages. The same study predicts that global smart city spending will shoot up by US$77 billion (from US$81 billion in 2018 to US$158 billion) over the same period.[158]

Part of the reason why the region still falls behind in this area is due to long-standing structural issues. These include factors range from power shortages in countries like Egypt, Tunisia and Lebanon[159], to an acute lack of the on-the-ground skills and talent needed to expand smart infrastructure initiatives.[160] Regional policymakers need to address these fundamental issues to build smarter infrastructure in the MENA.

Case Study 4

UAE's COVID response was driven by technology

The UAE used technological innovations to facilitate a swift response to the pandemic. Identified as a technological leader in the region, the UAE's ongoing efforts to integrate technology enabled it to deploy these tools widely and effectively in the pandemic response, at times to a greater extent than more advanced economies.[161]

Context and pandemic preparedness

Vision and policy documents like the National Innovation Strategy, the AI Strategy 2023, and the Blockchain Strategy 2021 set out forward-looking roadmaps for the uptake of emerging technology, as well as a regulatory approach that would facilitate technological development. This holistic policy vision ensured that the necessary infrastructure and regulatory mechanisms were in place to enable the COVID-19-induced transition to virtual interaction in all domains.

Innovative response

The UAE's technological preparedness enabled it to deploy AI solutions, facial recognition, robots and drones to augment its containment efforts. Dubai, in particular, used technology in innovative ways to stem the spread of COVID; even as the UAE's regulators showed agility in introducing new laws, relaxing restrictions and addressing issues as they arose.

Dubai's Department of Health developed TraceCovid, which informs individuals if they have come into close contact with those diagnosed with COVID-19.[162]

The Dubai police used an AI monitoring system, Oyoon, that gathers facial and voice data as well as license plate numbers to enforce lockdown rules.[163]

UAE regulators adopted an open data policy, launched a Dubai data strategy and passed the Dubai International Financial Centre (DIFC) Data Protection Law No. 5 to ensure the protection of citizens' data.[164] According to Omar Al Olama, Minister of State for Artificial Intelligence, Digital Economy and Teleworking Applications, "The UAE Government has adopted an open data policy as part of the digital transformation process, to facilitate researcher and the community access to government data and statistics about the UAE."[165]

A smooth transition to remote working was ensured by partial relaxation of existing restrictions on digital communication tools, in particular, VoIP platforms.[166]

UAE is also encouraging remote working professionals to live in Dubai through its remote working scheme.[167]

Legacy and implications

The UAE's proactive approach to technological advancement was validated by the experience of the pandemic, and its investments in technology were rewarded by how indispensable these tools became during the COVID-19 disruption. According to regional experts, technology has been seen by policymakers as desirable but not essential; but the UAE stood out by giving importance to this domain. The pandemic has changed this view dramatically and showed that the UAE's prioritisation of technological issues was appropriate.

2. Limited regulation on data protection and data flows and restrictive business rules

The growing adoption of tech-based applications during COVID-19 has highlighted the need for new and balanced frameworks and policies for data security, for consumers as well businesses. For consumers to confidently transact in the cyber space and for tech-based businesses to expand, the region needs to improve the regulatory framework by implementing strong data protection and cybersecurity regulations with a regional mandate and by easing the business environment for tech-based innovators and entrepreneurs. An enabling regulatory and operational environment with conducive policies on cloud adoption and cross border data flows will give the required boost to businesses to integrate technology for efficient business outcomes and contribute to economic resilience.

2.1. Weak data security and cybersecurity policies

While the general provisions of laws and regulations in most MENA countries provide for some basic level of protection when it comes to data, few countries have enacted legislation that specifically focuses on data privacy or data protection.[168] Moreover, most MENA countries lack formalised authorities charged with the enforcement of data security laws. However, jurisdictions like Saudi Arabia have recently begun adopting data-protection-specific laws. The Saudi Arabian Commission for Cybersecurity has become the regulator for personal data protection and freedom of information[169] and the National Data Management Office (NDMO) issued interim regulations on national data governance in June 2020.[170] Egypt has also issued its Data Protection Law in 2020 which establishes standards and controls the processing and handling of personal data. The government is now in process of designing the executive regulations.[171]

Cybersecurity regulations are also sparse in the MENA region, with only the UAE, Egypt and Qatar boasting a substantial regulatory framework for cybersecurity.[172] Cybersecurity is of paramount importance to protect sensitive data and information from theft, even more so as COVID-19 forces a larger part of lives online. In the MENA region, 62% of consumers cited concerns about their personal information getting leaked online as a reason not to shop online.[173] Governments throughout the region will not only need to step up their accountability for online privacy and security measures, but will also have to implement a regulatory framework for e-signing and other critical elements of e-commerce before it will thrive. For example, the EU established the eIDAS (electronic IDentification, Authentication and trust Services) regulation in 2014, to oversee electronic identification and trust services for transactions in the EU's internal market. eIDAS oversees authentications, signature seals, registered delivery services and time stamps to regulate electronic signatures, transactions, as well as embedding processes for transactions between public or private services.[174]

Online consumer protection is scarce in the MENA region, with most countries lacking mechanisms for dispute resolution. Only six MENA countries, Morocco, Tunisia, Lebanon, Saudi Arabia Algeria and Kuwait,

have consumer protection legislation that covers online purchases.[175] Considering movement restrictions in times of pandemic, the option of an Online Dispute Resolution (ODR)[176] mechanism is compelling, safe and cost efficient for online businesses.[177] This is particularly important for promoting trust in sectors like e-commerce and enabling its expansion.

2.2 Restrictive policies on cross-border data flows

Restrictions on cross border data flows have been a key data policy-related challenge for businesses in the MENA region before and during the pandemic. Internet-based services and e-commerce, cloud computing and advanced technologies such as AI and IoT rely on access to high-quality data that often resides in more than one territory. These data-reliant technologies and solutions are being used to derive increased economic growth in a world disrupted by the COVID-19 crisis. Cloud-based collaboration softwares, for example, have become the key facilitators for business continuity, allowing billions of teleconferences to be held worldwide every day. Data localisation requirements, i.e. laws, standards or policies that mandate that data be stored within a geographical territory, threaten to deter this progress. Data localisation requirements will require companies to create and maintain multiple data centres in different jurisdictions, which ultimately raises the cost of doing business. Data localisation requirements in MENA vary from country to country. As per Mohammed Soliman, a non-resident scholar with the Middle East Institute's Cyber Program, "KSA, UAE and Egypt have been aggressively working on implementing a large-scale digital transformation, building high-tech smart cities and investing heavily in their technology-based human capital. In a parallel track, the three governments have joined a growing global trend of data localisation, which is required to safeguard citizens' personal data and ultimately create a regional and international framework on data processing. The need to protect citizens' data is legitimate, but extreme versions of data localisation requirements would hurt corporations operating in these markets by shifting their resources from efficiently moving data across borders to spending millions to establish local cloud centres. Restrictions on the movement of data across borders also limits access to capital and investment and diminishes the ability of banks and governments to assess borrowers' creditworthiness and ban fraudulent activities".

According to Hazem Galal, Cities and Local Government Global Leader, PwC, data sharing is an issue that needs to be addressed by putting in place appropriate data classification schemes. Sometimes reluctance to share data stems from absence of these classification mechanisms and policies. When they are in place, countries would know exactly what is safe to share and what should be confidential and never shared. That said, restrictive data classification models make the digitisation process costly and time consuming. Governments need to develop a revised framework to help them determine jurisdiction over data while also facilitating cooperation among governments.[178]

2.3. Limited cloud first policies

"Data sharing is an issue that needs to be addressed by putting in place appropriate data classification schemes."

Hazem Galal, Cities and Local Government Global Leader, PwC

Cloud services allow businesses of all sizes to access customized enterprise software at relatively low prices. The outbreak of COVID-19 has contributed to the rise in spending on cloud computing in the region, according to a recent update from the International Data Corporation (IDC). According to Jyoti Lalchandani, IDC's Group Vice President and Regional managing Director for the Middle East, Turkey, and Africa, "organisations across the region are increasingly looking at avenues to rationalise their spending, while also accelerating digital transformation. Business agility, flexibility, scalability, and, most importantly, financial flexibility are key priorities that favor cloud adoption."[179] Cloud first policies play a key role in facilitating cloud adoption. Bahrain's cloud first policy, for example, supports adoption of public clouds, free training options for Bahrainis seeking to acquire cloud skills, and credit support for businesses transitioning into the cloud. The implementation has led to the establishment of a regional data centre in Bahrain in 2019 and provision of funding for citizens to be trained and certified in cloud.[180] Apart from Bahrain, countries like KSA and UAE have launched cloud first policies in 2020[181] and 2019[182] respectively, but most other countries in the region are yet to adopt such policies.

According to the Cloud Competitiveness Index, 2019, published by MENA Cloud Alliance, "one of the greatest challenges for cloud adoption in the region is the absence of relevant regulatory frameworks or, just as challenging, the presence of vague ones".[183] Implementation of cloud first policies conducive for businesses is needed in the region to improve cloud adoption.[184]

2.4 Absence of regional data policy frameworks

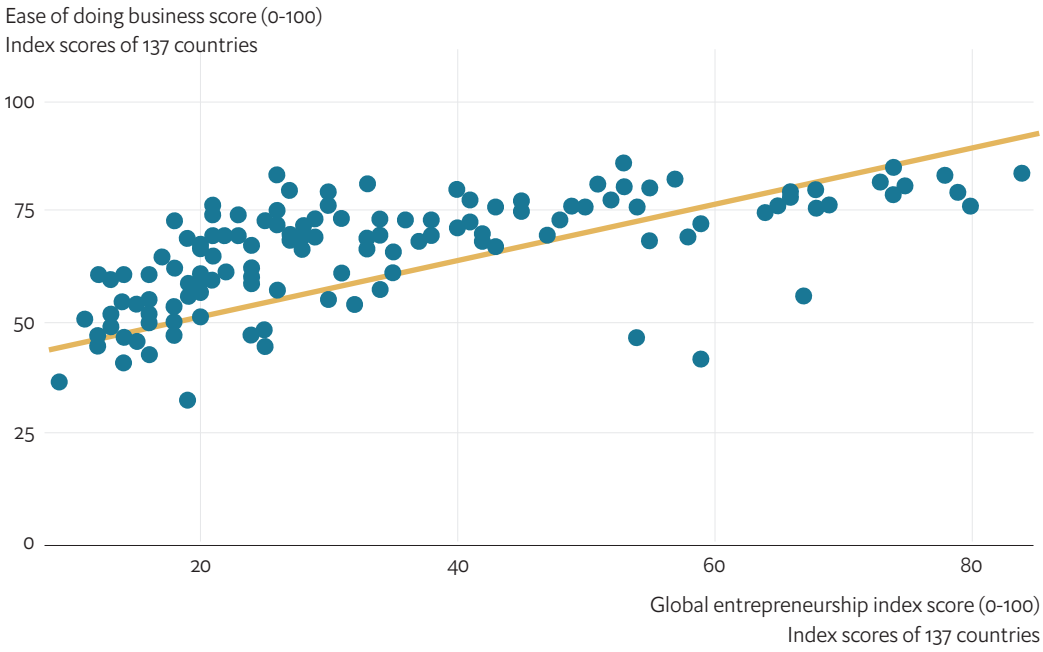
The absence of regional digital policy frameworks and regulations limits opportunities for technological innovations and start-ups from the private sector. The pandemic has heightened online scams, with a marked rise in unfair and fraudulent commercial online practices creating a need for data protection policies, cybersecurity regulations and online consumer protection legislation. The provisions for data governance mandated by different countries in the region should ideally be integrated into a broader framework that balances different data privacy protection priorities with a regional mandate.[185] The Global System for Mobile Association (GSMA) has called for a harmonised, sub-regional data protection for the MENA region, similar to the GDPR, which would bridge data protection gaps and enable increasing data flows while upholding data protection. Such a unified regional framework could foster greater regional economic integration, create a clearer compliance environment for online businesses and build trust among consumers, thus supporting the region's efforts towards economic resilience.[186] A first step in this direction could be the launch of the Digital Cooperation Organisation (DCO), a global organisation founded in November 2020 by Bahrain,

Jordan, Kuwait, Pakistan and Saudi Arabia. Aimed at strengthening regional cooperation to accelerate growth of the digital economy, one of the key strategic goals of the DCO is to align the development of legislation, policies and digital privacy standards.[187] According to Hazem Galal of PwC, "technology is a tool to process, analyse and use data creatively. In order to realise the full potential of these technologies, countries in the region need the right data policies and ecosystem to incentivise sharing."

2.5 Restrictions on doing business

Increasingly, technology startups are viewed as instrumental in building the digital potential of countries around the world.[188] In order to harness the potential of technology entrepreneurs and startups, the business environment, which includes factors such as the ease of starting and running a business and trading across borders, matters significantly. Indeed, countries with better business environments tend to also have higher levels of entrepreneurial activity (see Exhibit below).[189]

Ease of doing business drives level of entrepreneurship



Source: World Bank 2020, The Global Entrepreneurship and Development Institute 2018; EIU analysis.

According to the World Bank's 2020 Doing Business report[190], which compares business environments in 190 countries in the world, the MENA region falls behind globally. It scores an average of 60.2 for its business environment, well below the OECD average of 78.4 and the global average of 63.0.[191] According to the Dell Technologies Digital Transformation Index, unbalanced laws and regulations are often viewed as critical reasons why technology firms struggle with the MENA region's business environment.[192]

There are regional exceptions, however. The UAE, which in recent years instigated regulatory changes that were spurred by a critical need to diversify the economy away from oil, now scores in the world's top 20 countries for ease of doing business. Saudi Arabia, Jordan, Bahrain and Kuwait have also each made reforms (27 in total) to improve their business environments, earning them a place in the top 10 most improved economies for doing business. [193]

That said, persistent challenges exist that make it particularly difficult for technology startups to succeed. Aside from the costly, bureaucratic red tape involved in starting and operating a business in the region, many countries impose restrictions on foreign ownership, which limits the share of companies' equity capital that non-residents are allowed to hold.[194] This not only limits inward FDI into the region, but can also disincentivise tech startups from establishing themselves, as they're often unable to fully own their companies if they are not nationals.[195]

Another challenge is the tendency for telecommunication networks to be state-owned, often leading to governments instating

nationwide restrictions on Voice over Internet Protocols (VoIP) applications, rendering phone and video calling features of popular calling applications inaccessible. These conditions, as seen in countries such as the UAE, Qatar and Morocco, can increase operating costs for startups, making it more expensive and challenging for them to conduct long-distance voice calls and trade across borders.

MENA policymakers will need to remove business obstacles to technology entrepreneurship in the region to drive the much-needed innovation that is required to succeed in a post pandemic world.

3. Limited human capital in technology-related domains

A larger technology sector requires MENA citizens to be proficient in the use of technology. Successful cross-vertical integration via technology such as blockchain and AI requires specialised knowledge in both set-up and operation.There is a shortage of digitally-savvy human capital in the region, which is leading to MENA missing real-time opportunities for digital development. Investment in digital infrastructure, supported by investment in human capital development can lead to rapid, sustained growth.[196] MENA countries must foster home-grown talent through more comprehensive educational offerings to meet these requirements and enable sustainability in tech-based innovations.

3.1. Limited investment in the development of digital professional competencies

Bolstering human capital development in science and technology is among the most critical gaps that MENA must bridge on its way to a more resilient economy and a richer technology ecosystem. Studies highlight the three core competencies needed to build a digital society: the ability to use digital tools, technical skills in digital sector domains, and digital soft skills[197], According to Nancy Gleason, Director of the Hilary Ballon Centre for Excellence in Teaching and Learning at NYU, "The fourth industrial revolution is pushing a skill shift in the workplace that higher education has not entirely responded to yet".[198]

In MENA, current levels of human capital development in technology-related domains remain low, thus limiting the region's ability to scale businesses with technology and develop the high-tech sectors of the future. For example, over 64% of UAE businesses cited a lack of digital competencies as a key barrier for the success of their businesses in a recent EIU report, pointing to the need for educational reform efforts at the broadest level to ensure MENA students are prepared for the digital economy. A survey by LinkedIn on the distribution of fields of study among MENA's tertiary-educated workforce, highlights that only 13% of the workforce are educated in ICT, which is very low when compared with sectors like engineering, manufacturing and construction (30%).[199] In its 2017 Future of Work study, McKinsey found that across the region, only 1.7% of the workforce is 'digital talent'. In their 2017

skills survey of the region, Bayt/YouGov, a leading jobs website in MENA, revealed that IT jobs are among the top open positions, evidence of an acute talent and skills shortage in the region. In a 2020 PwC survey of CEOs in the Middle East, 70% said the availability of key digital skills is a business threat, while an earlier 2017 study found that only one of the 10 skills most commonly cited by digital professionals in the GCC matches the fastest-growing skills found globally on LinkedIn. Furthermore, none of the top 10 available skills in the GCC is a technical or specific digital skill.[200]

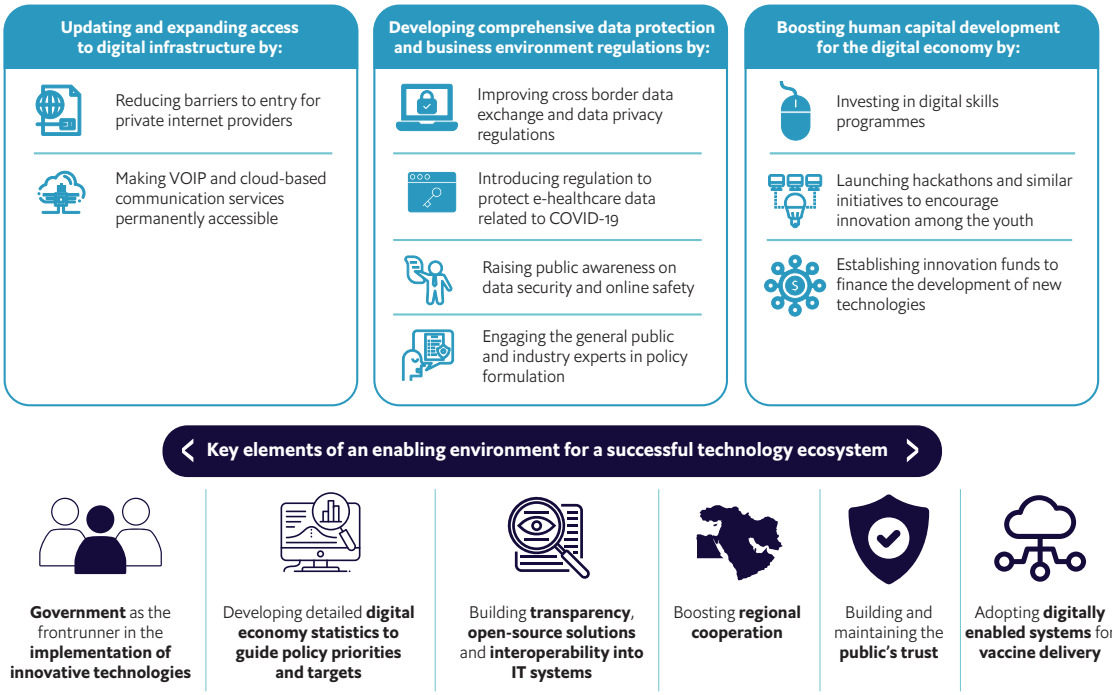
The dearth of digital skills in MENA is compounded by a brain drain of the region's top talent. For example, the successful integration of blockchain and AI technologies which is needed for the fourth industrial revolution, requires very specialised knowledge, but according to Dr Bernhard Trautner of the German Development Institute, many of the region's top talent in these areas have migrated elsewhere. This is due in part to shortcomings in regional educational systems[201] as well as persistent pay gaps in the public sector, and between genders.[202]

MENA policymakers will need to offer higher quality and more comprehensive educational offerings to build a pipeline of home-grown talent. The region has the potential to be a leader in technology-enabled industries. Many people in the region, in particular its youth, are high-level consumers of technology, and in GCC countries as well as some others, comparatively greater resources have made for great rates of consumption. A renewed focus by governments in the region on STEM education will aid in its transition from a centre of technology consumption to one of technological innovation.

Policy solutions to strengthen MENA's technology ecosystem and build long-term economic resilience

MENA's ability to effectively leverage existing and emerging technologies for economic recovery and growth will require policy responses to highly complex issues. The region will need to quickly put in place regulatory frameworks that encourage innovation and competition in rapidly changing environments while protecting public welfare. In light of the gaps across infrastructure, regulation and human capital development detailed above, this section highlights some measures that local policymakers could consider.

Building resilience: Policy solutions for expanding digital ecosystems and building economic resilience



Source: EIU analysis.

1. Update and expand access to digital infrastructure

Much like transport infrastructure is important for enabling trade, integrating local economies and connecting workers with jobs in commercial hubs, digital infrastructure forms the backbone of technological readiness and the digital economy. With up-to-date digital infrastructure, businesses and social institutions in MENA can continue to meet consumer and community needs by providing goods and services remotely. Modern digital infrastructure will also facilitate the scaling of new innovations that could be used to address many of the economic challenges that the COVID-19 pandemic has exposed. Governments in the MENA region

will also need modern digital infrastructure to support their increasing drive towards e-governance and the provision of targeted social security and economic support to businesses, civic institutions and households. Internet access and telecommunications infrastructure needs to be in place to optimise the use of EdTech to equalise learning opportunities.

However, developing up to date and fit for purpose digital infrastructure is expensive and highly technical. Therefore, enhancing digital infrastructure in MENA requires a scale that is best achieved through public and private partnerships.

1.1. Reduce barriers to entry for private internet providers

World Bank Digital Economy Specialist Suhail Shersad observes that the current COVID-19 crisis has accelerated "an existing trend towards digitalised interaction". The sudden shift to digital and remote work due to COVID-related lockdowns and movement restrictions has introduced a 'new normal' for how businesses and governments operate around the world. However, adapting to this new normal, will be difficult for MENA countries as long as large swathes of their population do not have easy access to the internet, the backbone of technological readiness and the digital economy.

As discussed above, currently, approximately 6.6 million MENA residents do not have reliable or sufficient access to the internet. A key reason, cited by interviewed experts, for the relatively low levels of internet penetration in several MENA countries was a lack of competition in the telecom sector. In several MENA countries, major telecom providers are state-owned entities, including in countries like Algeria, Egypt, Kuwait, KSA, Oman, and the UAE.

Although countries like Algeria and Egypt have opened their telecoms sectors to private sector players in recent years, MENA governments need to create a level playing field in the telecoms sectors that will encourage private sector players to invest in high-speed internet infrastructure and offer competitive prices for mobile data. Open access to international submarine fibre-optic systems, i.e., access on transparent terms and cost-based pricing, for example, will promote private sector participation.[203] Improved and expanded telecom infrastructure, particularly outside urban centres, will, in turn, increase the penetration of app-based technologies in MENA, thus providing business with access to new markets and households with easier access to needed goods and services. India's experience with expanding internet access offers an instructive example of how the private sector can develop a country's telecom sector. In the 1990s, India began the process of privatising its telecom sector by issuing two major policy instruments, the National Telecom Policy of 1994 and the New Telecom Policy of 1999. These policy instruments opened up all segments of the telecom sector to private players to make services more affordable and accessible for all segments of society. From 2001 to 2011, the total number of telephone subscribers expanded at a compound annual growth rate (CAGR) of 35%. Comparable rates in the 1980s and 1990s were 9% and 22%, respectively.[204] Since the start of its privatisation programme, India has expanded telecom infrastructure

by over 90%[205] and increased private sector participation in the telecom sector.[206] With a tele-density of 84%, the Indian telecom industry is considered the second largest telecom market in the world. According to a recent report on worldwide mobile data pricing, India has the cheapest mobile data plans, with costs as low as US$0.26 per GB on average.[207]

1.2. Make VOIP and cloud-based communication services permanently accessible

The COVID-19 pandemic has highlighted the importance of cloud-based communication services and VoIP for the continuation of global business. However, in much of the GCC, cloud-based solutions and VoIP have been blocked or banned for years. As countries went into lockdown in early 2020, several GCC countries moved quickly to temporarily lift VoIP restrictions, such as Oman and the UAE. This was helpful in minimising interruptions to business operations and allowed several services to be shifted online. However temporarily lifting restrictions is insufficient for long-term economic resilience.

Permanently unblocking cloud-based communications solutions will facilitate global business and encourage the growth of internet-based businesses. Realising VoIP's advantage in enabling global businesses to function smoothly, some GCC countries have lifted bans permanently. Saudi Arabia lifted its ban on WhatsApp calls in 2017, while Qatar now allows the use of VoIP services through licensed telecoms operators.

Easy access to cloud-based communications will also enable an easy transition to enable people to work from home. Workplaces across the globe are adapting to the new reality, where social distancing measures are likely to remain in place. According to a recent survey of business leaders in the UAE, a permanent change around ways of working is evident with 83% of companies now having a set remote work policy in place.[208] To navigate this new normal, organisations are incorporating technology-based solutions to stay connected and engaged. Access to reliable internet (highlighted in the previous point) and globally adopted communication platforms will play a key role in enabling this transition in a post-COVID world.

Not only are temporary lifts on bans insufficient for long-term growth, EIU experts believe that this kind of uncertainty in terms of availability status of a particular technology can be a strong deterrent to investment in a country's technology ecosystem. VoIP services are generally free or relatively cheap, making them an affordable communication tool for business, especially for entrepreneurs and start-ups with limited investment potential. These technologies are also important for residents to stay connected. No or limited access to VoIP makes it expensive and difficult for businesses and individuals to conduct long-distance voice calls.[209] Given new ways of working and doing business, MENA policymakers will need to consider moving towards permanently unblocking these cloud-based solutions to facilitate public health measures and global business.[210]

2. Develop comprehensive data protection and business environment regulations

In an increasingly digital global economy, encouraging the free flow of data between firms and across borders can help drive trade and support economies of scale in key industries in MENA. However, manipulated and leaked personal data, as well as anti-competitive use of data at business-level, can undermine efforts by MENA governments to develop a resilient technology-enabled economy.

Designing, implementing and enforcing data protection regulations will enable MENA economies to increase data flows while upholding data protection. This will create a clearer compliance environment for businesses and build the needed trust among consumers, which will, in turn, promote the wide adoption of technology in MENA economies.

2.1. Improve cross-border data exchange and data privacy regulations

As global growth relies increasingly on digital growth in the post COVID-19 era, the ability to move, store and process data across borders is foundational to the modern international data economy. While certain regulatory differences across countries cannot be eradicated, regional cooperation to encourage cross-border data flows will make it convenient for individuals and businesses to use data-intensive technologies like AI, IoT and blockchain. To realise the potential of such data-intensive technologies, data needs to be able to move seamlessly across country borders.[211] At the same time, as the digital economy expands, so too do the threats to personal data and economic competitiveness. These threats include the unrestricted growth of digital monopolies, loss of personal privacy, identity theft, and disinformation and fake news, among others. As data becomes an increasingly valued strategic and commercial asset, it is critical that MENA countries effectively safeguard data to protect the public good and allow data to be processed/controlled in a way that ensures fair competition in the digital economy. Widespread trust in digital tools and platforms is an important foundation for building a technology-enabled economy that is well prepared to weather future crises.

Setting up a regional authority in MENA countries that will be responsible for designing, implementing and enforcing an interoperable policy framework that can streamline data protection, exchange and classification requirements across borders and create mechanisms to reduce regulatory overload would be a good first step in this direction. States of the Asia-Pacific Economic Cooperation (APEC), for example, agreed on a privacy framework in 2004 and cross-border privacy rules (CBPR) in 2011. As of February 2020, eight jurisdictions have implemented these rules (Australia, Canada, Japan, Mexico, South Korea, Singapore, Taiwan and the United States).[212] This regional agreement should be supported by a national authority for data protection to cooperate with each other. The data protection regulator should also be responsible for facilitating a national dialogue to establish the principles for data security and define a national cybersecurity strategy. A good example of this is the Cybersecurity and Infrastructure Security Agency (CISA) in the United States. CISA works with the federal government and

stakeholders across the country to provide cybersecurity tools, incident response services and assessment capabilities to safeguard government networks.[213] CISA works towards building a collective defense against the full range of threats, including national cyber, communications and physical incidents.[214] However, a recent cyberattack on US agencies, private companies and other entities that went undetected for months implies that even the most advanced authorities are vulnerable to cyber attacks.

2.2. Introduce regulation to protect e-healthcare data related to COVID-19

With a number of healthcare services moving online and contact tracing apps collecting data on people's health status, healthcare cybersecurity regulations as well as the protection of healthcare data is required to ensure individuals' data privacy. A lack of data security policies in the healthcare sector could potentially lead to harmful data manipulations and leaks, which could potentially set back the ongoing development and deployment of technology in MENA's healthcare sector. The misuse of health-related data is of particular concern in light of COVID-19, because of issues with contact tracing noted in Section II of this report, as well as the possible misuses of residents' history of exposure or presumed immunity in making decisions related to work or access to public space and resources.

Aside from the UAE and Saudi Arabia, other MENA and GCC states do not have separate healthcare cybersecurity regulations or policies to protect healthcare data.[215] In the UAE, Federal Law on Information and Communication Technology in the Health Field of 2019 (Federal Law No. 2 of 2019) regulates the processing of electronic health data originating in the UAE, including patient names, consultation, diagnosis and treatment data, alpha-numerical patient identifiers, common procedural technology codes, medical scan images and lab results. The Health Data Law applies to all entities operating in the UAE and the free zones that provide healthcare, health insurance, healthcare IT and other directly and indirectly related services.[216] In Saudi Arabia, Shariah law protects healthcare data. As per the healthcare practice code, a health practitioner is responsible for safeguarding patient data.[217]

In the short-term, MENA governments can enhance the protection of individual healthcare data by requiring healthcare providers to introduce citizen consent forms in COVID-19 tracing apps. These consent forms will ensure that personal data is only uploaded on healthcare provider platforms when users decide to make them available, rather than making it a mandatory component of using tracing apps. For example, while the UAE's contact tracing app has a centralised model, it only uploads data from devices when users voluntarily decide to report themselves as symptomatic. On the other hand, healthcare tracing apps like Qatar's EHTERAZ and Bahrain's BeAware upload personal data in real time, overriding individuals' ability to consent or manage their own data when using these apps.[218] Contact tracing apps in Bahrain and Kuwait have been highlighted by Amnesty International as the most invasive in the world, as the systems capture location data through GPS

and upload this information to a centralised database, tracking movements in real-time. Because the apps ask users to register with a national ID number, authorities can easily link these movements and personal information to individuals.[219] As governments take greater steps to collect and store data in the wake of the COVID-19 pandemic, greater care needs to be taken to ensure this data is not at risk.

2.3. Raise public awareness on data security and online safety

The MENA region has experienced many cases of cyberattacks, with several governments and large organisations sustaining damage from cyberattacks in the past decade.[220] For example, one such attack in January 2020, was carried out using malicious Excel documents containing politically charged content. The campaign was aimed at extracting information from the government, the transport industry and educational institutions in the Middle East.[221]

Most cybersecurity efforts in the MENA region have been reactive, focusing on recovery rather than prevention.[222] While the UAE has launched fraud awareness campaigns to equip consumers with the knowledge to protect themselves against cyber fraud, the region needs to include proactive cyber capabilities that can help to prevent attacks, such as information sharing and continuous monitoring for elevated situational awareness.[223] Cybersecurity efforts must also involve the private sector and citizens, and enlist their assistance in addressing the protection of critical digital assets and infrastructure.[224,225] The UK government's Get Safe Online campaign, for example, has helped to educate the general public and small businesses on how to prevent cyberattacks. Get Safe Online is sponsored by a number of government and private sector entities, including the National Police Chiefs' Council, Ofcom, Europol, Tesco and HSBC. The programme works with a range of community groups to educate the public on how to prevent data theft, identity fraud and disinformation when using a range of digital platforms, including online shopping, social networking sites and mobile banking, by combining marketing and promotional activities with a comprehensive website (www.getsafeonline.org) to give up-to-date advice, tools and guidance on good cyber practice.[226] The platform launched a "Get Safe Online Scammer Nanas campaign", aimed at training people aged 66-76 to become more internet-savvy, as older people are generally targeted more by cybercriminals. The campaign was featured on the BBC.[227]

Since students are spending considerable time online as a result of the pandemic, it is important to raise awareness among teachers, students and parents about potential online threats and prevention mechanisms. One such program has been launched by a private internet service provider which aims at equipping students to use the internet with caution.[228]

2.4. Engage the general public and industry experts in policy formulation

Although it is not unique to the process for formulating policy on data protection or technology, the imperative for obtaining public perspectives on key policy issues is especially important in the context of building

a technology ecosystem. This is because trust is critical in using technology, whether it is to do business or to protect communities from a new infectious disease. Pandemic-related uses of technology, for example, can be best deployed when they are universally understood by the public, thus decreasing the likelihood that non-compliance by a small group that distrusts the policy will result in the otherwise preventable spread of an illness. Integrating public feedback into policy design will serve the dual purpose of winning the public's trust, by making them partners in implementing the policy, and generating awareness of important policy areas. Likewise, consultation with industry experts in the policy draft stage will ensure integration of global best practices in policy design. This will also ensure that the policymakers consider industry and user requirements and design policies that are more relevant and user-centric. Consultations with key stakeholders in the policy-making process are pivotal for collecting information, managing expectations, assessing costs and benefits, and identifying the most efficient regulatory policy options. Despite their importance, consultation procedures on draft legislation remain informal in the MENA region.[229]

In the United States, for example, the Administrative Procedure Act (APA) requires all US government agencies to provide a public notice and seek comment prior to issuing new regulations or revising existing ones.[230] The APA provides a common default framework for all agencies, which guides almost every sector/agency in at least some contexts.[231] A recent example of integrating expert consultation in technology policy design is from India. The Office of the Principal Scientific Adviser to the Government of India and the Department of Science and Technology (DST) have jointly initiated an inclusive process for the formulation of the new science, technology and innovation policy. This involves an extensive public and expert consultation process through Science Policy Forum, a dedicated platform for soliciting inputs from the larger public and a pool of experts during and after the policy drafting process, and expert-driven thematic consultations to feed evidence-informed recommendations into the policy drafting process.[232]

3. Boost human capital development for the digital economy

An important precondition for building a productive, technology-enabled economy is the availability of talent. MENA economies can successfully integrate technology into key business and social sectors only if they have sufficient human capital to drive digitalisation across all sectors of the economy.

Creating and investing in education systems that are attuned to the realities of the digital age should be a priority for MENA countries. Education policies in the region need to improve the quality of overall instruction as well as expand instruction in the hard and soft skills required for participation in a high-tech economy. Beyond formal education, governments in MENA can support individual adoption of digital skills through a variety of upskilling and innovation programmes.

3.1. Invest in digital skills programmes

MENA countries currently have low levels of human capital in tech-related disciplines. Fostering home-grown talent through more comprehensive educational offerings will help MENA countries become more competitive and will aid in their transition from a centre of technology consumption to one of technological innovation. Governments can work with academic institutions to develop certification courses and degree programmes in digital skills. For example, Bahrain's Institute of Banking and Finance launched the Blockchain Academy in 2019, which offers training in blockchain development, implementation and strategy. The establishment of the Blockchain Academy represents the country's first blockchain professional qualification offering and is designed to prepare participants to earn the international qualification of Certified Blockchain Professional.

"Siloed systems are in part to blame for some of the slow responses of some MENA governments in making e-services available."

Dr Ubaldi, Head of the Digital Government and Data Unit in the Directorate for Public Governance for the OECD

In addition to improving the quality and expanding the provision of formal education in tech-related subjects, MENA governments can boost human capital in technology by partnering with private sector organisations to upskill workers with digital skills and boost employability by offering industry recognised certifications.

This was the approach taken by Luxembourg. In Luxembourg, the National Employment Agency ran a Digital Skills Bridge project in 2018-19 that worked with companies across sectors to train staff in digital skills. The program's objective was to ensure the availability of talent for emerging tech-based industries. The project targeted employees whose positions or companies were likely to be negatively impacted by the expansion of technology and digital industries. It aimed to coach and upskill these employees to prepare them for digital disruption and provide them with new opportunities in the emerging digital workforce. The Digital Skills Bridge project was successful in achieving internal mobility for 65% of project participants, placing them in new positions.[233] The UK has also invested in education in emerging technologies and related fields. The Research Institute in Science of Cyber Security is the UK's first academic institution to focus on understanding the overall security of organisations, including their constituent technology, people and processes.The Institute is one of three Institutes formed as part of the UK National Cyber Security Strategy. The other two Institutes are the Research Institute in Automated Program Analysis and Verification and the Research Institute in Trustworthy Industrial Control Systems.[234]

To support integration of technology in sectors like education, governments need to collaborate with the private sector to facilitate the upskilling of key stakeholders in the education system, including educators, students, parents and solutions providers, in new learning modalities. The rapid deployment of EdTech solutions and the potential of blended learning formats make it urgent for teachers to continuously upskill and reskill. Digital technology can enrich the learning experience for children; however, it is important to provide them with the necessary training. Parents also need guidance on how to make remote and blended learning successful and secure, including choosing the right providers and understanding the

resources available.[235] According to HE Abdulaziz Alrasheed, "we have e-learning platforms, but we need to improve the way we conduct education online and the way teachers and students deal with e-learning platforms through proper training and capacity building. We need to enhance how we utilise technology efficiently for the best outcomes."

3.2. Launch hackathons and similar initiatives to encourage innovation among the youth

Investment in innovation initiatives, such as hackathons, can help facilitate the region's transition from being primarily a consumer of technology to being a technology innovator. Countries in the region can build on these initiatives by bringing together relevant players in the entrepreneurial ecosystem, start-up founders, policymakers, developers, students and investors, to enable dialogues on improving the business environment to innovate.

Within the region, the UAE's Arab Youth Centre launched an Arab Youth Hackathon with the aim of enhancing the contribution of Arab youth in finding solutions to the most pressing issues affecting the globe during the COVID-19 crisis.

3.3. Establish innovation funds to finance the development of new technologies

The capital-intensive nature of technology requires that MENA governments create financial vehicles to support the development of new technology. Not only is such investment a prerequisite for catalysing the growth of technology in various sectors, it is also a sign to investors that the region is serious about developing its technology industries. Governments in the region can set up innovation funds that support the commercialisation of high-technology research and development, help SMEs scale new innovations, or help existing businesses expand the adoption of locally grown technologies.

Using a dedicated innovation fund to build local digital capacity has been a core component of the UK's industrial strategy since 2007. To realise its goal of becoming one of the most technologically innovative countries globally, the UK government created Innovate UK, an innovation agency that operates outside the purview of any government department. Since 2007, Innovate UK has invested around US$3.23 (£2.5 billion) in businesses to minimise financial risk for early-stage companies and accelerate research and development in new areas of innovation. To date, Innovate UK has also helped 8500 organisations create 70,000 jobs, which has contributed an estimated US$23.22 (£18 billion) of value to the UK economy.[236]

4. Key considerations for enhancing the digital ecosystem in MENA

With the right infrastructure and privacy and human capital development policies in place, MENA countries can leapfrog from low-value added and oil-based economies to high-technology economies. This economic transition, however, requires an enabling environment for large, small and medium enterprises, as well as start-ups, regional cooperation and effective

"There is a relatively high level of trust in the UAE government among its citizens, which allowed the government to become the trusted broker in some essential COVID-related health interventions, such as contact tracing."

Hazem Galal, PwC

management of the ongoing pandemic by leveraging technology.

4.1. Digitalise transactional government services

Government adoption and usage of digital technologies to offer citizens essential services like tax filing, licensing and passport renewal, is crucial for the expansion of the digital ecosystem. The digitalisation of government services is a necessary step for creating resilient economic systems as well as a clear signal of a country's openness to new technologies. Some governments in the region have already begun to address this issue. The Egyptian Minister of Communications and Information Technology has announced that all government services will soon be digitised. Jordan has rolled out e-tax and e-payments systems.[237] The UAE has begun offering digital government services, such as epay[238] and ejob[239], online to improve service delivery and enhance its institutional capacities.[240]

4.2. Develop detailed digital economy statistics to guide policy priorities and targets

Governments in the region should focus on collecting detailed data on the digital sector's value added between its major components (telecom services, ICT manufacturing, IT services and software) and jobs by qualification level (inside as well as outside the ICT sector). Some of the ways to collect these statistics are by generalising business surveys to gauge the level of ICT adoption, monitoring foreign direct investment flows, using national statistical offices to measure internet use by individuals and by sex, improve the collection and analysis of big data and open data. This will help in improving the process of digital policy development and decision-making.[241]

4.3. Build transparency, open-source solutions and interoperability into IT systems

Adopting cutting-edge technologies throughout an economy is risky, and MENA should ensure that it has built a solid foundation of awareness, education, and in-region expertise to protect the public good while increasing economic growth. Therefore, transparency, open-source solutions and interoperability should be key aspects of IT systems to ensure that no loss of preparedness is suffered in the near term. Similarly, integrated and interoperable systems should be a facet of cross-sectoral systems and systems shared by governments and the private sector wherever possible. Dr Ubaldi, Head of the Digital Government and Data Unit in the Directorate for Public Governance for the OECD noted that siloed systems were in part to blame for some of the slow responses of some MENA governments in making e-services available.

4.4. Boost regional cooperation

To ensure effective implementation of policies around human capital development, data transfer and building digital infrastructure, governments in the region need to work together. Regional cooperation will encourage adoption of cross-border data flow policies and ensure that economies do not get left behind in the age of economic recovery driven by digital enablements. The launch of DCO to strengthen collaboration among a set of nations to drive consensus on digital cooperation and to help governments

work together collectively with businesses and entrepreneurs[242] seems to be a good start, but it will need to expand its coverage to include other countries in the region.

4.5. Build and maintain the public's trust

The experts interviewed echoed the need to build and maintain public trust in order to make sure that the digital ecosystem is being efficiently used by the public. According to Dr Ubaldi, countries like Morocco and the UAE found themselves ready to use technology to communicate with citizens as well as keep the public sector operational during the pandemic. Governments in these countries were extremely ready to use technology for transparent sharing of information on the pandemic situation and to support pandemic response by keeping their citizens aware. According to Hazem Galal of PwC, there is a relatively high level of trust in the UAE government among its citizens, which allowed the government to become the trusted broker in some essential COVID-related health interventions, such as contact tracing. Nevertheless, trust in government is a major issue, and governments need to address this by maintaining proper lines of communication with their citizens. Governments need to ensure equal access to digital platforms and new technologies for their citizens (including migrant workers) and businesses to support sustainable long-term growth.

4.6. Adopt digitally enabled systems for vaccine delivery

As the world awaits the promise of an end to the global pandemic, governments in the region need to embrace digital solutions to achieve the goal of an efficient, equitable and safe delivery of the COVID-19 vaccine. For example, use of digital tools for conducting sentiment analysis to gather insight on general feelings about receiving a vaccination before initiating a vaccine distribution programme;[243] vaccine management solutions for registration of patients and providers, phased scheduling for vaccinations, streamlined reporting, and management dashboarding with analytics and forecasting; use of technologies like API (Application Programming Interface) to enable interoperability and integration with existing systems of record and AI to generate accurate and geo-specific predictive analytics. According to experts, effective vaccination management and delivery will require governments to make the best use of newly introduced technologies and integrate these with existing systems of record for quality and cost efficiency in vaccine delivery.[244]

Case Study 5

Estonia's innovative approach to ensuring transparency in health data

Estonia has been a pioneer in ensuring transparency and trust among citizens in the collection and use of their data. Its approach to citizen ownership of health data could be a template for countries grappling with data privacy issues thrown up by the extensive health data collection required during the pandemic.

Context

As a small country with limited economic opportunities, Estonia sought to build a competitive advantage in the digital sphere, leading the world in forward-looking digital regulation and governance.[245] For years, the country's approach to digitalisation and data has been seen as a model to learn from.[246] In healthcare, it was one of the earliest countries to digitise its health records.[247] While e-health records are now fairly commonplace in Europe and other advanced economies, their coverage and consistency is irregular. Even countries like Germany have not completely digitised their health records. In Estonia, health data is comprehensive and interoperable, but most impressive is the way privacy concerns prompted by this comprehensive system have been addressed.[247] Estonia's novel approach preserves data privacy while enhancing the efficacy of its data usage.

Innovative approach

Estonia's philosophy for data governance is completely unique. A citizen "owns" all the data that is recorded about them. In practice, this means an unprecedented level of transparency. Citizens can see when anyone has accessed their data, shared it with any other entity (public or private) or used their data. This creates a powerful disincentive for any misuse or abuse of the data, by the government or any private company, because this is visible to citizens/customers. Additionally, unauthorised access is punishable by law.[249]

Pandemic relevance

During the pandemic, governments needed to collect increasing amounts of data on citizens to track and respond to the disease. Healthcare systems also needed to access and collect health data for risk assessment and effective treatment. Access to physical health records was interrupted and this forced hospitals and governments to take health records online. This reopened questions and concerns surrounding data privacy and security. Estonia's model, which enables collection, use, and sharing of data while preserving trust and transparency may help countries manage these multiple priorities.

SECTION IV: CONCLUSION

"The COVID-19 pandemic has transported us deep into the future."

Suhail Shersad, World Bank

As the World Bank's Suhail Shersad notes, "the [COVID-19 pandemic] has transported us deep into the future." The shape of this future for MENA countries will depend on the choices the region's governments make today. To meet the health and economic challenges posed by the COVID-19 pandemic, MENA governments will need to strengthen their social service delivery systems and reimagine their economic structures. Technology can help MENA spur growth and minimise risk. By addressing difficult infrastructure and policy gaps that stand in the way of full technological integration in MENA economies, the region's countries can build economic resilience, positioning themselves to withstand future crises.

Looking ahead, developing strong technology ecosystems will also help the region prepare for full participation in the emerging fourth industrial revolution. Countries in MENA that are unable to develop strong technology ecosystems will be unprepared to take advantage of the fourth industrial revolution and risk being left behind, with low productivity industries and low-wage employment. Lagging economic growth is a particular concern for MENA, a region where many countries are actively seeking to prevent deindustrialisation by diversifying into high-value added industries and away from reliance on many low-value industries or a single commodity. Therefore, creating an environment where businesses and organisations of all types can easily employ new technologies, like AI, advanced data analytics, blockchain and cloud computing, will put MENA in a position to be a leader in the global economy of the future. MENA policymakers can best prepare for this future by leveraging existing and emerging technologies to meet the challenges of the ongoing COVID-19 crisis, with a focus on putting in place systems to rebuild livelihoods and drive new socio-economic models.

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